Changing Family Size in England and Wales: Place, Class and Demography, 1891–1911

EILIDH GARRETT

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Changing Family Size in England and Wales

This volume is an important study in demographic history. It draws on the individual returns from the 1891, 1901 and 1911 censuses of England and Wales, to which Garrett, Reid, Schürer and Szreter were permitted access ahead of scheduled release dates. Using the responses of the inhabitants of 13 communities to the special questions included in the 1911 'fertility' census, they consider the interactions between the social, economic and physical environments in which people lived and their family building experience and behaviour. Techniques and approaches based in demography, history and geography enable the authors to re-examine the declines in infant mortality and marital fertility which occurred at the turn of the twentieth century. Comparisons are drawn within and between white collar, agricultural and industrial communities and the analyses, conducted at both local and national level, lead to conclusions which challenge both contemporary and current orthodoxies.

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For our children:

Ruairidh
Rachel, Agnes and Madeleine
Anastasia Sophia
Sam, Ben and Zack

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Preface and acknowledgements

This book would not have been written had it not been for a meeting, in the mid-1980s, between Peter Laslett and Roger Thatcher, the then Registrar-General. Neither fertility nor the survival chances of young children was the original focus of their discussions, but their vision of comparative historical research across space and time made the present study possible.

The four authors came together from a diversity of academic disciplines; history, geography and demography, and this has encouraged us to take an interdisciplinary approach to our subject. Realisation that we were not always 'talking the same language' led us, within the constraints of the space available, to lay out the methods, techniques and assumptions used in an effort to make our work more transparent for readers drawn from across a spectrum of disciplines. Our book has been laid out in the expectation that readers may wish to go straight to chapters which interest them, but with the hope that they might feel drawn to follow cross-references to investigate more fully the interconnections between fertility and mortality, geography and history, sources and methods.

Our work, we gratefully acknowledge, has been supported throughout by funding from the Economic and Social Research Council (ESRC), and has formed part of the research programme of the Cambridge Group for the History of Population and Social Structure.

We also owe a large debt of gratitude to the staff of the Office of Population Censuses and Surveys (OPCS), now of course the Office for National Statistics (ONS), at Titchfield who provided a great deal of help and assistance. We must also acknowledge our debt to the ESRC for a special grant to meet the costs of the data inputting undertaken by OPCS at Titchfield.

Friends and colleagues, students and visitors to the Cambridge

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Humphrey Southall and Ian Gregory, both then members of the Geography Department, Queen Mary and Westfield College, University of London, but currently in the Geography Department at the University of Portsmouth, taught one of the authors and Ros Davies of the Cambridge Group the intricacies of using ArcInfo and the Great Britain Historical Database. It was Ros who then prepared all the maps used in the volume, the other pupil proving decidedly inept! We wish to thank Ros for creating versions of the maps of which we are very proud. We also owe her many thanks for extracting us from numerous entanglements with software which allowed us to accomplish our computing goals when we had all but admitted defeat. Jim Oeppen, too, has provided a great deal of support and encouragement on matters statistical and demographic, all of which has been very much appreciated.

Particular thanks go to the two directors of the Cambridge Group who have presided over this project: Roger Schofield and Richard Smith. We owe them a great deal for their patience and encouragement, particularly in the face of several 'secondments' to allow for the practical experience of demography. We trust the finished volume justifies their faith in us.

Having been the original catalyst for this study Peter Laslett has maintained an interest in our work over the intervening years. We wish to acknowledge our debt to him as a mentor and friend. These two words also describe Richard Wall who, although his name does not appear in the list of authors, contributed an immense amount to the 'OPCS study', and has continued to offer support and encouragement through the various stages of the gestation of this book.

We have presented papers at a variety of conferences and members of the audiences have given us many helpful suggestions and set us off in new directions with their questions and challenges. In a similar vein, parts of the material presented here have appeared in earlier versions as journal articles in *Continuity and Change*, *Economic History Review*, *Histoire Sociale/Social History*, *Historical Research*, *International Journal of Population Geography*, *Local Population Studies* and *Population and Development Review*, and in books by Corsini and Viazzo (1997) and Rowland and Moll Blanes (1997). We would like to acknowledge the role of the referees and editors of these publications in furthering our arguments and bringing our thoughts into clearer focus. Michael Anderson has given us a great deal of his valuable time and copious comments on an earlier draft of our manuscript, and his enthusiasm has been an inspiration. Bob Woods, too, has been a source of encouragement and a motivational force. To both we extend our grateful thanks.

We also thank the estate of the late John Galsworthy for permission to quote a passage from *In Chancery*, one of the volumes comprising his *Forsyte Saga*.

Finally, we have dedicated this book to our children. Their arrivals took us away from the realms of theory and immersed us in the practical world of family building, bringing home the choices and constraints, trials and tribulations faced by our own parents and generations of parents before them. It is however to our respective wives, husbands and partners that we owe our greatest debt of gratitude. They have helped us balance our lives between the private and public spheres, given unstintingly of their time, support and affection, and accompanied us through those life-cycle stages which still, at the beginning of the twenty-first century, remain a great adventure: household and family formation.

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1

Introduction

1.1 The fast-changing demography of England and Wales, c. *1880–1920*

Profound social and demographic changes were underway within British society as the nineteenth century waned. The four decades straddling Queen Victoria's epoch-closing demise in 1901 were witness to the dawning of a new era in the nation's family life. Marriage patterns, birth rates, infant and child mortality, family sizes, sexual behaviour and sexual attitudes, the position of the elderly, and the typical compositions of households in terms of children, servants and boarders, were all changing relatively rapidly between the late-1870s and the 1920s, when compared with the preceding and succeeding half-centuries.

This is reflected in strong movements of the basic demographic indices. Whereas the crude death rate of England and Wales had remained fairly constant, somewhat above 20 deaths per thousand persons, since civil vital registration began in 1837, from 1881 it fell continually to a figure of 14 per thousand by 1910–12 and 12 per thousand by 1920–2, after which the rate of decline slowed markedly.[1] Similarly, the crude birth rate, having fluctuated quite substantially, between rates of 32 and 37 per thousand persons since 1837, fell unambiguously from the late 1870s, to a figure of just under 25 per thousand by 1911, subsequently settling at a level of just over 15 per thousand throughout the 1930s.[2] Figure 1.1.1 shows these general trends within a wider chronological context.

Of course, different regions and localities varied enormously, as this volume will strive to emphasise, but the scale of the general trends also needs to be appreciated. For instance, among those married women born between 1851 and 1855, over one-third experienced at least seven live births and as many as 15 per cent had ten or more confinements

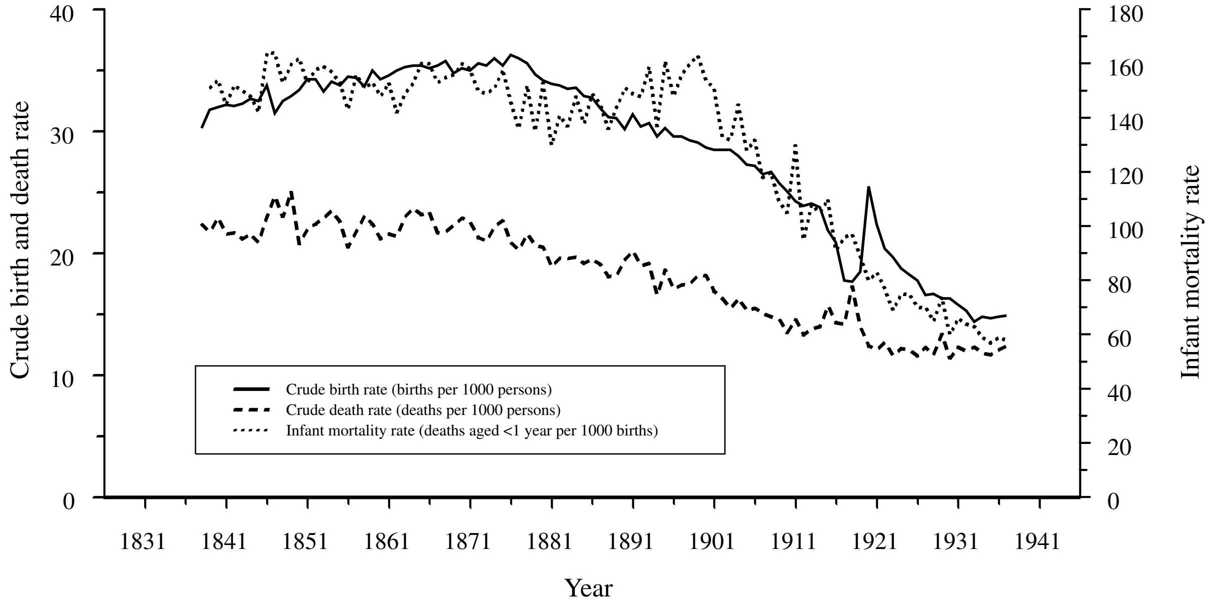


Fig. 1.1.1 Fertility and mortality trends in England and Wales, 1838–1937; crude birth rate, crude death rate and infant mortality. *Source:* Mitchell (1988), Tables 10A, 10B and 13.

during the course of their lives. But of those women born half a century later, between 1901 and 1905, less than 5 per cent of those who married had seven or more children and only 1 per cent had ten or more. Sixteen per cent of the earlier cohort and 21 per cent of the later cohort were childless. Whereas 15 per cent of the former had only one or two children, almost 50 per cent of the latter cohort had families of this small size.

The kinship simulation calculations of Zhao, based on data from the 1911 and 1961 censuses of England and Wales, have demonstrated how these demographic changes had important implications for the typical pattern of family life and individuals' personal experiences. Grandparenthood or, reciprocally, the experience of knowing one's grandparents, is a good example of this. Only 34 per cent of the women born in the 1850s still had both parents alive in the 1880s when they themselves were in their thirties and bringing up young families; but over 60 per cent were in this position among those born in the 1900s and bringing up their families in the 1930s.[3] Contrary to popular assumptions that grandparents are now less involved with their children's families than in the past, the simulations show that full and active grandparenthood has only become a general demographic possibility relatively recently. The capacity of parents with young children to call on their own parents for assistance during the child rearing years and the possibility of children learning from and coming to know their own grandparents was a rarity in the mid-nineteenth century; it only became a common possibility in the twentieth century. Change also engulfed the experience of the grandparental generation. Of those women from the 1850s birth cohort who survived to be 75, over half would have more than five living grandchildren. Among the women from the 1900 birth cohort surviving to the same age, fewer than 14 per cent had such a large number of grandchildren. More than half of this generation had no grandchildren to help celebrate their seventy-fifth birthday; indeed, 43 per cent had no children with whom to celebrate. Among the cohort from the 1850s the equivalent figures were, respectively, about 35 per cent and 31 per cent.

The dramatic fertility and mortality changes occurring during the three to four decades preceding the Great War were thus exerting a range of powerful short-, medium- and long-term effects on family life, individual experience and society. In combination, the changes created an inter-war Brave New World of 'demographic certainty', a society where individuals found themselves relatively emancipated from the natural caprices of birth and death, probably for the first time in human history.[4] The present volume is a further contribution towards the academic enterprise of attempting to understand and explain how and why these fundamental demographic shifts occurred. The ensuing study focuses in particular on fertility change and that dimension of mortality change which has been most closely related to fertility: deaths among infants and children.

1.2 Demography, national anxiety and the 1911 census

For the present study, among many others, the most important materials for studying these historical demographic phenomena in England and Wales remain the official products of the General Register Office (GRO), the department of state responsible for administering the nation's vital registration system and its decennial population census. By the Edwardian era the nation's decennial census had been in regular operation for just over a century, having been in the capable hands of the GRO from the beginning of Victoria's reign.[5]

The GRO quite justifiably long enjoyed a reputation for demographic and epidemiological expertise of a high order. It always did much more than just manage the mammoth intelligence exercise of the collection of registration and census data, as stipulated in the relevant Acts of Parliament governing its duties. The GRO very quickly established itself as the principal analyst and interpreter of the nation's changing demographic and epidemiological patterns.[6] Until the inter-war period it was staffed by an unbroken succession of extraordinarily able, medically trained statisticians, each with a profound interest in the promotion of the environmentalist, preventive public health programme, in which they had typically served an apprenticeship as a local Medical Officer of Health (MOH). The GRO's analytical capacity with respect to epidemiological change was therefore highly developed by the beginning of the twentieth century. In that same era, however, the GRO's officials, as the nation's medical and social scientific experts on population questions, found themselves inadequately equipped in terms of statistical tools, available data and relevant knowledge to analyse and comprehend the increasingly obvious downward plunge of the national birth rate.

In the 1880s and 1890s there had been an upsurge of concern over a set of long-standing worries about the 'degenerating' effects of urban existence on the human organism. This came to a head in the Edwardian decade as the nation underwent a prolonged bout of public soul-searching in the wake of the South African Wars of 1899–1902. The great British Empire had found itself militarily humbled at the hands of the Boer farmers and, with bizarre logic, placed the blame for this ignominy not on defective military leadership or ineffectively conducted campaigns but on the poor physical quality of those members of the working classes who did not fight. The high rejection rates of those trying to enlist at urban recruiting stations was seen to be symptomatic of a withering of vitality and virility which was undermining 'national efficiency'; a sign that the 'lower orders' with their high fertility, poor child survival rates and low standards of health were reducing the average Briton's physical and mental prowess.[7]

Explanations and remedies for this state of affairs divided into two main camps. Hereditarian eugenicists argued that the higher infant and child mortality among the urban poor reflected their deficient biological stock. To achieve 'national efficiency', the hereditarians argued, the state must abandon expensive ameliorative social policies towards the poor. Instead, this strata of society should be discouraged from reproducing themselves, while the wealthy should be given greater incentives to increase the number of their children in order to increase the average quality of the nation once more. Karl Pearson in particular brought this line of thought to public attention, highlighting the class-differential aspect of both the infant mortality and the birth rates.[8]

In opposition to these views stood the environmentalists who argued that the high mortality, deficient health and physical development, poor learning capacities and large families of the poor all resulted from the harsh and insecure urban industrial environment in which so many lived. The public health movement of the Edwardian era had well over half a century of work based on such environmentalist thinking behind it.[9] The nascent systems of social, medical and educational services put in place through the efforts of the movement were now being derided by their eugenic opponents as a waste of public money. The public health officials thus had strong political motivation to test and refute eugenic views. The Registrar-General, W. C. Dunbar, the Chief Medical Officer of the Local Government Board, Arthur Newsholme, and the Chief Superintendents of Statistics at the GRO, John Tatham and T. H. C. Stevenson, all took great pains over the first decade of the century to perfect various demographic measuring techniques, both to increase their own understanding and to provide counter-arguments to the eugenicists' claims.[10] In so doing they collated and analysed the most important sources of demographic information available for studying changes in infant and child survival and fertility behaviour, and planned the 1911 census inquiry.

In 1911, following the 1900 census of the USA and the New South Wales census of 1901, and in tandem with the census of Scotland and Ireland, the census of England and Wales carried a new suite of

<table>
<tr><th colspan="5">PARTICULARS as to MARRIAGE</th></tr>
<tr><td rowspan="3">Write "Single," "Married," "Widower," or "Widow," opposite the names of all persons aged 15 years and upwards.</td><td colspan="4">State for each Married Woman entered on this Schedule, the number of:-</td></tr>
<tr><td rowspan="2">Com-pleted years the present Marriage has lasted. If less than one year write "under one".</td><td colspan="3">Children born alive to present Marriage. (If no children born alive write "None" in Column 7).</td></tr>
<tr><td>Total Children Born Alive.</td><td>Children still Living.</td><td>Children who have Died.</td></tr>
<tr><td>5.</td><td>6.</td><td>7.</td><td>8.</td><td>9.</td></tr>
</table>

Fig. 1.2.1 The form of the questions concerning the fertility of marriage as presented in the census schedule for England and Wales, 1911. *Source:* 1911 Census of England and Wales (1917), *General report*, Appendix A.

questions. As shown in Figure 1.2.1, these directed every married woman enumerated to return the duration of her current marriage, the number of children she had borne alive within that marriage and the number of those children who had subsequently died. Unsurprisingly, these questions earned the census of 1911 the sobriquet of the 'Fertility Census'.[11]

The hereditarian–environmentalist debate pervaded the thinking of those designing the collection, analysis and reporting of the responses to the questions concerning family building experience in the Fertility Census. As a result, the terms of reference of this argument have remained embedded within our understanding of the declines in fertility and infant and child mortality ever since, because the official tabulations in the published reports, previously the only access to the 1911 data, inevitably reflect the contemporary intellectual agenda. In addition, the national scope of the 1911 survey and the relatively detailed nature of its findings have always endowed its results with great authority, overshadowing subsequent studies exploring alternative sources of demographic information.

It has long been recognised that the 1911 census returns represent, for Britain, the most important and comprehensive body of historical demographic evidence compiled for the study of changing fertility, nuptiality and mortality among the young during the period before the Great War. In England and Wales present law prohibits public access to the original individual-level census returns for a century after their collection. Previously, therefore, students have had to content themselves with secondary analysis of the official tabulations published by the GRO. Thanks to the interest and persistence of Stevenson, the GRO's chief statistician at the time, a great deal of extremely valuable material from the 1911 census was abstracted and published in two volumes: an interim report presenting results in tabular form was published in 1917, while a much lengthier, more exhaustive and analytic report came out in 1923.[12] As a form of shorthand these are referred to as the *Fertility of marriage* report, Parts I and II throughout the ensuing text. Much can be and has been done with this and with other related official evidence – work which is briefly surveyed in the ensuing historiographical review – but conclusive and rigorous analysis and verification of various hypotheses concerning the detailed course of demographic change during this period necessarily awaits direct access to the original household enumeration records from the 1911 census, scheduled to be released into the public domain on 2 January 2012.[13]

In the mid-1980s, however, the Cambridge Group was able to commission the production of abstracts of a sample of anonymised individual-level returns drawn from the 1891, 1901, 1911 and 1921 Census of England and Wales from the Office of Population Censuses and Surveys (OPCS) which were provided on magnetic tape. Names and addresses were not provided in the abstracts, and members of the Group working with OPCS at the time were required to sign the Official Secrets Act. The abstracts were provided only for research carried out by the Group and remained in its custody at all times. The abstracts have now been returned to the Office for National Statistics, successor to OPCS. The early release of a certain amount of data from the 1911 Fertility Census, drawn from 13 localities across England and Wales, provides the opportunity to examine afresh the evidence for demographic change at the level of the individual couple and the community. Furthermore, since parents were asked by the 1911 census to record not only the number of children ever born to their current marriage but also the number who had subsequently died, their answers provide retrospective data which allow analysis of comparative levels and trends in infant and child mortality as well as fertility. The ability of the present study to use individual-level data largely overcomes the limitations associated with analysis based on ecological correlations often encountered by previous studies based on the published 1911 census tabulations. This study will be able to demonstrate some of the kinds of insights which the original census returns permit above and beyond those detailed in the published reports. The two facets of the original inquiry, infant and child mortality and marital fertility, are examined separately in the following chapters; a convention followed in the historiographical sections below.

1.3 A new approach to infant and child mortality – the historiographical context

The study of fertility and mortality change has, of course, attracted an enormous range and volume of contributions over the course of the twentieth century, beginning with the preoccupations of the contemporary social commentators, academics and officials discussed in the previous section. Within this field the idea of demographic transition has been a long-lived and influential model. In its classic formulation, published by F. W. Notestein in 1945, it emerged as a well-elaborated, comprehensive and testable theory which provided an integrated account of both mortality and fertility change, with economic growth providing the prime mover.[14] However, it has long been acknowledged that the well-documented historical populations of France, USA and Hungary all refuted one of the theory's central specifications – that mortality fell before fertility. Furthermore, in Britain's case it has always been considered a major embarrassment for the theory that fertility appears to have fallen long before infant mortality. Since the demise of transition theory no other thesis has succeeded in commanding attention in the same way. The term demographic transition has therefore continued to be used to refer to the two principal dimensions of modern demographic change, fertility and mortality decline, but in practice they have been studied for many decades as quite distinct processes, each with its own separate literature. Moreover, the study of infant mortality has been substantially conducted as a specialist subject in its own right, reflecting its quite distinctive aetiology and epidemiological patterns.

The aim of explaining the overall mortality decline at all ages has continued to attract grandiose theories, such as the McKeown thesis of nutritional determinism.[15] But the effort to understand changing patterns of death specifically among the very young has been characterised by a more inductive and exploratory approach. Such research has examined a wide range of theses, principally including the role of the following factors: poverty, class, overcrowding, maternal and infant nutrition, inadequacy of domestic hygiene facilities and feeding practices, sanitary state of the wider environment outside the home, breast-feeding, general child care and its interaction with female working practices, and family size and frequency of childbearing. In the attempt to throw light on the relative importance of these various factors much effort has been devoted by a number of scholars to careful statistical inference from a range of comparative epidemiological data. The changing infant and child mortality rates of various different populations have therefore been compared: the Registrar-General's social classes, urban versus rural rates, distinct regions of the country, socially different parts of the same city, and different kinds of city.[16] Other studies have shown that the distinct child rearing and feeding practices of different ethnic groups can substantially influence mortality among the young – a classic example being the low fatality rate of immigrant Jews in London's East End, regardless of exposure to a whole battery of the negative influences most strongly implicated elsewhere.[17] Woods and his colleagues have maintained that a very wide range of factors were all involved in explaining infant mortality change; and, in a complete inversion of classic demographic transition theory, they have even suggested that falling fertility may also have been a factor, enhancing survivorship chances in smaller, more widely spaced families.[18]

By contrast, in their major comparative study of the USA and England and Wales Preston and Haines indicated that social class differentials were the most significant determinants of infant mortality in England and Wales, whereas other factors were more important in the USA. They used published data from the census of 1911 of England and Wales to analyse infant mortality differentials between the Registrar-General's social classes along with a range of socio-economic variables.[19] In a separate publication Haines appeared to show that these class differentials had been widening down to 1911.[20] The authors did, however, point out that they suspected these social class findings might be reflecting the influence of various spatial factors, such as residential segregation, but were not able to pursue this possibility further.[21] This is certainly one aspect of analysis on which the present study has been able to cast significantly greater light.

The likely significance of spatial factors has already been indicated by Watterson, who analysed different tabulations from the 1911 census publications, according to place of residence.[22] Watterson found important differentials between urban and rural populations but, furthermore, argued that type of urban place appeared to be of considerable significance, suggesting that the more industrial a town, the less healthy it was. This approach is further developed in chapters 4 and 6 of the present study through the application of a typology of 'environments', enabling the largely urban population of early twentieth-century England and Wales to be classified according to its local occupational and industrial complexion. Using this scheme it has been possible to demonstrate that the suspicions both of Preston and Haines and of Watterson, regarding the greater significance of residential environment rather than class affiliation according to the Registrar-General's social classification scheme, are indeed well founded. A multiple regression analysis finds that the new analytical category of 'environment' is consistently able to explain more variance in infant and child mortality than the Registrar-General's social classes.

In chapter 6 the published, tabulated census material for the whole population of England and Wales is re-examined, applying an 'environmental' analysis to the urban and rural patterns of infant and child mortality in the very early twentieth century. Some interesting perspectives on the overall geography of mortality among the young are produced, and the chapter emphasises the greater quantitative importance of the populous and often very unhealthy regions of Lancashire and West Yorkshire, dominated by the classic staple industries of textiles, mining, engineering and metal founding, over the less industrialised capital city of London, in influencing trends in the nation's mortality rates during this period. It can also be shown through this approach that London was not in fact as healthy as some contemporary observers seemed to believe.

It has also proved possible, using the individual-level census data, to examine rigorously a favourite thesis among many contemporary Edwardian analysts of infant mortality: the supposed negative effects of maternal employment on infant mortality rates. The research reported in chapters 4 and 5 concludes that figures supporting the 'maternal employment hypothesis' published in the 1911 *Fertility of marriage* report (and also the putative finding by Haines of widening class differentials in mortality among the young) are essentially the product of statistical artefacts in a retrospective source such as the 1911 census.

1.4 Fertility and nuptiality – debates and description

Where the study of change and variation in human fertility is concerned the output from both historians and social scientists since the Second World War has been very substantial, even if only those works strictly relevant to British history are considered. This brief introduction does not attempt a thorough survey of this vast field, seeking only to place the present study within the context of the most immediately relevant literature. Chapter 5 contains more extensive discussion of several of the detailed issues.[23]

As is the case with the analysis of infant and child mortality, one of this study's two principal advantages over previous unofficial investigations of changing fertility patterns in England and Wales lies in its capacity to analyse individual-level data from the 1911 Fertility Census. The other major advantage is that information for a number of specific, contrasting localities is available for analysis here.

Most previous studies have offered ecological statistical analyses of the average fertility and nuptiality patterns of sections of the national population drawn from the published data available in the official census reports. The studies tend to be of two types. First there are those addressing the variation in fertility and nuptiality behaviour exhibited by different geographical units: counties, registration districts and towns.[24] Secondly, there are those based on investigations of the fertility differentials between male occupational groupings, either amalgamated into the Registrar-General's social class scheme or, where possible, offering a more discriminating analysis of some of the several hundred individual occupational categories distinguished by the census authorities.[25] Studies of the latter type led both Haines and Szreter to conclude that the relationship between occupation, industry and community was probably a powerful determinant of fertility patterns and trends at this time. Both advocated that geography and the influence of local socio-economic and cultural environment should be addressed in future research.[26]

Several demographic studies of specific communities in England and Wales have been recently completed, which have also indicated the significance of the kind of labour market relationships identified by some of the occupational studies, and concluded that various other influences, such as religious affiliation, ethnicity, residential segregation and local migration patterns, were probably also important.[27] However, these researchers have perforce had to focus on the period before the most rapid changes in fertility because of the hundred-year rule prohibiting access to the primary source material required for such demographic community studies, the census records. Furthermore, there are certain irreducible problems in deriving robust fertility measures from the information available in the census enumerators' books. Such studies, mostly of a single place in the mid-nineteenth century, although providing many important substantive insights and methodological innovations, can supply only limited rigorous demographic information with which to track the momentous changes in fertility and nuptiality occurring during the period 1880–1920.

The comparative information on individuals and households in a number of specific communities available to the present study allows a more detailed and rigorous examination of some of the current debates concerning the nature of changing fertility and nuptiality in England and Wales during the period 1891 to 1911 than was previously possible. One issue which merits particular consideration is the question of the adequacy of the long-established, official class-differential model of fertility decline, which originated out of the debates between hereditarians and environmentalists. Szreter has argued that the Registrar-General's social classification scheme, which he terms the 'professional model' of society, was an ideological construction which reflected, without self-critical insight, the conventional social prejudices of the metropolitan, professional, scientific and administrative elite.[28] The latter, despite differences of opinion on other matters, clearly believed that they formed the apex of the socially graded hierarchy which was British society.[29]

Szreter has demonstrated that the professional model of fertility decline was a misleading summary of the diverse patterns of occupational variation in fertility and nuptiality from which it was composed.[30] For instance, married couples placed in the professional model's top social category, social class I, were not the most heavily represented class among the 5 per cent of the nation's married couples exhibiting the lowest completed fertility in 1911, being outnumbered by couples classed to social class II. Conversely, it was not the low-paid, unskilled labourers of social class V but the highly paid coal-miners who exhibited the highest completed fertility in 1911.[31] The spatial analysis by environment presented below in chapter 5, using the individual-level data, indicates that fertility variations in Britain at the turn of the century were significantly more complex than the picture depicted by the professional model of social classes. It is shown, for example, that elements of the population classified to the same social class in the Registrar-General's scheme exhibit rather different fertility levels depending on their residence in different types of environment.

This finding additionally relates to the issue of the relationship between occupation, industry and community as a social and cultural influence on courtship, marriage and child rearing patterns. Szreter has argued that these may be theoretically related through the concept of a 'communication community': a collectivity of similarly socialised persons and families, sharing in the dialect, body language, manners, norms and values of a local vernacular.[32] He argued that, because familial and gender roles are necessarily integrated with the demands and opportunities available in the local labour market, if a specific industry or form of employment predominates in a particular locality, it will endow that community with particular norms for family life. These, of course, may change over time, especially if the relevant characteristics of the main industries change. The point is that an intimate connection between the employment and industrial complexion of a community and its fertility, courtship and nuptiality characteristics can be expected. Chapters 5 and 6 of the present study add further evidence and support to the argument that distinctive local demographic regimes existed, especially where there was the dominant presence of a particular kind of employment, as in middle-class Pinner with its high demand for domestic servants, the potteries of Stoke, the coalfields of South Wales and the North East, or the mill towns on either side of the Pennines. Indeed, the thesis is amplified by demonstrating that the differently gendered and class-specific local labour markets led to quite diverse age and sex structures in the communities under examination. Since such diversity was particularly marked at the key marriage ages, there were strong implications in this for local marriage markets, courtship practices and sexual codes. This therefore explains why fertility and nuptiality patterns may have varied as an attribute of 'communication communities'.

Szreter's vision of distinctive communication communities, each with its own trajectories of fertility and nuptiality change, raises the issue of multiple, independent fertility declines in Britain. This contrasts sharply with the long-established professional model of a single, socially graded process of fertility decline gradually diffusing down a putative social hierarchy.[33] Woods, too, has called into question the notion of a change starting at the social apex and subsequently spreading from there, noting that the Registrar-General's social classes tend to exhibit a close simultaneity in the downward movement of their fertility indices, with the main difference being that the higher social classes exhibit lower fertility, but not necessarily earlier reductions in fertility.[34] This is a major area of contention in the historiography, since the most important previous interpretations of fertility change have presented their respective theses on the premise that a single, identifiable causal process, albeit complex and not necessarily reducible to a single factor, was at work in producing falling fertility throughout British society, with argument centring on the extent to which economic, cultural or social forces were of primary significance.[35]

Unfortunately, conclusive, relevant analyses to test the thesis that Britain's late-nineteenth-century demography was fragmented into a number of distinctive communication communities were beyond the reach of the present study. The anonymous nature and spatial structure of the data extracted from the 13 locales precluded any record linkage methodology and thus prevented a thorough socio-economic and cultural reconstruction of each community. The application of the fourfold environmental typology to national data, presented in chapter 5, does, however, identify at least two spatially distinct geographical regions of the country in which low fertility emerged relatively early, substantiating Woods' point. The first, in the South, comprised many districts in which there was a strong middle-class residential presence, although it is important to recognise, as demonstrated in chapter 5, that the low fertility of these areas was by no means confined only to the upper- and middle-class households they contained. Secondly, there were the 'textile regions': an area encompassing not just the mill towns of Lancashire and Yorkshire's West Riding, but also the textile districts of the neighbouring East Midland counties of Derbyshire, Nottinghamshire and Leicestershire. While it is easy to conceive of connecting communications within each of these two very diverse regions, it is much more difficult to envisage connections specifically between them and no other regions; and thus the concepts of communication communities and of multiple fertility declines rather than the unitary 'diffusion' process do gain a degree of support from the work undertaken here, although many questions still remain.

There has always been much debate over the relationship between female employment and fertility, and the present study is also able to offer an important contribution in this area. It was clearly recognised by Edwardian observers that those parts of the country in which women worked outside the home in textile factories tended to exhibit relatively low birth rates. As mentioned above, it was also noted that such areas recorded relatively high rates of infant mortality. In both cases, there was an obvious, straightforward causal inference which it was tempting to draw and which contemporaries, including Stevenson at the GRO, sought to verify in empirical studies. On the fertility side it has been supposed that the need for, or desire of, a mother to remain in paid employment militated against large families. On the mortality side, working mothers were condemned on the grounds that their infants suffered from the lack of breast-feeding and care which their mothers' absence from home entailed. Stevenson was able to produce tables from the 1911 census returns demonstrating that mothers in the labour force did indeed record both extremely low fertility and very high infant mortality.[36]

Although many historians have been rightly critical of the ideological bias which is evident in such studies, slanted as they were against working-class women and their means of earning a living, there has been little previous attempt to question the statistical associations which they reported.[37] Using the individual-level data available from the 1911 OPCS localities, it is demonstrated in chapters 4 and 5 that the statistical association between maternal employment and both high infant mortality and low fertility probably flowed in precisely the opposite direction to that supposed by contemporaries. Married women tended to be enumerated in employment at the census, it is argued, because of their low effective fertility: they had either had few children or suffered a high rate of child loss. In other words, those mothers reported by the census to be in the labour force were selected for their *prior* low fertility or high infant mortality. Mothers worked because they had few children to care for; they did not necessarily have few children because they worked. Of course, in many parts of the country there was little paid work outside the home available for women, and so this selection effect only became statistically obvious in those few areas, such as the textiles regions, where female employment opportunities were available in abundance. This important finding also implies that the remarkably low fertility of most mill towns was not simply due to the direct consequences of married women working. This returns us once again to consideration of the probable importance of the overall socio-demographic character and unusual labour markets of these particular towns in creating a particular set of social relationships and familial roles conducive to low-fertility norms of family life, shared by all in the communication community.

Finally, this brief historiographical introduction should draw attention to the relevance of the work reported below in chapter 5 for the recent debates within the fertility literature on the question of 'stopping' versus 'spacing' or 'starting'. Until the 1980s the historical demography of fertility was dominated by the Henry-Coale-Trussell concept of 'natural fertility' and its associated investigative methodologies.[38] This was a model which predisposed researchers to think primarily in terms of parity-specific 'stopping' behaviour – the relatively abrupt curtailment of births at higher parities – as the only significant divergence from uncontrolled, unplanned or natural fertility. Although it was recognised that the historical and ethnographic evidence showed that the rate of childbearing at lower parities could vary significantly in different populations, this was considered to be principally the result of the vast range of involuntary social, cultural, biological, epidemiological, institutional and economic factors which were known to operate and any of which could cause the rate of childbearing to vary without any conscious intervention.[39] Thus, a wide range of absolute levels of natural fertility was recognised, but only one significant form of 'modern' birth control: parity-specific stopping.

During the course of the 1980s and 1990s, however, the self-imposed conceptual limitations and related methodological weaknesses of the dichotomy between natural fertility and stopping have come to be recognised; and alternative generic methods for detecting other forms of deliberate birth control in the past have been devised, although these too have their problems.[40] Furthermore, detailed empirical research on falling fertility, both in nineteenth-century USA and in England and Wales, has demonstrated that stopping was by no means the principal method of birth control used when these populations began deliberate fertility restraint: there was much 'spacing' in evidence, and this quite probably also entailed extensive 'starting' (a long gap between marriage and the first birth).[41] Using the responses to the special questions in the 1911 Fertility Census, chapter 5 reports on the detailed assessments of the contribution of stopping, spacing and starting to the family building strategies of England and Wales at the dawn of the twentieth century.

1.5 Limitations of the present study

Without anticipating the detailed considerations covered in later chapters, one or two words of general caution are in order regarding the scope of the 1911 census material available to this study and its relationship to fertility and infant and child mortality – the main subjects of research. As will become obvious from the various technical discussions, the data used here required cautious and careful exegesis. Constraints, as already suggested, were imposed on the range of possible social and demographic analyses by the requirements of OPCS that the data supplied be both anonymised and in most cases related only to a part, not the whole, of any definable community or settlement. It was therefore not possible to pursue a set of conventional 'community studies', although analysis could be conducted at the level of relatively small geographical areas.

Secondly, it needs to be fully acknowledged at the outset that, despite their detailed statistical nature, the official sources of household and demographic information, such as the census, have their limitations, especially with respect to the issues of changing fertility. In regard to the latter, there are two key questions to which historical demographers would ideally wish an answer. What motives and intentions prompted individuals in the late nineteenth century to commence controlling their fertility to a quite unprecedented extent? And what methods were used to achieve this reduction in live births? Unfortunately, statistical material such as that used here cannot, by its nature, offer direct answers to either of these questions. It may seem strange to commence a long volume which devotes much of its space to the study of fertility change with the admission that none of the following evidence relates directly to the key questions. However, in this constraint we are little different from virtually all other historical researchers in this field. Inference from the indirect evidence provided by the changing patterns of fertility, nuptiality and child survival has had to remain our principal method of inquiry.

When considering fertility, the extreme paucity of surviving, direct evidence on intentions and techniques is the result of two compounding silences in the historical record. First, until the very end of the nineteenth century there was little public acknowledgement of the widespread nature of the fertility changes occurring. Second, British society had evolved a general code of euphemism and evasion in virtually all sexual matters.[42] The rapidly falling birth rate necessarily implied significant modifications in sexual behaviour between spouses, presumably involving less frequent intercourse or contraceptive behaviour or both, but as it was considered indelicate and vulgar to pursue such matters in explicit public discussion, even the most fearless pioneering sexologists have left remarkably little explicit and direct information on the changes which were occurring.[43]

Such evidence as is available indicates a generally negative and moralistic attitude towards contraceptives, something that was endorsed as much by a medical profession anxious to avoid slurs on its reputation, as by the Anglican clergy and by working-class leaders.[44] There seems to be a rare consensus among those historians who have conducted oral history investigations that the working classes in the first half of the twentieth century genuinely shared much of this sense of opprobrium regarding birth control and, indeed, for many women this seems to have extended to their attitude to sexuality in general.[45] This is certainly consistent with the general state of profound public ignorance on matters of basic sexual functioning and anatomy which has been found in many communities throughout the period to the Second World War, even among trained doctors.[46]

Despite discussion of the moral and social issues involved in fertility decline in the novels of the period, from Thomas Hardy's frank and harrowing *Jude the Obscure*, which proved too shocking for contemporary taste in the late 1890s, to Galsworthy's more urbane, subsequent reflections in the *Forsyte Saga*, there was little precise or well-defined appreciation of the changes under way.[47] Only a self-consciously radical fringe of sexologists, who were so daring as to attempt to reconstruct a language of sexuality at this time, were trying to discuss sexual behaviour at all.[48]

If letters addressed to Marie Stopes are at all representative, it was not until the publication of *Married Love* in 1918 that the wider British public received some form of explicit instruction in the sensual arts of the marriage bed and acquired a vocabulary which permitted correspondence on these matters.[49]

In the relative absence of substantial and representative direct testimony, historians have championed many different methods of birth control as the ones they believe to have been most prevalent, with the condom or sheath, *coitus interruptus* and abortion having been most frequently favoured.[50] Most recently, Szreter has concluded, from a critical review of the available qualitative and quantitative evidence, that various regimes involving attempted abstinence within marriage, some no doubt incorporating the use of *coitus interruptus* and some quite possibly countenancing the resort to abortion, were probably the predominant culture of birth control in England and Wales, before the arrival of latex condoms, caps and diaphragms after 1930.[51]

When attention turns to the marked improvement in the survival prospects of the nation's young at the dawn of the twentieth century, the means by which this was achieved is obscured not so much by the silence of the historical record as by the clamour created by the plethora of different authorities involved, each acting, as well as monitoring and reporting developments, within their own particular terms of reference.

In 1858 central government had effectively stepped out of the arena of environmental improvement, placing the matter in the hands of local government. In that year compulsory preventive health clauses included in the 1848 Public Health Act were repealed.[52] From then, until well into the following century, the orthodoxy of *laissez-faire* meant that it was the local governments of Britain, ranging from the municipal councils of wealthy cities to the councils of the most sparsely populated of the rural administrative districts, which largely decided and funded local amenities.[53] Certainly Parliament passed much enabling legislation with regard to health measures but compelling laws were much, much rarer. Thus the four decades before the outbreak of hostilities in 1914 witnessed enormous variation in the way in which different communities, towns and cities managed their local environments. The variation was manifest even in such absolute basics as the quality of the water supply and the extent to which the population had access to adequate sewerage; there were still many medium-size towns lacking such basic amenities even in the inter-war years.

Why certain cities should be leaders in instigating public health improvements while others, often close by, were laggards remains a subject of historical debate, although continuing research is beginning to point to certain principal reasons. A major factor was finance. In an era when the principal fiscal source for urban environmental maintenance, along with other social services, was the local ratepayers, the availability of funds for improvements was dictated by two components. The first was the ability to generate the required capital for improvements. London in the 1860s had been the first British city to make the colossal investment necessary to construct a comprehensive arterial mains sewerage system.[54] Initially, only the largest cities, such as Glasgow and Birmingham, had the capacity to raise and service the enormous loans required to follow London's lead, and thus maintain their ethos of 'civic pride'. The ability of smaller towns to finance public health measures was often dictated by the historical accident of how much productive property was owned by the council, or by their willingness to become involved in 'municipal trading': the collective ownership of amenities such as gas works or tramways.[55] The latter could act as a source of revenue, providing funding for environmental improvement.

The ability to raise finance was tempered by the political will to spend the money on projects of benefit to all.[56] Much depended upon in whose hands power lay. In the towns by the last quarter of the nineteenth century there were three forces in the political arena: the civic leaders, very often drawn from the industrial and commercial elite, the propertied ratepaying class, representing petty capital, who throughout the nineteenth century had been vehemently opposed to moves which would increase the rates, and the non-property-holding voters who had been given a voice in municipal affairs by the franchise reforms of the late 1860s. Civic leaders had to have the good of their constituents at heart as well as their support before serious urban improvement became possible in Victorian Britain. In the rural areas power lay for much longer with the landowning classes, and this may in part explain why rural health, long protected by the generally more salubrious environment, failed to improve at a pace similar to that of the urban areas in this period.

The picture of piecemeal environmental improvement found in England and Wales over the last decades of the nineteenth century has implications for national trends in mortality. The inhabitants of the large towns and cities may have been subjected for longest to the poorest survival chances, but, once improvements were engendered, their large size meant that, in combination, they would create the impression of an accelerated decline in the national mortality trends.

Thus, while council minute books and local MOH reports detail the debates, discussions and decisions surrounding various authorities' march towards health reform, the very weight of material in all its diversity perhaps obscures the general outline of the path to better health. For a broader picture historians have once again to resort to inference, mainly from geographical and temporal patterns of mortality, to gauge the extent, efficacy and intentions behind the measures put in place. The present study is constrained in its ability to further our understanding by the fact that details on neither the age nor the cause of death of the children were reported in the data used here. Nevertheless, because data are drawn at an individual level from a selection of widely spread communities, observations can be made regarding the interaction of status, location and environment which illuminate the processes by which health improvements were achieved.

1.6 Summary

The current volume represents a further attempt to reach behind and beyond the agenda of the contemporary officials who created the original source materials for studying the demographic history of England and Wales during the last quarter of the nineteenth century and the first decade of the twentieth. We are, of course, profoundly in their debt for the Herculean tasks which they performed, but we are not so bound by debts of gratitude that we must continue to accept and work with the particular models of society and the hypotheses relating to fertility and mortality which emerged from the policy debates of the time. Where previously the analysis of occupational variation has provided a principal means to develop an alternative perspective on the findings of the 1911 Fertility Census, here the primary focus will be the influence of geography: the importance of the social and physical environment in accounting for the changing demography of this period. As mentioned above, a number of other scholars, studying both fertility and mortality during the nineteenth and early twentieth centuries, have also recently focused increasingly on place and environment, as potentially offering important insights into the way in which demographic change occurred.[57] This volume aims to take up the lead offered by these recent initiatives: studying the processes of change in fertility and infant and child mortality by exploiting data of a higher demographic quality and a more discriminating geographic character than has previously been available for England and Wales in the late nineteenth and early twentieth centuries.

Notes

1 Mitchell and Deane (1962), pp. 36–7.
2 *Ibid.*, pp. 29–30.
3 Zhao (1996), pp. 262–3, Tables 7 and 8.
4 On the concept of 'demographic certainty' see Anderson (1985), pp. 86–7.
5 On the administrative history of the GRO, see Glass (1973); Cullen (1974); Eyler (1979); Higgs (1989, 1996a, 1996b, 1996c).
6 Eyler (1979); Higgs (1988b, 1991); Szreter (1991).
7 The literature on 'national efficiency' is copious. See, *inter alia*, Searle (1971); Soloway (1982); Szreter (1996b), chs. 4–5.
8 Pearson (1896), pp. 301–5; Heron (1906); Webb (1907).
9 On the public health movement see Eyler (1979); Smith, F. B. (1979); Wohl (1983); Szreter (1991); Hardy (1993); Eyler (1997).
10 See, for instance: Stevenson and Newsholme (1905, 1906). For a full account of the developments summarised here, see Szreter (1996b), chs. 4–5.
11 The 1911 census was not the only British census to include questions on fertility. Questions directly concerned with fertility were asked in 1951 and in 1961. These census schedules did not, however, record the number of children who had subsequently died. Questions concerning 'orphanhood and dependency' asked in the 1921 census give an indirect means of considering fertility, but give no indication of the mortality experienced by the children born; Office of Population Censuses and Surveys and GRO, Edinburgh (1977).
12 A very few statistics based on the 'fertility' questions in the 1911 census were reported in: 1911 Census of England and Wales (1915), Vol. X, *Occupations and industries,* Part II. The 1911 Census of England and Wales (1917), Vol. XIII, *Fertility of marriage,* Part I (hereafter *Fertility of marriage,* Part I) contained a large amount of tabulated information, principally relating to the nation as a whole, but Part II (hereafter *Fertility of marriage*, Part II), published in 1923, presented far more detailed analyses and tables. For full British Parliamentary Paper references see the bibliography.
13 Examples of studies of fertility using different sources include: Glass (1938); Innes (1938); Haines (1979); Teitelbaum (1984); Hinde (1985); Garrett (1987); Walker, S. P. (1988); Kemmer (1990); Rainger (1995).
14 Notestein (1945). On the complex history of the idea of demographic transition, see Szreter (1993a).
15 McKeown (1976). Szreter (1988) provides a critique of McKeown's thesis and indications for an alternative approach.
16 Williamson, J. G. (1981); Woods (1984); Buchanan (1985); Watterson (1986, 1988); Lee, C. H. (1991); Preston and Haines (1991); Williams, N. (1992); Williams and Mooney (1994).
17 Marks (1994). On other ethnic groups see, for instance, Goldstein *et al.* (1994); Fitzpatrick (1986).
18 Woods, Watterson and Woodward (1988, 1989).
19 Preston and Haines (1991), pp. 177–98.
20 Haines (1995).
21 Preston and Haines (1991), p. 197.
22 Watterson (1986).
23 For a recent review focusing on literature of relevance to Britain, see Szreter (1996b), ch. 1. Other helpful and wide-ranging reviews include: Hauser and Duncan (1959); Hawthorn (1970); Cleland and Wilson (1987); Alter (1992).

24 Glass (1938); Anderson (1976); Friedlander (1983); Teitelbaum (1984); Woods (1987); Crafts (1989).
25 On social classes, see Stevenson (1925, 1928); Innes (1938); Haines (1989, 1992). On occupations, see Haines (1979); Banks (1981), ch. 8; Szreter (1996b), Parts III and IV. The studies of Walker, S.P. (1988), Kemmer (1990) and Rainger (1995), focusing on distinct occupational sections of the Edinburgh population, were able to use Scottish vital registration records, a category of evidence which remains inaccessible to historical researchers in England and Wales, to good effect. On Scottish occupations see Anderson (1998b), Table 3.
26 Haines (1979); Szreter (1996b).
27 Hinde (1985); Garrett (1987); Dupree (1994); Reay (1994, 1996).
28 Szreter (1996b), Part II and ch. 6. For the argument that the British official model of social classes privileged the professions, see Szreter (1993b).
29 *Ibid.*, pp. 365–6.
30 *Ibid.*, ch. 6.
31 *Ibid.*, pp. 305–6.
32 *Ibid.*, pp. 546–55. The concept of communication community is therefore an attempt to emphasise the significance of the range of characteristics given prominence in Pierre Bourdieu's notion of *habitus*. Bourdieu (1977).
33 Szreter (1996b), ch. 7.
34 Woods (1987). The earliest cohorts surviving to report their fertility in the 1911 census were married in the 1850s and 1860s. Among these couples fertility appears to have been particularly low in both class I and class VI, 'Textile workers'. However, as little evidence exists concerning class differentials in fertility prior to the mid-nineteenth century, it is hard to say whether this differential was due to an earlier decline in fertility or to longer-established lower levels of fertility.
35 Banks (1954, 1981); Caldwell (1982); Teitelbaum (1984); Coale (1986); Levine (1987), ch. 4; Gillis *et al.* (1992); Seccombe (1993), ch. 5. See Cleland and Wilson (1987) on the stand-off between economic and cultural theories of fertility decline.
36 *Fertility of marriage*, Part II (1923), Table XLIX, p. cxiii and Table L, p. cxv.
37 Davin (1978); Dyhouse (1978); Lewis (1980).
38 Henry (1961); Coale (1967); Coale and Trussell (1974, 1975).
39 Davis and Blake (1956); Bongaarts and Potter (1983); Weinstein *et al.* (1990).
40 Wilson *et al.* (1988); David and Sanderson (1988, 1990); Okun (1994). For a review of the relevance of this methodological literature to the current study, see below, chapter 5, sections 5.3 to 5.5.
41 Crafts (1989); Bean *et al.* (1990); Szreter (1996b), ch. 8.
42 Mason (1994a, 1994b); Porter and Hall (1995), Part II; Szreter (1996b), chs. 8 and 10. For an account which helpfully draws on the scattered literary testimony available, see Kane (1995), chs. 6–8.
43 There has been considerable debate among historians over whether or not middle-class Victorians really were as 'Victorian' in their sexual behaviour and attitudes as has been proverbially supposed. The principal revisionist work was Gay (1986). The most recent, and much more fully documented studies of Victorian sexuality and sexual knowledge have, however, tended to confirm the original view of a relatively inhibited Victorian sexuality, albeit far from monolithic and uniform in its manifestations: Mason (1994a,

1994b); Porter and Hall (1995). Nevertheless, there may well be room for argument over greater licence in the earlier half of the nineteenth century; see Robin (1986); Barret-Ducrocq (1991). For a systematic review of the small amount of direct evidence on these matters that is available, both for the period before the Great War and for the inter-war decades, see Szreter (1996b), ch. 8.

44 McLaren (1978), ch. 7; Soloway (1982), chs. 5–6, 11–14; Hall, L. (1991), ch. 2; Porter and Hall (1995), ch. 10.

45 Roberts, E. (1984), pp. 71–80, 84–100; Chinn (1988), pp. 141–8.

46 Roberts, E. (1984), pp. 16–17, 80, 109–10; Hall, L. (1985, 1991, chs. 1, 3, 5 and 6); Cohen (1993); Porter and Hall (1995) ch. 11.

47 For a fuller discussion of Galsworthy's treatment of the issues see the opening section of chapter 5.

48 Those such as Olive Schreiner, Eleanor Marx, Annie Besant and Maria Sharpe, who were associated with Karl Pearson's Men and Women's Club in the late-1880s, were among early female examples of such sexual radicals, though several of the most advanced male radicals of the time, such as Havelock Ellis and Bernard Shaw, were excluded from participation by Pearson: Walkowitz (1992), ch. 5, esp. n.27. In general, see Porter and Hall (1995), chs. 7–8; Bland (1995).

49 Stopes (1918).

50 Himes (1936); Banks (1954); Fryer (1967); McLaren (1978); Gittins (1982); Davey (1988); Seccombe (1990); Mason (1994b), ch. 2; Santow (1995).

51 Szreter (1996b), ch. 8. For an important earlier contribution emphasising the role of abstinence among the Edinburgh professional class, see Kemmer (1990).

52 The 1848 clauses had been fought for by Edwin Chadwick and had included a compulsion on local authorities to fund expensive sanitary improvements if either 10 per cent of ratepayers petitioned central government for such improvements or if the Registrar-General found the town's death rate to be above the national average of 23 per thousand living: Szreter (1988).

53 *Ibid*.

54 *Ibid*., p. 20.

55 Millward and Sheard (1995) suggest that municipal trading was very much a feature of northern and midland industrial towns.

56 Szreter (1997).

57 Haines (1979); Woods, Watterson and Woodward (1988, 1989); Crafts (1989); Lee, C. H. (1991); Williams, N. (1992); Mooney (1994a); Williams and Mooney (1994); Williams and Galley (1995).

2

Locations for study

2.1 Introduction

As pointed out in the introductory chapter, while considerable progress has been made in charting and understanding the progress and nature of the declines in fertility and infant mortality in the late nineteenth and early twentieth centuries, the lack of data on the family building experiences of individual couples has constrained researchers' ability to understand fully the network of factors encouraging and enabling the population of England and Wales to have fewer, healthier children. With the civil registers of births, marriages and deaths closed to researchers, there has been little opportunity to undertake the detailed analysis of child bearing and rearing patterns possible for earlier centuries through the technique of 'family reconstitution'.[1]

One source which has been repeatedly plundered for information on the initiation and acceleration of fertility decline and infant survival has been the published reports from the 1911 Fertility Census authored by T. H. C. Stevenson.[2] By using the data on 'children born alive' and 'children dead' supplied by individual couples, carefully discarding those married women who were not living with their husbands on census night, and standardising his measures of fertility and child survival to remove any distorting effect arising from differences in the average age at marriage or in the average marital duration of mothers, Stevenson was able to demonstrate occupational and spatial variations in both fertility and child survival.[3] He also devised a system, using the occupational information provided in the census, to divide the nation into social strata, enabling previously suspected variations in experience by 'class' to be rigorously examined for the first time.[4]

While they were undoubtedly impressive in many ways, the 1911 census reports failed, in all but a few instances, to take the opportunity to analyse spatial, occupational and class factors in combination, thus constraining the paths open to subsequent researchers reliant on the published tabulations. It has long been recognised that the opening of the individual-level 1911 census material to public scrutiny would herald new insights into both socio-spatial variations in the level of fertility and child mortality, and the several paths taken towards the modern demographic regime of low fertility and high rates of child survival. The 1911 census data provided to the Cambridge Group by OPCS offered the opportunity to 'preview' some of the analyses which will be possible after 2012. In addition, the data provided by the OPCS for the same communities in 1891 and 1901 made it possible to 'bridge the gap' between previous research on fertility using the 'open' nineteenth-century censuses and the findings of the 1911 census.

The data supplied by OPCS were not without problems, and chapter 3 outlines these and the remedies adopted. First of all, however, section 2.2 explains how particular communities were selected for study; section 2.3 provides a brief thumbnail sketch of each community, and section 2.4 lays out how certain enumeration districts were designated as foci of interest. Readers are invited to pick and choose their way through the sections of chapters 2 and 3, but may prefer to move directly on to chapters 4 and 5 where they will be referred back to relevant sections of the earlier chapters at appropriate points.

2.2 Selecting communities for study

The abstracts provided by OPCS comprised census returns transcribed by OPCS without names and addresses onto magnetic tape. They were drawn for whole enumerator districts from within 13 localities in England and Wales, each of which lay as far as possible within one registraton sub-district. A total of around 100,000 returns was abstracted for each of the four censuses.

It must be stated from the outset that the 13 chosen locales, shown in Figure 2.2.1, do not constitute a national sample, but rather a selection out of myriad possible experiences. If time, money and official permission had allowed, there might have been advantages to be gained in constructing a national sample at a 1 or 2 per cent level, based on a random selection of households or enumeration districts, in parallel to that undertaken by Anderson *et al.* for the census of 1851, for example.[5] However, a sample of this kind might well have precluded the type of analyses reported in the following chapters.

As Figure 2.2.1 indicates, the 1891 registration districts (RDs) encompassing the communities for this study were scattered across England

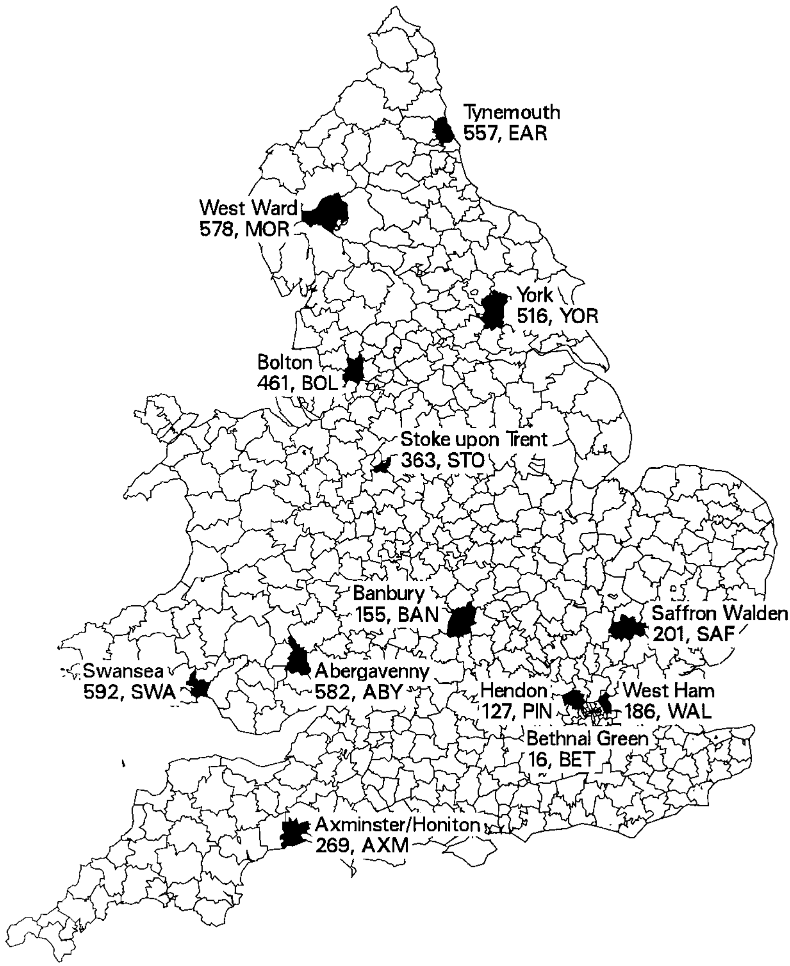


Fig. 2.2.1 The location of the registration districts (RDs) containing communities included in the OPCS study: showing the RD name and the three-letter reference code for each community

Acknowledgement: We wish to thank Ros Davies of the Cambridge Group for preparing both this map and those in chapter 6. The maps were constructed using the Great Britain Historical Database created by Humphrey Southall and Ian Gregory of the Geography Department, Queen Mary and Westfield College, University of London. We wish to extend our thanks to them, both now at the University of Portsmouth, for allowing us access to this exceptional research resource, and for their help and guidance in using the GIS software associated with the database during the preparation of the maps.

and Wales. In general the study communities were referred to by the name of the registration district in which they lay. Two exceptions were 'Earsdon' and 'Pinner', in the registration districts of Tynemouth and Harrow respectively, and a third, 'Morland', which was in fact the registration district of West Ward (in Cumbria). It should be noted, however, that the enumeration districts selected to represent a community did not necessarily include the locality from which the registration district took its name.[6] Hence the 'Axminster' locale includes Colyton, Colyford, Seaton and Beer, but not the town of Axminster, while the town of Saffron Walden itself makes no contribution at all to the material from the registration district of the same name. 'Stoke-on-Trent' (hereafter 'Stoke') was represented by enumeration districts drawn exclusively from Hanley, only one of the city's constituent 'five towns'.

The choice of locales was dictated by a desire to provide examples or case studies of various types of community which were seen as significant to the various socio-economic developments and pressures of the late Victorian and Edwardian period. A principal aim of the study was to contrast and compare the experiences of one place, or one social group, with those of others rather than to concentrate on pooled experiences at an aggregate level. For this reason little attempt has been made in chapters 4 and 5 to weight the study populations in a way which might represent national experience. However, in the penultimate chapter the national experience is reconsidered in light of the findings from the local-level data.

What, then, were the most significant socio-economic characteristics of England and Wales during this period which would be of relevance to the attempt to select a range of representative locales? Economic historians see the period between 1870 and 1914 as one of significantly slower economic growth than that of the preceding four mid-nineteenth-century boom decades.[7] Furthermore, the agricultural sector experienced a prolonged general depression, as domestic producers were increasingly undercut by a rising flood of cheaper intercontinental imports from North America and the southern hemisphere.[8] From the perspective of the urban-dwelling British working-class family, however, this period was one of generally rising personal prosperity and improving conditions of employment and living. Sliding economic competitiveness and the almost imperceptibly slower rates of overall economic growth would have been much less obvious to the urban working-class majority than the approximately 50 per cent rise in real wages, which they enjoyed, on average, over the period as a whole, owing as much to reductions in the prices of foodstuffs and other basic goods as to rising money wages.[9] There was also very distinct and visible improvement in the urban environment as many, if not all, cities left behind the overcrowded insanitary conditions of the first half of the nineteenth century.[10] In addition, the growing numerical strength of trade unions and their dominance in certain sectors of industry resulted in an increasing confidence and organisation on the part of the unionised sections of the workforce to take industrial action to protect and enhance their employment conditions.[11]

The export- and investment-driven, mature industrial economy was, however, experiencing considerable fluctuations throughout this period. Broadly speaking the 1870s and 1890s were the more prosperous decades, the 1880s and 1900s, in contrast, being marked by serious levels of urban unemployment. The metropolis and those communities most heavily involved in Britain's staple export industries were worst affected, and the cycles of unemployment and underemployment had implications for migration both around the country and overseas. Long-term unemployment could still be exported – principally to the USA, the sparsely settled white dominions and areas of 'informal Empire'.[12] There was, of course, much two-way traffic, but it is estimated that 6 million more individuals left England and Wales than arrived between 1870 and 1914.[13] Despite this outflow, the last decades of the nineteenth century are noted for certain substantial ethnic inflows. Irish immigration to Britain, which had been such a feature of the nineteenth century, continued; a further 100,000 arrived in this period. In addition, over 120,000 Jewish refugees landed, most of them from Eastern Europe.[14]

Although urban industrial workers prospered during this period, for labourers remaining on the land, particularly in the more inaccessible areas of the countryside, these were genuine hard times.[15] Provided they were on one of the many rail lines to a major town, farmers and farm managers were generally successful in diversifying into market gardening, dairying and specialised meat products – an option taken by many in the home counties feeding London. Such adaptations often carried labour-saving implications, however, and thus fell hardest on the farm labourers.[16] Elsewhere even the farmers experienced real hardship as the prices for food and other agricultural products fell as a result of import substitution. Declining rents meant that the value of the nation's land virtually halved from its 1878 peak of £2,000 million by 1914. At the time, however, the nation's holdings of overseas property and investments increased almost sixfold to a 1914 value of around £4,000 million.[17]

Against this background the important economic success story of the 'mature-industrial' phase of the British economy was the financial services sector centred in London, although this was only the most spectacular case of a more general efflorescence of professional, managerial, administrative, commercial and retailing services.[18] Furthermore, with upper-, middle- and working-class real incomes all increasing substantially, the market for the full range of service occupations rose insistently. A 'retailing revolution' was underway: multiple and chain stores emerged, and the number of small retailers grew at a rate which outstripped population growth.[19]

In seeking to classify places, districts or counties in Britain during the period 1870–1914 according to the principal developments occurring in the economy at this time, it is thus necessary to distinguish positively at least three distinct types of experience. First there were places dominated by one or more of the old established, so-called 'staple' industries, in which Britain had led the world since the early stages of its industrialisation (coal-mining, textiles, iron and steel, mechanical engineering, shipbuilding and earthenware manufacture). Second were agricultural sectors, which in general experienced serious difficulties from the late 1870s after half a century of relative prosperity. The 1870s saw a mass exodus from the countryside which continued during the rest of the century, with the result that, despite their continuing high fertility, rural communities tended to be ageing societies, a feature rendering them socio-demographically quite distinct from all urban and industrial areas. Third were communities most clearly benefiting from the great services and rentier-class boom of this period: 'middle-class' residential areas, inhabited primarily by financiers, professionals, those of private means, the employer class, the clerical lower middle class, and the associated small armies of domestic servants which they employed.

As the dozen or so localities chosen for study represent the diversity of fortunes in British society during the late Victorian and Edwardian era, they are more notable for their heterogeneity than for any homogeneity. The communities provide examples of various groups within society that were noted for particular modes of demographic behaviour: miners, potters, textile workers, agricultural labourers, for example. They also cover a spectrum of residential types from well-established urban working-class communities to docklands, growing middle-class suburbs, immigrant areas and isolated rural settlements. To avoid examining the selected places in a vacuum, certain communities were chosen in the light of previous social investigations or surveys: hence the inclusion of Stacey's Banbury, Young and Wilmott's Bethnal Green, Rowntree's York and the Cambridge Group's Colyton.[20]

Although an obvious point, it is worth remembering that while certain places were selected for analysis, a very large number of others, easily warranting selection, were inevitably rejected. Neither Birmingham, Bradford, Bristol, Leeds, Liverpool, Manchester, Newcastle nor Sheffield was picked; and thus, despite the strong representation of 'London' communities, the largest provincial cities with a population of over 200,000 are poorly represented.[21] Within the restrictions of the selection process the most important objective had to be to capture a picture of what might best be termed 'balanced diversity'.

Inevitably, problems of oversimplification and overgeneralisation were encountered, and the characterisation of the populations chosen for study may perhaps seem somewhat crude as a result. Turn-of-the-century coal-mining communities are represented by Abergavenny in South Wales, Earsdon in the North East and Stoke in the West Midlands, and stone-quarrying communities by the 'miners' of Morland. Bolton represents the cotton textile industry and Axminster the much smaller, more specialised lace industry. Bethnal Green took finished cloth for its tailoring, dressmaking and upholstery trades. Earthenware manufacture is represented by Stoke, and both Stoke and Swansea represent the heavy metal industries. Lighter engineering is represented by Banbury, which made agricultural machinery, and York, at the core of the railway network. Swansea's docks contrast with the Devonshire coastal resorts of Beer and Seaton in Axminster registration district. Several of the locales acted as retailing or service centres; for example Abergavenny and Banbury served as market towns for agricultural hinterlands, and York as a provincial centre. Agricultural districts were chosen to include areas of pastoral (Morland, Abergavenny), arable (Saffron Walden) and mixed farming (Axminster, Banbury), as well as to provide upland versus lowland contrasts. Social divides were uncovered by comparing 'urban, working-class' areas such as Bolton and Bethnal Green with areas developing as *petit bourgeois* such as Walthamstow and with the suburban 'high-status' areas within Pinner and Swansea. In contrast to areas of stability and growth, both Morland and Saffron Walden provide examples of rural areas suffering population decline.

Such brief descriptions do little justice to the 13 'communities' chosen and therefore the following section considers the character of each area in rather greater depth. This is particularly important because, as will become clear, when only a few enumeration districts could be chosen to represent each locale or registration district, the overall nature or a particular distinguishing feature of that district could be lost. For example, York, as well as being a provincial and railway centre, was known to be at the hub of the confectionery industry and to have a large military presence, yet neither of these latter features was particularly obvious from the individual-level census returns from the enumeration districts making up the York registration district in our sample, because workers in those industries did not happen to live in the enumeration districts selected.

2.3 Brief histories of the 13 locales

Thirteen locales in all were selected for study: Abergavenny, Axminster, Banbury, Bethnal Green, Bolton, Earsdon, Morland, Pinner, Saffron Walden, Stoke, Swansea, Walthamstow and York. Thumbnail sketches of each of the locales at the turn of the century are given in alphabetical order below. Those seeking more detailed portraits would be best served by consulting the myriad books, articles, theses, pamphlets and illustrated guides available for each area. Unfortunately it is impossible, given the constraints of space, to provide a comprehensive bibliography for each locale here, or indeed to include references to all the works consulted in compiling the histories outlined below.[22]

The purpose of the thumbnail sketches is to draw out some of the similarities and contrasts between the communities concerned. Particular aspects of local history are highlighted, where information is available, especially if they have a bearing on the focal issues of the present study: fertility and child survival. Considerable attention is paid to the development of each area, and to the resulting ebbs and flows of migration and the associated implications for population structure and demography. As well as age and sex composition, the economic base and occupational make-up of the communities are considered, the occupations informing discussions as to the social composition of each locale.

A further aspect of local life mentioned is public health provision, as this has direct relevance to mortality experience. Since the 1872 Public Health Act England and Wales had been covered by a comprehensive patchwork of sanitary authorities and the state had adopted a somewhat more coercive stance in regard to minimum standards. The 1875 Public Health Act, for instance, confirmed the duty of local health authorities to ensure a healthy water supply. The constitution of the responsible bodies differed from place to place, however, and did not always represent the interests of all members of the local population. In rural areas, for example, sanitary authority rested with the Poor Law Guardians, usually drawn from the landed gentry and local dignitaries. It was not until 1894, when all sanitary authorities came under the wing of either Urban or Rural District Councils, that members were relatively democratically elected and those with most to gain from improvement could make their voices heard.

Thus, in the histories which follow, local political inclinations and religious complexion are also noted, where information is available, as these, along with class differences, were thought to be indicative of 'community values'. The latter may not directly influence fertility behaviour, or induce a community to undertake measures to protect their health, but, as argued in the following chapters, they may help to explain why communities differed in the date of onset and rate of decline of family size or infant mortality.

Abergavenny[23]

The registration district of Abergavenny, situated in the north-eastern rim of the South Wales coalfield, encompasses not only the market town of Abergavenny, but also the industrial settlement of Blaenavon and a considerable expanse of the rural hinterland surrounding these two centres.

Abergavenny was established as a market and commercial centre for the local castle and priory in the late eleventh and twelfth centuries. By the late nineteenth century it had a distinctly rural feel in comparison to its neighbouring towns within the South Wales coalfield, but these nearby industrial areas allowed it to consolidate and enhance its market position. Blaenavon lay just within the boundaries of the coalfield, 6 miles south-west of Abergavenny over the Blorenge mountain. It was heavily dependent on iron and coal production, although there were a few subsidiary occupations (such as blacksmithing), and a brickyard which employed mainly women. Iron production was established there in the late eighteenth century, but it had a relatively short heyday, soon being surpassed both by coal production, as demand for 'steam coal' to fuel trains and ships rose, and by steel production, stimulated by technological developments. In Blaenavon the second half of the nineteenth century was marked by a powerful sense of prosperity and optimism. By the early twentieth century, however, the town's industrial base was in decline. The blame was laid on managerial incompetence and foreign competition, and the first two years of the new century witnessed a series of crippling strikes, which brought hunger, illness and outmigration.

The railways were crucial to the development of the South Wales coalfield, and in Blaenavon iron and coal production not only was boosted by the coming of the railway but also acted as a magnet, drawing railways to the Abergavenny area. The Newport to Blaenavon line was opened in 1852, and Abergavenny and the neighbouring rural parish of Llanvihangel Crucorny were connected to the South Wales plain two years later. Boasting three stations, Abergavenny was a junction town, linking the Great Western line with London and with the London and North Western line. The railway was important in determining the town's fortunes, stimulating its market and commercial activities, and facilitating its development as a health resort and tourist destination. It also provided much work in the locality, employing at its zenith over 1,000 people (including blacksmiths, vets and a small army of female cleaners). Unlike Blaenavon, Abergavenny had a healthily diverse industrial structure, with leatherwork, the manufacture of goat hair wigs and caps, flannel weaving and shoemaking, as well as a paper bag factory which was a major source of employment for women.

Despite their proximity, Abergavenny and Blaenavon seem to have been surprisingly independent, perhaps because of the absence of a direct rail link between them. Blaenavon was fairly self-sufficient, having its own market, post office, ironmongers, co-operative society, and surrounding farms supplying agricultural produce. It differed from Abergavenny in that it attracted a large proportion of immigrants, some from rural Wales, but especially English craftsmen whose jobs had been usurped by factories. It has been estimated that 40 per cent of Blaenavon's population was English in 1840, but the years of peak immigration were not until 1901–11.[24] One feature which Abergavenny and Blaenavon did share was residential segregation. The new northern parts of Abergavenny built in the late nineteenth and early twentieth centuries were particularly middle class. In Blaenavon, each group of workers occupied its own streets, ironworkers living apart from cokers and coalsetters, and miners and colliers being concentrated in a different neighbourhood.

The rural areas of the registration district should not be thought of as purely agricultural communities. The Royal Commission on Labour in 1892 found that farm labourers in Monmouthshire had a wide range of additional employment such as woodcutting, quarrying and mine work.[25] The parish of Llanvihangel Crucorny, for example, not only encompassed limestone quarries, but also boasted two railway stations and five large houses for which staff would have been required. Jobs in these rural areas, however, were predominantly in livestock farming, concentrating on pasture and dairying, and as a result it is likely that here, in common with the rest of South Wales, farmers suffered relatively lightly in the agricultural depression. The rapidly growing industrial population in the region maintained demand for agricultural products, and in the face of industrial competition agricultural wages in South Wales had to remain relatively high in order to retain a workforce; nevertheless mechanisation did lead to some labourers leaving the land during the depression.

The Abergavenny registration district thus represents the experience of several types of community: a heavily industrial one, whose economy fluctuated with the vagaries of world trade and technological developments, a prosperous market town, and a buoyant agricultural sector.

Axminster[26]

Although part of the Axminster-Honiton registration district, the area encompassed by this Devonshire locale does not contain any part of either Axminster or Honiton. Here, therefore, only the coastal villages of Seaton and Beer, the market town of Colyton, the nearby villages of Shute and Colyford, and the surrounding rural hinterland are discussed.

Traditionally, Seaton and Beer had been supported by fishing, but this industry suffered an irreversible decline during the nineteenth century owing to the westward migration of fish shoals and the closure of Axmouth harbour; by 1891 fishing was virtually non-existent in Seaton, but had been replaced by tourism which, as in many parts of Devon, had grown across the nineteenth century. Encouraged by the arrival of the railway in 1868, Seaton's popularity was, however, on the wane 30 years later as its pebbly beach made it less attractive than competing resorts. As befitted a settlement trying to attract visitors, Seaton, administered by an Urban District Council, enjoyed good amenities: through-drainage was completed in 1886 (the sewers emptying into the sea), and the town was also served by waterworks, and lit by gas by the turn of the century.

Unlike Seaton, Beer, with a population of 1,125 in 1911 as compared to Seaton's 1,700, did not lose its fishing trade entirely. The population also supported themselves by stone quarrying, lacemaking and, reputedly, smuggling. Over the last two decades of the nineteenth century quarrying and lacemaking witnessed a small revival, but these must be seen in perspective. A new quarry was opened in 1883 to provide stone for church building and restoration, but it was no longer working in 1910; and whereas 400 Beer women had been engaged in lacemaking during its heyday, by the late 1880s their number had dwindled to only 60 or 70.

Further inland, Colyton was a long-established market town, although by the late Victorian era its twice-weekly markets had been discontinued. The town's industries included four grist mills, a tanyard, a foundry and steam saw mills. As in Seaton and Beer, lace was made for the tourists, but although Colyton was on the railway, tourism was not such a flourishing concern as on the coast. Despite Colyton's standing as a market town with a grammar school, piped water and gas lighting, it did not merit the formation of an Urban District in 1894.

Depopulation was typical of inland areas in nineteenth-century Devon, growth being confined to coastal regions. Although Devon did not suffer unduly, the exodus from the land was partly linked to the agricultural depression. High dependence on livestock dampened the effect of decreasing prices for arable products, and little land was laid to rough. Nevertheless, despite a move towards dairy farming, poultry, fruit and vegetables to serve the urban markets, agricultural labourers' wages failed to keep pace with inflation.

The Axminster locale thus has a highly rural flavour, but includes, in Seaton, a tourist resort attracting a mainly middle-class clientele.

Banbury[27]

Banbury registration district includes not only the market town of Banbury, but also three of the town's satellite settlements: Neithrop, Chalcombe and Chipping Warden. The development and fortunes of the town and its agricultural hinterland were inextricably linked. Banbury's position as a major market town depended on the agricultural prosperity of the surrounding villages, which also provided a market for its agricultural machinery industry. In addition the town acted as a centre for the plush weaving trade.

Between the 1830s and 1860s the town flourished, aided by the arrival of the railway and prospering agriculture. In the later nineteenth century, however, its fortunes witnessed a downturn, plush weaving going into a decline and the agricultural depression having repercussions both for the town's market and commercial activities and for its production of agricultural machinery. The agricultural depression also took its toll in Banbury's surrounding districts, which experienced a rise in unemployment, increasing resort to poor relief and outmigration. By the early years of the twentieth century, however, the area's agricultural fortunes had been restored through restructuring towards dairy farming, geared to supplying milk to London and the home counties, and the rationalisation of farm holdings.

For a relatively small, southern market town Banbury was socio-politically atypical.[28] Its independent-minded, Liberal, nonconformist commercial class, strong temperance movement and history of agricultural militancy gained it the appellations 'Radical Banbury' and 'the Manchester of Agriculture'. The dynamic liberalism of Banbury society and politics engendered unusual activism in the areas of public health and provision for the poor. Substantial sewerage works had been completed by 1859, a house-to-house refuse collection was in operation from the 1860s, and the issue of housing for the poor was addressed even before the First World War, and with particular vigour in the immediate post-war years. There were also many independent, voluntary and friendly societies which complemented and stimulated municipal action.

Bethnal Green[29]

The borough of Bethnal Green was chosen as one of three locales to represent the breadth of London experience. Two-thirds arable land at the beginning of the nineteenth century, Bethnal Green was in the heart of the East End by 1891, having witnessed massive growth. Railway construction and the commercialisation of central London in the first half of the century had forced the working classes into an arc around the City. As part of this arc Bethnal Green became very overcrowded as workers were prevented from moving further out by a lack of cheap transport to the city areas where many were still employed. When cheap 'workmen's fares' were introduced in the last three decades of the century, large-scale outmigration from the district ensued. Inmigration continued to be high, however, resulting in very high population turnover and substantial growth: the population of the borough peaked around the turn of the century. In the early nineteenth century immigrants to Bethnal Green had been predominantly native Londoners, but many of the newcomers in the second half of the century originated from rural areas, or from Ireland, or were Jews escaping anti-semitism in Eastern Europe.

The Jewish population was able to use its artisans' skills in the largely unmechanised industries of London's East End. At a time when most of the rest of England was becoming increasingly mechanised and factory based, the East End's larger-scale shipbuilding and silk production industries had declined, leaving a multiplicity of small masters and middle men exploiting a large but disparate workforce of low-paid labour. Sweated labour was particularly common in the clothing, footwear and furniture trades. Some inhabitants sought work in London's docks or as charwomen in the city, but the decline of the docks and high population turnover, with those who could afford to do so moving elsewhere, led to a marked concentration of poverty, manifested in chronic male underemployment and low-paid female sweated labour in overcrowded conditions. Areas such as this fuelled the widespread middle-class belief in the degeneration of the urban poor and fears of popular unrest. Nevertheless, contemporaries were aware that the Jewish families tended to remain significantly healthier than their impoverished gentile neighbours; cultural differences were important to the demography of the various ethnic groups in the East End.

Overcrowding and associated health problems intensified at the turn of the century as the borough's population reached its peak. Booth estimated that there were 276 people per acre in west Bethnal Green in the 1890s, and in 1911 one-third of the inhabitants of Bethnal Green lived more than two to a room.[30] London was served by a two-tier system of self-government, and all London benefited from a comprehensive sewage system in 1865. Other services, however, were determined by individual boroughs (vestries until 1900), or farmed out to private companies in order to keep rates down. In Bethnal Green the water supply was in the private hands of the notorious East London Waterworks Company.[31] As late as 1897 low rainfall resulted in the Company's suspension of regular, constant-pressure supply.

The East End's poverty had long attracted a high level of missionary activity and charitable support, but it was not until the end of the nineteenth century was approaching that local government spending and activism increased to supplement these voluntary efforts, and to provide funding at last for the range of municipal initiatives which the more progressive provincial cities had been pioneering for the previous three decades.

Bolton[32]

Bolton was selected as a locale to represent the Lancashire textile industry. It was one of the county's oldest centres of cotton manufacture, but witnessed particularly rapid growth in the nineteenth century. By 1911 it had grown to be the seventeenth largest city in England and Wales, with 180,851 inhabitants. The cotton industry's peak year in terms of production, consumption, export and employment was 1913, and after a short post-war boom its dominance began to wane. Over the nineteenth century the cotton industry had allowed Bolton to develop a relatively diverse industrial structure. Engineering was needed to supply machinery but also provided export opportunities. Coal-mining produced the means to power the factories. Bleaching, dying and printing, iron and steel production, paper manufacture, the building of houses and mills, and the servicing of the railway all provided alternative employment opportunities.

As in many textile towns, female employment was high. Women made up nearly half of Bolton's cotton workforce, and more than half of its weavers, although female participation rates were not as high as in other major textile towns such as Rochdale. Lancashire's wages were relatively high, and Bolton 'stood at the top of the Lancashire wages league'.[33] Rents were high but food prices were low, suggesting a relatively comfortable standard of living. Despite this, women often stayed at work until the last possible minute of their pregnancy (some oral accounts speak of giving birth at the loom) and came back before weaning.[34] This might be expected to have contributed to a particularly high infant mortality rate but for the fact that Bolton Local Authority was active in the public health arena. Municipal water and sanitary systems were established early, back-to-back houses and privy middens were gradually eradicated, and the nation's system for the notification of infectious diseases was actually pioneered in Bolton. This impetus towards activism may be attributed to some extent to the success of the cotton industry and related civic pride – cotton manufacturers were prominent in municipal government, education and religion.

Despite Bolton's economic diversity by the early twentieth century, both its services and its character were still very much moulded by the cotton industry. Although spatial divisions were not precluded, the patterns of life in the town were dictated by the structures of shift work involving men, women and children. Such common timings engendered a common culture, bolstered by the 'ethnic' unity deriving from relatively low immigration during the second half of the nineteenth century.[35]

Earsdon[36]

The locale known as Earsdon consists of the three parishes of Earsdon, Holywell and Seghill lying in the Tynemouth registration district on the Northumberland coalfield about 7 miles north of Newcastle upon Tyne. The industrial and occupational structure of the locale was dominated by mining. The North East was one of England's main industrial areas, its growth encouraged by abundant mineral deposits, navigable rivers and established docks. Coal-mining had been established in the early nineteenth century, but the development of the railways, which facilitated transportation and export, meant that the region's most productive period was the second half of the century, even although the north-east was suffering a slow decline relative to other coalfields, particularly those in South Wales. The situation was exacerbated when labour productivity in the region's mines began to decline, and cyclical trade problems provoked strikes and increasing unionisation. However, the early establishment of the coal industry had paved the way for the emergence over the century of engineering and shipbuilding industries, which diminished the region's dependence on coal and thus mitigated the consequences of the decline in its production.

The three study parishes saw their first pits sunk during the first third of the nineteenth century as an attempt to extend the production of household coal. This venture met with some success in Earsdon and Holywell, but only steam coal, itself a valuable commodity subject to growing demand, was found in Seghill. Many more pits were sunk during the course of the century in what was otherwise an agricultural landscape, the three parishes experiencing several periods of rapid growth, inmigration and building activity, linked to the fortunes of the coal industry. In Holywell and Seghill mining led to the development of new settlements as well as to the expansion of established villages and the creation of links to the rail network. In Earsdon parish, however, the existing village of Earsdon escaped change, and retained its Georgian agricultural charm despite the growth of surrounding pits. These were served instead by new settlements such as Shiremoor.[37]

The stereotypical image of a mining region as a series of socially isolated communities does not ring true in the case of the North East. The growth of the mines attracted considerable inmigration during the nineteenth century, and there is also evidence of substantial local migration from pit to pit in line with local openings and closures. Nevertheless, each of the mining settlements within this locale appears to have had a distinct community spirit, engendered through the relationship of the men with their work, as well as a clear social hierarchy produced by a hereditary element to employment and by a well-trodden progression through different types of pit work as men grew older. As is often the case in mining communities, where in general there were fewer female employment opportunities, women on the whole devoted their energies to their children and homes.[38] One source of female employment was the agricultural sector. In the 1890s one-quarter of Northumberland's farm workers were women, and the proportion had been higher in earlier decades.[39] While the county as a whole was mainly a sheep-farming region, in the neighbourhood of Earsdon arable farming was dominant.

Morland[40]

Northern upland farming is represented in the study by a group of nine civil parishes in the registration district of West Ward in the north-western part of Westmorland. Known in this volume as Morland, the area is on the eastern fringe of the Lake District, with Ullswater to the west, and the market towns of Penrith to the north and Kendal to the south. Around the turn of the century it was a community whose traditional ways of life were crumbling under the pressures of change.

Outmigration was always a necessary part of an upland rural economy where small family farms, restricted employment opportunities outside farming, and relatively low mortality were prevalent. During the second half of the nineteenth century, however, the pressures and propensities for outmigration increased. Although agriculture suffered less acutely in Westmorland than in other regions during the depression of the 1870s and 1880s, nevertheless pasture and arable acreage was reduced, holdings were amalgamated, and farm incomes became precarious as wool prices declined. Alternative sources of income evaporated as domestic industries such as textiles were eclipsed and seasonal labour demands in quarrying, mining and railway construction declined or were subject to increased regulation. A shortage of housing led simultaneously to a rise in the number of agricultural labourers 'living-in' as farm servants. Although agricultural wages were higher than in other farming areas, the alternative of industrial wages and urban life proved increasingly attractive to the young.

Those who remained in the area inherited the legacy of the agricultural depression. The trend towards farming sheep for lowland fattening and cattle for the Lancashire milk market, the declines in arable farming, in wool production for domestic and local textile industries and in ancillary local industries, made farming tightly dependent on specific external markets and reduced the diversity of the local rural economy.

The community was changing in other ways too. The growth in migration channels aided by the main north–south routeway at Shap, the arrival of the railway and tourism and the proliferation of information increased local knowledge of opportunities, conditions and ways of life in the wider world. New consumption patterns inevitably began to replace the relative self-reliance and frugality of earlier periods, and accepted styles of life came under duress. This state of change is exemplified in the Liberal challenge to the political dominance of the Lowther family, under whom local politics had been characterised by Tory paternalism, indirect control and deference. An emergent, if small, group of middle-class incomers provided a new base for political alignment and organisation in this period.

Pinner[41]

The eighth locale lay within the registration district of Hendon and comprised, by 1911, the newly developed middle-class community of Pinner. In the early nineteenth century Pinner was no more than a collection of small hamlets and farms around a large common meadow. The arrival of the railway at nearby Hatch End in 1837 heralded an era of gradual growth, which picked up in pace after the building of the Metropolitan Railway and Pinner station in the 1880s. The new arrivals tended to be of higher status than the native inhabitants, attracted by the well-served rural haven. Pinner had a good water supply and sewage system from the start of its expansion; a sewage farm and outfall works were completed three years before Pinner station was opened, and no doubt helped to attract the wealthy and middle classes. Although a middle-class housing estate had been built as early as the 1850s, however, the middle classes did not come to dominate the community until the suburbanisation drive in the late nineteenth and twentieth centuries. It was only in the 1930s that the large tracts of untouched land surrounding the village were finally built over and Pinner became a fully integrated suburb of London. Despite substantial house building and immigration in the late nineteenth century, the district still had a distinctly rural air until well after the First World War.

Agriculture was the main occupation in Pinner throughout the nineteenth century; there were still 61 farms in the district in 1907. Some arable farming remained at the turn of the century, but it was gradually being replaced by dairy farming to help to meet London's demand for milk and meat. Pinner was particularly famous for its hay, which was sold as food and bedding for London's horses. There was never any substantial industry in Pinner, other than chalk pits which had closed by the 1880s. Those not occupied in agriculture worked in building, transport, general labouring and domestic service. Others travelled outside the district to find work. A Kodak factory opened in 1891 at Wealdstone, some 2 miles from Pinner, and clerical work in London became more popular as a source of income for young men and women. As the population grew the local people took low-paid manual jobs, handing over their agricultural positions to those from adjacent parishes. Pinner was therefore not without its poorer population, concentrated in particular localities, whose housing stock shrank as cottages were torn down to build new estates, but the locale's character and tone were increasingly set by the commuting professional and financial middle class.

Saffron Walden[42]

The locale chosen to represent the agricultural districts of England's South East lies within the registration district of Saffron Walden in the north-west of Essex. Saffron Walden itself is not included in the study locale, which is entirely made up of rural tracts and small villages lying close to the Cambridgeshire and Hertfordshire borders. The most significant of these villages were Elmdon (with a population of around 500), Wendens Ambo and Newport.

The area was heavily agricultural and provides a classic example of the devastation and change wrought by the agricultural revolution. Essex had weathered the agricultural depression of the 1820s and 1830s with the aid of a limited amount of diversification. Livestock and the cultivation of livestock feeds had been introduced and fallow land had been eliminated. The mid-nineteenth century was an era of prosperity under this 'high-farming' regime, with the opening up of new markets through the railways. By 1875, however, cheap foreign imports from the Americas, the consequences of ignoring technical improvements such as land drainage, and a series of wet summers, brought renewed depression. Land values, rents and length of leases dropped dramatically. Low rents on good land attracted cattle farmers from Scotland and the North West, but cattle farming required only a third of the labour force demanded by arable farming. As a result there was a widespread exodus from the land: the parish of Langley lost 20 per cent of its population in the last decade of the century, while the parish of Clavering lost 25 per cent. Despite the change in their social and economic complexion, accompanying the outmigration of agricultural labourers, some parishes managed to maintain their populations over troubled years.

Stoke[43]

The six North Staffordshire pottery towns of Tunstall, Burslem, Hanley, Stoke, Fenton and Longton were united to form Stoke-on-Trent County Borough (hereafter CB) in 1910. The area was important with respect both to the pottery industry itself and to the nation's industry in general. In 1900 80 per cent of the country's pottery workers lived within a 5 mile radius of Stoke town hall, and in 1911 the newly created Stoke-on-Trent CB was the twelfth most populous urban area in England and Wales.

Although pottery (especially earthenware) was the dominant industry, mining was also a major employer. Iron production had flourished in the mid-nineteenth century, but declined after 1870 as the coal industry expanded. The pottery industry provided many employment opportunities for the wives and daughters of both potters and miners, although their work was largely confined to artistic finishing or to unskilled, low-paid work. Despite the very high female labour force participation rate, however, marriage was early and fertility high. Scholars have suggested that this was made possible by a combination of flexible work and employment practices in conjunction with well-developed kin and community networks. Such support networks contributed to the creation of close-knit plebeian communities. The pottery industry, however, was too diverse to foster much occupational or political identity. It consisted of many small family firms, and it was further fractured into product sectors: brick and tile, sanitary ware, electrical porcelain, crockery and china. There was little apparent residential segregation, the towns being overwhelmingly working class. Owners and industrialists lived elsewhere (Newcastle under Lyme), and only Hanley, from which the OPCS data for this locale are drawn, had any service or commercial role at all. Politically the towns were Liberal (moving to Labour in the twentieth century), but industrial relations were sectionalist and pragmatic.

The Potteries have often been portrayed as a relentlessly grim industrial working-class landscape. Poor terraced housing was interspersed by potbanks and dotted with marl pits and spoil heaps. The sky was darkened by industrial pollution and the spectre of alarmingly high mortality rates haunted the population. There is no doubt that some aspects of this portrayal are close to the truth, but in other respects it is an overly depressing picture. Although housing was poor, the majority of houses still being without water closets in 1911, back-to-backs and multi-occupancy, which made hygiene and health difficult to achieve in other industrial cities, were virtually unknown.[44] Further growth of the pottery industry in the early twentieth century, with high earnings, at least for men, and widespread employment opportunities for women and young people, lessened the impact of life-cycle poverty, male unemployment, sickness and early widowhood. Risks to health, however, were certainly higher than in many other cities: the use of lead in glazes was not controlled until 1895, and the problem of dust was not addressed until after the First World War. Furthermore, besides the dangers to its workers, the pottery and mining industries created environmental hazards for the whole area. The smoke from hundreds of potbanks and additional beehive kilns caused respiratory problems and, although Hanley was served by a private water company from 1870, the towns lacked a comprehensive sewerage and sanitation system until 1907, much later than most other cities of this size. The introduction of other types of public health intervention which proved beneficial in other industrial cities was also impeded by the fragmented administrative structure of the six towns, a situation left unresolved until 1910.

Swansea[45]

In the early nineteenth century Swansea had been both a genteel watering place and home to a bituminous mining and coal export trade. Copper smelting took place in the Tawe valley to the east of the town, and this led to the development of the port and thence to the town's prosperity: between 1880 and 1913 it was revelling in its heyday, enjoying economic growth, industrial power and social optimism. By 1911 the population had grown to 144,000. Copper production demanded a great deal of coal, and trade with Chile developed through the use of coal as a return cargo in copper ore ships. Local coal supplies were largely exhausted by the late nineteenth century, but the port continued to export coal from elsewhere in South Wales. By the turn of the century the copper industry was in terminal decline, but it had been replaced by the production of zinc, tinplate and steel. In 1891 Swansea produced 70 per cent of Britain's tinplate, 80 per cent of it for the export market. It also had a host of ancillary concerns to serve the metal and dock industries, and a particularly strong middle-class professional and commercial sector. Although the town was economically diverse, its fortunes were built upon an industrial base which was entirely production- and distribution-orientated, and there was no opportunity for vertical integration with manufacturing firms. Moreover, local industries were inextricably linked to exporting and the vagaries of foreign competition, and Swansea's fortunes began to decline in the inter-war period.

The metal industry based in the Tawe valley engendered compact communities, strongly nonconformist, Welsh-speaking and working class, living in bleak areas of gravel tracts and ashes where most of the vegetation had been destroyed by the byproducts of the copper industry. The middle classes, representing a powerful commercial, mercantile and professional elite, active in municipal affairs, resided in the much more salubrious western areas of the town. Although they were very different from the Tawe valley residents they shared their nonconformism, their Welsh identity and their tradition of lively community-based entertainment. It was these two sections of society which fostered the cultural renaissance of a 'new Welsh way of life' at the turn of the century. In contrast the occupationally more disparate eastern areas of the town were less community based. Their residents were more likely to be English or Irish migrants, lacking a common heritage and nonconformist culture, and employed more often than not as labourers on lower wages than the metal workers. Their housing was poorer, predominantly two-roomed cottages and courts, as well as more overcrowded. It was not just these eastern areas of the town, however, which were slow in receiving adequate drainage, water and sanitation. It was not until 1906 that Swansea achieved a water supply, and it had to wait until as late as 1920, when Labour wrested political control out of Liberal hands, before a comprehensive sewerage system was put in place.[46]

Walthamstow[47]

Although Walthamstow was located in Essex, 6½ miles north-east of the City of London, its development was intimately connected with that of the metropolis. In the early nineteenth century it was an agricultural and dormitory village, an exclusive rural retreat for city merchants. The opening of the Lea Valley Railway in the 1840s attracted the middle classes and it grew into a dormitory town. The opening of Liverpool Street station and the Chingford line in the 1870s, however, together with the introduction of the 'workman's fare', heralded the town's explosion into a working-class suburb. Its population mushroomed from 11,000 in 1871 to 21,000 in 1881, 46,000 in 1891 and 95,000 in 1901. Speculative builders set the pace of development, always keeping slightly ahead of population growth, and even today Walthamstow's characteristic housing stock is late-nineteenth-century terraced housing. Although predominantly working class in this era, it was socially more mixed than the East End. It included some areas inhabited largely by natives of rural Essex, as well as more affluent middle-class areas with larger houses and a higher standard of living, and poorer neighbourhoods inhabited by newer migrants from the East End.

A large proportion of those who had moved to Walthamstow from London returned daily to work in the capital. Within Walthamstow itself agriculture remained important during the nineteenth century, particularly dairy farming, which provided milk and meat for the London market. Other employment opportunities included brickfields until 1910, a pottery until 1918, abundant building work, and woodworking and furniture making, which employed skilled artisans who had moved out from the East End. Until the turn of the century there was little factory work in Walthamstow, but around 1900 the manufacture of electrical goods, vehicles, clothing and toys was established within the parish, together with a printing industry, providing work for both women and men. Commuting remained dominant, however: over 58 per cent of the occupied population still found employment outside the parish in 1921.

Despite being to all intents and purposes a suburb of the capital by the end of the Edwardian era, Walthamstow was not covered by London's administration. Nevertheless, having become a sanitary district in 1873, it saw considerable activity in public health matters. A sewage treatment works was established in the 1870s, along with a domestic refuse collection and a public dispensary. Despite such autonomy and activism, however, some important aspects of public health were dependent on developments in London. The water supply, for example, which was provided by the East London Waterworks Company, was inadequate until the formation of the Metropolitan Water Board in 1904, and the sewage system was not entirely satisfactory until it was incorporated into the London County Council system in 1928.

York[48]

York had been a town of regional importance from Roman times. With no urban rival to the north, south or east, it served as a market town for the surrounding agricultural districts. Its cattle market thrived until well into the second half of the twentieth century. In addition it was a centre both of secular and ecclesiastical administration, and a social focus for Yorkshire's gentry. A centre of cloth manufacturing in the fourteenth century, York was overlooked by the industrial revolution, and by the early nineteenth century it was considered to be in a state of decline, lacking any industry.

In the mid-nineteenth century, however, York emerged from its preindustrial state. Its position at the intersection of the main north–south land and east–west river routes made it a focal point in the national railway network. The railways, which arrived in the 1830s and 1840s, were the city's first really large-scale employer. By 1901 about 2,900 people were employed in their administration and operation, and a further 2,600 in the locomotive, carriage and wagon works. The locomotive works closed in 1905 but York became the main centre for carriage building for the North Eastern Railway Company (NER). The other major industry to arrive in York in the late nineteenth century, offering employment opportunities to both sexes, was confectionery, particularly chocolate. New machinery, a reduction in the import duty on cocoa beans, a decline in the price of raw materials and a rise in real incomes made conditions ideal for the expansion of this industry, although York became a centre largely by chance, through the enterprise and talent of entrepreneurs such as Joseph Rowntree. Rowntree's was the largest of the city's confectionery firms, although Terry's and M. A. Craven and Sons were also prominent. By 1910 some 5,000 workers were employed in York's sweet factories, and the city gained further economic variety with the arrival of a host of smaller industries, including flour milling, glassworks, optical instrument manufacture, printing, ironworks and building. The city was also the headquarters of the army's Northern command, and the site of barracks and other military institutions.

Despite the growth of industry in the nineteenth century, however, political power remained in the hands of the traditional elite, and therefore, although paternalistic charitable institutions were relatively abundant, collective provision and strategic investment in the town's environment and its public health facilities came pitifully late. Gas, water and tramways all remained in private hands into the twentieth century, and a MOH was appointed only when it became statutorily compulsory in 1872. Open drains, contaminated wells, privy middens and slaughterhouses were still common at the end of Victoria's reign. Such health hazards were exacerbated by the city's low-lying position, which made efficient drainage difficult to achieve. The imaginative philanthropy of the nonconformist Rowntrees, including an eight-hour working day in 1896, the construction of a garden village in 1901, and the introduction of pension schemes in 1906, is famous, but these were private initiatives, inevitably limited in their scope. No real effort was made to clear the slums within the city walls until the 1930s.

Having identified the very diverse 13 registration districts from which our data were to be drawn, the next stage was to locate the specific enumeration districts within each RD whose populations would provide the individual-level data to be computerised by the OPCS. This task was to prove far from simple, as described in section 2.4 below.

2.4 Selection of the enumeration districts within locales

With an upper limit of around 100,000 individuals to be transcribed per census year, each of the 13 study locales could be represented by 7,000–8,000 of their inhabitants on average. In general the rural registration districts identified for analysis held populations considerably smaller than this, and thus could largely be transcribed intact. However, as several of the registration districts selected encompassed large urban centres, only a subset of their constituent enumeration districts could form part of the study.[49] This immediately posed a problem. If analysis of change over the 20 years covered by the three censuses of 1891, 1901 and 1911 was to be undertaken as originally intended, then any changes in the geographic extent of the chosen enumeration districts could confound the findings.

Unfortunately, enumeration district boundaries can be highly inconsistent over time.[50] For each of the nineteenth-century censuses since that of 1841, the boundaries of the enumeration districts were determined some months before the allocated census day, being compiled as a series of written descriptions known as the plans of division. These were revised and rewritten for each census, and, despite the recommendation that registrars were 'to retain as far as possible the same enumeration districts as were used at the previous census', this ideal proved hard to fulfil.[51] It was not until the 1911 census that maps supplied by the Ordnance Survey were used as a means of defining the boundaries of enumeration districts.[52]

Despite searches within both the Public Record Office and OPCS, neither the plans of division nor the maps which replaced them could be traced. It appears that the plans of division may have been destroyed each decade as they were superseded by a new set. In their absence new maps had to be compiled using the description of the district given by each enumerator in the preface of his enumeration book in 1891 and

1901, and the compilation of the addresses covered in each enumeration district for the census of 1911.[53] The boundaries for well over 1,000 enumeration districts were reconstructed over the three census years in question for the 13 registration districts involved. Contemporary large-scale Ordnance Survey maps were used as a guide wherever possible.[54]

This time-consuming mapping process proved critical in selecting enumeration districts from each locale. Given that spatial consistency was viewed as highly desirable, enumeration districts whose boundaries remained stable or relatively stable over time were favoured. In rural areas there were few problems as the boundaries of enumeration districts tended to follow those of long-established civil parishes. In urban areas, however, the extent of enumeration district boundary changes often meant that the same geographical area could only be followed from one census to the next if a group, or 'cluster', of contiguous enumeration districts was chosen from each census. Ideally the aggregate geographical area of each cluster would have remained constant over time. In reality, however, the best which could be achieved in some cases was to minimise the aggregate level boundary change experienced.

The word 'sector' was adopted to signify the basic unit of analysis within the study locales. Table 2.4.1 demonstrates the point that while the number of enumeration districts representing each locale varies from census year to census year, the number of sectors does not. The number of sectors in a locale tends to be related to the volatility of enumeration district boundaries; where the rate of growth was great and enumeration district boundaries altered rapidly, fewer sectors could be delineated. In the case of Walthamstow this problem was so acute that no more than one sector could be identified. In contrast, the locales of Abergavenny, Saffron Walden and Morland contained, respectively, six, seven and eight sectors.

Fifty-three sectors were identified in all, each being given a name to indicate the neighbourhood, parish or district with which it was most closely associated within its locale. The sectors were then sequentially numbered across the alphabetically ordered locales, as shown in Table 2.4.2.

Table 2.4.1 also indicates the population representing each locale on the census nights of 1891, 1901 and 1911. In certain localities the path of population numbers is as expected from the histories outlined in the previous section: great growth in suburban Pinner and Walthamstow, notable decline in rural Morland and Saffron Walden. Robust comparisons should, however, only be made among sectors at any one point in time, as across time alterations to enumeration district and, therefore, sector boundaries may be effecting unsuspected changes. The population

Table 2.4.1 *Relationship between locales, sectors and enumeration districts in the OPCS dataset, 1891 to 1911*

	1891			1901			1911		
Locale	Pop.	No. of sectors	No. of EDs	Pop.	No. of sectors	No. of EDs	Pop.	No. of sectors	No. of EDs
Abergavenny	9,012	6	18	7,486	6	16	8,286	6	14
Axminster	4,867	5	10	4,814	5	7	5,178	5	7
Banbury	8,207	4	10	8,188	4	9	8,227	4	8
Bethnal Green	8,101	3	6	12,797	3	7	10,878	3	6
Bolton	7,194	2	8	7,328	2	7	6,698	2	4
Earsdon	3,726	3	4	4,232	3	5	5,583	3	4
Morland	5,096	8	14	4,339	8	12	4,160	8	12
Pinner	2,374	2	2	2,967	2	2	6,739	2	4
Saffron Walden	5,726	7	11	5,021	7	11	5,165	7	9
Stoke	6,645	3	5	7,253	3	7	12,368	3	7
Swansea	9,490	4	7	9,030	4	9	9,177	4	5
Walthamstow	5,799	1	4	10,950	1	7	12,391	1	7
York	8,285	5	8	8,435	5	8	9,755	5	7
Totals	84,522	53	107	92,840	53	107	104,605	53	94

Table 2.4.2 *The enumeration district clusters or sectors representing the OPCS locales*

Abergavenny	1	West Abergavenny Town	Pinner	32	Pinner West
	2	East Abergavenny Town		33	Pinner East
	3	Llanarth			
	4	Llanvihangel	Saffron Walden	34	Chrishall
	5	Urban Blaenavon		35	Elmdon
	6	Rural Blaenavon		36	Strethall
				37	Wendens Ambo
Axminster	7	Shute		38	Wicken Bonhunt
	8	Colyton		39	Clavering
	9	Colyford		40	Rickling
	10	Seaton			
	11	Beer	Stoke	41	Hanley North-West
				42	Hanley East
Banbury	12	Banbury Town		43	Hanley Central
	13	Neithrop			
	14	Chalcombe	Swansea	44	Llangafelach
	15	Chipping Warden		45	Swansea Old Dock
				46	Swansea New Dock
Bethnal Green	16	Bethnal Green West		47	Swansea West
	17	Bethnal Green North-East			
	18	Bethnal Green South-East	Walthamstow	48	Walthamstow

Bolton	19	Bolton South-West	York	49	York Central
	20	Bolton North-East		50	York East
				51	York South
Earsdon	21	Earsdon		52	York North
	22	Holywell		53	York South-West
	23	Seghill			
Morland	24	Shap			
	25	Strickland/Thrimby			
	26	Askham			
	27	Bampton			
	28	Barton			
	29	Lowther			
	30	Martindale			
	31	Pattersdale/Hartsop			

numbers for Bethnal Green demonstrate this problem. Unusually for an urban centre, the civil parish of Bethnal Green happened also to be coterminous with the Poor Law Union and the Metropolitan Borough of the same name. It also formed a complete registration district, the boundary of which remained constant across each of the three census years. Within the registration district, however, virtually no enumeration district had a constant boundary from one census to the next. The enumeration districts selected for this study were drawn from the 1891 and 1901 South Bethnal Green sub-district; after major reorganisation these lay in the South West sub-district in 1911. The chosen enumeration districts formed two sectors, but although the main core of these sectors remained the same from year to year, the match was not perfect, the change from 1891 to 1901 being the most marked. However, changes between 1901 and 1911 meant that by the latter year the sectors had reverted back more to their 1891 spatial form, although they retained some gains made in 1901. Thus, despite the resort to 'clustering' of enumeration districts, the fluctuating population numbers representing the Bethnal Green locale may possibly be ascribed solely to boundary changes rather than to any actual gain or loss of population.

While a boundary change *may* account for some of the differences across time, these are often trivial in comparison to the social or economic changes occurring within a sector. In the following analysis the impact of any boundary shifts is, it is believed, further reduced when the sectors are amalgamated into 'environments'. As will be more fully explained in chapter 3, section 3.5, sectors were classified as being of a particular environmental type on the basis of the occupational make-up of their workforce. The addition or loss of a few streets within a sector is most unlikely to be sufficient to cause that sector to be reclassified to a different environment. Changes at the environmental level are unlikely to be the consequence of boundary shifts at the sector level. However, the impact of such changes will be highlighted at the relevant points in the ensuing analysis.

Thus, acting under the guidelines laid down by OPCS, census data for 13 locales, drawn from 53 relatively constant spatial units, were selected for analysis and the data were transcribed onto magnetic tape. The resulting database was then edited and 'enriched' to aid analysis, as described in chapter 3.

Notes

1 A very few studies exist where researchers have had access to the civil registers. See for example Wrigley (1975) and Davies, H. R. (1994). The intricate

analyses possible using family reconstitution can been seen in Wrigley *et al.* (1997). Examples of the type of work possible when civil registers are available may be seen in Kemmer (1990) and Rainger (1995) where the authors had access to Scottish civil registers.

2 See *Fertility of marriage*, Part I (1917) and Part II (1923).

3 *Fertility of marriage*, Part II (1923), Tables XLVIII–LIII. For the form of the special questions in the Fertility Census, see Fig. 1.2.1.

4 See Szreter (1984, 1996b).

5 Details of the 2 per cent sample of the 1851 census are given in Anderson *et al.* (1977) and Anderson (1982). For some results, see Anderson (1988).

6 The selection of enumeration districts is further discussed in section 2.4.

7 The literature on the subject is vast. For an introduction to the issues, see Supple (1994) and the chapters by Floud, Pollard and Edelstein in Floud and McCloskey (1994); for a survey of the historiography, see Pollard (1989). For a recent collection see Clarke and Trebilcock (1997).

8 Ó Gráda (1994).

9 Feinstein (1990); McKinnon (1994).

10 Wohl (1983); Waller (1983), chs. 3, 6 and 7; Hardy (1993).

11 There were 1.5 million trade union members in 1893, just under 2 million in 1905, but over 4 million by 1913. Cook and Stevenson (1983), pp. 152–3.

12 Morris, J. (1968); Baines (1985).

13 Baines (1985), ch. 5; Harris, J. (1993), p. 44.

14 It should be noted that many of the Jewish immigrants, at least 30,000, were subsequently repatriated.

15 Rowntree and Kendall (1913); Howkins (1991).

16 Ó Gráda (1994).

17 Harris, J. (1993), pp. 97–8.

18 Lee, C. H. (1994).

19 Jefferys (1954); Mathias (1967); Hosgood (1989).

20 See, for example, Rowntree (1941); Young and Willmott (1957); Stacey (1960); Robin (1980); Sharpe (1988); Dupree (1994).

21 It should be noted that Stoke-on-Trent was the twelfth largest town in Britain and Bolton was the seventeenth.

22 The authors wish to thank David Stone, Michael Griffiths, Julie Duncan, Tanya Hoole and Richard Wall for their very valuable contributions to the compilation of the histories detailed in this section. Their reports, most including a bibliography, are held by the Cambridge Group.

23 See especially Browning (1906); Minchinton (1969); Davies, E. J. (1975); Bayley (1980); Morgan, K. O. (1981); Preece (1985); Tasker (1986); Asteris (1986–7); Atkinson and Baber (1987) Jones, I. G. (1987); Howell (1988); Knight (1989); Bradney (1991); Big Pit Mining Museum (1992).

24 Thomas, B. (1962) esp. the chapter on 'Wales and the Atlantic economy'; Baines (1985); Williams, J. (1988); Knight (1989).

25 Howell (1988).

26 See especially Kelly and Co. (1893, 1902, 1910, 1923); Bickley (1911); Burton (1954); Oppenheim (1968); Thompson, W. I. (1980); Walton (1983); Sellman (1985).

27 See especially Stacey (1960); Everitt (1974); Potts (1978); Trinder (1981, 1982); Crossley (1984).

28 The population of the Municipal Borough of Banbury in 1911 was only 13,500.

29 See especially Besant (1901); Booth (1902); Vale (1934); Young and Willmott (1957); Briggs (1963); Stedman Jones (1976); Waller (1983); Feldman (1986, 1989, 1994); Clarke, M. (1987); Palmer (1989).

30 Booth (1902), Vol. II, *Sheets and Population Classified*, Appendix, p. 24. The 1911 figure is reported in Young and Wilmott (1957), p. 23.

31 It was this company's contaminated Old Ford reservoir in Bethnal Green which caused the 1853–4 London cholera outbreak.

32 See especially Clarke, A. (1899); Victoria County History (hereafter VCH), *County of Lancaster* (1906); Saxelby (1953); Foley (1973); Evans (1974); Kenny (1982); Longworth (1987); Walton (1987).

33 Walton (1987).

34 Dr E. Ballard, 'Report to the Registrar-General on sanitary conditions in Bolton and District', 1871, quoted in Saxelby (1953), p. 78; Clarke, 'Effects of the factory system; Medical Officer of Health Report', 1914, quoted in Mawson and Sons (1916), pp. 86–7.

35 Spatial division, in the form of residential segregation between those in different occupations, may explain why the selection of enumeration districts we have underrepresents married male textile workers.

36 See especially VCH, *Northumberland* (1907); Haselhurst (1913); Smailes (1935, 1938); Middlebrook (1950); House (1954); Pawson (1961); Davison (1973); Watson (1976); McCord (1979); Sturgess (1981); Williamson, B. (1982); Thomson, H. (1984); Church (1986); Moran (1988).

37 Shiremoor was probably built in the 1870s when the census returns indicate that Earsdon parish experienced a particularly large growth spurt. Shiremoor was located on a railway junction, and may have been established specifically as a mining settlement by a colliery company.

38 It should be noted, of course, that both Bolton and Stoke, which contained significant mining communities, were exceptions to this general rule concerning 'colliery culture'.

39 Gray (1984).

40 See especially Garnett (1912); Bouch *et al.* (1961); Marshall, J. D. (1969); Millward and Robinson (1970); Marshall and Walton (1981).

41 See especially Ware (1955–7); VCH, *Middlesex* (1971); Druett (1980); Ball (1981); Golland (*c.* 1984); Kirkman (1986); Jackson (1991).

42 See especially VCH, *Essex*, Vols. I and II, (1903, 1907); Robin (1980).

43 See especially Warburton (1931); Morgan (1942); Beaver (1964); VCH, *Staffordshire,* Vols. II (1963) and III (1967); McKendrick (1971); Burchill and Ross (1977); Lamb (1977); Moyes (1979); Weatherill (1986); Whipp (1987, 1990); Sarsby (1988); Dupree (1989, 1994).

44 Hawke-Smith (1985), p. 37.

45 See especially Stead (1940); Williams, D. T. (1940); Brennan *et al.* (1954); Thomas (1959); Rosser and Harris (1965); Balchin (1971); Morgan, K. O. (1981); Williams, G. A. (1982); Smith, D. (1984); Daunton (1986); Jones, I. G. (1990).

46 Harris, R. (1934); Jones, I. G. (1990), pp. 128–9.

47 See especially Booth (1902); Houghton (1929); Hatley (1935); Wall (1968); VCH, *Essex,* Vol. VI (1973); Law and Barry (1978); Pond (1982); Walker, H. W. (1986).

48 See especially Rowntree (1902, 1941); Duckham (1956); Willmot *et al.* (1959); VCH, *County of York: City of York* (1961), pp. 254–310; Armstrong (1974);

Feinstein (*ed.*) (1981), pp. 109–59; Nuttgens (1989); Peacock (1992a, 1992b).

49 Ideally, it would have been best to undertake a systematic sample of households within each of the 13 places, selecting every *nth* household across the entire locale, where the sampling fraction was determined by the ratio between the total population size and the appropriate desired sample population size for a given census year. However, as explained at the beginning of section 2.2, OPCS stipulated that only whole enumeration districts would be transcribed.

50 See Lawton (1978), pp. 122–7.

51 Quoting a General Register Office document concerning census returns: correspondence and papers held at the Public Record Office, Kew (hereafter PRO): RG19/45/10.

52 This decision was very much influenced by an internal survey of the 1901 returns for the London district of Chelsea, which illustrated that the number of enumeration errors would have been much reduced if maps had been used to determine the boundaries of enumeration districts. PRO RG19/45 'Memoranda re – census of 1911', Appendix B.

53 With the introduction of the Hollerith card punching, sorting and counting process at the census of 1911, enumerators were no longer required to copy the contents of the householders' schedules into bound books. Instead the schedules themselves were loosely bound together by enumeration district and forwarded to the Census Office in London for processing. Thus, the 1911 census marked the end of the era of census enumerators' books. Enumerators were still required to keep 'books' for the census of 1911, yet these recorded only the addresses of the households visited, the name of the householder and the number of schedule forms delivered to that address and subsequently collected, thus enabling the enumerator to keep a track of his movements. It appears that these too were destroyed once the census materials had been processed.

54 If a locale fell within one registration sub-district then only the descriptions of the enumeration districts within that sub-district were transcribed.

3

Studying locations

3.1 From census enumerators' books to data files

Once the enumeration district clusters or sectors chosen to represent each of the 13 locales in each census year had been identified, the information recorded in the relevant enumerators' returns had to be converted into computerised data files.

The transcription of the returns to magnetic tape was carried out by OPCS to maintain the confidentiality of the original material. Names and addresses were not transcribed so that anonymity was provided, but otherwise the files were as far as practically possible a faithful transcription of the original returns.[1]

The files brought with them two sets of problems which had to be addressed before analysis could proceed. The first set of difficulties were those created by the census-taking process itself, while the second set were encountered when transforming the transcribed records into an analysable dataset. The present section deals with the latter set first, outlining the pitfalls faced and the remedies adopted. Sections 3.2 and 3.3 then address the issues arising from the changing nature of the census-taking process and procedures, before sections 3.4 and 3.5 lay out the analytical concepts and expediencies utilised within the research framework in order to overcome the constraints of the data.

On receipt of the data tapes a series of checks verifying the accuracy of the source material and of the transcription was carried out, and amendments were made to the files where necessary. Then, in order to facilitate subsequent analyses, most of the fields of information within the data files were systematically coded. Although the two steps can be seen as separate processes, they proceeded in conjunction with one another as any necessary corrections or amendments were implemented via the coding variables added to the database, thereby allowing the original data to be retained for the purposes of reference.

A first consistency check was to ensure that the amount of data received conformed to expectations. For the first two census years the numbers of individuals and households could be checked against the numbers recorded by the enumerator in the introductory pages of each enumeration book, to which the researchers had controlled access after signing the Official Secrets Act. However, given that from 1911 onwards census enumerators did not copy householders' schedules into *pro forma* books, the population sizes and total number of households were not readily available for enumeration districts in this census year.[2] For those rural districts where the boundaries of a given enumeration district, or group of adjacent districts, were co-terminous with those of a civil parish, the number of households and population size of the transcribed file could be matched against those recorded for the parish in the published reports of the census, but this was not possible in the more urban areas.

In some three-quarters of the checkable districts the observed population size failed to match the expected figure. In a small minority of these cases the number observed was in fact too high, with the details of some stray individuals having been entered twice. Such cases were tracked down and deleted. It proved much more common, however, for the check to point to fewer individuals than expected having been entered. Unfortunately, there was no way of re-creating the missing data; such shortfalls simply had to be accepted as unresolvable transcription errors. The 'missing person' count hardly ever exceeded a rate of one per thousand, however; the greatest omission occurred in sector 11, the parish of Beer in the Axminster locale, in 1891, when 49 individuals, or 5 per cent of the expected population, were estimated to be missing from the transcription. This, however, was exceptional.[3]

In creating additional coded variables to enrich the dataset, two distinct categories were recognised: those which might be termed 'reference' or 'identification' codes, and those which classified or standardised the essentially textual responses recorded in the original documents. The reference codes, which effectively define the location of an individual within the community and within the database, are discussed in the remainder of the present section. The classificatory variables form the focus of section 3.2.

In any one census year an *individual* is reported to be residing within a *household.* That household is situated within an *enumeration district,* and thus forms part of a *sector* in the OPCS study. One or more sectors represent a particular *locale.* By defining a mutually exclusive code for each level of this hierarchy every individual, household or sector is provided with a unique 'reference' within the database to aid identification.

While years, individuals and the spatial units are reasonably easy to identify, 'households' can be rather more problematic. The census machinery enumerated individuals, or groups of co-residing individuals, on so-called 'householders' schedules'. Household units were the residential element of physical structures, principally houses. However, as with most things connected with the census administration during the study period, the definition of 'household units' changed over time, and this meant that the way in which census schedules were distributed also altered, further modifying the view of exactly what, or who, constituted a household in the census returns.

In theory the census office was clear in its notion of what constituted a house. In the 1911 census 'houses' were defined as follows:

(a) ordinary dwelling houses and dwellings over shops
(b) houses converted for the occupation of two or more families
(c) maisonettes or double houses
(d) blocks of flats and model dwellings, each block reckoned as one house irrespective of the number of distinct suites of rooms inhabited by separate families
(e) blocks of shops with residences above
(f) hotels, clubs and boarding houses
(g) institutions such as workhouse establishments, hospitals, asylums, barracks, schools, etc.
(h) warehouses, offices and business establishments (only when inhabited by resident caretakers or others).[4]

Over the course of the nineteenth century there had been considerable confusion as to who, within each house, should receive census schedules and have the responsibility for completing them.[5] The position of lodgers was particularly unclear until 1901, when enumerators were instructed to leave schedules:

for the head of the family occupying the whole or part of a house. NOTE – A '*family*' is held to include a man, and his wife and children (if any), also any relatives, visitors, servants, and *persons boarding with the family, and residing together under one roof*.

for a lodger (with or without family) separately occupying a room or rooms, *and not boarding with any family in the house*.[6]

With this instruction the intention was clear: independent lodgers formed separate households in their own right; boarders did not. This point was reinforced in the census of 1911 when the census schedules ordered that 'If a house be let or sub-let to two or more occupiers each occupier of a part of the house must fill up a schedule for his part of the house. Boarders are not to be considered as separate occupiers.'[7] The OPCS data suggest that boarders formed approximately 4 per cent of the population, sharing meals and possibly other family amenities with their 'hosts'.

While the definition of the household has important implications for our understanding of the distribution of census schedules, it is not fundamental to the present study, where the principal focus of attention in analysis falls on another group of related individuals: the *conjugal family unit*.

Individual residents within households can be grouped into one or more conjugal family units, or CFUs.[8] Such units are highly suited to demographic studies as the kernel of their definition is the parent–child relationship. Although the definition of a household may change, a CFU is still a CFU regardless of whether its members are enumerated as an independent household or as sojourners within someone else's household. An individual's position within a household may change, but his or her position within a CFU does not. Households can, of course, hold multiple CFUs. In defining these groupings it is important to realise that no one individual can simultaneously be a member of more than one CFU.

Conjugal family units take one of three basic forms: a couple without children; a couple with a never-married child or children; or a lone parent with a never-married child or children.[9] When children marry they effectively exit their parents' CFU to form their own, and once having exited the parental CFU children cannot rejoin, even if they subsequently become widowed or separated and move back in with their parents. Despite the use of the term 'conjugal', such units can be formed through non-marital unions; a consensual union between two unmarried individuals could be regarded as a CFU, as could a single unmarried mother and her illegitimate offspring. However, given the range of information available from the historic censuses and the general reluctance in the late Victorian and Edwardian eras to admit to illegitimacy or non-marital unions, the ability to detect any such relationships in censuses of the period is extremely limited. Out of a total of 22,162 separate CFUs identified in the OPCS data for 1911, for example, only 69 could confidently be identified as the result of single parenthood and only one as a result of a non-marital union. It is also important to realise that in most census studies, as in the data for 1891 and 1901 discussed here, only co-resident relationships can be taken into consideration because of the constraints of the data. Consequently, a couple identified and classified as 'childless' might be so either because the union is genuinely barren, or alternatively because their offspring have all moved away from home, or have all died. Because of its additional questions, however, the 1911 census provides more concrete evidence of a couple's childbearing history. It should be noted, finally, that all those described as 'visitors' in the census returns were not, indeed often *could* not be, assigned to any CFUs. Because of this, and other ambiguities in their position, 'visitors' were excluded from virtually all analyses reported in the succeeding chapters.[10]

Identification of conjugal family units within individual-level census data is not always straightforward, requiring the examination of the combinations of relationship to head of household, age, sex and marital status. Order of enumeration, birthplace or even occupation may also be used to resolve puzzling cases. The difficulties involved were exacerbated in the present study by the anonymised nature of the data files. Where it was impossible to remove an ambiguity, the individuals involved were removed from any further analysis involving the variable in which the ambiguity appeared.

Being unable to consult the original documents, any logical inconsistencies identified within the data could only be amended by accepting as correct the outcome which would resolve the inconsistency with the least number of changes. This process was aided by a predetermined set of priorities in terms of likelihood of error. To take a simple example: if in 1911 an individual was detected with a relationship to the head of the household given as 'daughter' but with an age recorded in the male age column rather than the female, then the sex was corrected to 'F' on the assumption that the enumerator or the keyboard operator would have been more likely to have mis-placed the age information than to have mistakenly entered 'daughter' rather than 'son'. In normal circumstances, of course, such an ambiguity would be removed through resort to the individual's forename.

Surname information would have helped to untangle the relationships in a household where, for example, a group of individuals is listed with the following relationships: head, wife, son-in-law, daughter, grandson, daughter, son. The first three individuals are recorded as married and all the rest are recorded as single. Is the grandson the child of the son-in-law or the offspring of someone else? The son-in-law's wife could, of course, be absent from the household on census night, but then why was the first daughter listed between the son-in-law and the grandson, separated from her siblings at the end of the enumeration? In such a case, provided that the recorded ages were appropriate it would be assumed that the first daughter's marital status had been wrongly entered as 'single' rather than 'married'. Making this one simple change resolves the rest of the ambiguities within the household and allows the family units to be defined.

It may be argued that some of the decisions taken in the process of clarifying ambiguous data were arbitrary in nature and may have biased the resulting database towards preconceived notions of the structure of families and households in the past. However, to have simply left the ambiguous cases unresolved or to have deleted them from the file would have introduced bias of a different sort. The procedure followed was felt to be justified by an exercise comparing 1891 data for the parish of Colyton in the Axminster locale, both as received from OPCS and once amendments had been made, against a microfilmed copy of the original census enumerators' books, released to the public in 1992. This exercise revealed that a 'correct' decision had been made in over 90 per cent of the ambiguous cases.[11]

Table 3.1.1 summarises the findings of this validation exercise. Certain transcription errors, such as the minor mistyping of ages – 43 for 45, say – or abbreviated renderings of an entry, for example 'domestic servant' rather than 'domestic servant, housemaid', could not be detected through logical consistency checks and only came to light when matching the data line by line against the original source. While such errors are impossible to detect and therefore could not be corrected, they were largely insignificant in terms both of number and substantive implications.

One point where the census returns used in the present study differ substantially from those returned to the census authorities is in their treatment of the 'institutional population'. While the vast bulk of the population were enumerated in private homes, others were enumerated in so-called 'institutions' – schools, hospitals, barracks, hotels and workhouses. Institutions, defined from 1891 onwards as being home to more than 100 inmates, were enumerated using separate and specially designed enumerators' books. These were explicitly excluded when the selection of census material for the current project was made.[12]

Many 'institutions' comprised considerably fewer than 100 inhabitants, of course, and such 'quasi-institutions' were enumerated in the standard books using standard schedules. Where these were encountered in the OPCS dataset used here, resident individuals were excluded from analysis, just as if they had been resident in one of the larger institutions. However, in the case of the quasi-institutions this exclusion was not extended to 'keepers' and their families; the headmaster, his wife, children and servants resident in a school would all be counted as a 'normal' family household and part of the non-institutional population.[13] The

Table 3.1.1 *Errors detected for the parish of Colyton, 1891, comparing the OPCS material with microfilms of the original census enumerators' returns*[a]

Number of ages incorrectly entered			Number of errors other than age		
Years out (N)	Persons (N)	% of total pop.	Error	N	% of total pop.
1	5	0.23	Birthplace mistyped	46	2.14
2	7	0.33	Birthplace queried	2	0.09
3	3	0.14	Birthplace wrong or left out	7	0.33
5	5	0.23	Elements of birthplace left out	2	0.09
6	15	0.70	County of birth mistyped	1	0.05
7	3	0.14	Incorrect dittoing of birthplace	7	0.33
10	5	0.23	Occupation mistyped	12	0.56
18	2	0.09	Occupation wrong or left out	2	0.09
20	1	0.05	Words left out of occupation	8	0.37
30	4	0.19	Incorrect dittoing of relationship	1	0.05
40	1	0.05	Data entered in wrong field	3	0.14
60	1	0.05	Whole entry for person left out	6	0.28
Total	52	2.42	Total[b]	97	

Notes:
[a] Total population of Colyton parish = 2,152.
[b] In certain instances more than one error may have occurred in the return of a single individual; therefore no percentage of the total population experiencing 'errors other than age' is provided.

same logic applied in the case of hotel managers, lodging-house keepers and the like.

The number of married couples residing together in institutions was very small, institutional life being principally a life-cycle phenomenon, concentrated among the old and the young.[14] Thus, the absence of the institutional population in the context of the present study should not be seen as a significant hindrance to the analysis of fertility and child survival patterns.

While checking the data for internal consistency is clearly important, an understanding of the material collected by the census-taking machinery is necessary before analysis and interpretation can proceed. In the sections which follow, responses from the 1891, 1901 and 1911 censuses will be examined. Section 3.2 considers data items routinely requested in each census (age, sex, relationship to head of household, marital status, occupation and birthplace), and section 3.3 looks more closely at the special fertility questions asked in 1911. In both cases the scope of the questions, the way they were phrased, and the problems associated with the way in which each inquiry was answered are considered, and the implications for interpretation are discussed.

3.2 Understanding the census variables

The census is one of the most used of all historical sources.[15] It is the only source which provides a complete cross-section of the population: a picture of all strata of society for each city, town and village across the country, with each individual, family and household recorded on a seemingly equal footing. As a result, much has been written not only on findings derived from census-based research but also on the censuses themselves and their interpretation and use.[16] Despite this, however, the census is still often misinterpreted and misused.[17] Moreover, in the case of the three census years used in this study (1891, 1901 and 1911), the details of the source are still largely to be discussed, since the returns for two of the three years remain closed to inspection and much is still being learned concerning the most recently opened, those of 1891.[18]

While the basic information sought at each census on the main characteristics of the respondents did not differ, the questions eliciting the information did alter over time, and on occasion this had consequences for comparability. A very brief résumé of the history of census-taking in Britain therefore contributes to an understanding of the data on which the present study rests.

A brief review of census history 1801–1911

The first British census, taken in 1801, and the three which followed in 1811, 1821 and 1831, were not overly ambitious and amounted to little more than headcounts of the population. In 1841, however, responsibility for the taking of the census moved to the General Register Office (GRO).[19] From its inception, the GRO's most important task was to collect and compile vital demographic statistics based on the registration of births, marriages and deaths.[20] Its intellectual work and output in its fledgling years were firmly rooted in a medico-biological view of society, in which concerns over the differential levels of mortality were uppermost. Such ideas found one of their greatest champions in William Farr who, as Superintendent of Statistics from 1838 until his retirement in 1880, used the publication outlets of the GRO to fight an environmentalist-orientated public health campaign and to promote his theories concerning the zymotic transmission of diseases and the desirability of workers' medical insurance.[21] Indeed, it has been claimed that, despite their stock-in-trade use by social and economic historians in depicting the economic development of the nation, the reports and publications of the GRO for much of the nineteenth century, including those associated with the census, were essentially medical in aim, and to interpret them in any other light is to misunderstand their prime objective.[22]

From 1851 to 1881 the census questionnaire remained virtually unchanged, the information requested ranging across address, names, relationship to household head, age, sex, rank, profession or occupation, birthplace and disability. Local registrars appointed enumerators who distributed separate census schedules to each household for the householder to complete. The completed schedule was collected and checked by the enumerator after census night. The information was then copied into enumerators' books, the books for each registration district being dispatched to London for further checking and tabulation.[23] This system of data collection has remained fundamentally unchanged ever since, the only notable alteration being that from 1911, and the introduction of computational technology, enumerators' books were dispensed with and the householders' schedules were dispatched directly to the census authorities.

The medical 'bias' in the census questions and in the interpretation of their results did not go unnoticed in those circles seeking information on economic indicators from this most central of government surveys. Farr's retirement in 1880 and his replacement by William Ogle may have been significant, as may the displacement of concerns over public health from the centre of the political stage, but it was certainly the case that from the 1880s lobbyists for a change in census-taking, using the Royal Statistical Society as a base for debate and led by men such as Alfred Marshall and Charles Booth, increasingly found their voices heard. In particular they gained a useful and powerful ally in the Board of Trade, and in 1891 the census included an entirely new question which required individuals to indicate whether they were either an employer, an employee or worked on their own account.[24] In 1901 individuals were, in addition, asked to state whether or not they followed their trade or industry 'at home', and in 1911 further employment details were requested. The latter schedules, as well as the special 'fertility' questions discussed in section 3.3, also included a new question on 'nationality' to be answered by all individuals 'born in a Foreign Country'.[25] Yet despite this increasing focus on employment, control of the census remained in the hands of the GRO with its public health agenda.[26] Indeed, in some respects the 1911 census was the GRO's finest hour in terms of its medical project, attention being focused away from economic and employment issues to the most detailed investigation of fertility and infant mortality trends that had ever been conducted in this country.

Considering the census variables
Given the changes which the census was undergoing between 1891 and 1911, a close inspection of the key variables available for analysis is necessary to understand many of the results reported in the following chapters. Certain variables, such as sex and age, remained the same over the three censuses, but others saw subtle word changes in the questions designed to elicit the necessary responses, and some others were completely new additions. This section takes a closer look at seven key variables used in the present study. Section 3.3 puts the fertility questions exclusive to the 1911 census under the microscope.

Relationship to head of family The information contained in the census which is most fundamental to the identification of conjugal family units is that given in the column headed 'relationship to head of family'. There was obviously some scope for confusion between 'head of the household' and heads of different families within that household. As with previous censuses, those of 1891, 1901 and 1911 contained no explicit instruction as to how this question should be answered. The appropriate column of the schedule form simply asked the form-filler to 'State whether Head, or Wife, Son, Daughter, or other Relative, Visitor, Boarder, or Servant', for each individual who was present in the house on the night of the census. In the great majority of cases this information was sufficient to assign individuals to their 'biological families' or conjugal family units for the purpose of analysis.[27]

Marital status The censuses of 1891 and 1901 both required a statement to be returned for 'all persons, except young children' on their 'condition as to marriage'. They were to return either 'married', 'widower', 'widow' or 'single' in the appropriate column; there was no option to indicate that a person was 'divorced' or 'separated'.[28] On the 1911 schedule these categories remained unchanged, but the instruction now specifically applied to 'all persons aged 15 or upwards'.[29] It must be assumed that a certain proportion of couples were 'living as married' without a marriage certificate, but the extent of this phenomenon is very hard to judge.

From the individual-level census returns it is possible to see what proportion of 'married' men and women were living apart from their spouse on census night. The figures for each of the OPCS locales in 1911 are given in Table 3.2.1 Certain locales can be seen to be more prone to this

Table 3.2.1 *The percentage of women and men aged 15 and over who, although returned as 'married' on the census forms, are not living with their spouse on census night, 1911, by OPCS locale*

Locale	Females	Males
Abergavenny	4.9	5.5
Axminster	8.3	5.5
Banbury	4.9	5.4
Bethnal Green	6.9	4.2
Bolton	9.3	5.8
Earsdon	3.8	3.4
Morland	6.5	6.5
Pinner	6.9	2.3
Saffron Walden	4.0	2.9
Stoke	8.2	5.2
Swansea	6.6	6.6
Walthamstow	5.1	3.4
York	6.8	4.8

phenomenon than others, with Axminster, Stoke and particularly Bolton standing out when women are considered. With approximately one in 12 women in these locales being without a spouse, the connection with female employment opportunities seems a significant one. Generally, the percentage of married men whose spouses were absent on census night is rather smaller than that for married women. In Pinner, for example, only one married man in 40 spent census night 1911 apart from his wife. However, in both Abergavenny and Banbury proportionately more men had their spouses 'absent' than women. It is not possible, of course, to differentiate between married individuals who are separated from their spouse on a short-term basis, say overnight, those separated on a long-term basis, perhaps while the husband was away at sea or posted abroad in the Army, and those permanently separated by agreement or desertion. Indeed, many women who were in fact not married may have reported themselves as having a spouse in order to disguise the illegitimacy of children living with them. The reasons behind, and implications of, the variations in proportions married, widowed and single from locale to locale are discussed in detail in chapter 5.

Sex There is little to be said about this variable. In the censuses of 1891 and 1901 respondents had to write 'M' for male and 'F' for female in a column headed 'Sex'. In 1911 the schedule reverted to a format seen in earlier censuses, where the responses on age and sex were combined in a double column and males put their ages to the left of a dividing line and females to the right. Logical inconsistencies such as an 'M' individual reported in the 'relationship to head' column as a 'daughter' could be easily picked up, but in the absence of names it could never be ascertained with complete certainty in which column the true mistake lay, although occupational data could be indicative in certain circumstances – 'housemaids' and 'seamstresses', for example, were unlikely to be male. No analyses with respect to fertility or child survival were carried out differentiating by children's gender as only that of children staying with their parents on census night could be ascertained. Inaccuracies in sex-reporting, although corrected where possible, were not therefore considered to affect the study results.

Age The instruction relating to age given between 1891 and 1911 was that individuals should record their age at *last birthday* and that infants under one year should be entered as 'under 1 month, 1 month, 2 months &c.'[30] The schedule for 1911 also noted at the top of the page that 'returns are not to be used for proof of age, as in connection with Old Age Pensions, or for any other purpose than the preparation of Statistical Tables'.[31] This statement relates to the Act of 1908 which instituted means-tested, non-contributory pensions for British subjects resident in the UK aged 70 and over. Work on the Irish census of 1911 has shown that many people exaggerated their ages in the hope of qualifying for a pension, but the situation in England and Wales does not appear to have reached Irish proportions.[32]

Given the importance of age to the examination of patterns of fertility and mortality, however, the ages of individuals as recorded in the study censuses require particular scrutiny. Census enumerations are prone to age-misreporting, as a result either of deliberate falsification or of unintentional inaccuracy, and nineteenth century British censuses were no exception.[33] Females invariably recorded higher levels of discrepancy (in terms of volume and degree of variance) and it appears, as Higgs has put it, that 'the standard of age reporting plainly varied from place to place'.[34] Lee and Lam, in a study comparing the relative sizes of age cohorts in the censuses of 1821 to 1931, and adjusting appropriately for migration and using life table survival ratios, concluded that ages tended to be exaggerated in the oldest age groups, and that there was a general overstatement of the number of females aged 20–24 and a deficiency in the number of both sexes aged 55–59. Significantly, however, they acknowledge a general and steady improvement in age reporting across their study period.[35]

The census authorities at the turn of the century in England and Wales were clearly concerned about the problem of age-misreporting. The census report of 1911 included for the first time an analysis of age distribution by single year for the whole country.[36] This analysis highlighted the extent of age misstatement and prompted the compilation of a special report.[37] This report, too, found that the problem of misstatement was diminishing, although it did concentrate on the graduation of ages and therefore missed some of the potential error. Three main sources of error were identified: rounding of ages concentrating on numbers ending in zero from age 30 upwards; recording age at next birthday rather than last birthday, with a particularly marked deficit amongst those aged 1 as opposed to those aged less-than-1 or 2; and recording even rather than odd ages.

It is of relevance that concern over age-reporting remained and that in 1921 the census required individuals to record their age in years and months, with infants under one month to be entered as such. The intention was to engender greater accuracy, and this largely proved to be the case.[38] The *General report* for the 1921 census undertook an analysis of age-reporting by comparing the numbers recorded at certain ages in the census with the size of the equivalent birth cohorts, allowing for mortality and migration. Some of the reported findings had implications for the interpretation of information on age as reported in previous censuses.

In 1921 there was still a marked deficit in the numbers of infants reported to be less than 2 years old. However, while it was estimated that in 1911 the enumeration of infants of this age was some 6.8 per cent short of the number of births recorded between April 1909 and April 1911, in 1921 the shortfall had shrunk to approximately 2.8 per cent.[39] Initially this was explained in terms of the tendency to report age at next birthday for young infants rather than current age.[40] However, given that the estimated deficits in the recorded numbers of under-2 year olds were not compensated elsewhere, the *General report* concluded that the shortfall of infants 'in the absence of a better explanation, must be due to the omission of young children from the returns'.[41] This probable underenumeration of infants must be borne in mind in the discussions and analysis of fertility and infant mortality which follow, although no adjustments to make allowance for this presumed omission have been made, because of the difficulty of identifying variations in omission rate among spatial, social or marital duration groups.

The 1921 analysis also revealed that there had been 'deliberate misstatement of age by a large number of females', particularly in the 24–28 age group, females tending to overstate their ages.[42] These conclusions are somewhat problematic because of compounded errors when cohorts are 'survived' from one census to the next, and because of the difficulty in allocating accurate migration estimates. It may be that the excess of women in their twenties was the result at the national level of immigration from Scotland, Ireland or abroad, to jobs in service. Visible within the OPCS population, when locale-level age pyramids are drawn, the excess is seen to be concentrated in particular locations, thus supporting the hypothesis that migration may have been the root cause. The enormous growth engendered by speedy suburbanisation in Pinner between 1891 and 1911, and the predominant role of women in that growth, as shown in Figure 3.2.1 for example, contrasts sharply with the experience of both Bolton and Earsdon. Thus again, although the significance of the 1921 findings on age are acknowledged, no attempt has been made to adjust women's age in the fertility and mortality calculations, partly because any amendment would have to be locally specific and partly because it seems that they may well have been more accurate than previously thought.

The more general problem of persons returning their age rounded to a number ending with a 0 or a 5 can be shown to have diminished within the OPCS population by 1911. The Whipple index was applied separately to males and females in each OPCS locale in 1891, 1901 and 1911. An index of 100 signifies no tendency towards 0 or 5 age-heaping.[43] In 1891 11 of the 26 groups considered by locale and sex returned an index of over 115. By 1911 this had fallen to just one. Age-heaping had not been eradicated but the situation was much improved.

Occupation Occupation holds a particularly special place in the historic census material of countries such as Britain, where respondents were not asked directly to record their income, since invariably it is the key piece of information which historians have at their disposal in order to determine the economic and social status of the respondent or the respondent's family.[44] In the official reports of the 1911 census much emphasis was placed on the analysis of fertility and child and infant mortality patterns according both to the occupation and the social class of the husband in a given family.

For the period 1851 to 1881 the sole question on employment, which asked individuals to state their 'Rank, Profession or Occupation', remained largely unchanged. However, as outlined on page 64 above, pressure from outside the GRO led, in 1891, to all employed individuals being required to indicate whether they were an employer, an employee or worked on their own account, by entering a cross in an appropriate column. The *General report* for the 1891 census argued that

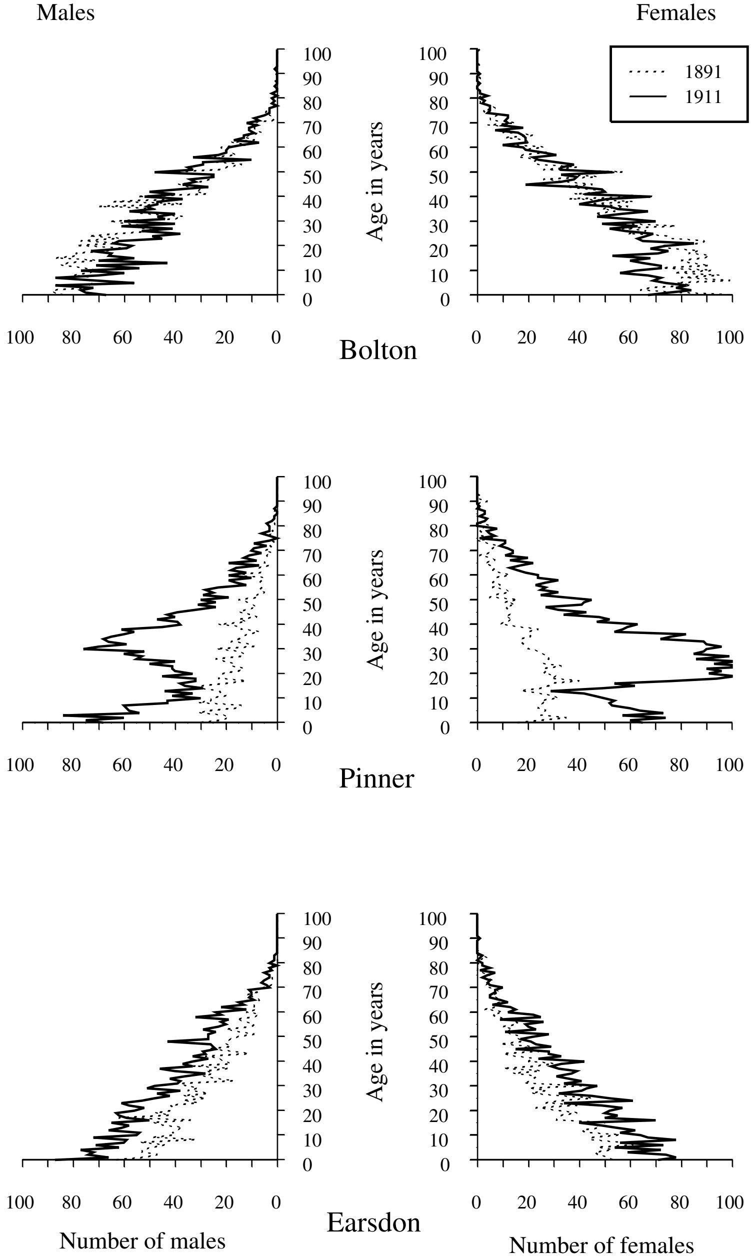


Fig. 3.2.1 Population pyramids for Bolton, Pinner and Earsdon locales, comparing 1891 and 1911. *Source:* OPCS dataset.

this new question had been misinterpreted and the answers incorrectly entered, citing the fact that some individuals had entered a cross in more than one column. The results were held to be 'excessively untrustworthy' and very little use was made of them in the census report.[45] Schürer has suggested, however, that such views were overblown; the GRO produced very little in the way of substantive evidence with which to back them. One table which did provide a breakdown of occupations by the new employment status question suggests that for employed males only 5.3 per cent either failed to answer the question or did so by ticking multiple boxes.[46] Although the comparable figure for working females was somewhat higher at 10.3 per cent, these levels still do not justify the GRO's claim that the information was 'excessively untrustworthy'. Indeed, it is clear that for some occupations ticking more than one box would have been totally justified, as, for example in the case of subcontracting workers in the construction industry.[47]

Despite the GRO's reservations, not only was the employment status question repeated in the 1901 census but a further question was added to the schedule, asking individuals to state if their place of work was either 'at home' or 'not at home'. Both these questions were retained for the census of 1911, which included a further, new question asking employees to state the industry or service in which they were employed and the nature of their employer's business. In some respects the inclusion of this new 'industry' question resulted from concerns first raised some 20 years earlier by economists concerned to determine the relative sizes and strengths of the nation's industrial sectors. They had noted that it was difficult, and in some cases impossible, to determine from a person's occupation alone in which sector of the economy he or she was employed. A book-keeper, for example, could be a member of the staff of a railway company, a department store or a factory. The object of the additional question in 1911 was therefore to ascertain the numbers employed in each distinct industry, enabling for the first time the production of separate tables detailing both occupational structure and industrial structure.[48]

In common with most previous studies making use of the census, this study has to acknowledge that variations occurred in how the respondents might choose to represent their occupation and that of other members of their household. With pre-1911 censuses there was also the danger that enumerators would place their own interpretations on what were acceptable responses when transcribing information into their books. Women were particularly vulnerable to having their participation in the workforce underplayed, misrepresented or omitted, as they did not always fit neatly into the male occupational model implicit in the census questions. It could be argued, indeed, that many working-class males also suffered such discrimination, as the census questions were not subtle enough to differentiate those who undertook second jobs, or shifted employment with the seasons.[49] In the following analysis no attempt has been made to amend the returned occupations to allow for misreporting or underreporting of the occupations of males or females.[50] In almost all instances occupations are discussed as though they were full-time, and held throughout the year, although it is recognised that this would not necessarily be the case, particularly among women.

One result of transcribing the original census documents on to computer 'as seen' was that in total some 70,000 unique occupation titles were identified across the three census years. As the titles were essentially textual strings, some standardisation, classification and coding of occupations had to be undertaken in order to allow in-depth analysis. The most popular classification scheme used by British historians when analysing occupational data in nineteenth-century censuses is undoubtedly the so-called 'Booth-Armstrong' scheme. Originating in Charles Booth's early-twentieth-century attempt to harmonise the occupation figures provided by the published census reports of 1851 to 1881, the scheme was later modified by Armstrong for his analysis of mid-nineteenth-century York.[51] One of the earliest occupational classification schemes, it remains one of the relatively few to be published in some detail by an historian.[52]

The Booth-Armstrong scheme can be seen, however, simply as an elaboration of the classification produced by the Registrar-General's Office to analyse the occupations of the 1861 census, when, according to Higgs, the main focus of attention had been occupational-specific mortality rather than employment or economic patterns.[53] The scheme was rejected for the purposes of the current study on the grounds that it did not adequately represent the economic and social structure of early-twentieth-century England and Wales.

In devising a new occupation classification scheme, it was decided that an important criterion should be the ability to compare findings with the official statistics tabulated in the published census reports of the study period. Unfortunately, during the study period official classifications changed from one census to the next, a particularly major shift occurring between 1901 and 1911.[54] The changes in the official classification system not only represent the dynamic nature of governmental analysis of occupations, but also reflect the impact of increasing pressures on the GRO to produce statistics which were more representative of the economic performance of the nation.[55]

To aid comparability it was decided to produce a single classification scheme which harmonised the official late Victorian and Edwardian classifications as much as possible. In order to do this, the various schemes used by the census authorities were broken down into their constituent elements which were then traced over time and reconstituted into minimal unit 'building blocks'. This process was extended backwards to the occupational scheme of 1861, allowing links to the 'Booth-Armstrong' classification.[56] The result is a scheme of some 853 individual codes which is similar in appearance to the official occupational classification scheme of 1911, but which does not correspond directly to any one of the classification schemes used by the Census Office. Through a series of 'look-up tables' or 'formats' the new scheme enables statistics to be produced which can be compared directly with virtually all the various official occupational classifications from 1861 onwards.[57]

It is also possible to regroup the occupations to mirror the attempts of other researchers to produce harmonised classifications from the official schema of the period being investigated, or into groups suited to particular analytical purposes.[58] It can be argued that the resulting flexibility has clear advantages over any coding scheme based essentially on a single predetermined baseline classification.[59] Table 3.2.2 depicts the occupational profiles of men aged 15–64 living in the 13 OPCS locales in 1911, using the 23 occupational codes used in the 1911 census report. The full title of each order is given in the notes for this table.

In some locales men were concentrated in certain occupations. Earsdon, with over 80 per cent of its male workforce employed in mining, is the prime example, but Morland and Saffron Walden also display marked concentration in agriculture. The figures for Bolton and Stoke, selected to represent 'Textile' and 'Pottery' experience respectively, indicate that, certainly within the sectors received from OPCS, neither of these occupations was monolithic, and men found employment in other industries. In every locale over 95 per cent of men in the 15–64 age group reported an occupation. Among women of the same age, the contrast was more marked, as Table 3.2.3 shows. Generally between 35 and 45 per cent of women aged 15–64 were occupied, although in Earsdon the figure was only 15 per cent and in Bolton it rose to 57 per cent. Within locales the percentage of female employment varied with age, and also with marital status. It is easy to see that the range of occupations open to women was more restricted than that for men. 'Service' employment was available in all locales, but seems to have been scarce in Bethnal Green, Bolton, Stoke and Walthamstow.[60] In Bethnal Green and Walthamstow 'Dress' employed almost one-third of

Table 3.2.2 *The percentage of employed males aged 15–64 in occupational orders, for the 13 OPCS locales, 1911*

		Locales												
Occupational order		ABY	AXM	BAN	BET	BOL	EAR	MOR	PIN	SAF	STO	SWA	WAL	YOR
I	Government	1	2	3	2	2	0	3	6	1	1	2	5	3
II	Defence	0	1	0	0	0	0	0	0	0	0	0	0	3
III	Professions	2	5	3	2	1	1	2	11	2	1	4	4	5
IV	Service	3	6	4	2	1	1	6	8	8	1	1	2	4
V	Commerce	1	2	4	3	2	0	1	17	1	2	8	13	7
VI	Transport	11	9	8	22	11	3	5	12	5	8	18	11	17
VII	Agriculture	16	27	11	1	0	3	41	6	55	0	1	1	3
VIII	Fishing	0	5	0	0	0	0	0	0	0	0	1	0	0
IX	Mines/quarries	31	1	1	0	4	81	16	0	0	17	4	0	1
X	Metals	6	4	12	4	17	2	3	5	3	19	35	7	9
XI	Precious metals	0	0	1	1	0	0	0	1	0	0	1	2	1
XII	Construction	10	13	10	4	8	3	8	9	7	5	6	13	11
XIII	Wood	1	2	10	17	1	0	1	2	0	2	1	6	3
XIV	Pottery	0	0	0	1	1	0	0	0	0	30	0	1	1
XV	Chemicals	1	0	0	1	0	0	0	1	0	1	1	1	1
XVI	Skins	0	1	3	2	1	1	1	1	3	0	0	2	1
XVII	Paper	1	1	4	5	1	0	0	3	0	1	1	8	3
XVIII	Textiles	0	1	2	1	24	0	1	2	0	0	1	2	1
XIX	Dress	2	3	4	13	3	1	1	3	1	2	2	5	4
XX	Food	6	11	12	11	9	2	5	8	6	6	7	10	16

XXI	Amenities	0	0	1	0	1	0	0	1	0	1	0	0	1
XXII	General	5	5	6	9	12	1	7	3	6	4	8	7	6
Total[a]		100	100	100	100	100	100	100	100	100	100	100	100	100
Total no. of males 15–64		2,588	1,382	2,430	3,105	2,007	1,809	1,241	1,873	1,660	3,684	2,914	3,785	2,795
% with occupation		98	95	96	96	98	99	98	100	96	99	96	96	95

Notes:

[a] Figures are presented rounded to the nearest whole number and thus the contents of the columns do not always sum to 100. In order to save space in this and following tables abbreviated titles have been used for the occupational orders. The full titles, as given in 1911 Census of England and Wales (1917), *General report*, Appendix C, Table 9 are:
I: General or Local Government of the Country; II: Defence of the Country; III: Professional Occupations and their Subordinate Services; IV: Domestic Offices or Services (excluding Domestic Outdoor Service); V: Commercial Occupations; VI: Conveyance of Men, Goods and Messages; VII: Agriculture; VIII: Fishing; IX: In and About, and Dealing in the Products of, Mines and Quarries; X: Metals, Machines, Implements and Conveyances; XI: Precious metals, Jewels, Watches, Instruments and Games (including Electrical apparatus and Electricity Supply); XII: Buildings and Works of Construction; XIII: Wood, Furniture, Fittings and Decorations; XIV: Brick, Cement, Pottery and Glass; XV: Chemicals, Oil, Grease, Soap, Resin, etc.; XVI: Skins, Leather, Hair and Feathers; XVII: Paper, Prints, Books and Stationery; XVIII: Textile Fabrics; XIX: Workers and Dealers in Dress (including 'Machinists, Machine Workers undefined' for Females only); XX: Food, Tobacco, Drink and Lodging; XXI: Gas, Water and Sanitary Service; XXII: Other, General and Undefined Workers and Dealers. Order XXIII is reserved for those 'without specified occupations or unoccupied'.

Source: OPCS database, 1911.

all working women, no doubt in supplying the London market, while 'Textiles' was the main source of employment for women in Bolton, and 'Pottery' the main source in Stoke.

It should be remembered that each locale is represented by sectors. The occupational profiles of the sectors within a locale can vary markedly. For example, almost one-third of the workforce in the Abergavenny locale were employed in mining, but 96 per cent of the miners are found in just two of the six sectors: over 50 per cent of men working in Urban Blaenavon (sector 5) and more than 75 per cent of men working in Rural Blaenavon (sector 6) were employed in and around the pits. Similarly, the 'Abergavenny' agricultural workforce is concentrated in just two sectors, Llanarth and Llanvihangel, both characterised by upland pastoral farming.

Again, while the Swansea locale has a concentration of men in both 'Transport' and 'Metal-working', the former are found almost exclusively in the New and Old Docks areas (sectors 45 and 46), but over 80 per cent of Swansea's metal-workers are to be found in Llangafelach (sector 44), a centre of the tinplate and steel industries on the outskirts of the urban area. The locale's final sector, West Swansea, is much the smallest but is of a very different calibre. It holds approximately 47 per cent of the men representing the locale who worked in the professions or in 'commerce'. Of all the sectors in the OPCS selection, West Swansea is the most white collar, even more so than the two sectors which together make up Pinner.

The official 1911 occupational scheme outlined in Table 3.2.2 is the one most frequently used in the analyses which follow. Where others have been used they will be introduced at the appropriate point in the text. The 1911 scheme has many advantages, particularly its ability to differentiate various sectors of the economy, but it does fail to capture a sense of hierarchy within particular industries. A mine-owner and a coalface worker are grouped together in Order IX. Law clerks, barristers and solicitors are all classified together in Order III. In parallel with the occupational-based coding scheme, therefore, a second 'employment status' code was developed to indicate, where possible, differences in the workplace hierarchy: to separate, for example, employers and masters from assistants and labourers. Regrettably, not all the groups in this scheme were well endowed with members among the OPCS population. The numbers of employers and own-account workers were disappointingly small, at least from the perspective of carrying out analyses of differentials between layers of the socio-economic strata within occupational orders in terms of their family-building experience.[61] Further categories, such as 'assistant', 'apprentice' and 'retired', were seldom

Table 3.2.3 *The percentage of employed females aged 15–64 in selected occupational orders, for the 13 OPCS locales, 1911*

		Locales												
Occupational order		ABY	AXM	BAN	BET	BOL	EAR	MOR	PIN	SAF	STO	SWA	WAL	YOR
III	Professions	6	5	5	1	2	10	7	10	9	2	7	8	7
IV	Service	49	46	38	16	16	45	47	73	61	14	46	21	43
V	Commerce	1	1	1	2	0	1	0	3	1	1	2	8	2
VII	Agriculture	7	6	2	1	0	10	22	0	5	0	0	0	1
XIV	Pottery	0	0	0	0	0	0	0	0	0	59	0	0	0
XVII	Paper	4	0	4	12	1	0	0	1	0	2	1	5	3
XVIII	Textiles	4	15	7	3	63	2	0	1	1	1	3	5	2
XIX	Dress	9	10	22	31	5	16	7	5	6	6	15	32	9
XX	Food	12	13	11	12	8	7	13	4	8	8	12	6	26
Other		8	4	10	22	5	9	4	3	9	7	14	15	7
Total		100	100	100	100	100	100	100	100	100	100	100	100	100
Total number of females 15–64		2,399	1,849	2,721	3,245	2,319	1,601	1,283	2,802	1,512	3,669	3,122	4,085	3,453
% with occupation		34	46	42	50	57	15	35	43	25	45	35	37	39
% returning no occupation		66	54	58	50	43	85	65	57	75	55	65	63	61

Notes and sources: see Table 3.2.2.

found among the child-bearing population. 'Employment status' was thus little used in the ensuing analysis, resort being made instead to the social class classification devised by the Registrar-General's Office especially for analysing the 1911 census material. This scheme, based on a 'professional' model comprising five graded social classes (I–V) and three supplementary industrial classes (VI Textile workers; VII Miners; and VIII Agricultural workers) has met with considerable criticism, despite being the basis for many of the social classifications in use around the anglophone world today.[62] Szreter has argued, for example, that the graded social classes were essentially derived by grouping together occupations which displayed similar levels of fertility, while relegating awkward cases to the three industrial classes, thus ensuring a 'social class gradient' in fertility.[63]

While recognising the many shortcomings of the 1911 Registrar-General's social class scheme, it was decided that comparability with previous studies, not least with the 1911 census reports, would be compromised if an entirely new path was to be taken in the present study. Much of the ensuing interpretation and discussion is therefore conducted, albeit from a critical perspective, in the context of the five graded 'social' classes and the three special industrial or 'occupational' classes concocted in 1911. The eight-class scheme has the additional advantage that it permits relatively robust numbers for analysis.

Social scientists have always found it more difficult to assign females to social classes on the basis of their occupations than men. In common with previous historical studies of family-building experience, this study allocates couples, rather than individuals, to a class, on the basis of the husband's occupation. Using the same occupational returns for males aged 15 or over as presented in Table 3.2.2 but classifying them using a 'social class' format, Table 3.2.4 not only illustrates another way of viewing the occupational profile of the 13 locales, but also indicates whether particular localities are predominantly 'middle class' or 'working class' – a feature much discussed in the succeeding chapters. Once again, of course, differences may be expected in the social make-up of the sectors representing each locale.

Interpreting Table 3.2.4 is not as easy as it may first seem. The predominantly middle-class nature of Pinner is beyond dispute given the preponderance of classes I and II (the latter including clerical workers). More than half its male workforce fall in the white collar category; indeed a third are drawn from class I. The relatively high presence of class II in Axminster and Morland could be ascribed to the large number of 'farmers' in these areas rather than white collar workers *per se*.[64] The very different agricultural regimes of Morland in the North and Saffron

Table 3.2.4 *The percentage of all males aged 15–64 in each of the five 'social' classes and each of the three 'occupational' classes, for the 13 OPCS locales, 1911*

		Locales												
Class[a]		ABY	AXM	BAN	BET	BOL	EAR	MOR	PIN	SAF	STO	SWA	WAL	YOR
I	Upper & middle[b]	4	9	9	5	5	3	5	36	4	4	13	18	17
II	Lower white collar[b]	15	24	18	12	10	4	26	17	11	7	11	18	16
III	Skilled manual	17	17	31	35	18	6	12	16	12	12	14	32	26
IV	Semi-skilled manual	10	21	17	18	15	2	20	17	17	39	36	15	20
V	Unskilled manual	16	12	14	25	27	3	12	8	9	19	19	12	15
VI	Textile workers	0	0	0	1	21	0	0	0	0	0	0	1	0
VII	Miners	29	0	0	0	4	79	9	0	0	16	2	0	0
VIII	Agricultural labourers	7	12	6	0	0	2	14	2	41	0	0	1	1
Unallocated to a class		1	4	4	4	2	1	2	4	4	3	4	3	5
Total[c]		100	100	100	100	100	100	100	100	100	100	100	100	100

Notes:
[a] The classes are defined in 1911 Census of England and Wales, Vol. XIII, *Fertility of marriage*, Part II (1923), pp. lxxvi–lxxvii. Classes II and IV were intermediate classes and as such not given precise titles. Those given here have been used simply for convenience.
[b] White Collar employment is taken to be the amalgamation of Classes I and II.
[c] The total number of men aged 15–64 is presented in Table 3.2.2. Figures are presented rounded to the nearest whole number and therefore the contents of the columns may not sum exactly to 100.
Source: OPCS database, 1911.

Walden in the South East are reflected in their ratios of male agricultural labourers to farmers. The pastoral farmers of Morland apparently employed far fewer labourers, their farms being much smaller and less labour-intensive than the arable farms around Saffron Walden. It seems plausible that the social systems of the two locales, and the perceived social hierarchies, although both rooted in agriculture, would be very different. Whether these are accurately reflected either at the local level or in the national context by the social class scheme remains open to doubt.

Table 3.2.4 certainly emphasises the point that certain communities were much more solidly working class than others. Fewer than one man in ten in the mining community of Earsdon could be designated white collar. While some communities had, on balance, a preponderance of more skilled workmen (class III), in others it is the lack of skill which is striking. Swansea, Bolton and particularly Stoke may be picked out in this regard, but the true situation is obscured in the case of the latter two locales by the large presence of 'industrial' classes VI and VII respectively. Within these two classes the social class scheme makes no differentiation by skill level.

One final aspect of occupation which may be analysed using the 1901 or 1911 census data is whether a respondent was employed 'at home' or elsewhere. Obviously the local labour market would dictate whether opportunities for working at home were available and there may have been some subjectivity in whether people saw themselves as working at home. Generally speaking, as Table 3.2.5 indicates, home working was much more common among female workers than among male, although the proportions varied from locale to locale. In 1911 almost one in four employed females and one in seven employed males in Axminster worked at home, whereas according to the census returns there were no home-workers in Bolton at all. In a community dominated by a factory-based industry it would perhaps be surprising if large numbers of workers were to be found 'at home', but it is puzzling that there were not at least a few laundresses, bakers or dressmakers working from a domestic base. Perhaps in Bolton employment carried out at home was not commonly perceived to count as 'work'. Alternatively, of course, it may simply be that the sectors selected in this study to represent Bolton's population did not encompass the neighbourhoods where such 'home workers' lived.

The 'service', 'dress' and 'food' occupational categories appear to have been favoured by home-working women. Among men 'agriculture' replaced 'service' in this list. The 'food' category included those working in 'tobacco', inn, hotel and lodging-house keepers, and keepers

Table 3.2.5 *The number and percentage of females and males aged 15 or over in employment who are reported as working 'at home', for the 13 OPCS locales, 1911; plus the percentage of those working 'at home' who are employed in selected occupations*

	Females					Males				
			% of all females employed 'at home' working in					% of all males employed 'at home' working in		
Locale	Number employed 'at home'	% of the workforce employed 'at home'	Service	Dress	Food	Number employed 'at home'	% of the workforce employed 'at home'	Agric.	Dress	Food[a]
ABY	150	17.2	22	29	21	212	7.7	22	10	21
AXM[b]	229	24.8	15	23	21	204	13.7	19	13	20
BAN	157	13.3	24	29	28	245	9.6	12	15	26
BET[c]	139	8.3	12	44	12	178	5.8	–	25	21
BOL	–	–	–	–	–	–	–	–	–	–
EAR	47	19.0	30	47	–	39	2.0	3	–	18
MOR	66	13.9	–	29	32	132	9.7	46	4	12
PIN[d]	77	6.3	23	–	34	48	2.5	6	8	19
SAF	57	13.9	33	21	19	131	7.5	36	5	24
STO	188	11.2	23	19	33	159	4.2	–	15	45
SWA	197	17.8	25	38	24	224	7.6	2	7	28
WAL	233	14.8	11	47	16	261	6.9	3	26	27
YOR	149	10.7	28	25	29	210	7.5	6	14	35

Notes:
[a] The 'food' category includes those working in 'Tobacco', 'Inn, hotel and lodging house keepers', and 'Eating and coffee house keepers' as well as those' Working and dealing in food'.
[b] 27% of women employed 'at home' in Axminster worked in 'Textiles'.
[c] 23% of men employed 'at home' in Bethnal Green were working in 'Wood'.
[d] 26% of women and 31% of men employed 'at home' in Pinner were employed in a 'Professional' capacity.
Source: OPCS Dataset.

of 'eating and coffee houses' as well as those working with and dealing in food, so it is perhaps not surprising that this category included many individuals who lived at their place of work.

Whether women who worked from home had different child bearing and rearing histories from women who worked away from home was of course of great concern to turn-of-the-century social commentators.[65] The individual responses in the 1911 census allow this question to be considered again in chapter 5 below.

Birthplace The final census question asked of everybody and of concern to the present study is that enquiring about birthplace. Britain's increasingly detailed questions suggest that administrative and trade links with her far-flung empire were obviously felt to be causing problems in identifying 'true foreigners' from 'those born abroad' in the study era. In 1891 each respondent who had been born in England and Wales was instructed to enter the parish or town as well as the county of his or her birth. Those born elsewhere, including Scotland or Ireland, simply had to indicate their country of birth. Those British subjects born in 'foreign parts' were also instructed to indicate whether they had been 'naturalised'. The wording of the equivalent question in 1901 was similar, with the addition that 'Foreign subjects' must indicate their nationality. In 1911 everyone born in the United Kingdom was expected to supply the name of the parish, or town, and county in which he or she had been born. A separate column was supplied for those born elsewhere to indicate their nationality, and naturalised British subjects were requested to supply the year of their naturalisation.

In theory the 1911 census returns may be used to map the origins of the inhabitants of any one location with considerable accuracy. However, in practice the need to locate the parishes and towns mentioned by respondents makes this a cumbersome and time-consuming task as many people misspelled the parish, or inserted the name of a hamlet rather than the name of a parish or of a neighbourhood instead of a town. To avoid such difficulties a somewhat coarser-grained picture of migration can be gleaned by concentrating on the counties and countries of birth reported.

Table 3.2.6 shows the origins of those living in the 13 OPCS locales in 1911. To save space only five categories of birthplace are shown: the British-born are divided into 'those born in the same county as that in which they were enumerated', 'those born elsewhere in England and Wales' and 'those born in Scotland or Ireland'.[66] A fourth category is reserved for 'those born abroad, including the British colonies' and the

Table 3.2.6 *Percentage of inhabitants in each place of birth category, for the 13 OPCS locales, 1911*

	Place of birth (%)					
Locale	Same county	Rest of E & W	Scotland/ Ireland	Foreign born	Not known	Total N
Abergavenny	68	29	1	–	1	8,193
Axminster	75	22	–	1	1	5,036
Banbury	61	36	1	–	2	8,129
Bethnal Green	79	8	–	10	3	10,846
Bolton	87	8	3	–	1	6,670
Earsdon	76	21	2	–	1	5,545
Morland	66	30	2	–	1	4,104
Pinner[a]	52	42	2	3	–	6,563
Saffron Walden	70	24	–	1	5	5,100
Stoke	87	10	1	0	2	12,317
Swansea	70	24	1	2	4	9,088
Walthamstow[b]	77	17	–	1	4	12,280
York	77	16	2	1	3	9,621

Notes:
– signifies less than 1 percent.
[a] For Pinner, 'born in the same county' encompasses all those born in Middlesex and London.
[b] For Walthamstow, 'born in the same county' encompasses all those born in Essex and London.

residual category covers those for whom no place of birth could be deciphered from their census entry.

Stoke and Bolton stand out as having particularly high proportions of their populations born in 'Staffordshire' and 'Lancashire' respectively. This is perhaps not too surprising for well-established industrial centres where young children learnt the necessary skills 'on the job' and where the pull of industrial expansion was relatively muted at the turn of the century. In most other locales between 65 and 80 per cent of the population had been born in the 'same county'. The exception was Pinner. Under 55 per cent of its population had been born in either Middlesex or London, and over 25 per cent had been born beyond the neighbouring counties. Such widespread geographic origins are perhaps not unexpected amongst a community of the highly mobile middle classes and their servants, but the finding suggests that the suburbanisation of London's white collar elite involved those who had come to the capital in search of employment and the means of 'getting on' as much as native-born Londoners trying to escape the confines of the metropolis.

It is possible that both the Banbury and Morland locales had quite low proportions of their populations born in the local county because of their geography. Morland, being part of Westmorland, had long been closely tied to Cumberland, and Banbury lay in a spur of Oxfordshire which placed it in close proximity to Warwickshire, Northamptonshire, Gloucestershire and Buckinghamshire. People living in nearby parts of these four counties would have had a far shorter distance to travel to Banbury than the inhabitants of southern Oxfordshire.[67]

A further notable feature of Table 3.2.6 is the 10 per cent of foreign-born residents in the Bethnal Green locale. Closer inspection reveals that nine out of every ten of these individuals were born in Eastern Europe, thus corroborating other evidence of a Jewish influx from that region to London's East End in the 1890s. No more than 3 per cent of the children under the age of 15 in the OPCS population had been born in Eastern Europe, but 12 per cent of persons aged 15–29 and 16–17 per cent of 30–44 year olds had been born there. Thus it is highly likely that the true proportion of Bethnal Green's population of Jewish extraction is underplayed: a considerable number of 'London-born' children undoubtedly had Eastern European-born parents. In the analysis reported in the following chapters the experience of Bethnal Green's recent immigrants will be explored in greater depth, as they appear to have had a demographic history quite distinct from that of their neighbours.

It is clear from Table 3.2.6 that in the great majority of OPCS locales the population was locally 'born and bred'. The potential which this offered for maintaining and even strengthening community beliefs, norms and behaviours has considerable importance in the discussions which follow, as has the exceptional mobility of Pinner's white collar population.

Persons per room In addition to the information requested for each individual the censuses of 1891–1911 also sought information concerning the conditions under which each household lived. In 1891 and 1901, as a measure of overcrowding, household heads were instructed to give the number of rooms they and their family occupied, but only if they occupied 'less than five rooms'. However in 1911 the enumerator had to enter the total number of males, females and persons residing in each household and the head of each household had to enter the number of rooms in the dwelling. The kitchen was to be counted as a room but sculleries, landings, lobbies, closets, bathrooms, warehouses, offices and shops were not. Assuming householders reported the information accurately, it is therefore possible to calculate the number of persons per room for every household in 1911, as well as the average number of rooms per dwelling for a particular area. These variables were to prove very important in the analyses considering infant mortality in chapter 4.

3.3 The Fertility Inquiry

Having examined the questions more generally asked in the censuses of 1891, 1901 and 1911, we turn in this section to look at the questions designed to examine fertility and child survival which were asked only in the special survey of 1911.

The inclusion of four direct questions on marital fertility in the 1911 census was championed principally by T. H. C. Stevenson, the then Superintendent of Statistics, aided by his mentor Arthur Newsholme, the Chief Medical Officer to the Local Government Board. As leading figures in the Edwardian public health movement, both men were concerned to challenge and discredit the hereditarian, eugenic models of population development posited by Galton, Pearson and their followers.[68]

The form of the new questions was as shown in Figure 1.2.1. The first point to note is that the inquiry was intended to exclude all stillbirths, miscarriages and abortions. It was explicitly concerned only with live births. Secondly it focused exclusively on *current* marriages. No attempt was made to gather data about children born to a woman's previous marriage or marriages.[69] To ensure as far as possible that couples provided information on the total number of children ever born, as opposed to just those still living, three questions about the numbers of children were asked: the numbers of those born alive, those still living and those who had died. This provides, first, a useful check on the consistency of the reporting, since clearly the number recorded as dead plus the number recorded as living should equal the total ever born. Second, and more importantly, it provides direct information on mortality as well as fertility levels. It should be noted, however, that the age at which the dead children had died was never asked. Given that some of the women responding to the census had been married as far back as the 1870s, 1860s and even the 1850s, it is obvious that some of the children could well have died as adults. Considerable demographic ingenuity is therefore necessary to convert numbers of 'dead children' into mortality rates which reflect the survival chances of infants and young children at different points in time. The techniques employed to this end are explored in depth in chapter 4.

As might be expected, the collection of the extra information in the

Table 3.3.1 *Mis-statement of duration of marriage, England and Wales, compared with OPCS data, for married, co-resident couples, 1911*

England and Wales, 1911		OPCS data, 1911	
Stated duration of marriage	Excess over nos. returned as one year longer %	Stated duration of marriage	Excess over nos. returned as one year longer %
10	17.4	10	18.4
20	36.5	20	54.2
30	47.4	30	53.6
40	71.6	40	60.0

Sources: Fertility of marriage, Part II (1923), p. viii, and OPCS database.

1911 census was not without its problems. The first problem is easily detected but not easily remedied. As individuals tended to round up their ages, so married couples tended to round up the figure they gave for the duration of their marriage. In the *Fertility of marriage*, Part II, this problem was highlighted by the provision of the percentage figures of excess for those reporting durations ending in 'zero' over the number recorded as one year longer. These figures are reproduced in Table 3.3.1, alongside the equivalent figures calculated for the OPCS population. In the country as a whole 17.4 per cent more marriages with a duration of ten years were reported than marriages with a duration of 11 years. In the OPCS data the excess was 18.4 per cent. Accuracy in reporting duration of marriage clearly decreases with time elapsed since the ceremony.

Another problem concerning duration, which is evident in the graphed marital duration responses of the OPCS population in Figure 3.3.1, is the fact that there was a shortfall in the numbers recording a marriage duration of less than one year, despite the clear instruction at the head of the column that such marriages should be recorded with the words 'under one'.[70] One likely explanation is than couples reported their duration of marriage according to the next anniversary rather that the last celebrated, in the way in which the Chinese traditionally record their ages. Another explanation, however, posited by the Registrar-General, was that longer durations were in some cases deliberately recorded in order to hide pre-nuptial pregnancy and illegitimate births. The real duration was altered so that in comparing this to the ages of the resident children it appeared that all had been conceived within the period of marriage.[71]

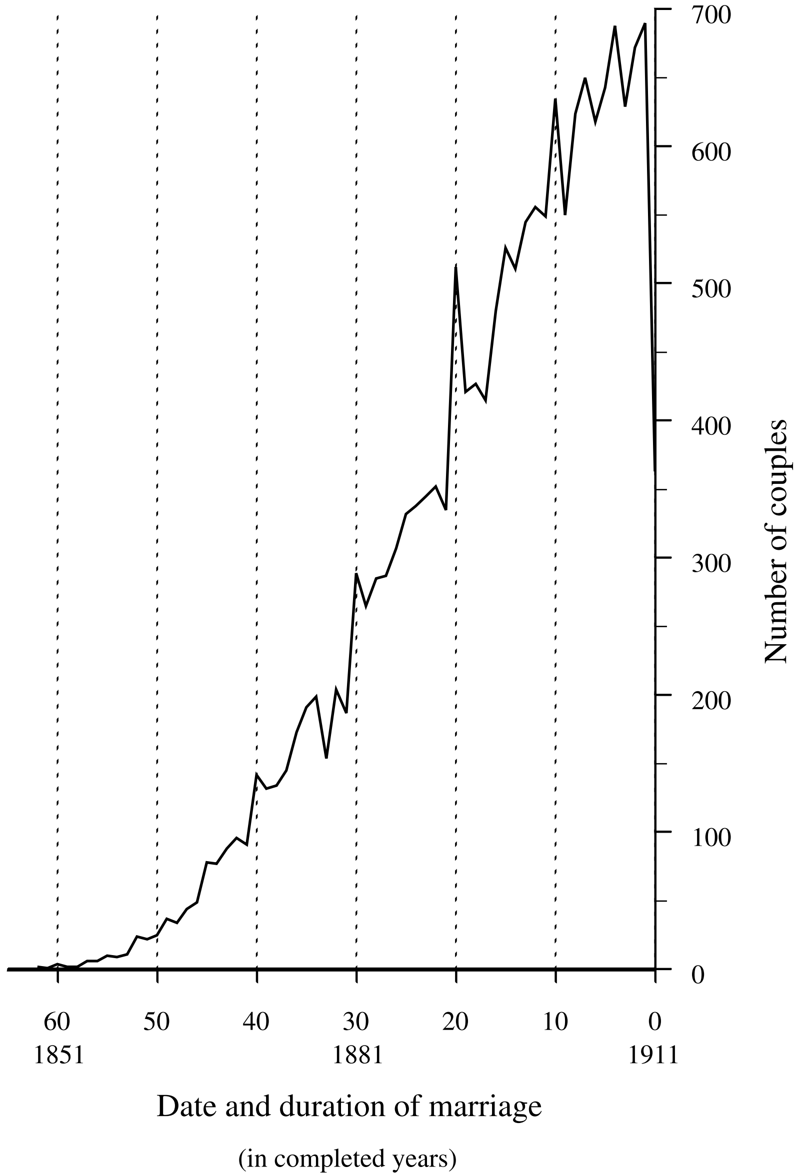


Fig. 3.3.1 The number of couples recorded by duration of marriage; OPCS population, 1911. *Source:* OPCS dataset.

The variation in the way couples measure, or report, the length of their marriage in addition to the latitude with which ages are reported complicates the estimation of the age of marriage of the bride and groom. An individual aged 25 reporting a marriage duration of five years could be most easily supposed to have been married when aged 20. However, even if age is reported accurately, the individual could have been celebrating their twenty-fifth birthday on census day, or their twenty-sixth birthday on the day following the census. Equally the marriage could have been exactly five years long, or a day short of six. Consequently the age at marriage could have been anything from just over 19 years (25.0−5.99) to just under 21 years (25.99−5). In the analyses which follow it has been assumed that misstatements as to age and marital duration cancel each other out; however it should be remembered that figures presenting age at marriage represent a range of plus or minus one year.

While the fertility questions were explicitly directed at 'married women', it is clear from the individual-level returns that some widows responded, presumably assuming that because they had been married and had previously had children they were required to fill in the questionnaire. Erroneous entries like this were excluded from analysis, both by the Registrar-General and in this study.

A further group effectively excluded from analysis were those married women who were enumerated on census night as living apart from their husband. A husband's absence meant that many of his characteristics necessary to the analysis, such as occupation, would be completely unknown. It is also possible that some women reporting themselves as married were in fact still single and should not be included in measures of 'marital' fertility.

For England and Wales as a whole the absence of husbands excluded 493,679 (7.4 per cent) out of the 6,630,284 married women in the 1911 census. Overall in the OPCS population 6.0 per cent of married women were excluded on these grounds, all locales, with the exception of Axminster and Bolton, recording lower levels of married-spouse-absent women than the national average.[72] In the national figures a further 1.8 per cent of couples were excluded on the grounds of inconsistent or illogical entries. Such entries might be the result of poor arithmetic, such as reporting a woman as having six children ever born, one dead, and two currently living. More commonly errors seem to have occurred as a result of women detailing children of previous marriages together with those of the current marriage, recording entries such as eight children ever born within a marriage of three years' duration. In the OPCS population 3.0 per cent of couples were excluded on the ground of inconsistency or incompleteness; the higher rate of rejection most probably being due to stricter acceptance criteria than those used by the Registrar-General. In all, however, the 9.0 per cent of married women excluded from the analyses of the OPCS 1911 data compares favourably with the 9.2 per cent excluded from the national figure.

Having described our data source, the following section discusses some of the concepts adopted in the analytical work undertaken in exploring the demographic patterns which the data reveal.

3.4 Data analysis – some concepts

Demographic data come in two major forms: 'stock' or 'flow' data. 'Stock' data describe the size and structure of a population at a particular point in time. They can be seen as akin to a snapshot capturing 'a moment'. Conventional census data are an excellent example of this genre because they allow tabulation of the numbers of individuals by age, sex, occupation, etc. by location on one particular night within a given time-span.[73]

The data on childbearing within marriage collected in 1911 are, on the other hand, an example of 'flow' data; they chart the occurrence of demographic events over time and thus are more akin to a reel of movie film than to a single-frame shot. The 1911 census is, however, an unusual source for historical demographic purposes. While some methods such as family reconstitution use parish registers to identify a couple's marriage and then follow them over time as they build their families and thus take a *prospective* view of events, noting them as they happen, the Fertility Census takes a *retrospective* perspective, looking backwards over a couple's reproductive history. To continue the film analogy: the prospective perspective unfolds the plot from a starting point until the dénouement; the retrospective perspective starts with the dénouement and relates the story in 'flashbacks', the audience being required to piece together the events which result in the final outcome. Demographic data presented in such a way do give new insights into the processes underlying the changes in marital fertility and infant survival underway at the end of the nineteenth century. However, the methods used in their analysis and interpretation have to be suited to their relatively unconventional nature, and the present section sets out some of the concepts involved for those for whom this is unfamiliar territory.

To calculate demographic rates in order to compare experience of a particular phenomenon over time, both flow and stock data are required. The number of events occurring in a particular time period (the flow data) forms the rate's denominator, while the population present in the same period acts as the numerator. Calculating the latter stock data is not as straightforward as it seems. For example, the number of legitimate births occurring in the period between 1 January and 31 December of a particular year may be easily gleaned from abstracts of birth registration, but the number of individual married women available to have those births over the course of the year is more difficult to calculate with complete accuracy. Some women will enter the married state during the course of the year, but others will exit as their husbands die or they themselves succumb. Some women will migrate away from the study area, others will arrive. Because it is virtually impossible to ascertain the true 'at risk' population, demographers tend to assume that the 'average' number of married women present in the reproductive age groups is the number at risk of giving birth. The 'average' number is usually extrapolated from a point where the number is accurately known, most often from a census count. The 'period' legitimate fertility rate is then calculated by dividing the number of births occurring within marriage by the estimated number of married women available to have these births, and the results expressed in terms of 'births per woman' or 'births per thousand women'.

Another way of looking at fertility, however, is to ask how many children did women born in the 1860s have compared to women born in the 1960s, or how many children did women married in the 1900s have compared to those married in the 1850s? In such cases the experience of cohorts, groups of individuals experiencing the same event within the same period, is being compared, rather than time periods *per se*. Such 'longitudinal' analysis identifies those experiencing one particular type of demographic event (e.g. marriage) within a specific time period from a set of 'flow' data, and then, still using the flow data, follows the experience of that cohort over time, charting, for example, the average number of births achieved by the time the women in a marriage cohort reach menopause or a particular birthday (most usually their fiftieth or forty-fifth), by which time it is assumed they can no longer conceive or bear children. The pool of individuals contributing to the demographic rates, once identified, never gains any new members, although it may lose members as they 'fall out of observation' through migration or death.

Such longitudinal analysis is much used in family reconstitution studies and has yielded very detailed insights into the demographic patterns of the past.[74] One drawback, however, is the problem of *censoring*. This occurs when individuals drop out of observation in a longitudinal study. It is easily comprehended by comparing the experience of two women within one cohort. Imagine that both women were married, aged 20, in 1860. They can both be observed having children throughout the 1860s and into the 1870s. In 1878, however, one woman has a child and then disappears from the records. She cannot be found in the death or burial registers of the area, nor is she observed remarrying. The conclusion must be that she has moved from the district and therefore has 'left observation'. If the birth intervals experienced by the two women are being compared, care must be taken to compare only those intervals which are known to have been closed by the birth of another child. As the date of departure of the migrant woman is not known, the number of childless years she spent in the parish before leaving cannot be calculated; her data have been censored. Her last observed birth interval is that 'closed' by the arrival of the last child recorded in the registers. Thus she is taken to have spent 18 years 'under observation' (from marriage to last recorded birth). The six children she had in that time should thus be compared to the number of children born to the other women over the same 18 years. If the latter had had nine children in that time, then the migrant would be considered less fertile than her non-mobile neighbour. Demographers have to be alert to problems of censoring when dealing with longitudinal data, and particularly so when comparing different cohorts. It is possible that apparent differences in cohort behaviour are caused by differential censoring, rather than by actual changes in the particular demographic behaviour being studied.

The relationship between period and cohort data is usefully illustrated by what is known as a Lexis diagram.[75] An example of such a diagram is produced in Figure 3.4.1. Time is represented along the horizontal axis. Thus the occurrences within a decade are represented between each pair of vertical gridlines: Panel A indicates the two decades 1861–80, running from 1 January 1861 to 31 December 1880. Ten-year age groups are represented up the vertical axis: Panel B represents all those individuals observed aged 70–79 in each time period.[76] The process of passing through time, or ageing, is represented by cohorts. Arrow C indicates the ageing of all individuals born in the decade between 1 January 1851 and 31 December 1860. Obviously the vertical axis could be taken to represent marital duration rather than age, and any cohorts represented on the diagram would then be defined by the time of their marriage.

Figure 3.4.2A represents individuals in a prospective study. Each is followed from the same time period, some remaining in observation longer than others, demonstrating the problems of censoring.[77] Figure 3.4.2B represents the respondents in a retrospective survey: all have survived to be recorded during the survey process. In the 1911 Fertility

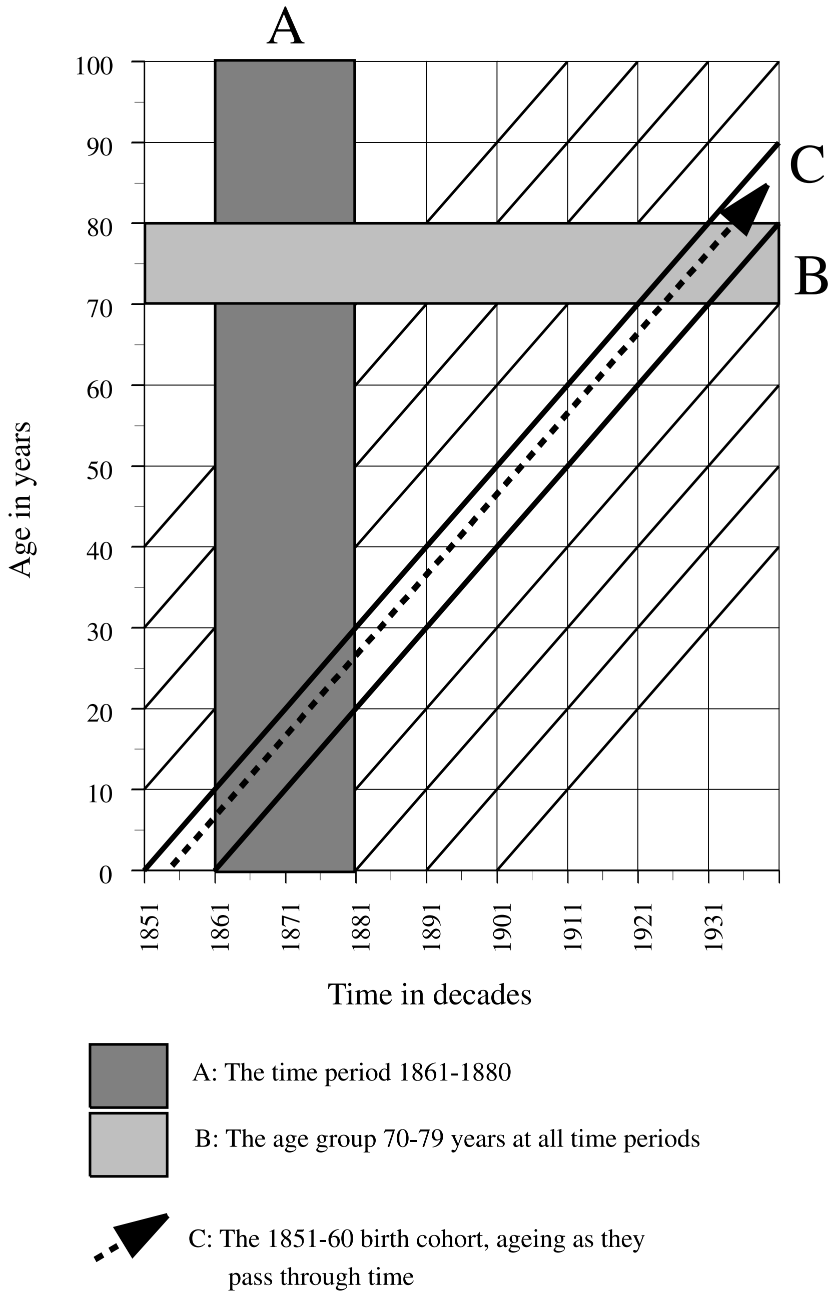


Fig. 3.4.1. The elements of a lexis diagram: time, age and cohort

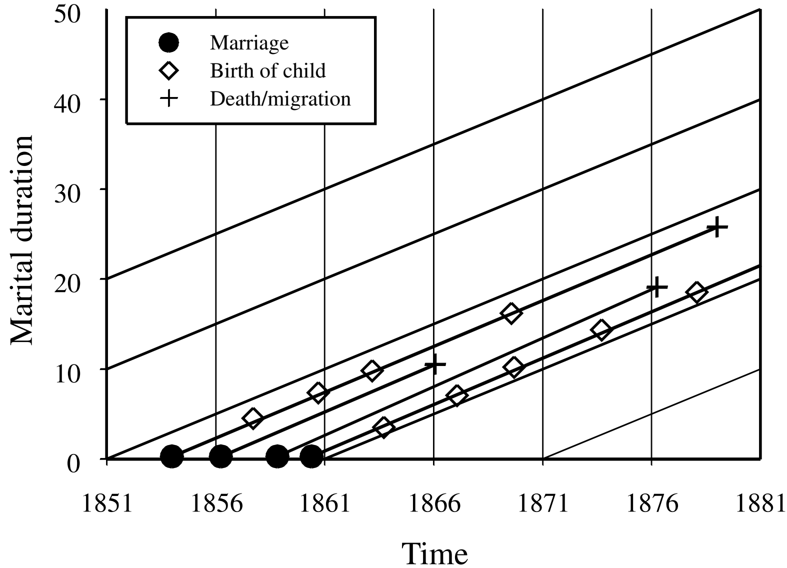


Fig. 3.4.2A A lexis diagram representing a 'prospective' longitudinal survey

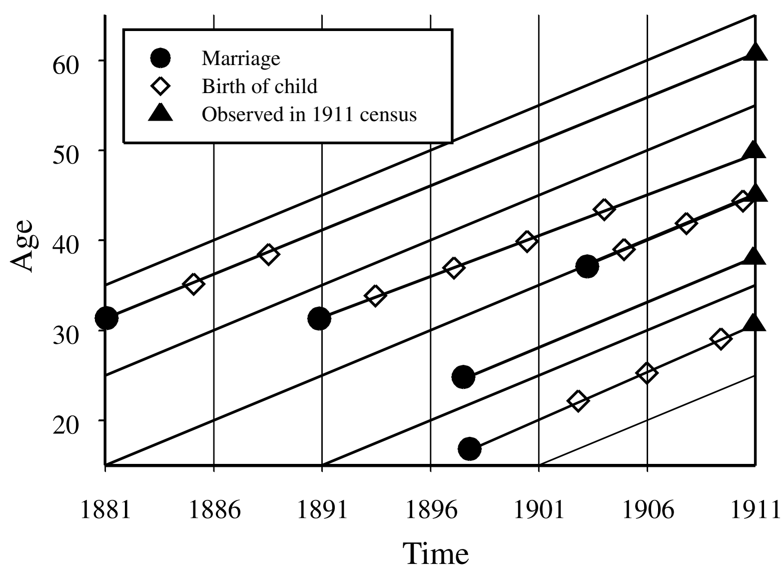


Fig. 3.4.2B A lexis diagram representing a 'retrospective' longitudinal survey

Census, as widows were excluded from the survey, *both* marriage partners had had to survive in order for their marital fertility to contribute to the findings.

The need for, and importance of, careful standardisation when analysing such retrospective data will be obvious from Figure 3.4.2B. Women of longer marital duration would have had longer both to bear children and to lose them. Also, amongst those with the longest marital durations, it is likely that those marrying at younger ages would be overrepresented because those marrying at older ages would have experienced higher mortality in the intervening years.[78] It is possible that rates of individual and couple survival differed by place, class and occupation, a situation further complicated by variations in marriage age among the different groups. Thus middle-class couples may have married later than their working-class counterparts, but because they experienced lower mortality they were more likely to survive to have their fertility recorded. In order to produce meaningful comparisons, therefore, the responses of women with the same marital duration and the same age at marriage should be analysed wherever possible. The need for such standardisation requires an original dataset which includes a large number of couples so that, when this number is subdivided, sufficient couples remain to produce robust measures of fertility and child survival. At several points in the analyses reported in the following chapters insufficient numbers prevented demographic measures being calculated, despite the large original total number of couples for whom responses were available.

In addition to period and cohort data, demographers also use what are known as *synthetic cohort* measures. In this case age-specific demographic measures, such as age-specific marital fertility rates (ASMFRs), are calculated for a particular time period and then these rates are summed to provide a single figure, expressing in the case of fertility the overall total marital fertility rate (TMFR). The TMFR is a synthetic cohort measure because it represents the number of children which would be achieved by a woman if she were to marry on her twentieth birthday and then proceed through her remaining childbearing years until, say, her fiftieth birthday, experiencing the estimated marital fertility of each of the age groups as she passed through them.[79] This concept is illustrated in Figure 3.4.3. Synthetic cohort measures are, of course, period measures; in calculating them it has to be assumed that demographic rates will remain unchanged over time. However, it is worth remembering that because they are calculated from the age-specific marital fertility rates of several age groups, TMFRs are in fact composed from the fertility experience of women from five or six birth cohorts, and the younger women may be behaving quite differently from the way in

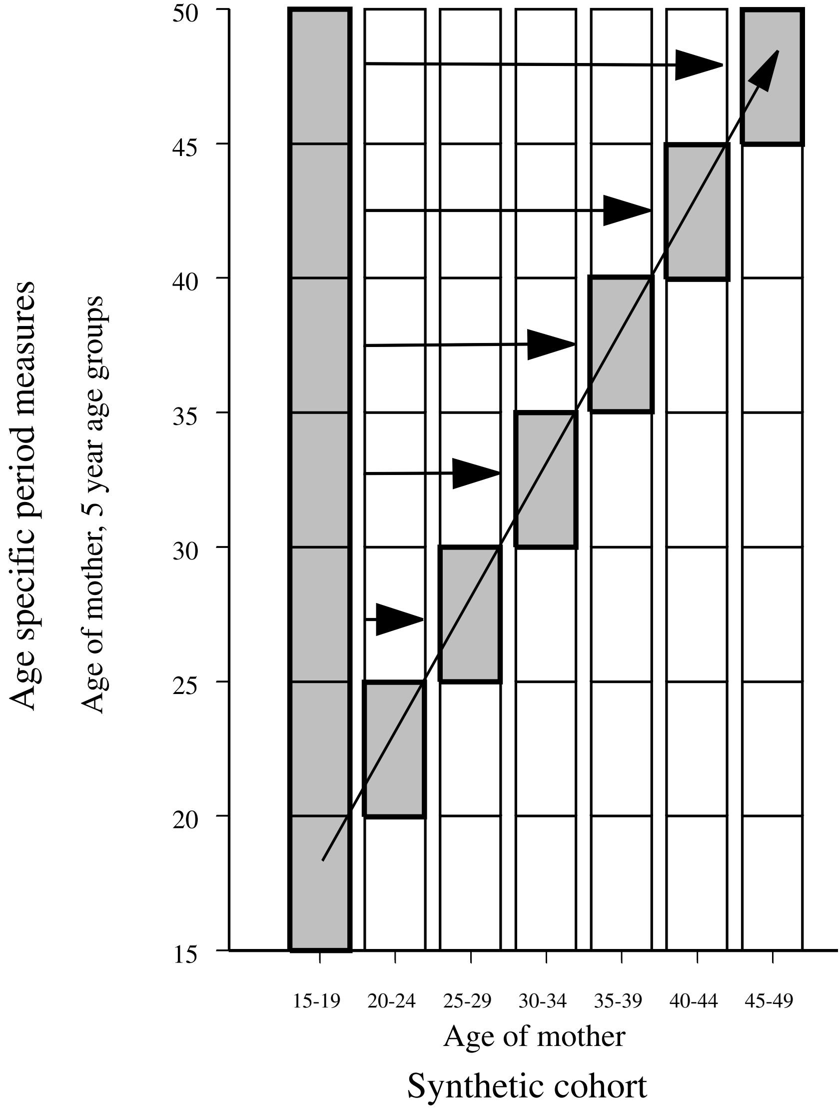


Fig. 3.4.3 A diagram representing the calculation of synthetic cohort measures from age-specific period measures

which their elder sisters behaved at the same age, but in an earlier time. A series of ASMFRs over time is thus required in order to tease out properly whether changes in total marital fertility were the result of cohort or period effects.

Unfortunately the answers to the 1911 fertility questions cannot be called upon to produce a series of period-based fertility measures because the exact dates of birth of all children are not known. However, as the OPCS dataset provides information on individual conjugal family units on census night 1911, 1901 and 1891, *indirect* estimates of age-specific marital fertility can be made for a variety of population groups and sub-groups at each of these points in time, allowing comparison over two decades. In order to do this, estimates of infant and child mortality for the five years preceding each census were required, and these were calculated using indirect techniques and the responses to the 'number of children dead' question in the 1911 census.[80] It should, of course, be recognised that the accuracy of the estimates will be affected by whether or not the underlying assumptions made during the calculation lie close to historical reality.[81] The latter question often remains unanswered. However, with proper standardisation, comparisons between groups, using indirectly estimated parameters, should be indicative of the direction and magnitude of differences between groups within a population, even if the level of the measures is later found to be erroneous.

3.5 Data analysis – spatial or social units? The 'environments'

While the sectors and locales of the OPCS data provide spatial units for comparative analysis, even 13 such units meant that calculations can repeatedly run into the 'small numbers' problem. This raises a final point to be considered before turning to the substantive chapters: the socio-spatial units which have been used in the analysis.

As explained in section 2.4, the spatially small enumeration districts were amalgamated to form rather larger 'sectors'. However, because of the restrictions placed on analysis by the requirement to have robust numbers, even sectors were often too small to act as units of analysis, particularly if the behaviour of occupational or class sub-groups within sectors was to be examined. Also, as explained in chapter 1, the analysis intended to move beyond the simple dichotomy of rural and urban demographic regimes to explore a 'spectrum' of experience.

Correspondence analysis was employed to assess the validity of grouping sectors together on the basis of their occupational, class and household characteristics.[82] Initially it appeared that a measure based on a tripartite occupational division of the combined male and female workforce provided groups of sectors which represented a rural–urban–industrial spectrum of experience. A cluster analysis was then undertaken (using the co-ordinates from the correspondence analysis) and this differentiated five groups: a strongly industrial group, two mixed groups and two agricultural groups. The first group was characterised by sectors dominated by one particular industry. These tended to be established, staple industries: mining, textile, pottery and metal work. This group of sectors was deemed to have a Staple Industry environment. The two mixed groups were delineated by the proportion of their workforces which worked in the service economy (the professions, commerce, and domestic and personal service). Where the latter occupations were most numerous the sectors were deemed to enjoy a White Collar environment. Where the occupational profile of a sector was more industrial than White Collar but more varied and by nature lighter than the Staple Industry areas, the sectors were described as having a Light Industry environment. The two agricultural groups, although differentiated by the proportion of their workforce in farming occupations, were composed of small sectors, and it was decided to amalgamate them into one Agricultural environment in order to maintain numbers.

Although identified on the basis of a suite of social and economic characteristics, the environments can as a rule of thumb be designated by considering the make-up of their male and female workforce, excluding those returned as 'general labourer' or 'labourer'.[83] If more than 20 per cent of a sector's workforce, so defined, was employed in agriculture, then the population was deemed to have been living in an Agricultural environment (sometimes rendered 'AG' in figures and tables in the ensuing text).[84] If less than 20 per cent of the workforce worked in agriculture but more worked in the service sector than in industry, then the environment was designated a White Collar (WC) one. Where the majority of the workforce was in industry and most of those industrial workers worked in one of the four staple industries listed above, then the environment was considered a Staple Industry (SI) one. If the staple industries were not dominant then the sector was classified as having a Light Industry (LI) environment.

The term 'environment' may be considered to embody both the physical and social milieux in which individuals lived. In describing an area as having an Agricultural environment, non-agricultural occupations being undertaken in that area can be envisaged as taking place in a rural location rather than an urban one. In certain Agricultural sectors the workforce was almost exclusively composed of farmers and agricultural labourers. In others, however, while more than 20 per cent of the workforce worked on the land, they were outnumbered by those in industry or in the service sector. The substantial local presence of the farming population was taken to indicate that the non-farming activities were undertaken within a rural community, and that those involved and their families were more likely to conduct themselves according to mores and values rooted in a 'rural way of life'. The same logic was held to apply to the other environments, and thus issues such as whether it was 'who one was' or 'where one stayed' which had the greatest influence on one's demographic history could be addressed.

The majority of the 53 sectors remained in the same environmental classification across the 1891, 1901 and 1911 censuses, but a few 'wandered' from one environment to another as the local economy underwent some sort of change. In these cases it was decided that the sector would be allocated to the environment to which it belonged in two census years out of the three. Table 3.5.1 lists the environmental classification of the sectors in each locale which will be used in the ensuing analyses. Certain locales, such as Bolton, Bethnal Green, Pinner and Stoke, clearly contain sectors typifying only one environment, while among the sectors of Abergavenny all four are represented. The final line of Table 3.5.1 indicates the total number of individuals in each environment within the OPCS population of 1911. The two industrial environments are much larger than either the White Collar or the Agricultural, but this is not unexpected in a population representing an urban, industrial nation such as early-twentieth-century Britain.

The characteristics of the different environments will emerge in the course of the next two chapters and will not be rehearsed here. It should be noted at this point, however, that where an 'environmental' experience is considered in the analysis, that experience is the product of the populations of the sectors as they stand: no attempt was made to weight the various sectors to compensate for their varied population size. This decision was taken on the basis of the consideration that larger communities would produce a more robust statistical picture: to inflate the contribution of the smaller sectors could potentially distort the picture of environmental experience. Wherever possible, however, the opportunity is taken to compare and contrast experience between the locales and sectors comprising a particular environment.

This present chapter has examined the census as a data source and addressed the problems associated with the use of individual-level data for the 1891, 1901 and 1911 censuses. It has also introduced some of the concepts to be encountered in the analysis described in the subsequent chapters. Chapter 4 moves on to consider the infant and child mortality patterns to be gleaned from the 1911 census returns from a number of spatial, social and environmental perspectives, before chapter 5 focuses attention on marital fertility behaviour within the environments and locales represented by the 53 enumeration district clusters comprising the OPCS study population.

Table 3.5.1 *The allocation of the sectors comprising OPCS locales to the environmental classification, giving sector numbers and the population (N) of those sectors in 1911*

	Environment							
	Agricultural		White Collar		Light Industry		Staple Industry	
Locale	Sectors	N	Sectors	N	Sectors	N	Sectors	N
Abergavenny	*3, 4*	1,553	*2*	1,845	*1*	1,499	*5, 6*	3,389
Axminster	*7–9, 11*	3,488	*10*	1,690	–	–	–	–
Banbury	*14, 15*	798	–	–	*12, 13*	7,429	–	–
Bethnal Green	–	–	–	–	*16–18*	10,878	–	–
Bolton	–	–	–	–	–	–	*19, 20*	6,698
Earsdon	–	–	–	–	–	–	*21–23*	5,583
Morland	*24–30*	3,291	–	–	–	–	*31*	869
Pinner	–	–	*32, 33*	6,739	–	–	–	–
Saffron Walden	*34–40*	5,165	–	–	–	–	–	–
Stoke	–	–	–	–	–	–	*41–43*	12,368
Swansea	–	–	*45, 47*	3,426	*46*	1,904	*44*	3,847
Walthamstow	–	–	–	–	*48*	12,391	–	–
York	–	–	*51, 53*	5,224	*49, 50, 52*	4,531	–	–
Total population		14,295		18,924		38,632		32,754

Note: sector numbers are those listed in Table 2.4.2.

Notes

1 The conversion exercise was costed by OPCS and the data were purchased with the help of a special award made available by the ESRC (Award reference G00232261).
2 See ch. 2 n.53.
3 A missing figure of this kind would suggest that the data entry clerk simply turned over two pages instead of one at some stage during the transcription process.
4 1911 Census of England and Wales (1917), *General report*, p. 24.
5 Recommendations have been made to ignore the allocation of schedules *per se* for the 1851–81 censuses, and to concentrate on the relationship to household head column, treating as a household all those individuals listed between one head and the next. See Anderson (1972b) and Tillott (1972). Yet see also Higgs (1988a, 1990).
6 Higgs (1989), p. 60.
7 1911 Census of England and Wales (1917), *General report*, Appendix A, p. 257. Despite these instructions, an inspection of the OPCS dataset clearly indicates that in a few households individuals were found as 'lodger' in the 'relationship to head of household' column instead of having their own schedule as per the census instructions.
8 A definition of conjugal family units used in conjunction with historic census-type material is provided in Laslett (1972), pp. 28–31, 41–4.
9 The term 'never-married' denotes someone who is currently unmarried and moreover has never been married: it specifically excludes those widowed, divorced or separated as well as the married.
10 The OPCS database for 1911 included 1,095 visitors (i.e. 1.1 per cent of the population recorded in the transcriptions).
11 The authors are very grateful to Jean Robin who allowed us to borrow her microfilm copies of the Colyton returns, and who gave us a great deal of help and assistance in the task of comparing the OPCS computer files with the films of the original documents.
12 On institutional enumeration see Higgs (1989), pp. 37–45. Some key institutions housing less than the requisite 100 persons were also recorded in the special books. 'Institutions' were identified for census purposes some months before the census. Fluctuations in the numbers of inmates meant that not all such establishments were recorded in enumeration books appropriate to their size on census night.
13 In the OPCS data for 1911, 26 'quasi-institutions' were identified. Excluding the 'keepers' and their families, 733 individuals (0.7 per cent of the OPCS population for that census year) were housed in such establishments and therefore excluded from analysis.
14 Of those enumerated in 1911 in the workhouses, asylums and prisons of England and Wales, 71 per cent were aged under 25 or over 55. Equally, in 1891 only 13.9 per cent of the workhouse and prison populations were recorded as married, a large proportion of whom clearly would not have been resident with their spouse. 1911 Census of England and Wales, *Ages and condition as to marriage*, (1913), Tables 14–16; 1891 Census of England and Wales, *Ages, marital condition, occupations, birthplaces and infirmities* (1893),

Tables 22 and 23. See also Thomson, D. (1984) on the problems of calculating the size of the institutional population from census figures.

15 For a guide to the use made of census material see Mills and Pearce (1989).

16 The best recent guides, written mainly from an archival perspective, are Higgs (1989, 1996c). Standard texts also include Wrigley (ed.) (1972) and Lawton (1978).

17 For words of warning concerning use of the census see Higgs (1987, 1991).

18 The background to the 1891 census has been discussed in Schürer (1991) and in Higgs (1992). An authoritative outline of the major changes to the census implemented between 1801 and 1931 is provided by the Interdepartmental Committee on Social and Economic Research (1951); but this was produced without recourse to the original nominal-level returns.

19 Higgs (1989), pp. 8–9. On the formation of the GRO itself, see Glass (1973), ch. 3; Cullen (1974); Eyler (1979), ch. 3. The 1801–31 censuses had been overseen by John Rickman, an assistant clerk at the House of Commons, who had drafted the first Census Act.

20 For a general popular history of the GRO, see Nissel (1987). England and Wales, unlike some other countries, did not have a permanent Census Office. The latter was established on a short fixed-term basis specifically for the collection and production of census statistics. This point has sometimes been overlooked by scholars: see, for example, Conk (1983). Equally, until the Census Act of 1920 (10 and 11 Geo. 5, c.41) which provided for a perpetual decennial census, each census was legislated by a separate Act of Parliament.

21 See Szreter (1991) and Higgs (1991).

22 Eyler (1979); Higgs (1991).

23 For the censuses 1801–31, information was collected by clergymen and local overseers of the poor and aggregated before being sent to London.

24 Higgs (1988b).

25 Sample census schedules from the 1891, 1901 and 1911 censuses may be found in the following reports: 1891 Census of England and Wales, *General report* (1893), pp. 138–9; 1901 Census of England and Wales, *General report* (1904), Appendix B, p. 322; 1911 Census of England and Wales, *General report* (1917), Appendix A, p. 258.

26 Szreter (1996b), pp. 114–20.

27 Conjugal family units are more fully discussed in section 3.1.

28 The 1921 census schedule was the first to invite those whose 'marriage had been dissolved by divorce' to indicate their status in the marriage column.

29 In the census returns of Bethnal Green in 1891 and 1901 a very small number of girls aged less than 15 were returned as married. While it is possible that there may have been some age misstatement, it is also possible that these women had been married abroad, since Bethnal Green had experienced several recent influxes of immigrants. The responses to the 1911 questions on duration of marriage and present age also indicate that a number of women had probably married in their early teens, but again this phenomenon was almost exclusively confined to the population of Bethnal Green.

30 Demographers express 'age last birthday' as 'age in completed years'; a convention followed throughout this volume.

31 1911 Census of England and Wales, *General report* (1917), p. 258.

32 Budd and Guinnane (1991). Thomson, D. (1980) argues that for the late nineteenth century the elderly 'appear to have had a fair idea of their ages and not to have reported them capriciously'.
33 For discussion and demonstration of the age discrepancies found see: Anderson (1972c); Razzell (1972); Tillott (1972); Wrigley (1975); Yasumoto (1985); Higgs (1989).
34 Higgs (1989), p. 68, although this statement was based on only a small number of observations.
35 Lee and Lam (1983). This pattern is also confirmed by Perkyns (1993).
36 This exercise was undoubtedly made feasible by the introduction of Hollerith card machines for the analysis of the 1911 census returns.
37 1911 Census of England and Wales (1913), *Ages and condition as to marriage,* pp. xxxix–xlviii.
38 1921 Census of England and Wales (1927), *General report*, pp. 72–5.
39 1921 Census of England and Wales (1927), *General report*, p. 77.
40 A study by the Registrar-General for Scotland reported that, when the birth certificates of 0 to 5 year olds appearing in the 1921 census were checked, between 2 and 8 per cent had had their age next birthday reported in the census. Dunlop (1923).
41 1921 Census of England and Wales (1927), *General Report*, p. 78.
42 1921 Census of England and Wales (1927), *General Report*, p. 80.
43 The Whipple index is calculated 'by summing the number of individuals . . . at ages 25, 30, 35, 40, 45, 50, 55, and 60, multiplying the total by 5, dividing the result by the number of individuals aged 23 to 62 inclusive, and multiplying by 100'. Willigan and Lynch (1982), pp. 84–5.
44 Much has been written on the use of occupational statements in this regard. See in particular Morris, R. J. (1990) and the various contributions to Schürer and Diedericks (1993). It should be noted that, historically, countries such as the United States have been far less reticent in asking more direct questions concerning income in their censuses.
45 1891 Census of England and Wales (1893), *General report*, p. 36.
46 1891 Census of England and Wales (1893), *Ages, marital condition . . .*, Table 5.
47 See Schürer (1991), p. 26.
48 This objective was made clear in the instructions which accompanied the 1911 census schedules.
49 See Hakim (1980); Conk (1983); Higgs (1987); Hill (1993); Abel and Folbre (1990) and Garrett (1995).
50 Higgs (1987); Abel and Folbre (1990).
51 Booth's original reworking of the occupation table of the published census returns of 1851 to 1881 is given in Booth (1886). For Armstrong's revision of this work, including his proposed coding scheme, see Armstrong (1972) especially Appendix E. Other early examples of occupation coding are given in Katz (1972) and Hersberg and Dockhorn (1976). The development of social classification by *unofficial* surveys, invariably based on occupation analysis, is outlined in Bulmer *et al.* (1991). See also Morris (1990).
52 For the study of York from which Armstrong's interest in occupation classification arose see Armstrong (1974).
53 Higgs (1988b, 1991).

54 An even bigger shift in classification occurred between 1911 and 1921. See Mitchell (1988), Table B, Labour force 2, pp. 103–4.
55 The imposition of the need to collect and publish more information on employment patterns upon the General Registry Office is discussed in the case of the 1891 census in Schürer (1991). For a broader perspective see Higgs (1988b, 1991) and Szreter (1991).
56 Prandy has disaggregated the official coding schemes of the censuses of 1921 to 1981 into similar minimal-unit building blocks, allowing links to be made from the nineteeth-century material forward into the twentieth century. See Elias *et al.* (1993).
57 See Schürer (1993), pp. 101–62.
58 Formats or look-up tables have been constructed to recreate the 'standard' occupational classifications produced by Lee, C. H. (1979), pp. 3–38, and Mitchell and Deane (1962), pp. 59–60.
59 In coding occupations, the experience of this project would suggest that the critical factor is not the selection of any one pro forma classification over another, but rather the development and identification of codes that will enable the regrouping of occupational groups for comparative purposes.
60 This is the case even when the abundant availability of alternative work for women has been taken into account.
61 Of all men aged over 15 in the OPCS population of 1911, 25,034 returned themselves as 'employed' or 'employee'. Only 22 reported themselves as 'employers', and only 15 as working on their 'own account'. There were 106 'masters', 76 'journeymen', 224 'apprentices', 219 'foremen', 1,138 'assistants', 4,058 'labourers', and 877 'retired' or 'pensioners'.
62 See Szreter (1993b) and (1996b), chs. 5–6.
63 See Szreter (1984). The dubiety of such a course was compounded because the occupational units used to construct the class schemes were the sub-orders which formed the 23-order 1911 occupational classification. Since, in some instances, the sub-orders were composed of fairly broad groups, the result is that some occupations were placed in what appear to be quite inappropriate social classes. See 1911 Census of England and Wales (1915), Vol X, *Occupations and industries.*
64 The position of farmers within the social hierarchy is one of the many peculiarities of the Registrar-General's classification scheme. It is not at all clear why farmers were included within class II, yet farm workers were excluded from the social stratification and placed in the separate 'industrial' class, class VIII.
65 See, for example, *Fertility of marriage*, Part II (1923), pp. cxiv–cxvi.
66 For the locales of Pinner and Walthamstow, those born in London are considered to have been born in the same county and are counted with those born in Middlesex and Essex respectively.
67 If those originating from the four counties listed had been included as 'natives', then Banbury would have had 80 per cent of its population 'native-born'. If Cumberland and Westmorland had been designated as 'the same county', then the Morland locale would have had 86 per cent of its population 'native-born'.
68 Szreter (1984) and (1996b), chs. 4–5.
69 It is not entirely clear what a woman was expected to answer if she had borne

her present husband a child before they were formally married. The Registrar-General clearly recognised that some couples had at least conceived children before their wedding, and perhaps we should infer from this that he also recognised that some couples only made it to the altar after a birth had taken place. See n.71 below.

70 A similar shortfall in recent marriages was also reported in the 1911 census of Scotland. See 1911 Census of Scotland (1913), Vol III, *Occupations by birthplace, nationalities, infirmities, fertility*, p. xxvi.

71 *Fertility of marriage*, Part II (1923), Table II, pp. x–xi, and Table XLI, pp. lxxxix–xc. The Registrar-General based his explanation on an age breakdown of the underreporting of marriages of less than one year duration which found it particularly prevalent among couples married at young ages.

72 The lack of institutions in the OPCS data in comparison to the national population may be contributing to this difference but the overall impact of institutions is minimal (see section 3.1).

73 Census data can either be *de jure*, i.e. where individuals normally spend their time, even if they were not residing there on census night, or *de facto*, where individuals actually spend census night. All the censuses used in the present study are of the latter type.

74 See, for example, Alter (1988); Knodel (1988); Wrigley *et al.* (1997).

75 Pressat (1972), ch. 2.

76 See n.34 above. The age group 70–79 indicates all those who have celebrated their seventieth birthday but have not yet celebrated their eightieth.

77 If the prospective study is place specific, individuals being traced in local records, then outward migration as well as death will remove them from observation. If however, the individuals can be followed wherever their location, then only mortality will remove them from observation.

78 Table 5.2.4 and n.28 in chapter 5 explore the implications such mortality differentials have for calculations of average age at marriage, and for comparison of such measures between cohorts.

79 If marital fertility rates for those aged 15–19 are available (very often the case in contemporary developing countries) then it is possible to assume that the woman may have married at age 15. In some studies it is assumed that women reach menopause by their forty-fifth birthday and therefore the marital fertility of women in their late forties is omitted from the calculation of Total Marital Fertility Rates.

80 The indirect estimation techniques used to derive measures of infant and child mortality are outlined in detail in chapter 4.

81 In demography many assumptions are made on the basis of empirical observations expressed as mathematical relationships. The use of life tables serves as a prominent example.

82 The use of cluster analysis was considered but rejected on technical grounds.

83 General labourers were removed from the workforce before the calculations necessary to allocate environments were undertaken because it cannot be known for certain in which sector of the economy the labourers were employed. Agricultural labourers or ‘labourers in iron works’ were retained for the calculations as they contributed directly to a particular sector of the economy.

84 The Agricultural workforce was deemed to include those employed in fishing.

4

Infant and child mortality from the 1911 census

4.1 Introduction

This chapter focuses on the interactions between environment, social class, and infant and child mortality which were introduced in chapter 1. It sets out to enquire whether 'who an individual was' had a greater impact on their children's health than 'where the family stayed'. Did, for example, high social class impart better health, or was it the ability of the wealthy to live in particularly salubrious surroundings which meant that the children of the better off were more likely to survive? The analysis undertaken also sought to elucidate which aspect of 'social class' or 'environment' had the greatest influence, or was most closely associated with mortality levels and trends amongst infants and young children at the close of the Victorian era.

Locational and social variables have been studied before in relation to infant and child mortality levels in the context of the nineteenth and early twentieth centuries. However, while Williams was able to address both 'environment' and class in her micro-study of Sheffield, assessments of the relative importance of location and social class variables have been precluded from large-scale studies by data limitations.[1] The Registrar-General's reports and the aggregate tabulations in the 1911 census reports, to which most researchers are restricted, do not extend to cross-tabulations of social and locational variables. Spatial studies have included those of Lee who examined variation at county level, and Woods who compared patterns among registration districts.[2] Woods and others have also highlighted the fact that large towns and cities were particularly pernicious environments but, working on the Registrar-General's reports, have not been able to address social class at all.[3] Neither Watterson nor Preston and Haines, using the 1911 census, were able to measure mortality by social class and location simultaneously.[4]

Preston and Haines maintained that social class 'made an enormous difference' to mortality in England and Wales, but their analysis of location was limited to aggregated county boroughs, aggregated 'other urban districts' and aggregated rural districts, each category further distinguished in four broad 'areas' of the country.[5] Watterson did attempt to assess the relative effects of class and environment by comparing average incomes and the degree of urbanisation of each occupation, concluding that 'environment was more important than income' in explaining the mortality decline.[6] She recognised, however, that her environmental indicators were far from ideal. For example, her urbanisation variable was unable to explain why agricultural labourers and miners had very different mortality levels, despite significant proportions of both living in rural areas. She called for a systematic investigation to take into account the independent and interactive effects of, amongst other things, 'urbanisation in areas of heavy industry compared with that in more suburban areas'.[7]

The large body of individual-level data drawn from the 1911 census, provided by OPCS, being drawn from a selection of places and encompassing a variety of different environments and individuals from many different classes and social backgrounds, allows the analysis of the interaction of a variety of variables, both at the individual and at the community level. The information recording the numbers of children ever born and children dead provided by the special 'fertility of marriage' questions permits the estimation of mortality rates for infants and children for 1911 and approximately two decades previous, and these rates then contributed to the estimation of levels of fertility, as detailed in chapter 5. The mortality rates calculated, in conjunction with the census data, therefore provide an ideal opportunity to reassess the conclusions concerning the influences on differential mortality levels amongst the young, which have been drawn from the aggregated data by previous researchers, in particular by Watterson and Preston and Haines.

As with cross-sectional differentials, trends in infant mortality by location have received considerable attention, but again it has been impossible to study the trends in relation to location and social class simultaneously.[8] There may well be a difference between those factors which produce variations in levels of infant and child mortality between groups at one point in time, and those which induce changes in mortality over time. In addition, the relative roles of the different factors may alter over the course of a mortality transition. Haines used the 1911 census of England and Wales to examine trends in infant and child mortality by social class, and concluded that the speed of mortality decline in England and Wales during the 1890s and 1900s was related to social class. He maintained that 'mortality in childhood declined more rapidly among the higher and more privileged social classes'.[9] Similarly, Woods, Williams and Galley, and Woods and Williams used estimates from the 1911 census to argue for a widening of class differentials in mortality towards 1911.[10] Again the OPCS dataset allows these conclusions to be reviewed.

Conventionally trends in a demographic variable would be examined before proceeding to dissect cross-sectional variation, but issues arising during our analysis of the 1911 data suggested that the time trends calculated from such a retrospective survey have to be interpreted with caution. So that the arguments presented on this issue are clear, they have been placed in the final section of the chapter, preceded by discussion of the cross-sectional analyses, which have been undertaken using a variety of techniques designed to make the current work comparable with that conducted by Preston and Haines, in their influential book, *Fatal years: child mortality in late-nineteenth century America.* First of all, the next section outlines the various measures of mortality used in the ensuing discussions, detailing their calculation and their relative strengths and weaknesses.

4.2 Measuring infant and child mortality from the 1911 census

Mothers bearing children between 1838 and 1854 would have seen 690 out of every thousand sons, and 716 out of every thousand daughters, live to celebrate their tenth birthday. The mothers of 1910–12 would have had 812 sons and 836 daughters in every thousand born survive to the same age.[11] There were undoubtedly spatial and social differences in mothers' ability to rear children: in the 'Healthy Districts' selected by Farr 786 sons and 805 daughters out of every thousand born were surviving to age 10 as early as 1849–53. A more conventional barometer of the health of a nation or a community is the infant mortality rate (IMR).[12] For most of Victoria's reign, England and Wales saw approximately 160 children dying before their first birthday from every thousand born. As a result of hot weather and the poor sanitation performance of several of the nation's major conurbations, the final decade of the nineteenth century saw this IMR rise to approximately 170 deaths per thousand births, thereafter to decline steeply.

Regrettably, the 1911 census data regarding numbers of children born and dead do not allow the estimation of mortality rates for particular age groups such as infants, that is those aged less than 1 year, or those in 'early childhood', taken by demographers to be those aged between the exact ages of 1 and 5.[13] The data enable *only* the estimation of the risk of dying throughout the *whole* of childhood, which is referred to here as 'infant and child mortality'.[14] Using relational model life tables and a suitable standard, such estimates can be expressed in terms of infant mortality and where this is done they are referred to as infant mortality.[15] Because there is a higher risk of dying in infancy than in later childhood, the measures of 'infant and child mortality' are reasonable reflections of the infant mortality rates, but it is very important to bear in mind throughout the discussions which follow that it is *impossible* to produce independent measures of infant mortality and child mortality using these data.

The estimation of infant and child mortality using the 1911 data is contingent upon the use of sophisticated demographic estimation techniques. As many of the technicalities make unappealing reading they have been relegated to footnotes or appendices. However, awareness of some of the limitations and assumptions of the techniques utilised is vital in order to avoid misinterpretation of the approach and the resulting estimates. Three main measures of mortality are referred to in discussions of mortality, in both this and subsequent chapters: the measure of standardised child mortality used by Stevenson in his report on the 1911 census; indirect estimates of infant and child mortality calculated from the responses of couples in the OPCS dataset; and a mortality index, a summary measure derived from the indirect estimates. The three measures are discussed below in turn.

Standardised Child Mortality Rate (SCMR)

The census schedules for the Fertility Census instructed each married woman to record for her current marriage the number of children she had ever given birth to, the number still alive and the duration of that marriage. As neither the ages nor dates at which children had died were recorded, conventional age-specific death rates, i.e. the number of deaths per thousand members of an age group, cannot be calculated.[16]

Stevenson, who oversaw the analysis of the 1911 census, was only interested in a single measure of childhood mortality, the number of deaths per thousand births, but he recognised the problem caused by the absence of age-at-death information. He realised that the offspring of longer unions were older and had therefore been at risk of death for a greater time. Older children would also have been born at a time when mortality rates, particularly infant mortality rates, were higher than in the years immediately preceding the census. Stevenson therefore judged it best to distinguish between cohorts of different marital duration in his examination of mortality among the young. He also discovered that *within* each cohort, the first few children of women who had married at younger ages were more likely to die than the children of women who had married at later ages.[17] Stevenson was well aware that different sections of the population married at very different ages and that this, together with social mobility, was bound to produce very different distributions of marital duration across sections of society.[18] In order to remove the distorting effects of marital duration and age at marriage in different sections of the population Stevenson standardised his measure of child mortality.[19] As the standard population, he used 1 million families representative of the whole country in terms of marital age and duration. Standardised rates of child mortality were calculated by applying the rates of child mortality (children dead per thousand born) for each age and marital duration section of the sub-group he was interested in, to the number of children born to married women in the corresponding age and marital duration section of the standard population.[20] This produced the number of children in the standard population who would have died under the mortality regime of the sub-group. Adding together the calculated deaths in the age and duration sections produced the standardised child mortality rate (SCMR): the number of child deaths per thousand births which would have occurred in the sub-group were its age at marriage and marital duration distribution the same as those for the standard population. Standardised mortality rates for different sub-groups could be directly compared, since any underlying age and marriage structure differences had been removed. The child mortality rate in the standard million families was 174 deaths per thousand births, so a higher rate represented excessive mortality in the context of turn-of-the-century England and Wales, and a lower rate reflected lower mortality than expected.[21]

Stevenson used his standardised measure to investigate differentials by size of dwelling, social class and occupation, geographical location and place of birth.[22] He found that both fertility and mortality varied substantially with the number of rooms in the tenement, with social class and with occupations, especially female occupations.[23] Differences were also evident by place of residence and by birthplace of parents.[24] Although Stevenson was rigorous in taking account of marital duration and age at marriage, his tabulations did not allow him to examine any of the above factors while controlling for others. He could not, therefore, assess their relative importance. With greater computing power and more sophisticated analytical tools, it is now possible to augment Stevenson's analysis of individual-level data from the 1911 census, but his meticulous analytical standards remain a benchmark for which to strive.

Indirect estimation of infant and child mortality

The calculation of conventional measures of mortality, such as age-specific death rates, requires numbers of deaths classified by age and people alive in each age group. In many developing countries, and in historical contexts, such statistics are often unavailable.[25] William Brass developed indirect estimation techniques for use in such situations.[26] These techniques use the answers to census or survey questions regarding the marital duration of groups of women, the number of children born within their marriages and the number of their children who had died, to estimate the probability of dying between one exact age and another.[27]

Brass developed his 'indirect' techniques after noticing that, for women in standard five-year marital duration groups, the proportion of their children that had died corresponded to the probability of dying before certain exact ages.[28] Thus, for women married less than five years, the proportion of children who have died gives an indicator of the probability of dying before the age of 2. Similarly, among women married 5–9, 10–14, 15–19, 20–24, 25–29 and 30–34 years, the proportions of children who have died give indications of the probabilities of dying before the ages of 3, 5, 10, 15, 20 and 25 respectively. There is, of course, only a rough correspondence between the proportion that have died and the probability of dying before a certain exact age. As already noted, women from different cross-sections of society marry at different ages and bear children at different speeds or tempos, and so have different distributions of children. Older children have been at risk of death for longer and therefore within the same marital duration cohort the average age of children, and thus the average risk of death experienced by those children, will differ among sub-groups of the population. Using a large number of empirical fertility and mortality schedules, Brass developed the means to allow for these variations and convert the 'proportions of children dead' among the children ever born to a population sub-group into the chances of those children having died by a particular age.[29]

The 1911 census gives the duration of each woman's current marriage. The number of children born within that marriage is known, as is the number of those children who had died. This means that the proportions that had died can be calculated according to marital duration groups and transformed into the probabilities of dying by a particular age, each marital duration group yielding the probability of dying by a different exact age. These probabilities of dying could be combined to construct a life table embodying the age pattern of mortality in childhood and the teenage years. However, as mortality had been changing in the decades before the census, older children, generally born to women who have been married for longer, will have been subject to a higher mortality regime during their most susceptible years. In cases such as this, instead of forming a life table, the estimates can be used to measure, and thus account for, the underlying time trend in mortality, by locating each estimate of mortality risk in time.[30] To enable comparison of mortality estimates for different groups and to help the interpretation of time trends in mortality, it is common to express all estimates as infant mortality (IMR, ${}_1q_0$ or q(1)); this is done by assuming a given pattern of mortality in childhood.[31]

However valuable, the 1911 census data are not without their limitations. The 'snapshot' view from the census means that it is only possible to observe the characteristics (such as sex and age) of those children who were recorded as co-residing with their parents. Furthermore, because relationships in the anonymised OPCS data are given by relation to household head, there can be some difficulty in identifying the children of women who are neither the household head nor the wife of the head.[32] The census question was addressed to married women regarding only their current marriage, making it impossible to consider children who were illegitimate, or who were living with a step-parent or a widowed parent. It is also impossible to gain any information concerning children who had died or who were not with their parents on census night and thus estimates of mortality by birth order, length of previous birth interval or sex cannot be made despite their demographic interest.[33]

To minimise possible bias, certain qualifiers have been used to restrict the analysis of women within the OPCS dataset to those whose answers to the census questions could be considered reliable. Only women whose husbands were recorded with them on census night were considered. Of the 17,741 married couples so defined 523 were discarded because no response had been given to the question regarding marital duration. Analysis was further restricted to those wives whose age at marriage fell between their tenth and fortieth birthdays and the number of whose children born did not exceed two more than the years of their marriage.[34] Altogether 16,664 couples contributed to the calculations discussed below, although in some instances where sub-group analysis was undertaken, those women with missing values for the characteristics defining a particular group also had to be excluded. Women who gave information on marital duration but failed to fill in the boxes enumerating children ever born, dead and alive were retained in the analysis because inspection of the households involved indicated that these responses should be interpreted as genuine zeros; no children had been born so none had been lost.[35]

The estimated time series of infant and child mortality rates (calculated from the OPCS dataset), when expressed as infant mortality, is very similar to that calculated for all England and Wales from the published report of the 1911 census. These time series are shown in Figure 4.2.1 together with the national infant mortality rates derived from the civil registration of births and deaths. As the indirect techniques exclude mortality among certain high-risk groups such as illegitimate children, the children of mothers who had been widowed or abandoned or children whose mothers had died, they produce an underestimate of overall national mortality but this does not imply that *marital* infant and child mortality is underestimated.[36] Margins of error for any estimation procedure such as this must be borne in mind, but these techniques appear robust, producing reliable relative levels and trends.[37]

Mortality index

In the discussion which follows a summary measure is used in addition to the indirect estimates to aid analysis, facilitating comparisons between different variables and for use when multiple regression is undertaken. The summary measure adopted is a 'mortality index' taking the form of the ratio of actual deaths to expected deaths for women married for less than 15 years, where expected deaths are calculated using elements of indirect estimation techniques.[38] Thus mortality rates calculated from the experience of children up to early adulthood and applying before about 1904 are not taken into account by the index, and it gives no indication of post-1904 trends. The calculation of the mortality index is described in Appendix A. The index can be calculated for sub-groups of women, effectively measuring infant and child mortality in those sub-groups against the average mortality for all children born to women married for under 15 years in the whole population.[39] For example, the index value of 0.70 for class I indicates that, on the basis of infant and child mortality of the population as a whole, out of 100 children expected to die, only 70 actually did so. An index value greater than one signifies that observed deaths exceeded those expected. The index can also be calculated for individual women, and as such may be used as an independent variable in regression analysis.[40]

In subsequent sections of the chapter the mortality index is used to examine infant and child mortality among different social classes and different environments, and to compare and contrast our results with those presented for the USA by Preston and Haines. When calculated via the methods outlined in Appendix A, the national index was estimated to be 0.9975. In order to express this national figure as unity, and

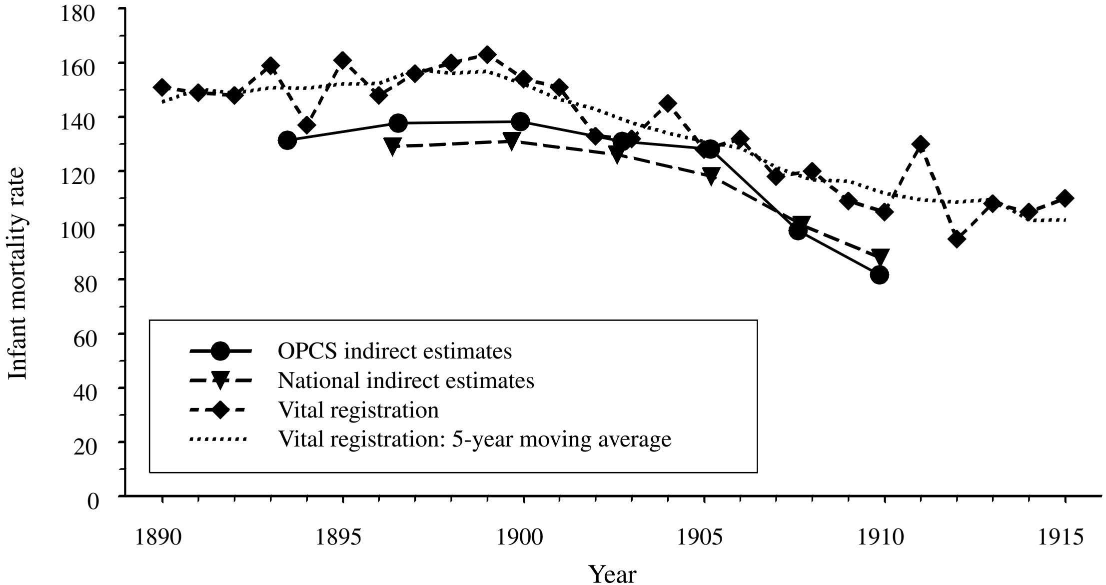


Fig. 4.2.1 Infant mortality estimates: comparing OPCS estimates, national estimates and rates calculated from vital registration, 1890–1915. *Note:* Indirect estimates are based only very loosely around a particular date and are thus effectively smoothed. *Source:* OPCS dataset, *Fertility of marriage*, Part I (1917), Tables 23 and 24; Registrar-General's *Annual Reports*, 1890–1915.

render all sub-national indices comparable to it, the indices used in discussion and presented in the tables are all 'adjusted' by multiplying the calculated index by 1/0.9975.

4.3 A comparison with the experience of the USA

The major part of Preston and Haines' influential work, *Fatal years,* was devoted to the analysis of a public-use random sample of 27,069 households recorded in the USA 1900 census, and the 100,438 individuals contained within them.[41] The 1900 census contained questions about children ever born and died identical to those used in the British census of 1911 and Preston and Haines performed their analysis on the 32,866 married women who provided legible responses to these questions. Using indirect techniques of demographic estimation and associated measures, they were able to investigate infant and child mortality differentials according to a number of variables or factors.[42]

The population was divided up between the different categories of each variable, for example the 'race' variable consisted of three categories: 'white', 'black' and 'other', and measures of mortality were then calculated for each such category enabling comparison between them. Preston and Haines found higher mortality among blacks than among whites, in urban areas than in rural ones, and in larger cities than in smaller. However, they discovered that correlation between factors produced misleading results. For example, the higher mortality they observed in the southern states was not entirely a product of the ecological and climatic features of the South, but at least partially the result of a higher proportion of black residents and lower state income levels than in other areas of the country. When the latter two factors were controlled for, the South appeared relatively healthy.[43] Preston and Haines' attempts to investigate such interrelationships using cross-tabulations were hampered by small sample sizes, so, as an alternative, they used multiple regression to minimise the problem of correlation between variables. The resultant picture of the influences on infant and child mortality at the turn of the century in the USA led them to conclude that individuals were 'relatively passive victims of time, place and labour markets'.[44] Infant and child mortality did not show striking variation according to individual behavioural characteristics such as occupation, literacy or ethnicity. Geographical variables, such as the size of place, region of residence and state income level, were very important in the American experience but race was the single most important discriminator between levels of infant and child mortality, a fact which Preston and Haines ascribed to the enormous economic disparities that existed between the 'white' and 'non-white' populations at the turn of the century.[45]

The two scholars proceeded to compare their findings for the USA with figures derived from the *Fertility of marriage* report from the 1911 census of England and Wales. From the latter they again calculated mortality measures for different sub-groups but they were restricted to those variables found in the tabulations of the 1911 census report, which meant that any comparison with the USA findings could never be perfect. Some of the information sought by the American census, such as race, ability to speak English or literacy, was not requested in England and Wales, while the comparability of other information was compromised by the form in which it was provided in the England and Wales census report. A more fundamental problem for Preston and Haines was their inability to cross-tabulate or perform multiple regression on the English and Welsh data to control for the effects of inter-correlation. Nevertheless, the published tabulations revealed that differences in infant and child mortality between urban and rural areas in England and Wales were as large as those in the USA. Preston and Haines were, however, most interested in the fact that differences between social classes in England and Wales appeared to be larger in magnitude than those between town and country. However, being unable to examine both social and locational factors simultaneously, they could not assess the relative importance of each.

Using the individual data from the 1911 census of England and Wales, a cross-sectional analysis was undertaken comparable to that conducted for the USA by Preston and Haines, and loosely following their analytic framework and methodology, but also incorporating a consideration of environment as a factor influencing infant and child mortality, an option not open to Preston and Haines owing to the nature of their sample. This section of the chapter compares Preston and Haines' findings for the USA public use sample with figures derived from the OPCS dataset. Section 4.4 then moves on to examine the influence of 'environment' as opposed to 'class' on child survival prospects in the OPCS population, and to reassess Preston and Haines' conclusions concerning England and Wales

Although there are many possible influences on infant and child mortality, projects relying on the census are obviously limited to those variables for which proxies can be calculated from this source. Given the nature of the census, the variables which have been included tend mostly to be of a socio-economic nature and such variables will not capture all of the variation in infant and child mortality. It is essential to bear in mind that variables measured at a point in time, such as in the

1911 census, may have changed since a previous event such as the birth or death of a child – they may even have changed as a result of such an event. For example, a woman may leave the labour force because of the birth of a child, or return to it if a child dies. Extreme caution must therefore be exercised in the inference of any causal pathways. Two further points urge caution in the comparison between the two nations undertaken below. First, there are compositional differences between England and Wales and the USA; their populations are distributed differently across locational and social groups. Second, the OPCS dataset, being a selection of a relatively small number of places, cannot automatically be taken as representative of the nation as a whole, unlike the data available for the USA. These latter points are more problematic for the interpretation of certain variables than for others. Despite these caveats, mortality indices are presented for all variables, as each contributes to later stages of the analysis.

The variables considered by Preston and Haines can be divided into six suites of proxies. These represent locational factors, parental origins, family status as represented by the father's employment, mother's employment, the structure of the household and housing conditions. We have tried to replicate Preston and Haines' analyses in the spectrum of variables used here, but some alterations have had to be accommodated because of cross-Atlantic differences in census questions and our smaller, differently structured dataset. The 1900 census of the USA addressed three areas untouched by that of England and Wales in 1911: race and ethnicity, literacy and home ownership. The alternatives employed are discussed at the relevant points below.

Of the three measures of mortality outlined in section 4.2 above, the summary nature of the mortality index renders it the most convenient for comparative purposes, and it is used here.

Locational factors

The sample nature of their dataset meant that Preston and Haines' 'population' was drawn from all over the USA and in their analysis they considered two locational variables: residence in various sizes of urban areas or rural areas, and census divisions. However, the OPCS dataset, being a selection of different places, is concentrated in just 13 locations, none of which can really be taken as representative of the census region in which it lies.[46] In Table 4.3.1, therefore, mortality indices have been provided only for the settlement size variable, PLACE SIZE, for comparison with those calculated by Preston and Haines for their USA urban/rural categories.

The mortality indices calculated from the OPCS dataset suggest that

Table 4.3.1 *Mortality indices for* PLACE SIZE *variable: OPCS 1911 and US 1900*

	Adjusted index[a]	Children ever born[b]	q(5)[c]	US 1900 index	
England and Wales	1.0000	6,431,596	0.1624	1.0088	US
OPCS	1.0332	18,690	0.1678		
PLACE SIZE					
London	0.9466	3,506	0.1538	1.1263	Top 10 cities
Urban 25,000+	1.1653	9,264	0.1893***	1.1445	Urban 25,000+
Urban 5,000–24,999	1.0554	3,445	0.1714	1.2813	Urban 5,000–24,999
Urban 1,000–4,999	0.7887	509	0.1281**	1.0994	Urban 1,000–4,999
Rural	0.5874	1,966	0.0954***	0.9270	Rural

Notes:

[a] The mortality index equals the ratio of actual deaths for each group of women. Expected deaths are found by multiplying the number of children ever born to the group of women by the proportion of child deaths to women of that marital duration in the population as a whole, adjusted by the multipliers for the indirect estimation of infant mortality as given in United Nations (1983). The adjusted mortality index is the mortality index multiplied by 1/0.9975, to fix the index for all England and Wales at unity.

[b] The number of children ever born to those women used in the calculation of the mortality index., i.e. women married for less than 15 years.

[c] q(5) is the life table probability of dying before the exact age of 5. It is found by multiplying the value of q(5) for England and Wales (0.1624, as given in the 1911 life table) by the adjusted index. Significance has been calculated assuming that q(5) is the outcome of a binomial process with variance (p*q/n), where q is the q(5) values and n is the number of children ever born.

*** indicates significantly different from the value for England and Wales at the 1% level,
** significance at the 5 % level,
* significance at the 10% level.

Sources: England and Wales figures from *Fertility of marriage*, Part II (1923), Tables 23 and 24; US figures from Preston and Haines (1991), pp. 91–4, 124, 185; OPCS dataset.

although those living in large cities were at a similar disadvantage in both nations, those living in rural areas and small towns were at a much greater advantage in England and Wales than in the USA. The mortality black-spots also differed between the different countries: in the USA medium-sized towns had the highest mortality, while in England and Wales the largest towns won this dubious distinction. The 'selected' nature of the OPCS communities means that comparison of the two sets of indices in Table 4.3.1 should be treated as no more than indicative, however. For example: the 'London' index, calculated from the combined census returns of Pinner and Bethnal Green (Walthamstow was officially in Essex) suggests that London had lower than average mortality. However, London is not made up of just the two extremes embodied by these two places, and in fact London had infant and child mortality rates much more similar to the nation as a whole; this is confirmed by the lack of significance of the index for London. Compared with the national population of England and Wales the OPCS population is overconcentrated in places with populations of over 25,000 and underrepresents rural districts. A great deal of variation in these categories is thus probably missed, creating a more extreme picture than that reported for the USA by Preston and Haines.

Parental origins

Although in England and Wales individuals had to report their own place of birth in the 1911 census, neither race, nor birthplace of wife's mother, nor ability to speak English, was investigated, lower rates of immigration rendering such factors less salient.[47] Three variables encapsulating what information is available on parental origins in the OPCS dataset have been computed from the birthplaces of the married couples being analysed. The NATIVITY OF MOTHER and NATIVITY OF FATHER variables distinguish between those born and enumerated in the same county, born and enumerated in different counties within Great Britain, born in Eastern Europe, born in Ireland, born elsewhere overseas, and with birthplace unknown. The Eastern European category has been included as a proxy for Jewish origin, which has been associated with better child care practices and thus better survival prospects for children.[48] The relative importance of the parents' birthplaces has been explored by combining the nativity of both parents in a further NATIVITY OF PARENTS variable which distinguishes between couples where both were born in Britain, only the wife was born in Britain, only the husband was born in Britain, and both were born overseas. The relevant mortality indices are shown in Table 4.3.2.

Although not exactly comparable, the figures indicate that on both

Table 4.3.2 *Mortality indices for variables relating to parental origins: OPCS 1911 and US 1900*

	Adjusted index[a]	Children ever born[b]	q(5)[c]	US 1900 index	
England and Wales	1.0000	6,431,596	0.1624	1.0088	US
OPCS	1.0332	18,690	0.1678		
NATIVITY OF MOTHER[d]					
Same county	1.1064	12,780	0.1797***		
Other UK	0.8809	4,793	0.1431***		
Ireland	1.2140	160	0.1972	1.2883	Ireland
Eastern Europe	0.7468	439	0.1213**	1.0265	Eastern Europe
Other foreign	0.7948	186	0.1291	1.1315	All foreign
Not known	0.8297	332	0.1348		
NATIVITY OF FATHER[d]					
Same county	1.0761	12,951	0.1748***		
Other UK	0.9254	4,576	0.1503**		
Ireland	1.3249	182	0.2152*		
Eastern Europe	0.7635	500	0.1240**		
Other foreign	1.2848	223	0.2087**		
Not known	0.8795	258	0.1429		
NATIVITY OF PARENTS[d]					
Both native	1.0418	17,097	0.1692**	0.9713	Both native
Mother native, father foreign	1.2605	292	0.2047*	0.9175	Mother native, father foreign
Mother foreign father native,	0.7767	191	0.1262	1.0513	Mother foreign, father native
Both foreign	0.8779	594	0.1426	1.1359	Both foreign

Notes:
Notes [a–c]: as for Table 4.3.1.
Note [d]: 'Mother' indicates women responding to the questions concerning the number of children who have died; 'father' indicates their husbands.
Source: as for Table 4.3.1.

sides of the Atlantic the survival chances of a child varied with the birthplace of its parents. In England and Wales, some immigrants had a much better infant and child mortality record than the country as a whole, and some fared much worse. Table 4.3.2 shows that children whose mother or father had been born in Eastern Europe were at a particular advantage, being only 0.75 times as likely to die as expected, despite the trauma of relocation suffered by their parents and perhaps themselves. In contrast, a child was at great risk if either parent was Irish although small numbers mean that the result is less significant.

In the USA, the children of *all* categories of foreign-born women stood a higher than average chance of dying, even those of Eastern European origin, but this was at least partly due to the fact that immigrants were more likely to live in cities than the average citizen of the USA. Preston and Haines demonstrated that within the larger towns and cities, the children of mothers born in Eastern Europe had a lower than average chance of dying, lower even than the white population in cities of the USA.

It is of interest to compare the survival chances of immigrants' children in their new homes with that which they might have experienced had they remained in their countries of origin. Many factors make such comparisons difficult. First, the reasons for migration may differ in certain contexts meaning that in some circumstances only the fittest and most enterprising made the journey, while in others it was the poorer and more disadvantaged who were forced to make the move. Secondly, child deaths may have occurred either in the country of origin or in the new, host country under immigrant conditions; thus it is not clear which country's conditions are being reflected in the mortality indices.

Measures of survival up to the age of 5 q(5) have been collected for Ireland and various Eastern European countries for the late nineteenth and early twentieth centuries, and are shown in Table 4.3.3, together with the same measures for immigrants from these points of origin calculated using the OPCS dataset and the public use sample from the USA. Irish immigrants to both England and Wales and to the USA not only had higher infant and child mortality than the native populations of their destinations but also considerably higher mortality than the Irish population they had left behind. At least part of this excess mortality can be attributed to the concentration of Irish immigrants into slums within cities where they tended to secure the worst jobs, in sharp contrast to the predominantly agricultural nature of their homeland.[49]

In contrast, the offspring of Eastern European women were at a distinct advantage when their mothers had moved away from their countries of origin. In this era, Jews were leaving Eastern Europe to escape overcon-

Table 4.3.3 *Child mortality of the children of immigrant women compared to mortality in countries of origin*

Enumerated in England and Wales, 1911[a]	q(5)
Mother's place of birth:	
All	0.162
England and Wales	0.170
Ireland	0.197
Eastern Europe	0.121
Enumerated in USA, 1900[b]	**q(5)**
Mother's place of birth	
All	0.193
US	0.196
Ireland	0.246
Eastern Europe	0.196

q(5) for countries from which migrants originated, for selected dates

Country of origin (date)[c]	q(5)	*Country of origin (date)[d]*	q(5)
Ireland (1900–2)	0.159	Ireland (1915)	0.122
Austria (1901–2)	0.321	Austria (1915)	0.291
Bohemia (1899–1902)	0.307		
Bulgaria (1899–1902)	0.289	Bulgaria (1915)	0.190
Russia (1896–7)	0.422		
		Czechoslovakia (1920)	0.236
		Hungary (1920)	0.260
		Romania (1920)	0.295

Sources:
[a] OPCS dataset.
[b] Preston and Haines (1991), p. 93.
[c] Preston and Haines (1991), p. 104.
[d] Calculated from infant mortality rates given in United Nations (1954), pp. 111–23. The Brass relational life table was used to derive q(5), together with Coale-Demeny East level 12 as a standard life table (except for Ireland, when Coale-Demeny West level 16 was used as a standard).

centration in the ghettos and the displacement of artisans' work by machines.[50] Thus, unlike the Irish immigrants, they arrived from poor urban conditions but were usually armed with a craft or trade. Although also concentrated in urban areas, the hygienic practices inculcated by their religion would appear to have offered a measure of protection to their children. Cultural practices are unlikely to have differed initially between migrants and those who remained behind, so better infant and child survival amongst the former has to be ascribed to migrant selectivity or improved economic conditions in the host country.[51]

Certainly, as Table 4.3.4 shows, amongst the OPCS population Eastern Europeans were concentrated in the skilled manual classes while the Irish born were overrepresented amongst those with the fewest skills in class V and in class VI. The apparent economic success of immigrants from Eastern Europe may be partly attributable to contemporary repatriation policies. In Britain, many of the Jews who failed to keep their heads above water were repatriated by the Jewish Board of Guardians: 56 per cent of the increase in the total number of Russians and Russian Poles in London between 1881 and 1911 were forced to return.[52] Those removed may have included many of those most at risk of infant and child death, leaving a relatively healthy and successful selection.

The mortality indices derived from the OPCS dataset in Table 4.3.2 indicate that the advantage or disadvantage to the child was similar whether it was the father or mother that had come from Eastern Europe or Ireland. In contrast, the children of 'other foreign' mothers were more healthy than average although the result was not statistically significantly different from the average, while those of 'other foreign' fathers were less healthy.[53] The mortality indices for the NATIVITY OF PARENTS variable indicates that where the mother was of overseas origin infant and child mortality was lower irrespective of the father's nationality, but particularly so if he was a native (although results were not significant). The higher and significant rates for native mothers were increased if the father was foreign. Mother's place of origin seems therefore to have been more important than the father's in influencing infant and child survival.

Whereas in England and Wales a foreign-born mother was connected with lower mortality, in the USA it was connected with higher, yet in both countries having a foreign-born father as well as a foreign-born mother elevated a child's risk of mortality. One, intuitive, explanation for this is that while mother's origins represented child care practices, those of the father reflected economic circumstances. The lower mortality observed for the children of Eastern European fathers may, for example, have been partly due to their fathers' ability to avoid unskilled manual labour. However, the risks to which infants were exposed were also likely to have been affected by the degree of social cohesion of the immigrant communities. Amongst the OPCS population Eastern European migrants, who tended to migrate as families, were rarely married to non-Eastern Europeans: 83 per cent of Eastern European men and 95 per cent of Eastern European women were married to another Eastern European. In contrast only 29 per cent of 'other foreign' husbands and wives were married to another foreigner, and even fewer of the Irish, who tended to arrive in England when young and single,

Table 4.3.4 *Percentage distribution of men used in the calculation of the mortality index, by social class within birthplace*

	Birth place						
Class	Same county %	Other UK %	Ireland %	Eastern Europe %	Other foreign %	Not known %	% of Total
I	8.38	16.78	22.78	1.78	21.28	8.70	10.77
II	14.00	17.17	10.13	10.06	20.21	17.39	14.85
III	22.33	19.11	11.39	75.15	21.28	24.35	22.43
IV	21.69	20.17	18.99	8.88	21.28	16.52	20.93
V	16.36	14.53	26.58	2.37	9.57	18.26	15.64
VI Textile workers	1.80	0.31	2.53	0.00	3.19	0.00	1.36
VII Miners	11.55	8.15	6.33	0.59	2.13	5.22	10.18
VIII Agricultural labourers	3.13	2.95	0.00	0.59	0.00	2.61	2.96
No class	0.76	0.84	1.27	0.59	1.06	6.96	0.87
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Number of men	5,777	2,271	79	169	94	115	8,505

Note:
Includes only couples used to calculate child mortality indices: i.e. those married for less than 15 years, with at least one child ever born.
Source: OPCS dataset.

were married to each other. The low mortality of children with Eastern European fathers could therefore be attributable to the behaviour of the wives.

It was not only international migration that was associated with better child survival prospects in England and Wales. Table 4.3.2 shows that the children of inter-county migrants were also less likely to die than those whose mothers or fathers were born in the county in which they were enumerated in the census of 1911. Table 4.3.4 shows that, at least amongst men married for less than 15 years, inter-county migrants contained a higher proportion of classes I and II (about 17 per cent in each class) than those who had not left their county of birth (only about 8 per cent and 14 per cent respectively).[54] The lower mortality associated with inter-county migration may therefore be connected to the social class of the migrants.

Father's social class, occupation and employment status

In *Fatal years* Preston and Haines calculated the infant and child mortality index for each social class in both England and Wales and the USA. For the former the indices for classes I to V were, respectively and to two decimal places, 0.65, 0.83, 0.95, 1.00 and 1.20. Textile workers had an index of 1.18, while that for miners was 1.26. The children of agricultural labourers fared much better: their index was only 0.77.[55] While the overall index for England and Wales was 1.00, that of the OPCS population was 1.03 and inspection of OPCS derived mortality indices for the SOCIAL CLASS variable in Table 4.3.5 indicates that mortality in each class in the OPCS population tended to be slightly higher than the national figures, but only marginally so and with the exception of textile workers and agricultural labourers. The OPCS dataset contained relatively few members of the latter two groups, and being drawn from specific locations it is perhaps unsurprising that they are not representative of their national counterparts.[56] With these exceptions the relative positions of social classes in the OPCS and the national populations were the same, a neat gradation in the indices from class I to class V being obvious. In contrast, as Table 4.3.5 shows, there was a far less pronounced gradient in the equivalent figures for the USA, with classes I and II having very similar levels of mortality, as had classes III and IV. Preston and Haines were also interested in the fact that the range of indices was much larger for England and Wales than for the USA.

Income, residential segregation and restricted access to the professions were suggested by Preston and Haines as possible factors explaining the particular advantage of the British middle classes and greater inequality in this country in general. They were unable to explain much mortality variation for England and Wales using the limited urban/rural variables which were available to them, although they had already found that urban/rural differences affected infant and child mortality comparisons between groups in the USA and also internationally.[57] For example, they found that the mortality level of American miners' children, the majority of whom were found in rural areas, was close to average. British miners' children fared much worse, partly because a larger proportion lived in urban areas. Not all differences could be attributed to residential patterns, however. The children of British miners had a worse record wherever they lived and those of British agricultural labourers survived better than American agricultural labourers although both lived in the countryside. The poor survival of American agricultural labourers' children was partly connected to the high proportion of blacks among them, but inspection of the occupational groups indicates that even those in higher-status agricultural occupations in the USA were not as healthy as British farm workers.

When FATHER'S OCCUPATION is considered in Table 4.3.5, comparisons between England and Wales, as represented by the OPCS population, and the USA are hindered by the different classification schemes employed.[58] In England and Wales the children of men working in the professions and agriculture had much better prospects for survival than average, the chances of death being 0.65 and 0.53 of the national average respectively. In contrast babies born to general labourers, miners, and those working in metal manufacturing and potting were exposed to much higher risks (1.21, 1.28, 1.44 and 1.53 times the average).[59]

The American occupational classification is based less on the type of material worked with and more on the position in the workforce hierarchy, separating for example managers, foremen and operative workers into different groups. Rather than place these under the FATHER'S OCCUPATION variable (Table 4.3.5) they should be compared to the only information of this nature available for England and Wales, the FATHER'S EMPLOYMENT STATUS variable; although it should be noted that some contemporary analysts maintained that the employment status question was inadequately answered and therefore useless.[60] As the census of England and Wales lacks information on literacy or home ownership this variable acts as a useful alternative indicator of status in the British context.[61] Within this variable a much greater range of indices in England and Wales is apparent once again; the gulf in status between labourers and foremen is reflected in their mortality indices, 1.30 and 0.86 respectively. The poor survival of the children of employers is more puzzling but numbers are very small, owing in part to the restriction of analysis to those couples married for less than 15 years. A man would

Table 4.3.5 *Mortality indices for variables relating to father's occupation and status: OPCS 1911 and US 1900*

	Adjusted index[a]	Children ever born[b]	q(5)[c]	US 1900 index	
England and Wales	1.0000	6,431,596	0.1624	1.0088	US
OPCS	1.0332	18,690	0.1678		
SOCIAL CLASS[e]					
I	0.6974	1,442	0.1133***	0.8700	I
II	0.8169	2,508	0.1327***	0.8600	II
III	0.9850	4,158	0.1600	1.1200	III
IV	1.0686	3,939	0.1736*	1.1400	IV
V	1.2606	3,489	0.2048***	1.2300	V
VI Textile workers	0.8928	219	0.1450	1.2300	VI Textile workers
VII Miners	1.3018	2,208	0.2114***	0.9800	VII Miners
VIII Agricultural labourers	0.5196	546	0.0844***	1.1500	VIII Agricultural labourers
FATHER'S OCCUPATION[d]					
Professions	0.6500	1,247	0.1056***	0.9450	Professional, technical
Retailing	0.9389	1,825	0.1525	0.8312	Sales workers
Transport	1.0140	2,143	0.1647		
Agriculture	0.5350	1,144	0.0869***	0.8637	Agricultural (excl. labourers)
Mining	1.2819	2,304	0.2082***	1.1448	Agricultural labourers
Metal manufacturing	1.4368	1,171	0.2334***		
Wood	0.9723	1,328	0.1579		
Construction	1.0563	1,488	0.1716		
Miscellaneous service	0.8656	1,088	0.1406**	1.0010	Service workers
General labourers	1.2083	844	0.1963**	1.2463	Labourers
Brickmakers/potters	1.5340	838	0.2492***		

Textiles	0.9194	213	0.1493	0.9344	Managers, Officials, Proprietors
Clothing	0.8273	452	0.1344*	1.1208	Craftsmen, Foremen, etc.
Paper	0.8271	340	0.1343	1.0458	Operative & kindred workers
Clerks		127		0.9121	Clerical & kindred workers
Others	1.0806	1,968	0.1755	1.0049	Miscellaneous & other
FATHER'S EMPLOYMENT STATUS					
Employee	0.9942	15,486	0.1615		
Employer/Master	1.3705	101	0.2226		
Foreman	0.8609	124	0.1398		
Journeyman/Assistant	0.7600	351	0.1234**		
Labourer	1.2998	2,456	0.2111***		

Notes:
Notes [a–c]: as Table 4.3.1; Note [d] as Table 4.3.2
Note [e]: there were 181 children in the OPCS dataset for whom father's class could not be ascertained.
Sources: as Table 4.3.1.

have been more likely to become an employer later in life, once he had worked his way up or accrued capital, and thus employers would be more likely to have been found in longer marital duration groups. The extreme good health of the children of 'journeymen and assistants' may be attributed to the type of occupations followed by the majority of workers in this category, as within the OPCS population most appear to have been pursuing higher-status or safer occupations. Over half were connected to a shop, mainly working as assistants, though some described themselves as journeymen butchers and bakers. Many of the remaining assistants were clerks or schoolmasters, with even a handful of assistant managers and superintendents creeping into this category. In other words, many of these were lower middle class, rather than proletarian or industrial workers.

In their analysis Preston and Haines used a further variable which noted whether a man was employed or unemployed. Their mortality index for those employed was 0.96, that for the unemployed 1.21. In the census of the USA men were specifically asked whether they had been unemployed for at least a month in the year preceding the census, but in the English and Welsh census unemployment can only be gleaned from the occupation records and refers only to those who stated that they were unemployed or out of work at the time of the census, and therefore exact cross-Atlantic comparison is not possible. Unfortunately, in the OPCS population the low numbers of fathers reported to be out of work at the time of the census prohibits the calculation of a mortality index for this group. The index for those in employment was, at 1.03, very close to that of the OPCS population as a whole.

Maternal employment

Turning to the mother's occupational status, it is clear from the MOTHER'S EMPLOYMENT variable in Table 4.3.6 that in both the USA and in England and Wales, the children of women in paid employment at the time of the census suffered high mortality, the risk of death being approximately one and a half times higher than average in both nations. Correlations between women's employment and infant and child mortality have often been observed and it has frequently been supposed that women's involvement in the labour force is bad for babies.[62]

In the early twentieth century, conditions of pregnancy were beginning to be recognised as an important factor in child survival and women in Britain were being encouraged to look after themselves during the ante-natal period.[63] Strenuous physical labour such as in the potbanks, and work late into pregnancy, common in the textile districts, were thought to induce miscarriage and to disadvantage any living

Table 4.3.6 *Mortality indices for variables relating to mother's employment*[d]*: OPCS 1911 and US 1900*

	Adjusted Index[a]	Children ever born[b]	q(5)[c]	US 1900 index	
England and Wales	1.0000	6,431,596	0.1624	1.0088	US
OPCS	1.0332	18,690	0.1678		
MOTHER'S EMPLOYMENT					
Employed	1.5282	1,877	0.2482***	1.4149	In work
Not employed	0.9778	16,812	0.1588	0.9865	Not in work
MOTHER'S OCCUPATION					
Professions	0.8654	61	0.1406	1.0173	White collar
Retailing	0.9702	294	0.1576		
Miscellaneous service	1.4780	354	0.2401***	1.7769	Service workers
Potting	2.3535	331	0.3823***		
Textiles	2.0311	170	0.3299***	1.1896	Crafts, operatives
Clothing	1.5146	180	0.2460**		
Other	1.2632	487	0.2052**		
EMPLOYMENT AND CHILD CARE					
Employed, no care	1.5572	1,559	0.2529***		
Employed + care	1.3914	312	0.2260**		
Not employed, no care	1.0173	14,541	0.1652		
Not employed + care	0.7247	2,278	0.1177***		

Notes:
Notes [a–c]: as Table 4.3.1; Note [d] as Table 4.3.2.
Sources: as Table 4.3.1.

child through prematurity and low birth weight. Exposure to toxins, particularly lead which was common in the pottery industry, was connected to a high degree of foetal abnormality and stillbirth.[64] The importance of birth weight and congenital abnormality to mortality in the first month of life suggested a connection between female employment and neonatal mortality, but women's employment was also associated with post-neonatal mortality.[65] Mothers in the workforce were accused of neglect, of depriving their children of valuable breast-milk and nurture, and of unduly exposing them to harsh climatic conditions as they took them to child-minders in the early hours of the day. Jones' 1894 polemic illustrates the strength of feeling which was aroused:

> These causes of death [convulsions, diarrhoea, atrophy, and premature birth] – at least the excess in them – must be attributed to the employment of women. The care of the babies is entrusted to others – they are fed artificially almost from birth. A case in point came under my personal observation this week, in which the mother returned to her work on the fourteenth day after her confinement, and fourteen days later the child was brought into the hospital suffering from gastric derangement due to improper feeding. The children of women engaged in industrial occupations suffer from the effects of maternal neglect. They are handicapped from the moment of birth in their struggle for existence, and have to contend not only against the inevitable perils of infancy, but also against perils due to their neglect by their mothers, and to the ignorance of those to whose care they are entrusted.[66]

Stevenson's analysis of the 1911 census appears to have provided ammunition against women's employment. Stevenson believed the census to have established the suspected but unproven 'evil results of maternal employment' with regard to child health:

> The fact that it is the employment of mothers away from the home which is particularly fatal to infant and child life is, of course, no new discovery, but has been long recognised, mainly in the evidence of two classes – firstly the comparison of infant mortality, etc. in towns where women are so employed and where they are not, and secondly, the records of child welfare investigation in certain towns. Although the evidence has been somewhat contradictory, it has in the main pointed to the evil results of maternal employment, especially outside the home, but it naturally could not provide any such measures of their extent as is now available.[67]

The figures for the MOTHER'S OCCUPATION variable calculated from the OPCS data in Table 4.3.6 do not refute Stevenson's analysis: paid employment for mothers in most occupations was associated with high infant mortality, particularly for those who worked in the potting and textile industries. Infants seem to have paid the price of the physical stress and long hours endured by their mothers. However, the mortality indices for women working in retailing and professional occupations show that paid employment for married women cannot have been uniformly bad for child survival. The children of women working in retailing had mortality levels similar to non-working women, and the offspring of those following a profession were even at an advantage although the result is not statistically significant.[68] However, such occupations formed only a small minority of married women's employment; only 16 per cent of women married for less than 15 years who were employed worked in retailing, and only 3.5 per cent worked in a professional occupation.[69] Women working in the professions were more likely to have husbands from the highest social class than were women in other occupations or not in paid employment: of wives married for less than 15 years and working in the professions, 32 per cent were married to men in class I, compared with only 11 per cent of all wives in the same cohort, and only a very small minority of those working in the pottery or textile industries. Women employed in the latter trades were predominantly married to manual workers in the lower social classes and the poor survival chances of their children may have been associated with poverty, rather than their mother's employment. Of course another factor influencing the occupation of married women would have been the availability of work in an area: in the OPCS population as a whole, 11 per cent of wives married less than 15 years were in employment, and while 14 per cent of social class V men and 6 per cent of Miners had wives in the labour force, amongst male Textile workers the equivalent figure was 23 per cent.

There have always been objectors to any attempt to draw a causal link from married women's employment to high infant and child mortality. Sympathetic commentators have drawn attention to the fact that many married women who worked did so in order to provide desperately needed income for their families.[70] Others have argued that high infant mortality in places with little female employment, such as the mining districts of Durham and South Wales, means that the connection between infant mortality and female employment must be spurious and that other factors such as overcrowding and general insanitary conditions were more important to child survival.[71] Many of the places beset with these problems were those in which there was also a need for married women to earn extra money, and so the observed connections between women's work and infant mortality may have been based on ecological correlations.[72]

Analysis of the 1911 census is based on individual-level data and avoids spatial correlation. Nevertheless it still seems to support the iniquity of women's work. The important difference between the 1911 census data and studies which indicated better survival prospects for the children of employed women is that the latter not only used individual women but followed their children longitudinally over time from the day of their birth. In a retrospective survey such as the 1911 census, on the other hand, the loss of a child by the mother before 1911 can only be related to her work status in 1911 after the child's death, yet in his 1923 report Stevenson's reasoning ascribed causation as running from the mother's work to the child's death. Given the sequence of events, it would be at least as valid to argue that a child's death allowed a woman, who would otherwise have had to stay at home to look after her children, to return to the workforce. The census snapshot thus captures, in the workforce, a disproportionate number of women who have suffered the loss of a child, giving the impression that women's work was bad for babies. In fact it may be more true to say that, as today, babies were bad for women's work. This is a point to which we will return in chapter 5.[73]

Following Preston and Haines, the current analysis expands the simple employed/not employed dichotomy for women into an EMPLOYMENT AND CHILD CARE variable incorporating information about possible sources of child care beyond the mother herself, as it is plausible that having an additional carer in the household might reduce child mortality, particularly amongst women employed outside the home. In the OPCS population if a servant or non-employed female relative aged over 15 was resident in the household, then it is considered that a potential child care source was present.[74] The combination of this with the employment status of the wife produces a fourfold distinction; 'not employed with no (potential, resident) child care', 'not employed with child care', 'employed with no child care' and 'not employed with no child care'.

As Table 4.3.6 indicates, the higher mortality among the children of employed women remained whether or not there was a source of potential child care in the house, but if a 'mother substitute' was available child survival did improve whatever the mother's employment status. Child care availability may have acted not simply to keep babies alive, but also to allow mothers to return to the workforce even if they had not lost their baby. The advantages of having a source of potential care are clear but it is by no means certain that any potential carer was actually looking after the children. Naturally there may have been many other forms of child care which cannot be seen in the census record, such as neighbours or relatives living nearby but outside the home.

The importance of alternative child care was recognised by Stevenson who wrote that:

it would seem that where the means of obtaining a reasonably adequate substitute for the mother exists, the children suffer comparatively little, as in the case of post office officials, teachers, actresses, clerks, and shopkeepers generally. In the more distinctively working class occupations, on the other hand, the loss of the mother's care frequently involves the death of the child, as in the case of, for instance, printers, earthenware workers, leather goods makers, and textile workers.[75]

The child care element included here is able to identify not just those likely to have had the money to employ child care, but also those with access to more informal sources of care. The presence of servants may be correlated with lower mortality as an indicator of higher than average income, education or other resources rather than child care. Similarly, a female relative may have been paying her way and thus providing an additional source of income. The child care element of the women's work variable may thus be measuring the effect of other factors, a possibility which will be explored later using multiple regression.

Household structure

In their analysis Preston and Haines considered the influence of the structure of household in which a couple lived on the survival chances of their children. Table 4.3.7 includes three variables within this category. The RELATIONSHIP TO HEAD variable indicates the position of the wife in a particular family group in relation to the head of the household in which they are living. In addition, the SERVANTS PRESENT and BOARDERS PRESENT variables indicate whether or not having such individuals in the household was related to child survival, irrespective of their relationship to the couples in question. The latter two variables can be thought of as indicators of financial security or hardship.[76]

The child care variable discussed above suggests that the presence of a servant in the household was associated with lower mortality and this is confirmed by the SERVANTS PRESENT variable in Table 4.3.7 which shows that the mortality of children whose parents kept a servant was only about 60 per cent of average in England and Wales and about 85 per cent of average in the USA. Greater advantages associated with servant keeping in Britain than in the States are consistent with greater differentials by social class. Servant keeping was, of course, concentrated amongst the better off. Of servant keeping households in the OPCS population, nearly three-quarters belonged to classes I and II. A third of couples in class I and a quarter of those in class II kept servants, but fewer than 8 per cent of any other class did so.

Table 4.3.7 *Mortality indices for variables relating to household structure: OPCS 1911 and US 1900*

	Adjusted index[a]	Children ever born[b]	q(5)[c]	US 1900 index	
England and Wales	1.0000	6,431,596	0.1624	1.0088	US
OPCS	1.0332	18,690	0.1678		
SERVANTS PRESENT					
With servants	0.6080	1,567	0.0988***	0.8594	With servants
Without servants	1.0728	17,088	0.1743***		
BOARDERS PRESENT					
With boarders	1.1603	1,985	0.1885***	1.1702	With boarders
Without boarders	1.0186	16,670	0.1654		
RELATIONSHIP TO HEAD[d]					
Head	2.4947	11	0.4052*	1.2152	Head
Wife	1.0244	17,984	0.1664	1.0015	Wife
Daughter	0.9292	298	0.1509	1.0022	Daughter
Daughter-in-law/step-daughter	1.5921	136	0.2586**	0.9372	Daughter-in-law
Sister	0.9135	69	0.1484	1.6863	Sister
Boarder/lodger	1.9331	132	0.3140***	1.2458	Woman is a boarder
Servant		8		1.7685	Woman is a servant

Notes:
Notes [a–c]: as Table 4.3.1.
Note [d]: There were 22 children with mothers living as 'other relatives' of the household in the OPCS dataset, for whom a mortality index could not be calculated.
Sources: as Table 4.3.1.

Taking in boarders is more likely to have been a strategy to increase the income of the household, although the opportunity to do so may have been constrained by the housing stock of the area and the demand for places to board. In areas such as Bethnal Green, where families were large and dwellings were small, there was little space to put a boarder. On the other hand, in places from which people were migrating away, such as Saffron Walden, not many would have been looking for places to board.[77] Any extra income arising from the keeping of boarders does not appear to have translated itself into better survival for the children of the household. On the contrary, the mortality indices in Table 4.3.7 show that the risk of dying increased by over 15 per cent in both the USA and England and Wales when boarders were present. One possibility is that boarding was prevalent only among the very poorest and that the extra money was insufficient to improve survival noticeably. However, amongst the OPCS population nearly 20 per cent of boarder-keepers were in classes I and II, not an insignificant figure. In addition when mortality indices were calculated for boarder-keepers and those without boarders in each social class, keeping a boarder was associated with higher mortality in all classes except miners. The index for classes I and II combined was close to unity for boarder-keepers and about 0.75 for those without boarders and there were similar differences for other classes.

It is possible that boarders may have brought an increased risk of infection to the children of the household, especially if that household was already cramped and short of ready money. Aaby has demonstrated that the risk of infection and the severity of a disease episode is greater when the source of infection is within the household and a steady turnover of boarders may have introduced diseases to the host family to which they lacked immunity.[78] Given the selection effects which can occur from the conjunction of the retrospective nature of the infant mortality questions and the cross-sectional nature of the rest of the census information, the possibility that when the dead child was alive no boarders were present in the household has to be considered. Indeed boarders may only have been taken in when a space in the home was created by the death of a child.

Looking at the third panel in Table 4.3.7 it can be seen that married boarders had even higher infant and child mortality than the families taking them in. Amongst the OPCS population their mortality index reveals mortality 93 per cent higher than average, and 77 per cent higher than their hosts, although in the USA the latter gap is far smaller. Part of the reason for the lower survival rate of the children of boarders may be their lower social class: married female boarders were disproportionately drawn from amongst the wives of men in class V and Miners.[79] We can only speculate as to whether differential treatment is at the root of the difference in mortality experience shown in Table 4.3.7 between the women who were the married daughters of the head and the much poorer experience of couples living with the husband's parent in the OPCS population, although the radically different relative experience of daughters, daughters-in-law and sisters in the USA may indicate that small numbers in the OPCS sample have rendered the results unreliable.

Housing conditions

An additional suite of variables considered by Preston and Haines was that measuring farm and home ownership. Such information was not recorded by the 1911 census of England and Wales but alternative measures of HOUSING CONDITIONS can be derived from the census returns, reflecting both income and overcrowding. These include the number of rooms in the household in which a particular couple were living, the number of persons in that household and the number of persons per room. These are very different measures from those used by Preston and Haines and, to avoid confusion, the latter have not been included in Table 4.3.8. In order to ensure numbers in the analysis using the OPCS are robust, the variables were all divided into three simple ordinal categories representing 'high', 'medium' and 'low' levels of that particular variable.

The mortality indices for the NUMBER OF ROOMS variable in Table 4.3.8 indicate that, as the number of rooms increased, the risk of child death became smaller.[80] Those children living in one or two rooms had a 30 per cent higher chance of death than the population as a whole whereas those with six or more rooms at their disposal were almost 30 per cent less likely to die. Although house size may have influenced mortality through congestion and transmission of communicable diseases, the number of rooms closely proxies general social standing.[81] For example, classes I and II, forming only one-quarter of the overall OPCS population, occupied well over half of all houses recorded with six or more rooms, but less than 10 per cent of one- and two-roomed dwellings. Preston and Haines maintained that the size of families' accommodation was 'probably one of the most important pathways by which economic circumstances influence child mortality'.[82]

The number of rooms occupied by a household will have also depended, however, on the available housing stock and the number of people needing to be accommodated. The number of people in a household is a crucial factor in determining whether a house is overcrowded. The best intuitive measure of overcrowding is persons per room; one

Table 4.3.8 *Mortality indices for variables relating to housing conditions: OPCS 1911 and US 1900*

	Adjusted index[a]	Children ever born[b]	q(5)[c]	US 1900 index	
England and Wales	1.0000	6,431,596	0.1624	1.0088	US
OPCS	1.0332	18,690	0.1678		
NUMBER OF ROOMS					
1–2	1.3047	2,172	0.2119***		
3–5	1.0795	12,724	0.1753***		
6+	0.7240	3,783	0.1176***		
PERSONS PER ROOM					
0–0.99	1.0539	3,846	0.1712		
1–1.99	1.0490	10,280	0.1704**		
2+	0.9810	4,553	0.1593		
NUMBER OF PERSONS					
1–3	1.8363	1,952	0.2983***		
4–6	1.0394	11,055	0.1688*		
7+	0.7662	5,683	0.1244***		
PERSONS PER ROOM WITH DEAD CHILDREN					
0–0.99	0.4791	3,143	0.0778***		
1–1.99	0.9078	9,164	0.1475***		
2+	1.4718	6,372	0.2391***		
PERSONS PER ROOM WHEN ONE CHILD DEAD					
0–0.99	0.6318	3,279	0.1026***		
1–1.99	1.0578	9,718	0.1718**		
2+	1.2149	5,682	0.1973***		

Notes:
as Table 4.3.1.
Sources: as Table 4.3.1.

would expect a greater number of persons in each room to increase mortality. Contrary to expectations, the relationship found in the OPCS data, shown by the PERSONS PER ROOM variable in Table 4.3.8, suggests the opposite: individual couples who lived in overcrowded accommodation appear to have enjoyed *increased* chances of child survival, although statistical significance is low.

A reason for this counter-intuitive relationship is provided by the mortality indices for the NUMBER OF PERSONS variable in Table 4.3.8 which suggest that mortality was lower where there were more people in the household.[83] Households with three or fewer inhabitants stood a risk of child loss over 80 per cent higher than average. Those with more than seven people, on the other hand, had about 24 per cent *lower* than average chance of a child death. Why should fewer persons be linked to higher infant and child death rates? We hypothesise that this is another case of 'reverse causality', with current characteristics being selected by past experience; the child mortality, occurring in the years before the census, resulted in a smaller number of people being present in the household on census night 1911. It would be more appropriate to relate the chance of mortality to the number of people present and number of rooms available when each child was growing up and at risk of death.

An attempt was made to test this hypothesis by recalculating the number of persons per room with dead children added back into the household size. The resulting mortality indices are given as the PERSONS PER ROOM WITH DEAD CHILDREN variable in Table 4.3.8. The picture is now completely reversed with the risk of death increasing as the number of persons per room increases. Those children born to a family with more than two persons per room, were all children to have lived, have nearly one and a half times as great a risk of death than average, whereas those with fewer than one person per room have risks which are less than half that which might be expected. Adding in all dead children is, of course, bound to exaggerate the household size experienced by an individual child as births and deaths happen sequentially not simultaneously. Those children who died may not all have been present and contributing to congestion at the same time. Others may have been born since the death of a child, or boarders and lodgers may have been taken in where there would not have been room if a child had lived. A compromise calculation was therefore performed with only one dead child added in for every family who lost any children producing a more realistic estimate of household size while children were at risk of death. The mortality enhancing effect of overcrowding is still highly visible although considerably reduced, as shown by the PERSONS PER ROOM WHEN ONE CHILD DEAD variable in Table 4.3.8.

Stevenson recognised this in his report on the census, writing that 'couples are enabled to continue occupation of very small tenements when the children born to them are lost by death; though no doubt the relation of cause and effect is often reversed'.[84] The number of rooms a family occupied may not have been a function simply of economic status or housing availability, but also of achieved family size. Because of the difficulty of assessing household size and thus overcrowding at the time of risk to the child, in the rest of this chapter, analysis is restricted to the NUMBER OF ROOMS variable.

4.4 The influence of environment versus social class in infant and child mortality

As explained in chapter 1, and at the beginning of the present chapter, the interplay between social class, 'who one was', and environment, 'where one stayed', in relation to infant and child mortality for the late nineteenth century is relatively poorly understood, owing to the nature of the available data. Using the individual records contained in the OPCS dataset we were able to address these issues, initially using mortality indices for four basic environmental categories and their several subdivisions, the parameters of which are described in section 3.5.

As has been shown in section 4.3 above, the OPCS data replicated the social class gradient in mortality indices observed at the national level for England and Wales by Preston and Haines. When environment is considered using the OPCS dataset, however, the mortality indices provided in Table 4.4.1 reveal a substantial gradient in infant and child mortality across the four basic environments; Agricultural, White Collar, Light Industry and Staple Industry. As expected, children in Agricultural areas were the most fortunate, being nearly 40 per cent less likely to die than average. Those in White Collar and Light Industry environments suffered slightly more, while those spending their formative years in Staple Industry environments were at a severe disadvantage. Such children were exposed to 1.3 times the risk of the overall national population and were more than twice as likely to die as those in Agricultural environments.

Table 4.4.1 also reveals considerable variation within each environment. Within the White Collar-rural places, for example, the risk of dying, at about half the national average, was below even that for Agricultural environments while being born into a White Collar-urban place offered no advantage over those born into a Light Industry area.

As a 'residual' category the Light Industry environment contains noticeable variation. When the two London communities of

Table 4.4.1 *Mortality indices by environment*

	Adjusted index[a]	Children ever born[b]	q(5)[c]
England and Wales	1.0000	6,431,596	0.1624
OPCS	1.0332	18,690	0.1678
Environment			
Agricultural	0.6038	2,013	0.0981***
White Collar	0.7139	2,821	0.1160***
White Collar-rural	0.5267	1,784	0.0856***
White Collar-urban	1.0328	1,037	0.1678
Light Industry	0.9748	7,055	0.1583
Light Industry minus Walthamstow and Bethnal Green	0.9184	2,527	0.1492*
Walthamstow	0.7965	2,183	0.1294***
Bethnal Green	1.2002	2,345	0.1949***
Staple Industry	1.3524	6,801	0.2197***
Mining	1.1845	2,001	0.1924***
Manfacturing	1.4221	4,800	0.2310***

Notes:
as Table 4.3.1.
Sources: as Table 4.3.1.

Walthamstow and Bethnal Green are separated out from the other communities with this type of environment, Table 4.4.1 indicates that although Walthamstow's experience was only a little different from that of other Light Industry sectors, the inclusion of Bethnal Green, where children were 15 per cent more likely to die than the national average, raised infant and child mortality in Light Industry overall. Several possible reasons for Bethnal Green's particularly high mortality regime will be considered below, but it does appear to have experienced mortality rates more akin to areas with a Staple Industry environment than those described as Light Industry. Amongst the Staple Industry areas Mining environments were worse than average, but even they were less dangerous than Manufacturing environments which were particularly pernicious to child and infant health.

In sum, although the picture is not entirely straightforward, a strong environmental gradient in infant and child mortality emerges from Table 4.4.1. The gradient is not merely an urban–rural one; the most striking differences in child survival are seen between those places where single industries dominated employment and other, less monocultural, urban areas. Indeed the gradient is not even an urban–rural one: many mining areas, with higher than average mortality, were situated in what were classed as rural districts.

In the context of the social class mortality differentials in England and Wales, Preston and Haines recognised that the residential segregation of social classes could help to explain the observed mortality differentials, and Smith implied that class differences in England and Wales could be a product of location within neighbourhoods.[85] Smith went so far as to suggest that location was much more important than 'the advantages or disadvantages consequent upon the status of individuals', but neither he nor Preston and Haines could pursue these claims further owing to lack of appropriate data.[86]

Certainly, as Preston and Haines suspected and Table 4.4.2 shows for the OPCS population, the social classes were unevenly distributed over environments. The table shows the percentage of the population living in households headed by persons of each class in each environment, and confirms that there was a concentration of lower-class households in unhealthy cities. Panel A shows that 76 per cent of class V households and 72 per cent of class IV households lived in areas dominated by industry (be it Light or Staple), whereas only 9 per cent and 13 per cent respectively lived in Agricultural areas. From a different point of view, Panel B indicates that in the unhealthiest, Staple Industry, environments classes IV and V made up 39 per cent of the population, a figure which rises to 70 per cent when textile workers and miners are treated as belonging to these low-skill groups. Only 12 per cent of the Staple Industry population belonged to classes I and II. Agricultural environments, on the other hand, had a rather more even social mix: 27 per cent of the population lived in households headed by men from classes IV or V, and a further 18 per cent in those headed by agricultural labourers, but 33 per cent lived in class I or II households.

The range of mortality indices for environments in Table 4.4.1 (0.53 to 1.42), is of only slightly larger magnitude than the range for social classes in Table 4.3.5 (0.52 to 1.30). Did both of these factors exert some independent influence on child mortality, or did one dominate, giving rise to mortality variation in the other? While the OPCS dataset cannot assign environmental categories below the level of the enumeration district, the latter units are small and relatively homogeneous, thus capturing some of the 'neighbourhood' effect. As such the data greatly simplify the task of disentangling the influences of locality and class, allowing the independent effects of each to be separated out in order to assess which is the more important with respect to child survival.[87]

Table 4.4.2 *Distribution of population living in households headed by men of different social classes, A: by environment and B: within environment*

Panel A: Percentage of each social class living in each environment

Social class	Agriculture	White Collar	Light Industry	Staple Industry	N in class
I	10	48	31	11	8,795
II	23	21	39	17	16,920
III	10	16	57	16	22,378
IV	13	15	32	40	19,441
V	9	14	43	33	14,756
VI Textile workers	7	3	16	74	1,285
VII Miners	0	0	1	98	9,019
VIII Agricultural labourers	79	8	10	4	3,141
None	10	20	39	31	7,197

Panel B: Percentage of population in each environment from each social class

Social class	Agriculture	White Collar	Light Industry	Staple Industry
I	6	23	7	3
II	27	20	17	9
III	16	20	33	11
IV	18	16	16	24
V	9	12	17	15
VI Textile workers	1	0	1	3
VII Miners	0	0	0	27
VIII Agricultural labourers	18	1	1	0
None	5	8	7	7
N in environment	14,085	18,153	38,242	32,452

Note:
Percentages may not sum to 100 due to rounding.
Source: OPCS dataset.

Mortality indices were calculated for each class within each type of environment where numbers permitted. Presented in Table 4.4.3, these demonstrate that in Manufacturing environments all working-class groups had higher mortality than the national average, class V exceeding this average by over 60 per cent.[88] In Light Industry environments the rate of mortality was slightly below the national average among classes I–IV, and was a little above it in class V. In White Collar-urban environments, experience was similar to that in Light Industry, although class I enjoyed a much stronger advantage and class V was rather worse off. In White Collar-rural areas all classes, but especially I and II, had lower mortality than average, a pattern repeated in Agricultural environments. Within Manufacturing environments, it is still possible to distinguish a neat class gradient in the mortality index, but within other environments not only are social class differences reduced but many of the regularities have been eliminated. No pattern is discernible at all in Agricultural and Mining environments. The particular relative disadvantage of children of men in social class V compared with others living in White Collar-rural areas may well have been due to the nature and insecurity of tenure of their fathers' jobs. Inspection of the occupations of the married, cohabiting men in this class in White Collar-rural environments shows that 39 per cent of them described themselves as labourers of some sort (mainly general labourers, or builders' or railway labourers). A further 48 per cent worked in some other capacity on the railways or in haulage. Such jobs may have been associated with short-term hiring and firing, uncertainty of income, and possibly high mobility with no settled residence, and this category of people may have been especially disadvantaged wherever they lived.[89] As was shown in Table 4.3.5, the children of general labourers in any area had a 21 per cent higher chance of dying than the average.

Interpretation of the figures for the Light Industry environment is, as ever, complex. The particular disadvantage suffered by the children of class V fathers in this environment can largely be ascribed to the very high mortality risks run by such children in Bethnal Green. Their mortality index of 1.47, in combination with the fact that a higher proportion of class V children than other classes lived in Bethnal Green (47 per cent as compared to 27, 35, 27 and 13 per cent of classes IV, III, II and I respectively), disproportionately increases the mortality risks amongst the children of class V in the Light Industry environment.

The experience of each class varied considerably depending on the environment in which they resided. Looking along the rows of Table 4.4.3, for instance, it can be seen that the risk of infant and child

Table 4.4.3 *Mortality indices by social class and environment*

	Agriculture	White Collar		Light Industry	Staple Industry	
		Rural	Urban		Manufacturing	Mining
Panel A: Adjusted index[a]						
I		0.3510	0.5248	0.9215		1.5630
II	0.4877	0.4058	0.9972	0.9224	1.0827	1.0383
III		0.5876	0.9506	0.9656	1.3653	
IV	0.6081	0.5730	1.0616	0.8265	1.4673	0.8513
V	0.6242	0.9146	1.3113	1.1706	1.6195	
VI Textile workers					1.0360	
VII Miners					1.4566	1.2365
VIII Agricultural labourers	0.5509					
No class						
Panel B: Children ever born[b]						
I	85	484	179	489	158	47
II	439	300	169	1,159	346	95
III	307	391	175	2,494	679	112
IV	496	319	203	1,140	1,701	80
V	247	227	274	1,564	1,065	112
VI Textile workers	1	7	0	29	182	0
VII Miners	0	7	9	21	645	1,526
VIII Agricultural labourers	429	44	3	38	3	29
No class	9	5	25	121	21	0

Panel C: q(5)[c]

I		0.0570***	0.0852***	0.1497		0.2539
II	0.0792***	0.0659***	0.1620	0.1498	0.1759	0.1687
III		0.0954***	0.1544	0.1568	0.2218***	
IV	0.0988***	0.0931***	0.1724	0.1342**	0.2383***	0.1383
V	0.1014**	0.1486	0.2130**	0.1901**	0.2631***	
VI Textile workers					0.1683	
VII Miners					0.2366***	0.2008***
VIII Agricultural labourers	0.0895***					
No class						

Notes:
as Table 4.3.1.
Source: OPCS dataset.

mortality among children in class I varied by a factor of 4 between White Collar-rural areas, where they ran only one-third of the national average risk, to Mining areas where they were subject to one and a half times the average mortality risk. Again, the children of class V in Agricultural areas were at a considerable advantage, with a mortality index of 0.62, compared to their peers in Manufacturing districts, who had a mortality index of 1.62. Such differences are significantly larger than those for the different classes within each environment, as inspection of the columns in Table 4.4.3 shows.

These findings suggest that in the late nineteenth and early twentieth centuries the surroundings in which people lived appear to have been much more important with regard to the risks of infant and child mortality than was their social class as measured by the Registrar-General. This implies that it was the distribution of classes over environments rather than the concentration of classes within environments which exacerbated environmental differences. 'Environment' has been defined by the profile of the occupations of those living in an area. Particular environments are thus characterised by communities of local people who lived there because it may have been within their means or convenient for their work, or because they grew up in the area and took a local job or married a local man. Such people will have shared those physical characteristics of their surroundings which affected infant and child health: the streets, the housing, the sanitation and water supply, the air quality and so on. The penalty on living in places with particularly poor surroundings is likely to have discouraged many of the better off from settling in them, and, in turn, the lack of influential, propertied individuals may have inhibited effective action to improve local amenities. People living in a certain neighbourhood may have shared a common culture, much influenced by their occupations and resources, which set limits on their ability, or willingness, to push for improvements in those amenities adversely affecting their children's health.

Given that mortality experience by social class has been shown to be closely associated with the environment in which the classes live, and given that occupation defines social class, it seems likely that variation in mortality by occupation may to some extent be explained by the distribution of occupations over environments. Many of the other variables considered in section 4.3 are also strongly correlated with social class, environment or both. There is a strong possibility that their observed relation with mortality is the product of their covariance with class or environment. Alternatively they may be part of the processes for which class and environment stand as proxies, or are in fact purer indicators of the influences underlying child and infant survival. In order to unpack further the two variables which form our main focus of interest, social class and environment, several multiple regression exercises were undertaken on all variables simultaneously. The results are reported in section 4.6 after a short discussion of the methods.

4.5 Multiple regression techniques

One of the most reliable ways of simultaneously assessing the relative effects of different variables, especially with a comparatively small dataset, is to use multiple regression. Ordinary linear regression uses paired observations of two variables to estimate a relationship between those variables. This relationship is described by an equation which can then be used to predict a value of one variable for any value of the other, the accuracy of the prediction depending on the accuracy of the estimated relationship. Multiple regression does the same thing with more than two variables, i.e. it estimates a relationship between one variable (the dependent variable) and two or more independent variables.[90] The resulting equation estimates the independent effect of each variable, holding all other included factors constant. The equation takes the form:

$$\text{Dependent variable} = \text{Intercept} + C_1 \times V_1 + C_2 \times V_2 + \ldots + C_n \times V_n.$$

Where C_i is the estimated coefficient for each independent variable, and V_i is the value of the variable.

The dependent variable is a form of the mortality index (i.e. the ratio of actual to expected child deaths), calculated for an individual woman, where the expected number of child deaths depends on the woman's marital duration.[91] The variables discussed in relation to infant and child mortality above in sections 4.3 and 4.4 were considered for use as independent variables.

Along with ENVIRONMENT and SOCIAL CLASS, NATIVITY OF MOTHER, NATIVITY OF FATHER, NATIVITY OF PARENTS, FATHER'S OCCUPATION, FATHER'S EMPLOYMENT STATUS, MOTHER'S EMPLOYMENT STATUS, MOTHER'S OCCUPATION, EMPLOYMENT AND CHILD CARE, SERVANTS PRESENT, BOARDERS PRESENT, RELATIONSHIP TO HEAD and NUMBER OF ROOMS were retained. PLACE SIZE, however, was dropped from the analysis as the variation it showed was fully captured by the ENVIRONMENT variable. When the ENVIRONMENT variable in Table 4.4.1 is compared with the PLACE SIZE variable in Table 4.3.1 the Agricultural environment and rural places can be seen to have had very similar levels of infant and child mortality. ENVIRONMENT, however, reveals far more variety within urban areas, ranging from well-to-do urban areas near the countryside, with child mortality levels below even those in truly agricultural regions, to those parts of towns and cities in which manufacturing industry was concentrated and where infant and child death was 42 per cent more likely than average. With the inclusion of ENVIRONMENT and its greater power of differentiation, there seemed little reason to retain PLACE SIZE. PERSONS PER ROOM and PEOPLE IN HOUSEHOLD were also omitted owing to the difficulty in assessing household size and overcrowding at the time of risk to the child as discussed in section 4.3.

To eliminate problems of inter-correlation all the independent variables were checked for collinearity and further ones omitted from the regressions as a result. All the nativity variables were very strongly correlated, so only NATIVITY OF MOTHER was used as it appears to have exerted slightly more influence on mortality than NATIVITY OF FATHER. FATHER'S OCCUPATION and FATHER'S EMPLOYMENT STATUS were strongly correlated to SOCIAL CLASS, as was MOTHER'S OCCUPATION to EMPLOYMENT AND CHILD CARE and in each case only the latter variable was used. Finally, RELATIONSHIP TO HEAD was omitted as it added little to the explanatory power of any regression. All the remaining independent variables were categorical and were represented using dummy variables.[92] A new continuous variable, AGE OF WIFE, was added to act as a control for changing mortality over time.[93] The use of individual-level data means that the risk for children in different individual families can be compared. All variables have been calculated for each individual woman, reflecting information about that woman alone. They are thus all micro-level variables, apart from ENVIRONMENT.

The coefficients for each variable represent the effect of increasing the value of that variable by one, so for categorical variables they indicate the difference between being in one particular category as opposed to the reference category. Although many variables have been included in the multiple regression models, the limitations of the census mean we cannot measure all of the factors which may have affected infant and child mortality. For example the census is silent on income, feeding methods, sanitation and water supply. Some of the variation captured by variables which have been included may therefore really be attributable to variables which it is not possible to include.

Multiple regression enables the consideration of one variable while holding others constant, and so it was unnecessary to restrict analysis to women married for less than 15 years, as has been done when calculating the mortality indices, because mortality decline can be controlled for using the wife's age.[94] However, analysis was restricted to couples married for less than 25 years and where both partners were present on census night. In addition, since a woman who had not had a child could not have lost any, an expected number of deaths and the individual index is meaningless for childless women and therefore childless women were excluded from analysis. Thus, the total dataset for multiple regression comprised 10,625 couples. The observations for each woman were weighted by the number of children she had had to enable the characteristics of families with more children to assume greater importance – reflecting the relative contributions of different families to overall mortality.

The proportion of infant and child mortality variation explained by each model is given by the value of the adjusted-R^2 statistic. Individual-level data cannot be expected to yield high explanatory power as much individual-level variation is idiosyncratic and cannot be captured by quantifiable variables.[95] This dataset is no exception as the variables considered explain no more than 15 per cent of total variation in infant and child mortality. However the adjusted-R^2 values reported indicate models with greater explanatory power than those constructed by others performing similar analyses.[96]

4.6 Confirming the relationships between environment, social class, and infant and child mortality

Table 4.6.1 shows the parameter estimates for a simple comparison of environment and social class, with wife's age included as a control for mortality decline. Models 1 and 2 show that, individually, both environment and class had marked effects on the prospects for infant survival, confirming the conclusions reached in section 4.4. In Model 1 Manufacturing environments are used as the 'standard' against which other environments can be compared. The negative coefficients for all other environments indicate that Manufacturing areas were indisputably the most detrimental to child health. Agricultural and White Collar-rural areas were the least pernicious, the chances of death in such areas being over 75 per cent lower than in Manufacturing areas. Mining areas had the second poorest mortality record, despite the fact that they were often more similar, in terms of settlement size, to small townships and villages than to big cities. This confirms the suspicion that the rural–urban divide or distinction by size of settlement does not capture all location-determined mortality variation. The distinction between Manufacturing and other urban places lends strength to the view, discussed earlier, that the industrial structure of a place lends it a particular character, connected to factors affecting the health of the inhabitants.

In Model 2 in Table 4.6.1 class V acts as the standard for comparison. This model shows that there was a clear survival gradient from classes

Table 4.6.1 *Multiple regression: the effect of environment and social class on infant and child mortality*

Explanatory variables	Model 1	Model 2	Model 3
Intercept	0.7524***	0.6562***	0.8723***
AGE OF WIFE	0.0184***	0.0169***	0.0188***
ENVIRONMENT			
Agricultural	−0.7779***		−0.7222***
White Collar-rural	−0.7745***		−0.6983***
White Collar-urban	−0.4017***		−0.3622***
Light Industry	−0.3657***		−0.3367***
Manufacturing	@		@
Mining	−0.2250***		−0.2886***
SOCIAL CLASS			
I		−0.5424***	−0.3968***
II		−0.3267***	−0.2181***
III		−0.2410***	−0.1845***
IV		−0.1581***	−0.1706***
V		@	@
VI Textiles		−0.1697	−0.3892***
VII Mining		0.0342	−0.0424
VIII Agricultural labourers		−0.6360***	−0.2507***
None		−0.1906	−0.1711
R^2	0.0472	0.0256	0.0533
Adjusted R^2	0.0467	0.0247	0.0521

Notes:
*** Significant at 1 per cent level.
** Significant at 5 per cent level.
* Significant at 10 per cent level.
@ Reference category.
The dependent variable is the mortality index per woman, weighted by number of births.

I to V, with the children of men in class I over 50 per cent more likely to survive than the children of men in class V. The children of agricultural labourers, class VIII, were at an even greater advantage with over 60 per cent better survival.[97] By showing the simultaneous effects of both environment and class, Model 3 in Table 4.6.1 helps to determine the extent to which the effects of the two variables are independent and to assess which is responsible for any common variation. While the effect of environment is largely unchanged by the inclusion of class (the coefficients decrease, but by relatively small amounts), that of class is substantially lessened by the inclusion of environment, particularly among the higher classes and agricultural labourers: those concentrated in the healthier environments. The better survival of the children of the highest social classes and of agricultural labourers was thus, to a large extent, the product of their favourable location and, to a fairly substantial degree, infant mortality differentials by class appear because environment has not been controlled for. The apparent differences emerge from the aggregate data because of the spatial segregation of social classes: the higher social classes tended to live in the healthier environments, and the lower classes in the less healthy environments. However, although environment exerted more influence than did social class on infant and child mortality, the latter did have some independent effect.

These two variables, environment and social class, are handy tools for establishing the overall patterns of differentials in infant and child mortality but it is likely that their effect on survival was produced by some combination of underlying factors. Model 4 in Table 4.6.2 shows the results of including in the multiple regression additional independent variables calculated at an individual-level from the census returns and incorporating all eligible couples in the OPCS population.[98] The table gives a further indication of what it is that ENVIRONMENT and SOCIAL CLASS represent. Variables which may be thought of as indicating a certain amount of hardship within the household such as FATHER UNEMPLOYED, MOTHER'S EMPLOYMENT, especially where there is no source of potential child care within the household, and BOARDERS PRESENT are associated with higher infant and child mortality. Measures of economic well-being on the other hand, such as NUMBER OF ROOMS and to some degree SERVANTS PRESENT, are associated with much better prospects for infant and child survival. Within the NATIVITY OF MOTHER variable, residence in a different county to that of birth is also associated with lower infant and child mortality. The mechanisms through which these socio-economic variables might have been connected to infant and child mortality have already been discussed in section 4.4. The inclusion of these variables in the regression decreases the coefficients associated with ENVIRONMENT and SOCIAL CLASS, confirming that the latter are to some degree correlated with the socio-economic variables. It also suggests that ENVIRONMENT and SOCIAL CLASS influence infant and child survival partly through these additional socio-economic factors. The coefficients for SOCIAL CLASS are particularly affected. For example, in Model 3 the chance of death amongst children of fathers in class I is 40 per cent below that of children whose fathers are in social class V. In Model 4 the mortality of the former group is only 20 per cent lower than that of the latter. Membership of a high social class was obviously associated with

Table 4.6.2 *Multiple regression: the effect of environment, social class and other socio-economic variables on infant and child mortality*

Explanatory variables	Model 4
Intercept	0.6475***
AGE OF WIFE	0.0188***
ENVIRONMENT	
Agricultural	−0.6476***
White Collar-rural	−0.5675***
White Collar-urban	−0.3211***
Light Industry	−0.3131***
Manufacturing	@
Mining	−0.2732***
SOCIAL CLASS	
I	−0.1994***
II	−0.0844*
III	−0.1070***
IV	−0.0974**
V	@
VI Textiles	−0.3505***
VII Mining	−0.0178
VIII Agricultural labourers	−0.2279***
None	−0.3264***
NATIVITY OF MOTHER	
Same county	@
Other United Kingdom	−0.0749**
Ireland	−0.0359
Eastern Europe	−0.3111***
Other foreign	−0.1245
Not known	−0.1780**
EMPLOYMENT AND CHILD CARE	
Not employed, no care	@
Not employed + care	−0.0395
Employed, no care	0.3416***
Employed + care	0.1724*
NUMBER OF ROOMS	
1–2	0.3254***
3–5	@
6+	−0.2025***
AGE OF HUSBAND	0.0038
FATHER'S UNEMPLOYMENT	0.3828***

Table 4.6.2 (*cont*.)

Explanatory variables	Model 4
SERVANTS PRESENT	−0.1322**
BOARDERS PRESENT	0.0704*
R^2	0.0732
Adjusted R^2	0.0707

Notes:
*** Significant at 1 per cent level.
** Significant at 5 per cent level.
* Significant at 10 per cent level.
@ Reference category.
The dependent variable is the mortality index per woman, weighted by number of births.

variables such as a large number of rooms, being a UK national living away from one's county of birth and having servants in the household. The mechanisms by which social class affected mortality therefore included not only the features of the circumscribed environments in which the different classes tended to congregate, but also the ability of the better off to move to such places, secure spacious houses and employ servants. Of course, these factors may be representing influences such as higher income or better education which cannot be deduced from the census returns.

When environment is controlled, the socio-economic variables measure the extent to which individuals, according to their identification with different social or cultural groups, were able to affect the health of their children. For example, the regression gives strong confirmation that the child care practices of Jewish women enhanced the survival of their children. Prolonged breast-feeding and strict religious rulings, which demanded a high degree of cleanliness in the preparation of food and in personal hygiene, are likely to have reduced the risks of artificial food for Jewish infants, and their older brothers and sisters were afforded further protection against infectious diseases by their dietary practices.[99] Given that Jewish immigrants were living in the poorest areas of the metropolis, the extent to which these factors reduced infant mortality among them is particularly remarkable.

When Preston and Haines undertook a multiple regression exercise on their 1900 dataset for the USA, they noted that 'the variables that do not appear to be very important in child mortality, individually or as a group, are those which we expect to be most closely associated with child care practices: mother's literacy, her ethnicity, her English-speaking ability, and her husband's occupation' and they concluded that 'whatever behavioural variation was associated with these variables seems to be swamped in its effects by broad geographic and economic factors'.[100] In comparing the USA with England and Wales, they further concluded that social class was a more important determinant of child health in the latter, but were unable to control for other variables. The OPCS dataset (much more directly comparable) allows analyses of English and Welsh data with Preston and Haines' regression of the 1900 data, and reveals that in England and Wales, as in the USA, the apparent effect of social class and other behavioural factors on infant and child mortality was really the result of broader environmental characteristics. When all variables are controlled, social class retains a little more explanatory power in England and Wales than in the USA, and certain other individual variables of a socio-economic nature remain important in terms of infant and child mortality in both countries, but, on the whole, the two regressions show a similar dominance of locational or environmental variables over individual socio-economic ones.[101] Any conclusion for the USA that behavioural variation was swamped by broad geographic and economic factors must therefore also apply to England and Wales.

None of the factors identified by Model 4 diminishes the importance of the environment nor wholly explains social class findings. The next section reports on attempts to identify the relative effects of class and other socio-economic variables within separate environments.

4.7 The effects of social class and other socio-economic variables on infant and child mortality within different environments

Investigating the role of factors such as MOTHER'S EMPLOYMENT or NUMBER OF ROOMS by dividing a population into a small number of categories is a useful way of exploring interrelationships. Sometimes, however, the categories concerned mask further systematic differences. The division of women into non-employed and employed, for example, reveals major differences with regard to their infant and child mortality, but, amongst those in the labour force, mortality experience was also associated with the type of employment undertaken and child care availability, as the MOTHER'S OCCUPATION and EMPLOYMENT AND CHILD CARE variables in Table 4.3.6 show. In order to unravel the interrelationships involved, individual female occupations could be substituted for the EMPLOYMENT AND CHILD CARE variable in the multiple regression, but as an alternative the regression was performed separately for each environment as women's employment opportunities varied substantially according to the context in which they lived.[102] In Manufacturing areas, for example, job opportunities in earthenware or textiles were plentiful for both single and married women and over 60 per cent of women married for less than 15 years recorded an occupation in these two industries. Within White Collar areas, in contrast, around half of all working women married for less than 15 years worked in service of some kind. As the character of the EMPLOYMENT AND CHILD CARE variable varied with environment a different relationship between this variable and mortality might be expected in each type of area. Similar, although less easily detected, effects are also possible with other variables, and in order to explore the implications regressions on the socio-economic variables have been carried out separately for each environment and are shown in Table 4.7.1, where Model 4 from Table 4.6.2 is included for comparison. Coefficients shown in ***bold italics*** are based on fewer than 50 women and must therefore be treated with caution.

Comparing the coefficients for SOCIAL CLASS within and across environments, it can be seen that in favourable environments, such as Agricultural areas, there was little difference between the child mortality experiences of different classes. In White Collar-rural environments, also characterised by low infant and child mortality, significant negative coefficients for classes I to IV indicate that children of men in class V were at a distinct disadvantage compared with the children of other social groups amongst whom little difference in infant and child mortality can be discerned. On the other hand, in Manufacturing environments, which were not conducive to child health, a consistent and significant social class gradient in child survival is evident, and looking further down Table 4.7.1 it can be seen that the association between other socio-economic variables and infant and child mortality was generally much stronger in less healthy environments.

Considering NATIVITY OF MOTHER, for instance, the particular advantage associated with having a mother born in Eastern Europe was, unsurprisingly, only observed in Light Industry environments as virtually all those of Eastern European origin in the OPCS population lived in Bethnal Green. More unexpected is the indication that the advantage of being a child of a long-distance UK migrant (born in 'Other United Kingdom') was also peculiar to Light Industry environments. It was suggested earlier that the better mortality among children of migrants might have been due to the higher social class of such migrants or to the

Table 4.7.1 *Multiple regression: the effect of social class and other socio-economic variables on infant and child mortality, by environment*

		Environment					
			White Collar			Staple Industry	
Explanatory variables:	Model 4	Agricultural	Rural	Urban	Light Industry	Manuf[a]	Mining
Intercept	0.6475***	−0.0006	0.2331	0.8374***	0.1063	0.6752***	0.6904*
AGE OF WIFE	0.0188***	0.0221***	0.0158**	0.0078	0.0222***	0.0202**	0.0025
ENVIRONMENT							
Agricultural	−0.6476***						
White Collar-rural	−0.5675***						
White Collar-urban	−0.3211***						
Light Industry	−0.3131***						
Manufacturing	@						
Mining	−0.2732***						
SOCIAL CLASS							
I	−0.1994***	0.1492	−0.4445***	−0.4823**	−0.0793	−0.5106***	***0.0658***
II	−0.0844*	0.0192	−0.3173**	−0.0061	0.0092	−0.3323***	−0.2354
III	−0.1070	0.0556	−0.2678**	−0.3382**	−0.0645	−0.1647*	−0.1088
IV	−0.0974**	0.0062	−0.2881**	−0.1677*	−0.1420**	−0.0402	***−0.3357***
V	@	@	@	@	@	@	@
VI Textiles	−0.3505***	***−0.4649***	***−0.8025***	***0***	***−0.1940***	−0.3974**	***0***
VII Mining	−0.0178	***−0.9051***	***0.7152***	***−1.1562***	***0.5309***	−0.0633	−0.0633
VIII Agricultural labourers	−0.2279***	0.0150	***−0.6298******	***0.1051***	***−0.6287*****	***−1.5486***	***−1.1775*****
None	−0.3264***	***−0.8737****	***0.8981***	***0.0689***	−0.3823**	***−0.1712***	***−1.1614***

NATIVITY OF MOTHER							
Same county	@	@	@	@	@	@	@
Other UK	−0.0749**	−0.0046	−0.0373	−0.0633	−0.1980***	0.0056	0.0848
Ireland	−0.0359	***−0.6684***	***0.2597***	***0.1852***	***0.1586***	***−0.4125***	***0.3471***
Eastern Europe	−0.3111***	***0***	***0***	***−0.1260***	−0.3826***	***0***	***0***
Other foreign	−0.1245	***−0.8886***	***0.2493***	***−0.1108***	−0.2202	***0.0388***	***−0.5250***
Not known	−0.1780**	***−0.2222***	***−0.2937***	***−0.1999***	−0.0973	$\boldsymbol{\mathit{-0.4324}}^{*}$	***0.0616***
EMPLOYMENT AND CHILD CARE							
Not employed, no care	@	@	@	@	@	@	@
Not employed + care	−0.0395	−0.0987	0.0021	−0.2148	−0.0431	0.1182	−0.1798*
Employed, no care	0.3416***	−0.1771	0.0092	$\boldsymbol{\mathit{0.8271}}^{***}$	0.2765***	0.5439***	***−0.1265***
Employed + care	0.1724*	***0.3528***	***0.1411***	***−0.2278***	−0.0149	0.3017	$\boldsymbol{\mathit{1.0793}}^{**}$
NUMBER OF ROOMS							
1–2	0.3254***	***0.1511***	$\boldsymbol{\mathit{0.8660}}^{***}$	0.0455	0.4591***	0.3809***	0.0234
3–5	@	@	@	@	@	@	@
6+	−0.2025***	−0.0407	0.0625	−0.1749	−0.2846***	−0.2352**	−0.2382
AGE OF HUSBAND	0.0038	−0.0037	0.0047	0.0036	0.0063	0.0014	0.0138
FATHER'S UNEMPLOYMENT	0.3828***	$\boldsymbol{\mathit{0.5272}}^{**}$	***0.2017***	***0.1423***	0.2941*	$\boldsymbol{\mathit{0.9466}}^{***}$	***0.1190***
SERVANTS PRESENT	−0.1332**	−0.1065	−0.3770***	0.1294	−0.0413	−0.1970	***−0.2243***
BOARDERS PRESENT	0.0704*	0.1137	0.0286	0.1190	0.1715***	−0.0138	−0.0387
R^2	0.0732	0.0317	0.0749	0.0761	0.0649	0.0455	0.0305
Adjusted R^2	0.0707	0.0144	0.0572	0.0415	0.0597	0.0368	0.0107

Notes:
[a] Manuf = Manufacturing.
The dependent variable is the mortality index per woman weighted by number of births.
Figures in bold italics are based on fewer than 50 women.
*** Significant at 0.01 per cent level.
** Significant at 0.05 per cent level.
* Significant at 0.10 per cent level.
@ Reference category.

type of place such migrants moved to. However, even in the full model, Model 4, where environment and social class were controlled, the advantage remained, suggesting that although such factors may have helped to produce better survival among the children of migrants as a whole, such advantage was concentrated in areas with Light Industry environments.

Social commentators of the late nineteenth century argued that in London natives were becoming progressively weaker and sicklier, losing out in job competition to an influx of young, strong rural immigrants.[103] While Stedman Jones has rightly questioned this theory of 'urban degeneration', he has shown marked differentiation between the jobs done by natives and by immigrants in the capital.[104] Londoners predominated in the traditional London crafts, which were in decline and which required high levels of skill, making them unattractive for new arrivals. Paradoxically, at this time in London's history, immigrants were prevented from entering the least promising forms of employment through the traditional practice of resident urbanites trying to maintain a monopoly over the more skilled crafts. While there may have been a preference for rural immigrants in other lines of work, this was more because they were thought to be less demanding and more adaptable, rather than because they were stronger. If other Light Industry areas received disproportionate shares of their migrants from rural or white-collar areas, with relatively robust constitutions this would have enhanced the observed relationship even further.[105] The few rural migrants to Walthamstow and Bethnal Green may have been at an economic, if not a physical advantage, and the health of their children may have benefited as a result.

Table 4.7.1 confirms that the effect on child survival of the wife being in employment differed by environment not only in magnitude but also in direction. Although a positive correlation between EMPLOYMENT AND CHILD CARE and infant and child mortality emerged in Model 4, this was not observed in each environment. In the pottery town of Stoke and cotton town of Bolton where there were plenty of job opportunities for women, an employed wife with no resident source of child care had a more than 50 per cent higher than average risk of having experienced the death of an infant or child. In Light Industry areas the risk for such women was close to 30 per cent higher than average. As has been argued elsewhere, these associations may well have arisen from the fact that a child's death may have allowed a woman to return to paid employment by reducing her work load in the home.[106] Married women's labour force participation was thus not *necessarily* detrimental to child health. Indeed, in Agricultural environments the children of employed women without child care appear to have had slightly better survival prospects than those of women remaining at home, although the result is not statistically significant. This might be a result of the type of employment available, but the relationship may reflect the benefits of additional income brought in by the wife.

Table 4.7.1 also demonstrates that the NUMBER OF ROOMS in which a family lived was more important in environments with higher infant and child mortality overall. In Manufacturing and Light Industry areas, where population density was high and satisfactory sanitation slower in arriving, more rooms were associated with better survival, although the factors underlying this relationship remain to be clarified.

The FATHER'S UNEMPLOYMENT variable was associated with higher infant and child mortality in Agricultural, Light Industry and Manufacturing environments, but the numbers are only robust in Light Industry. It was also only in the latter environment, where overcrowding was more acute, that the presence of boarders was significantly associated with lower survival. In contrast, the presence of servants was associated with higher survival only in White Collar-rural environments where servant-keeping was most common.

The fact that the effects of socio-economic variables on infant and child mortality were stronger in the unhealthier environments suggests that, in dangerous circumstances, the higher classes were better able than the lower classes to preserve the health of their children, perhaps because of superior finances, knowledge or other privileges; but apparently such advantages made much less of a difference in healthier environments. Social class in England and Wales around the turn of the century may have, as Preston and Haines wrote, 'connoted a constellation of factors related to mortality: earnings, education, style of life, housing, security, residential amenities, privilege, empowerment, and so forth', but it was only where conditions were particularly bad that the possessors of high levels of such advantages could muster them in defence of the health of their children.[107]

These regression results have disclosed substantial differentials in infant and child mortality at the turn of the century by environment. The findings encourage caution against generalising from studies which consider just one community or type of community. They reveal that a social class gradient in mortality experience was particularly marked only in the least healthy environments. One factor with particular bearing on child survival has not yet been considered however. As is well known, and chapter 5 will once again demonstrate, there were important class differences in fertility at the end of the nineteenth century. The higher social classes, as well as having lower child mortality, also had a lower than average number of children. Given that lower fertility tends, *ceteris paribus,* to be associated with lower infant mortality, was it possible that differences in family size were creating the social class differentials in child survival within particularly dangerous environments? This question forms the focus of section 4.8.

4.8 Parity and infant and child mortality

The connection between fertility and infant mortality is well known, although the exact mechanics of the relationship are far from clear. When fertility is high a greater proportion of births will occur to high-parity women, i.e. to women who have delivered several children. Such women will, on average, be older, and more at risk of difficult deliveries, and their children will suffer greater risks of congenital malformation and stillbirth.[108] In addition, women in high-fertility populations may have begun their families at younger ages and had shorter birth intervals, both factors associated with higher risks for each child.[109] A larger number of children in a family may also entail added risk as a smaller share of food and attention is available for each child.[110] Assuming parity of the mother influences child survival we have added it into our analysis, although it must be borne in mind that causality could run from high mortality to high fertility: women losing a child progressing to another birth more quickly, thus increasing the number of children born in a given time.[111]

Mortality indices were calculated for mothers who had had one, two, three, four and five or more children. These are presented in Panel A, Table 4.8.1. The children of high-parity women would have been born a greater number of years before the census, and would thus have run a higher risk of death in childhood as well as having been longer exposed to risk. The calculation of the mortality index automatically takes into account the effect of an increased period of exposure.[112] To allow for the higher risks further back in time, the indices shown have been calculated using a different life table to compute the expected survival of the children of each marital duration group. Within Panel A a neat gradient is observable, the children of higher-parity women exhibiting a greater risk of dying.

What constitutes high or low fertility will depend partly on the length of the marriage. Three children is a high number for a woman to have accumulated within the first five years of her marriage, but it is comparatively few for a woman who has been married between 10 and 15 years. Panels B1 to B3 in Table 4.8.1 therefore give mortality indices by parity of mother for each marital duration group separately.[113]

Table 4.8.1 *Mortality indices by parity of mother, for each marital duration group, modified to take account of different mortality among the children of women in different marital durations*

	Adjusted index[a]	Children ever born[b]	q(5)[c]
England and Wales	1.0227	6,431,596	0.1661
OPCS	1.0442	18,690	0.1696
Panel A: marital duration 0–14 years			
PARITY			
1	0.6012	2,014	0.0977***
2	0.7532	3,510	0.1223***
3	0.9187	3,405	0.1492**
4	1.0660	3,336	0.1731
5+	1.3966	6,425	0.2268***
Panel B1: marital duration 0–4 years			
PARITY			
1	0.6781	1,162	0.1101***
2	1.0657	1,136	0.1731
3	1.6186	381	0.2629***
4	3.6947	68	0.6001***
5+	2.5955	22	0.4216**
Panel B2: marital duration 5–9 years			
PARITY			
1	0.4939	573	0.0802***
2	0.5902	1,500	0.0959***
3	0.8866	1,866	0.1440**
4	1.1492	1,648	0.1867**
5+	1.6631	1,165	0.2701***
Panel B3: marital duration 10–14 years			
PARITY			
1	0.5015	279	0.0815***
2	0.6271	874	0.1019***
3	0.7401	1,158	0.1202***
4	0.8709	1,620	0.1415**
5+	1.3322	5,238	0.2164***

Notes:
as Table 4.3.1.
Sources: as Table 4.3.1.

These indicate that although the risk of child death increased with parity, the most enhanced risks seem to have been associated with increases in the tempo of childbearing.[114] The differences between the mortality of children of women at different parities were less marked for women of longer marital durations because they had had a greater number of years in which to produce a given number of children. Among the children of women married less than five years only those without siblings ran a lower than average risk of mortality, while amongst mothers married 10–14 years it was only those with five children or more whose children were at greater than average risk.[115]

The association of parity with child survival chances appears to be so strong that differences in parity between certain groups may help to explain differences in mortality between them, and thus alter our previous conclusions regarding environment, social class and the other variables. Model 4, originally shown in Table 4.6.2, was rerun to include PARITY as an explanatory variable, and the new Model 5 was then applied to each environment in turn. The results are presented in Table 4.8.2. In these models PARITY is treated as a continuous variable.[116] The 0.1 coefficient for PARITY in Model 5 indicates that each extra sibling was associated with a 10 per cent increase in a child's chance of dying. The adjusted-R^2 of 0.116 in Model 5, compared with that of 0.073 in Model 4, makes it clear that PARITY adds considerable explanatory power to the model and that consequently much of its effect is independent of the other variables. In Model 4, some of the impact of parity was being measured indirectly through other factors. Differences associated with AGE OF WIFE are almost entirely explained by PARITY in Model 5, which could have potentially damaging implications for the use of the age of the wife as a proxy for time trends. However, as longer-married women are likely to be of higher parity, it is probable that the PARITY variable now acts partly as a control for time trends in mortality.

Although the effects of both ENVIRONMENT and SOCIAL CLASS on child survival have been significantly decreased by the inclusion of PARITY in Model 5, ENVIRONMENT remains a very powerful influence. The relationship between the six different environmental categories change little between Model 4 and Model 5, except that the small relative advantage of White Collar-urban over Light Industry has been lost, indicating that it was primarily attributable to the lower fertility of the former environment category.

Virtually all social class variation in child survival has disappeared in Model 5. The mortality advantage accruing to higher social classes, in particular, has been substantially decreased, revealing it to have been due to their significantly lower rates of childbearing. With all other variables controlled for, only agricultural labourers (and those without a class) had a child survival rate which was significantly different to that of class V. The major influence of social class on infant and child mortality, highlighted by Preston and Haines in the wake of many others, was therefore produced partly by the differential distribution of classes over different environments with varying health risks, partly by the fertility experiences of the different classes, and partly by the more precisely defined socio-economic variables.

Amongst the latter, Model 5 reveals that the coefficients relating to mother's EMPLOYMENT AND CHILD CARE, the NUMBER OF ROOMS, FATHER'S UNEMPLOYMENT, and whether or not there were BOARDERS PRESENT were unaffected by the inclusion of PARITY, but the SERVANTS PRESENT variable was no longer significantly associated with lower mortality. Low fertility amongst the servant-keeping classes, rather than the presence of servants *per se,* was thus better at explaining mortality variation in the OPCS dataset. This relationship could be more complex than it appears, however. For example, only those with fewer children may have had money or room to employ a live-in servant. Their social peers with more children may have employed servants who lived elsewhere.

The NATIVITY variable also shows interesting changes between Model 4 and Model 5. The latter indicates that the exceptionally good rates of survival amongst the children of women born in Eastern European evident in Model 4 were in fact underplaying the situation, given the size of the families such women were accumulating. In contrast the advantage of those born to mothers who had migrated within the United Kingdom was lost between the two models, suggesting lower fertility among migrant mothers, or possibly that large families inhibited migration. Given that the census returns record life-time migration it is likely, however, that the bulk of the migration took place before marriage or childbearing, and reflected economic forces and social aspirations rather than the family size which was subsequently achieved. It seems likely, therefore, that internal migrants were a self-selected group more likely to marry prudently and avoid too many children arriving too fast. Conversely, early marriage and childbirth might well have put paid to any social and economic aspirations, tying couples to their place of origin.

When Model 5 is rerun for each of the six environments, as shown in Table 4.8.2, it can be seen that in Light Industry areas women who were living outside their county of birth, even if they were native to England and Wales, retained an advantage in terms of their children's mortality. Migrants to this environment, it seems, did not have significantly lower

Table 4.8.2 *Multiple regression: the effect of social class and other socio-economic variables on infant and child mortality, with parity, by environment*

Explanatory variables:	Model 5	Agricultural	White Collar Rural	White Collar Urban	Light Industry	Staple Industry Manuf[a]	Staple Industry Mining
Intercept	0.6663***	0.0025	0.1783	0.8652***	0.1913*	0.7435***	0.7760***
AGE OF WIFE	0.0066**	0.0183***	0.0089	−0.0051	0.0093**	0.0056	−0.0139
PARITY	0.1015***	0.0476***	0.0662***	0.0969***	0.1007***	0.1242***	0.1205***
ENVIRONMENT							
Agricultural	−0.5644***						
White Collar-rural	−0.4248***						
White Collar-urban	−0.2487***						
Light Industry	−0.2807***						
Manufacturing	@						
Mining	−0.2448***						
SOCIAL CLASS							
I	−0.0823	0.2124	−0.3441***	−0.3804*	−0.0049	−0.3444**	***0.3799***
II	0.0018	0.0728	−0.2484*	0.0807	0.0693	−0.1893	0.0063
III	−0.0595	0 0949	−0.2001*	−0.3530**	−0.0430	−0.0829	0.0634
IV	−0.0532	0.0209	−0.2516**	−0.0826	−0.0942	−0.0011	***−0.1704***
V	@	@	@	@	@	@	@
VI Textiles	−0.1967*	***−0.3219***	***−0.7147***	***0***	***−0.0503***	−0.2238	*0*
VII Mining	−0.0286	***−0.6637***	***0.7496***	***−1.0125***	***0.6460*****	−0.0978	0.0062
VIII Agricultural labourers	−0.2137***	0.0131	***−0.6150******	***0.2765***	***−0.4681****	***−1.2037***	***−1.0300*****
None	−0.3470***	***−0.7153***	***−0.7391***	***−0.0180***	−0.3790**	***−0.4055***	***−1.1504***

NATIVITY OF MOTHER							
Same county	@	@	@	@	@	@	@
Other United Kingdom	−0.0415	0.0049	−0.0042	−0.0436	−0.1511***	0.0324	0.1016
Ireland	−0.0200	***−0.5862***	***0.2970***	***0.1879***	***0.0868***	***−0.3337***	***0.5445***
Eastern Europe	−0.4367***	***0***	***0***	***−0.1802***	−0.4940***	***0***	***0***
Other foreign	−0.1434	***−0.7315***	***0.2754***	***−0.2783***	−0.2643*	***0.1139***	***−0.2877***
Not known	−0.1625*	***−0.2469***	***−0.2757***	***−0.1301***	−0.0927	***−0.3808***	***0.3963***
EMPLOYMENT AND CHILD CARE							
Not employed, no care	@	@	@	@	@	@	@
No employed + care	−0.0573	−0.1017	−0.0275	−0.2225	−0.0844	0.1690*	−0.2235**
Employed, no care	0.3591***	−0.1537	0.0677	***0.6789******	0.2531***	0.6287***	***−0.0652***
Employed + care	0.2151**	***0.3579***	***0.1691***	***−0.1681***	−0.0239	0.3687*	***1.0495*****
NUMBER OF ROOMS							
1–2	0.3610***	***0.2281***	*0.9740****	0.0186	0.4697***	0.4190***	0.1205
3–5	@	@	@	@	@	@	@
6+	−0.1780***	−0.0358	0.1004	−0.0719	−0.2548***	−0.2872***	−0.2455
AGE OF HUSBAND	−0.0017	−0.0070	0.0033	0.0010	0.0012	−0.0070	0.0063
FATHER'S UNEMPLOYMENT	0.4148***	***0.4960*****	***0.2981***	***0.2371***	0.3089*	***1.0077******	***0.1435***
SERVANTS PRESENT	−0.0441	−0.0783	−0.3269***	0.1872	−0.0871	−0.1508	***−0.2465***
BOARDERS PRESENT	0.0991**	0.1236	0.0197	0.1156	0.1855***	−0.0634	−0.0131
R^2	0.1156	0.0439	0.0886	0.1096	0.1120	0.1009	0.0924
Adjusted R^2	0.1132	0.0260	0.0704	0.0747	0.1068	0.0923	0.0730

Notes:
[a] Manuf = Manufacturing.
The dependent variable is the mortality index per woman weighted by number of births.
Figures in bold italics are based on fewer than 50 women.
*** Significant at 1 per cent level.
** Significant at 5 per cent level.
* Significant at 10 per cent level.
@ Reference category.

fertility than their host populations, but were better able to protect their children. It seems likely that migrants moving to Light Industry areas were rather different from those migrating to other environments. The scenario raised earlier concerning the better health and job-securing ability of rural migrants to London's East End may well hold good in the areas with Light Industry environments. Migrants moving across county boundaries into other environments, however, appear to have had lower mortality owing solely to their lower fertility. When all internal migrants were combined and parity controlled for, the lack of mortality advantage among migrants to other environments obscured the advantage among those to Light Industry.

As with the overall model, controlling for PARITY decreases the effect of SOCIAL CLASS within each environment.[117] Nevertheless, within White Collar-rural environments the disadvantage to class V remains. In Manufacturing environments the infant and child mortality of class I is significantly lower than that of the other classes once parity is controlled. We are therefore unable to explain the child survival levels of all groups in every environment using other variables, even with Model 5. Income and knowledge may have been important; low or intermittent income may have put the children of class V men in White Collar-rural areas at a particular disadvantage compared with the relatively good survival prospects of others in their district, while richer parents who knew how to secure the best access to health care and other amenities could avert the risks to their children's health suffered by all others in Manufacturing environments.

The adjusted R^2 values in Table 4.8.2, when compared to those in Table 4.7.1, indicate that the explanatory power of PARITY depends upon environment. In environments where mortality was low, the inclusion of parity as a variable does not add much explanatory power to the models, whereas in less healthy environments, mortality was much more closely related to the number of children born to each woman. In addition the parity coefficients, measuring the effect of each additional child on infant and child mortality, are higher in Table 4.8.2 for less healthy places. In Manufacturing environments, for example, an extra sibling was associated with an increased risk of a death in the family of nearly 12.5 per cent, but in Agricultural districts the additional risk was only 5 per cent.

Owing to the retrospective nature of the 1911 census data, interpretation of the relationship between fertility and child survival must be undertaken with caution. Undoubtedly levels of fertility could have influenced mortality in the early years of life through the routes discussed above, but mortality could also have affected fertility in both conscious and unconscious ways. For example, a couple who had been practising birth control and had decided not to have any further children might, if one of their children died, have replaced it with another. A child death could also have led to shorter birth intervals through a cessation of lactational amenorrhoea.[118] It is also possible that the relationship operated in both directions, high fertility and high mortality being mutually reinforcing. A final possibility is that the covariance of fertility and child mortality was due to their both being strongly influenced by a force which remains undetected within the present analysis.

4.9 The relative importance of variables

The regression results reported above indicate the extent to which membership of a particular group is associated with higher or lower mortality when other variables are controlled. The size of the coefficients associated with particular factors do not, however, necessarily reflect the proportion of the total variation in child survival explained by those factors. As a hypothetical example, a variable identifying unmarried mothers may have a very large coefficient, indicating that illegitimate children have a much higher risk of mortality than legitimate. If, however, illegitimacy is very rare in the population in question, then it may be the case that the high mortality of illegitimate children explains very little of the total variation in infant and child mortality in the population as a whole. Similarly, a factor which has a relatively small effect on mortality, if widespread, may in fact be able to explain a reasonable amount of variation.

Table 4.9.1 summarises the *effect* of each set of dummy variables on mortality by contrasting the categories with the smallest and largest coefficients.[119] The differences indicate the effect of belonging to the highest mortality category as opposed to the lowest, when other variables are controlled; the bigger the difference, the greater the effect of that variable on mortality. Because PARITY has been used as a continuous variable, it has no extreme categories containing reasonable numbers of cases to be contrasted, and so it has not been included as an independent variable in Table 4.9.1. Two calculations of the absolute differences for other variables have been made, however, the first where parity is not controlled, and the second where it is controlled. The table confirms that, of all the dummy variables, ENVIRONMENT, i.e. living in a Manufacturing as opposed to an Agricultural environment, had the greatest effect on infant and child mortality whether or not parity is controlled. Living in a small as opposed to a large house (NUMBER OF ROOMS), not having moved from the county of one's birth as opposed to

Table 4.9.1 *The relative importance of variables: as shown by differences between coefficients of high and low mortality categories of variables*

Independent variable	High mortality category	Low mortality category	Absolute difference in mortality when parity is controlled	Absolute difference in mortality when parity is not controlled
ENVIRONMENT	Manufacturing	Agriculture	0.5644	0.6476
SOCIAL CLASS	Class V[a]	Agricultural labourers[b]	0.2137	0.2279
NATIVITY OF MOTHER	Born in same county	Born in E. Europe[c]	0.4367	0.3111
EMPLOYMENT AND CHILD CARE	Employed, no care	Not employed, no care[d]	0.3591	0.3416
FATHER'S UNEMPLOYMENT	Not employed[e]	Employed	0.4148	0.3828
SERVANTS PRESENT	Servants absent	Servants present	0.0441	0.1322
BOARDERS PRESENT	Boarders present	Boarders absent	0.0991	0.0704
NUMBER OF ROOMS	1–2 rooms	6+ rooms	0.5390	0.5279

Notes:
[a] Class II has a larger coefficient, but is not significant.
[b] Class 0 (no occupation) has a smaller coefficient but small numbers.
[c] Only 2.1% of couples.
[d] No work with care has a smaller coefficient, but is not significant.
[e] Only 1.4% of couples.
Source: OPCS dataset.

originating from Eastern Europe (NATIVITY OF MOTHER), and having an out of work husband as opposed to one in work (FATHER'S UNEMPLOYMENT), all exerted large influences on the mortality of a woman's infants and children. Table 4.9.1 shows that the effect of other variables was also substantial, but, again, does not indicate which variables explained the greatest variation in infant and child mortality overall.

It is possible to examine the relative importance of variables in a number of ways.[120] One way is to compare the variation in infant and child mortality explained by individual variables or sets of dummy variables by running separate regressions with each variable. Another involves examining the effect of removing each of the variables or sets of dummy variables from the full analysis by measuring the explanatory power lost when the full model is run with each variable missing.[121] However if, as is very likely, the variables are to some degree correlated, there will be common variation between different sets of variables. When looking at the effect of individual variables therefore, each variable will get the credit for *all* the common variation it shares with any other variable, and its true effect will be overstated. On the other hand, when the variable is removed from the full model, it will get the credit for *none* of the common variation, and its true effect will be underestimated. For these reasons Kennedy stated that 'it would be illegitimate to measure the influence of an independent variable either by its R^2 in a regression of the dependent variable on only that independent variable, or by the addition to R^2 when that independent variable is added to a set of regressors'.[122] One could, however, look at both methods in tandem, treating the first as a maximum estimate of the effect of the variable, and the second as a minimum. If the difference between the two is large, the amount of common variance is likely to be large, and the independent effect of the variable small.[123]

The maximum explanatory power associated with each variable, represented by the adjusted-R^2 for each set of variables regressed on its own, is shown in Column A of Table 4.9.2.[124] The most important variable is revealed to be PARITY, able to explain 6.5 per cent of mortality variation on its own. However, because of the difficulty in determining the direction of any causal pathways between fertility and mortality, any explanatory significance should only be assigned with extreme caution. The next most important suite of variables is ENVIRONMENT, able to explain 3.6 per cent of variation in mortality on its own, more than twice as much as any other remaining set of variables. SOCIAL CLASS, NUMBER OF ROOMS and EMPLOYMENT AND CHILD CARE also had fairly high adjusted-R^2s, as, to a lesser degree, did the SERVANTS PRESENT variable. NATIVITY OF MOTHER and FATHER'S UNEMPLOYMENT were able

Table 4.9.2 *The relative importance of variables, as shown by adjusted R^2 and marginal adjusted R^2 for each variable*

Independent variable	A Adjusted R^2: variable regressed on its own	B Significance of variable regressed on its own	C Adjusted R^2: full model without predictor	D Marginal adjusted R^2	E Significance of variable in full model
PARITY	0.0656	***	0.0707	0.0425	***
ENVIRONMENT	0.0361	***	0.1000	0.0132	***
SOCIAL CLASS	0.0158	***	0.1122	0.0010	**
NATIVITY OF MOTHER	0.0058	***	0.1105	0.0027	***
EMPLOYMENT AND CHILD CARE	0.0106	***	0.1074	0.0058	***
FATHER'S UNEMPLOYMENT	0.0011	***	0.1120	0.0012	***
SERVANTS PRESENT	0.0092	***	0.1133	−0.0001	
BOARDERS PRESENT	0.0002	***	0.1128	0.0004	**
NUMBER OF ROOMS	0.0157	***	0.1049	0.0083	***
All variables	0.1132				

Notes:
The dependent variable is the mortality index per woman, weighted by the number of births.
*** Significant at the 1 per cent level.
** Significant at the 5 per cent level.
* Significant at the 10 per cent level.
Source: OPCS dataset.

to explain relatively very little of the total variation in infant and child mortality on their own. The indications of significance in Column B, Table 4.9.2 show that each set of variables was significantly related to mortality. Sometimes, however, the size of a large dataset means that coefficients are likely to be statistically significant, yet they may not be substantively significant if they explain relatively little variation.

The adjusted-R^2 for the complete model shows that it explains 11.3 per cent of the variation in infant and child mortality among individual women. Column C gives the adjusted-R^2s for the full model run without each of the sets of independent variables in turn. These values, together with the adjusted-R^2 for the full model, enable the calculation of the marginal adjusted-R^2s, which are shown in Column D. These values, representing the minimum explanatory power attributable to each set of variables, indicate that the relative importance of PARITY and ENVIRONMENT was unchanged, although the lower values suggest that some of the variation they appeared to explain on their own was really the result of some other factors included in the full model. For most of the sets of variables there was a decrease in explanatory power and significance, indicating some common variation with other factors, but the effect was especially large for SOCIAL CLASS and for the SERVANTS PRESENT variable, 100 per cent of the explanatory power of the latter and 99 per cent of that of the former being attributable to other variables.

Having compared the relative effect and explanatory power of different independent variables, it is clear that variables which have fairly small extreme categories, such as FATHER'S UNEMPLOYMENT and NATIVITY OF MOTHER, have little explanatory power overall despite their fairly large effect on those particular groups. On the other hand ENVIRONMENT not only has the greatest effect of all the categorical variables included, but also commands the most explanatory power. Unfortunately, as a continuous variable, PARITY was not easily comparable with the categorical variables.

So far, with the one exception of ENVIRONMENT, all variables investigated have been measured at the individual level. This has been done in an attempt to capture as many of the characteristics as possible of the individual families or households into which a child was born, treating such characteristics as factors which may have affected the child's chance of survival. A child's immediate surroundings, and the resources available to and practices undertaken by the child's carers, would obviously have been important to its health prospects, but the wider physical and social environment into which it was born would also have influenced its survival chances. The quality of the air which a child breathed, whether thick smog or bracing country breeze; the cleanliness of the water available for drinking, cooking and washing; the systems in place for the disposal of sewage and other detritus; the quality of food supplies obtainable and the prices at which they were offered; the standard of the housing and so on; these can all be supposed to have had an effect on the health and survival of children in a particular locality. In addition, they were at the mercy of childcare beliefs and practices which may well have been culture-bound and locally specific. In the next section the contrasting roles of ENVIRONMENT and the other variables affecting infant and child mortality at both the individual and the community levels will be addressed.

4.10 Do the influences on infant and child mortality operate through individual- or community-level characteristics?

Analyses of the influences on child mortality have often focused on two broad headings: poverty of the individual and poverty of the environment. The individual-level variables which can be identified from the census returns may, when measured at the level of the community, provide an insight into the effect of the local environment on health and allow us to gauge whether variables were important at an individual or at a community level. Was servant keeping, for example, correlated with lower child mortality because a servant in the home had direct benefits for any resident child, or because servant-keeping was an indicator of living in a community with better health prospects? Or were both aspects important?

The relative influences of individual- and community-level variables can be compared using multiple regression. In the present section regression is performed using individual women, as in the analyses reported above, but with additional community-level variables calculated for each of the 53 sectors represented in the OPCS dataset.[125] The community-level and comparable individual-level variables used are listed in Table 4.10.1, and the values for the community-level variables for the different sectors in the dataset are shown in Appendix C. SOCIAL CLASS at the individual level has been paired with *environment* at the community level as they are both derived from occupational characteristics. The relative impact of the individual and the community variables is assessed, and then a final model, incorporating both levels, is constructed. To add clarity througout section 4.10, community-level variables, including environment, are given in italics in the text and tables, while small capitals signify individual-level variables.

It is not possible to compare directly the coefficients of different variables as some are categorical and some continuous with a variety of ranges, but the explanatory power of different models, shown by R^2, and

Table 4.10.1 *Variables measured at individual and community levels*

Individual-level variable	Community-level variable
PARITY	Average parity
SOCIAL CLASS	Environment
NATIVITY OF MOTHER	Proportion of wives born in a different county
"	Proportion of wives born in Eastern Europe
EMPLOYMENT AND CHILD CARE	Proportion of wives employed
"	Proportion of employed mothers with child care
" "	Proportion of non-employed mothers with child care
FATHER'S UNEMPLOYMENT	Proportion of men unemployed
SERVANTS PRESENT	Proportion of households with servants
BOARDERS PRESENT	Proportion of households with boarders
NUMBER OF ROOMS	Average number of rooms per household

the significance levels and coefficients of the same variable in different models, can be compared. Columns A and H in Table 4.10.2 show, respectively, the parameter estimates for the individual and community-level variables run one at a time and Columns B and G show them run in individual and community pairs (such as individual PARITY and *average parity*, SOCIAL CLASS and *environment*). Column C shows the parameter estimates for the model including all individual-level variables run together, and Column F shows them for the model including all community-level variables run together. Finally, both Columns D and E show parameter estimates for all variables together, both individual and community. The adjusted R^2 for single variables and variable pairs are given in italics above the relevant parameter estimates.

First it is necessary to assess whether variables measured at both individual and community levels affected mortality in the same or different ways: i.e. did they capture the same or different variations? This is done by comparing the parameter value for an individual-level variable run separately (i.e. Column A) with the parameter value when the corresponding community level variable is included in a regression (Column B), and similarly with community level variables (Columns H and G). If the individual-level coefficient decreases between Columns A and B, this suggests that some of the explanatory power operated at community-level. Similarly if the community level coefficient decreases between Columns H and G, some of the explanatory power operated at

Table 4.10.2. *Comparing the effect of individual-level*

Individual-level variables		A Single variable	B Variable pair	C All individual variables	D All variables	
Intercept				0.7676***	1.0096***	—
WIFE'S AGE				0.0048	0.0062**	—
HUSBAND'S AGE				−0.0024	−0.0014	—
PARITY	*a-R^2*	*0.0663*	*0.0715*			
Parity		0.1147***	0.1050***	0.1074***	0.0985***	
SOCIAL CLASS	*a-R^2*	*0.0246*	*0.0520*			
I		−0.5443***	−0.3997***	−0.1199**	−0.0522	
II		−0.3283***	−0.2200***	−0.0688	−0.0047	
III		−0.2408***	−0.1842***	−0.1039***	−0.0475	
IV		−0.1581***	−0.1712***	−0.0442	−0.0356	
V		—	—	—	—	
VI Textiles		−0.1685	−0.3871***	−0.0366	−0.1522	
VII Miners		0.0329	−0.0446	0.0317	−0.0342	
VIII Agricultural labourers		−0.6360***	−0.2493***	−0.5145***	−0.2008**	
No class		−0.2344	−0.2154*	−0.3734***	−0.3452***	
NATIVITY OF MOTHER	*a-R^2*	*0.0140*	*0.0424*			
Same county		—		—	—	
Other UK		−0.2230***	−0.0457	−0.0989***	−0.0155	
Ireland		−0.0993	−0.0320	0.0405	0.0158	
Eastern Europe		−0.3232***	−0.6360***	−0.4673***	−0.5637***	
Other foreign		−0.3184**	−0.2690**	−0.1448	−0.1362	
Not known		−0.2458***	−0.2538***	−0.1919**	−0.1664**	
EMPLOYMENT AND CHILD CARE	*a-R^2*	*0.0200*	*0.0374*			
Not employed, no care		—	—	—	—	
Not employed + care		−0.2419***	−0.1386***	−0.0598	−0.0661*	
Employed, no care		0.4116***	0.3044***	0.4154***	0.3413***	
Employed + care		0. 0261	−0.0060	0.2759***	0.1735*	
FATHER'S UNEMPLOYMENT	*a-R^2*	*0.0078*	*0.0383*			
Father unemployed		0.2890***	0.3992***	0.4167***	0.4266***	
SERVANTS PRESENT	*a-R^2*	*0.0170*	*0.0338*			
Servant present		−0.5115***	−0.2636***	−0.0149	0.0229	
BOARDERS PRESENT	*a-R^2*	*0.0074*	*0.0212*			
Boarders present		0.0745*	0.0342	0.1141***	0.0832**	
NUMBER OF ROOMS	*a-R^2*	*0.0261*	*0.0400*			
No. of rooms in house		−0.0810***	−0.0492***	−0.0582***	−0.0441***	
R^2				0.1001	0.1181	—
Adjusted-R^2				0.0982	0.1150	—

Notes:
Wife's age and husband's age are included in all regressions.
Adjusted R^2 for single variables and variable pairs shown in italics.
* Significant at 1 per cent level.
** Significant at 5 per cent level.
*** Significant at 10 per cent level.
Source: OPCS dataset.

and community-level variables on infant and child mortality

E	F All community variables	G Variable pair	H Single variable		Community-level variables
—	0.6077**				*Intercept*
—	0.0169***				*Wife's age*
—	0.0026				*Husband's age*
		0.0715	*0.0254*	*a-R^2*	*Average parity*
−0.0871*	0.0010	0.1735***	0.3113***		Average parity
		0.0520	*0.0465*	*a-R^2*	*Environment*
−0.2421***	−0.2842***	−0.7243***	−0.7794***		Agriculture
−0.1642*	−0.1753*	−0.6965***	−0.7729***		Professional-rural
−0.0441*	−0.0298	−0.3640***	−0.4037***		Professional-urban
−0.1458***	−0.1553***	−0.3372***	−0.3665***		Light Industry
—	—	—	—		Manufacturing
−0.0858	−0.0584	−0.2885***	−0.2257***		Mining
		0.0424	*0.0368*	*a-R^2*	*Nativity*
—					Proportion of wives born in
−0.2393	−0.3107*	−1.5401***	−1.5841***		different county
					Proportion of wives born in
0.2657	−0.2813	0.3674*	−0.3973**		Eastern Europe
		0.0374	*0.0320*	*a-R^2*	*Wives' employment*
1.1725**	1.4484***	1.5869***	1.7780***		Proportion of wives employed
−0.0111	−0.1909	−0.2081*	−0.2261**		Proportion employed with care
1.1773***	1.0270***	−0.5847***	−0.7127***		Proportion not employed with care
		0.0383	*0.0371*	*a-R^2*	*Male unemployment*
−0.1699	0.0054	−8.6825***	−8.5806***		Proportion of men unemployed
		0.0338	*0.0316*	*a-R^2*	*Servants*
−1.1459	−0.9778	−1.9128***	−2.1575***		Proportion of houses with servants
		0.0212	*0.0212*	*a-R^2*	*Boarders*
1.3647**	2.1007***	4.1920***	4.2142***		Proportion of houses with boarders
		0.0400	*0.0343*	*a-R^2*	*Average number of rooms*
−0.0669	−0.1190***	−0.1549***	−0.1962***		Average number of rooms
—	0.0612				*R^2*
—	0.0597				*Adjusted-R^2*

individual level. Thus the comparative effects of each of the variable pairs can be judged by comparing Column A with Column B, and Column H with Column G. The resulting absolute and percentage differences in the coefficients are shown in Table 4.10.3.

Negative coefficient differences indicate that almost all coefficients, for variables at both individual and community-level, decreased, revealing that to some degree individual- and community-level variables captured the same effect. In general, however, Table 4.10.3 shows that the coefficients for the individual-level variables show larger relative decreases than the coefficients for the community-level variables, suggesting that individual-level variables had less independent effect than the corresponding community-level variables. To some extent the effects of individual-level variables on infant and child mortality really operated at a community level, but not vice versa.

Previous conclusions concerning the relative effects of SOCIAL CLASS and *environment* are further strengthened, Table 4.10.2 indicating that 61 per cent of the mortality advantage associated with being the child of an agricultural labourer was really attributable to residence in an Agricultural environment. Similarly 27 per cent of the advantage of having a father in SOCIAL CLASS I was due to the healthy environments in which people belonging to that class tended to live. Further, the decrease of 48 per cent in the parameter estimate for the SERVANTS PRESENT variable suggests that the survival benefit of possessing a servant was not so much a product of having a servant in the child's own home, but of servant-keeping being common in the areas in which the child lived, these generally being the most salubrious areas. By the same token, the disadvantage of having a boarder was to some extent a function of living in an area where boarding was common.

Some of the mortality variation that the individual-level variables indicated when considered on their own appears therefore to have been attributable to facets of the local community, this wider environment being of greater importance than the circumstances of the individual household. However, in almost all cases, the individual-level variables retained significance, suggesting that the conditions under which individual families operated did have some impact on children's survival chances. One exception to this is the BOARDERS PRESENT variable. While communities with higher levels of boarders had higher infant mortality, the presence of a boarder in a particular household did not prove a hazard to the health of a child when the proportion of boarders in the community was controlled. Boarding was a sign of a health-impoverished community, not of a health-impoverished household. Another exception is the NATIVITY OF MOTHER variable indicating the migration

Table 4.10.3 *Comparing the effect of individual- and community-level variables on infant and child mortality: decreases in coefficients on the addition of the individual or community-level variable pair*

Individual-level variable	Difference in coefficient		Difference in coefficient		Community-level variable
	Absolute	Percentage	Percentage	Absolute	
PARITY					*Average parity*
Parity	−0.0096	−8	−44	−0.1378	Average parity
SOCIAL CLASS					*Environment*
I	−0.1446	−27	−7	−0.0551	Agriculture
II	−0.1083	−33	−10	−0.0764	White Collar-rural
III	−0.0566	−24	−10	−0.0397	White Collar-urban
IV	0.0131	8	−8	−0.0293	Light Industry
V	@	@	@	@	Manufacturing
VI Textiles	0.2186	130	28	0.0628	Mining
VII Miners	−0.0775+				
VIII Agric. labourers	−0.3867#	−61#			
No class	−0.0190	−8			
NATIVITY OF MOTHER					*Nativity*
Same county	@	@			Proportion of wives
Other UK	−0.1773	−80	−3	−0.0440	born in different UK county
Ireland	−0.0673	−68			Proportion of wives
Eastern Europe	0.3128	97	−192	−0.7647	born in Eastern Europe
Other foreign	−0.0494	−16			
Not known	0.0080	3			

Table 4.10.3 (*cont.*)

	Difference in coefficient		Difference in coefficient		
	Absolute	Percentage	Percentage	Absolute	
EMPLOYMENT AND CHILD CARE					*Wives' employment*
Not employed, no care	@	@			
Not employed + care	−0.1033	−43	−11	−0.1911	Proportion of wives employed
Employed, no care	−0.1072	−26	−8	−0.0180	Proportion employed mothers with care
Employed + care	−0.0321#+		−18	−0.1280	Proportion not employed with care
FATHER'S UNEMPLOYMENT					*Male unemployment*
Father unemployed	0.1102	38	1	0.1019	Proportion of men unemployed
SERVANTS PRESENT					*Servants*
Servant present	−0.2479	−48	−11	−0.2447	Proportion of houses with servants
BOARDERS PRESENT					*Boarders*
Boarders present	−0.0403	−54	−1	0.0222	Proportion of houses with boarders
NUMBER OF ROOMS					*Average number of rooms*
No. of rooms in household	−0.0318	−39	−21	−0.0413	Average no. of rooms

Notes:
#: not significant.
@: reference category.
+: coefficient changed sign, therefore percentage not calculated.
Source: OPCS dataset.

of a mother within the United Kingdom. This lost significance on the addition of community-level *nativity* variables, suggesting that the act of moving did not itself confer any advantage; rather, the benefits were attached to the fact that women moving across county boundaries within the OPCS population tended to end up in healthy areas. Certainly, the community-level variable relating to migration shows that the unhealthy and crowded districts of Bethnal Green, Stoke and Bolton had the lowest proportions of inter-county migrants.[126]

Not all individual-variable coefficients decreased on the addition of their community equivalent. The effect of FATHER'S UNEMPLOYMENT increased, the negative sign for the community variable (Column H, Table 4.10.2) indicating that areas where a greater proportion of men were not in work tended to be healthier for infants and children. Therefore, within such areas, men who were not employed were at an even greater disadvantage (Column B, Table 4.10.2). Similarly, when the community variable representing the proportion of wives born in Eastern Europe was considered on its own (Column H, Table 4.10.2), being in a community with many immigrants appeared to be good for child survival. However, controlling for the birthplace of individual women (Column G, Table 4.10.2) shows that this advantage was confined to the children of those women of Eastern European birth. When individual birthplace was controlled, communities with a higher proportion of Eastern European women tended to be subject to worse mortality (Column G, Table 4.10.2). The negative value of the coefficient attached to individual Eastern European birth indicates that the offspring of Eastern European women had a health advantage over all children irrespective of the ethnic background of the community in which they were growing up. It was not, therefore, living in a community full of immigrants but being the child of an immigrant which conferred survival advantages, advantages which were especially large in the types of community playing host to high proportions of people of Eastern European origin. In other words, the Eastern European community lived in particularly bad environments, in which their beliefs and practices regarding child care were able to effect relatively large reductions in infant and child mortality. This finding may indicate a lack of communication and cultural exchange between the Eastern Europeans and their host community, possibly because of their relatively recent arrival, since they do not seem to have been assimilated to the extent of altering those of their characteristics which affected infant and child mortality. Religion, in particular, might be slow to change. By contrast in White Collar communities the professionals' low infant and child mortality and low fertility seems to have influenced the behaviour of all classes.

Table 4.10.4 *Comparing the explanatory power of individual- and community-level variables on infant and child mortality; marginal adjusted-R^2s*

Individual	Marginal adjusted R^2	Marginal adjusted R^2	Community
PARITY	0.0461	0.0052	*Average parity*
SOCIAL CLASS	0.0055	0.0274	*Environment*
NATIVITY OF MOTHER	0.0056	0.0284	*Nativity*
EMPLOYMENT AND CHILD CARE	0.0054	0.0174	*Wives' employment*
FATHER'S UNEMPLOYMENT	0.0012	0.0305	*Male unemployment*
SERVANTS PRESENT	0.0022	0.0168	*Servants*
BOARDERS PRESENT	0.0000	0.0138	*Boarders*
NUMBER OF ROOMS	0.0057	0.0139	*Average number of rooms*

Source: OPCS dataset.

Presumably there were few language or religious barriers between professionals and the lower classes in these areas, and communication or emulation within such communities must have been important in influencing behaviour.[127]

Particular individual-level variables have been assessed in relation to their community-level equivalents, but this has not revealed whether individual-level or community-level variables were more important in influencing childhood mortality. Adjusted-R^2 values for each of the paired variables run separately, given in italics in Columns A and H of Table 4.10.2, provide indications of relative importance. Marginal adjusted-R^2s, which show the minimum explanatory power for each variable on its addition to its corresponding individual or community variable are shown in Table 4.10.4.[128]

In general, both the adjusted-R^2s and marginal adjusted-R^2s are higher for community-level variables (for example, an adjusted-R^2 of 0.0465 for *environment* as opposed to 0.0246 for SOCIAL CLASS), suggesting that community or environmental influences were more important with regard to child health than individual class-related characteristics of the father. However, as with many data of this sort, very little of the variation was explained at all, and there is no indication as to whether the unexplained variation was individually or environmentally determined, or was simply chance. Nevertheless, it can be concluded that living in a community where there was a high proportion of servant-keeping households was a better indication of a child's likely survival than having a servant in the household. Similarly living where there was a higher population turn-over, where keeping a boarder was relatively uncommon, where the proportion of wives going out to work was low, and where a relatively high proportion of mothers had a source of potential child care in the home, were all better indications of child health than having a mother who had migrated, who did not keep a boarder, who did not work or who had potential child care. Living in an environment characterised by a high proportion of agricultural or professional and tertiary workers was, similarly, more important than the social class of the individual child's father. PARITY stood in marked contrast to these variables; the number of children a woman had so far borne in her life was a much better predictor of the mortality of those children than the *average parity* of the population their mother lived amongst. Apart from this important exception it was, in short, not so much who one was but where one lived which was important.

It has been established that most of the community- and individual-level variables considered here had important influences on child mortality. With respect to individual-level variables, because correlation between the variables means that different measures might have captured the same variation, the effect of some variables was not in fact as great as it might at first sight have seemed. It could also be the case that the community-level variables were duplicating each other: it is likely, for example, that places characterised by a professional and service occupational structure were likely to have had many servants and few working wives, so these variables may actually have been representing the same environmental facets.

Comparison of Columns F and H, headed 'all community variables' and 'single variable', in Table 4.10.2, indicates that this is indeed the case: the coefficients for variables denoting the *environment* are decreased dramatically when the other community-level variables are added. The adjusted-R^2 for the model in Column F (0.0597) is not much greater than that for *environment* on its own (0.0467, from Model 1, Table 4.6.1) showing that the additional community-level variables do not add much independent explanatory power but rather serve to elucidate which characteristics of the environments were systematically associated with infant and child health, a fact confirmed by the reduction in the parameter estimates when all community-level variables are controlled. The connection between White Collar environments and infant and child health is well explained by other variables in the model: most likely the SERVANTS PRESENT, NATIVITY OF MOTHER and EMPLOYMENT AND CHILD CARE variables. Thus some of the 'underlying factors' by which *environment* affected infant and child mortality appear to have been unearthed. Communities with high proportions of wives born in a different UK county, low proportions of wives in employment, low proportions of non-employed mothers with potential child care, low proportions of households with boarders and with a high average number of rooms, were characteristically healthy and this is partly what the environment categorisation captures. However, it is still unclear how such factors affect mortality. One layer of the *environment* variable has been unpacked but the root causes of high chances of survival cannot be unearthed from the census data. This needs individual-level data with cause of death information.

The regression for 'all community variables' further reveals that the proportions of *men unemployed* and of houses with servants cease to be indicators of low mortality when other variables are controlled. The facets they represented are now better explained by other variables. In addition, the sign of the child care variable for non-employed mothers has changed: this now suggests that a higher proportion of mothers with child care was connected to higher mortality. This is probably because once the presence of servants has been controlled, potential child care must have been restricted to other relatives, the presence of which may have been indicative of poverty and crowding.

There is less duplication with regard to individual variables, although for mothers without employment, the benefits of belonging to the highest social classes and of having potential child care disappear once other variables are controlled. The presence of a servant in the household is almost certainly a factor here, being correlated both with class and with the child care element of women's employment. Controlling for the presence of servants results in employed mothers having had a detrimental effect, even when they had child care. In a similar mechanism to the community-level effect, once the beneficial effect of keeping a servant has been accounted for, the negative relationship with work or with the presence of other relatives is allowed to emerge. The effects of male unemployment and of having a boarder in the household also increase once other variables are controlled, indicating that these factors had a more unfortunate effect among the already disadvantaged sections of society. Other variables change little, indicating that the individual variables captured independent effects on child survival prospects. The adjusted-R^2s for Models C and F in Table 4.10.2 indicate that all individual variables together explained more variation than all community variables together, despite the greater explanatory power of most community-level variables over their corresponding individual variable. This confirms the largely additive effects of the independent variables, although the high explanatory power is substantially due to the ability of individual PARITY to explain infant and child mortality variation.

In Model 5, Table 4.8.2, where the community-level variable included was ENVIRONMENT, that variable retained more explanatory power than any other apart from PARITY. In the models in Table 4.10.2, community-level variables, including *environment*, have been found to account for variation which had seemed previously to be due to individual-level socio-economic variables. It would therefore be unwise to take the explanatory power provided by the 'all individual variables', model Column C, at face value. It is likely that a good deal of the variation purportedly explained by that model is really attributable to community variables. The suite of models has therefore been completed by considering the effects of both individual- and community-level variables together. The parameter estimates and explanatory power of the resulting model are shown in Columns D and E in Table 4.10.2. Many variables retain significance, indicating that both individual characteristics and facets of the community were important in the determination of child health. Even though *environment* has been partially explained by other community-level variables, it is still a better predictor than SOCIAL CLASS of infant and child mortality. Although the coefficients of both have been greatly reduced, those for *environment* are larger and more significant, showing that there were still advantages associated with Agricultural environments and disadvantages associated with Manufacturing environments which were not captured by the other community-level variables. Neither has 'social class' been entirely explained away, since the children of agricultural labourers and those not assigned a class still had significantly better health prospects than other classes, even when all other variables were controlled.

When all variables were included at both an individual and a community-level, NATIVITY was only important for individual women born in Eastern Europe, whose children had markedly better health prospects, especially when other characteristics of the environment and of the woman herself were taken into account. Neither having a mother born in a different county, nor living in a community with a greater number of wives born in a different county than average, affected child survival once all other variables at both individual and community were controlled. The healthy nature of environments to which migrant women moved has been better captured by other characteristics of those environments and of the migrant women.

Women's employment was associated with high infant and child mortality at both an individual and a community-level; even within communities where a high proportion of wives worked, employment for a particular woman was still associated with a greater likelihood of child death. This by no means contradicts the hypothesis that women observed to be in employment at the time of the census were observed in the labour force precisely because of their poor child survival. It does, however, emphasise that even when the opportunity of paid employment for individual women was taken into account, those places with plenty of such work for married women were dangerous places to bring up a child.

As suggested in the model in Column F, which considers all community-level variables together, the analysis indicates that the proportion of non-working mothers with potential child care in the home was associated not with lower infant and child mortality but with higher, once servants were controlled for by other variables. However, potential care available to the individual mother was still associated with slightly improved child health, even after controlling for servants in individual households and the community.

The presence of boarders was associated with poor infant and child survival, both within a community and for individual households, despite the fact that when the analysis was restricted to the two boarding variables, only that for communities was important. It has already been pointed out that the presence of a boarder in an individual household was a better indicator of high infant and child mortality among already disadvantaged households and this was still the case even when the poor environmental characteristic of places with many boarders is taken into account.

The *average number of rooms per household* was a good indicator of low mortality communities on its own, but some of its effects were better explained by other community-level variables, and some by the number of rooms in individual households. Thus when all variables are controlled, the average number of rooms per household in the community has little correlation with infant and child mortality, whereas the number of rooms inhabited by particular households is still important. Thus living in a large dwelling was a much better indicator of child health than living in a community where most dwellings were large.

In summary, the investigation of the relative importance of individual- and community-level variables has shed some light on how the variables measurable from the census were connected to infant and child mortality. The investigation of individual-level variables has already unpacked some of the constituent factors of SOCIAL CLASS with regard to infant and child mortality: nativity of the mother, married women's employment coupled with potential child care availability, male unemployment, the presence of boarders and the number of rooms were all important. This section has proceeded to unpack the *environment* variable by considering other variables measured at the community-level. Some, but not all, of the differential mortality witnessed by those in the different environments is better explained by the proportion of wives in work, the proportion of mothers at home with additional potential child care, and the proportion of houses with boarders although the exact nature of the association of these factors with mortality is still by no means clear. Even when all these variables were controlled, Manufacturing, Mining and White Collar-urban environments remained dangerous for the young. In short: it was found in an earlier section of this chapter that *environment* was the most important influence on infant and child survival after individual parity, and the present analysis has not detracted from this conclusion.

4.11 Infant and child mortality differentials across time

So far this chapter has been devoted to the investigation of differentials in infant and child mortality between groups and has ignored the important question of infant and child mortality trends, and differential patterns of decline between different groups. Chapter 1 and the introductory section of this chapter referred to some of the research carried out by other researchers on the timing and course of the infant mortality decline; this chapter concludes by addressing these issues using the OPCS data.

Long-term series of infant and child mortality by social class show persistent differentials for a century and a half after 1750, followed by convergence after 1900.[129] Trends since 1921 have proved relatively easy to determine, given the regular publication of mortality rates in the form of the conventional five social classes of the Registrar-General. Before that date, however, estimates have to be gleaned from various elite groups and small surveys.[130] The 1911 census is thus a particularly valuable source as it yields not only differentials but trends, if only for a short period. All those who have looked at the passage of infant and child mortality over time from this source have commented upon the widening of social class differentials.[131] Haines found that 'social class in England and Wales during the 1890s and 1900s tended to be related to the speed of mortality decline: mortality in childhood declined more rapidly among the higher and more privileged social classes'.[132] Woods and Williams suggested that 'higher social classes were able to take some special early advantage of the general mortality decline at the turn of the century'.[133]

Pure demographic measures of infant mortality are, of course, not available from the 1911 census material.[134] Instead, combined measures of infant and child mortality can be produced which include deaths of 'children' up to the age of about 15. These measures have been referred to in this chapter as 'infant and child mortality' or 'child survival', but to aid the analysis of trends in this section they have been expressed as infant mortality rates – deaths per thousand births – and are referred to as such.

Unsurprisingly, the time series of infant and child mortality by social class which have been derived from the 1911 census reports are echoed in the smaller OPCS dataset. Figure 4.11.1 shows the estimates for both all England and Wales from the published report on the 1911 census and for the OPCS dataset.[135] The graph for the OPCS dataset is not nearly as neat as that for the whole country, because of the smaller numbers available and some atypical groups, such as the textile workers. There are some differences; for example the shorter marital duration groups of OPCS agricultural labourers (providing the three latest observations in time) are revealed to have had unusually low infant and child mortality and the children of men belonging to OPCS class II were slightly more likely to die than those of class II in the country as a whole. However, both the relative levels and trends for most of the social classes are very similar and the figures show that the pace of mortality decline increased after the turn of the century.

These graphs have been shown for comparison but the ensuing analysis is focused on absolute and relative declines between three approximate dates: 1893, 1900 and 1910.[136] These are shown for social classes in Table 4.11.1. The infant and child mortality decline was concentrated in the second part of the period and in absolute terms there was little difference between the declines for each class. However, because fertility amongst the better off was already low their relative decline was greater and inequality thus increased.[137]

Table 4.11.1 also shows infant mortality rates for the four main environments at the same time points.[138] These also indicate little decline until the dawn of the new century. Absolute declines were no greater in the healthy than in the unhealthy environments, although the low initial levels in healthy areas meant that they witnessed greater relative improvements.

Table 4.11.2 shows the relative changes in the different classes within each of the four environments for the two successive time periods. Concentrating on the later period, it can be seen that in Staple Industry locations the overall class pattern of larger declines among the three highest classes is repeated. While the survival of lower-class children did improve, the improvement was less, relatively, than that secured by

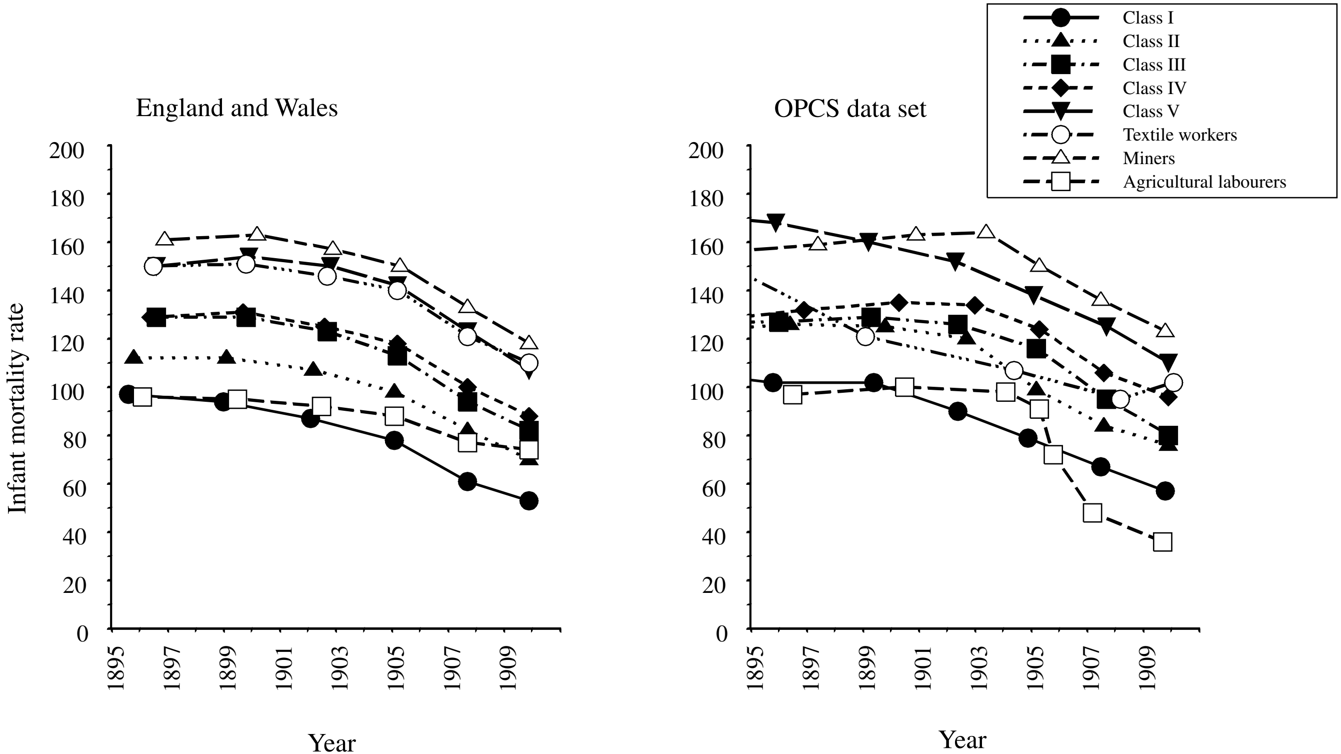


Fig. 4.11.1 Infant mortality estimates by social class, 1895–1911; England and Wales and OPCS population compared.
Source: Fertility of marriage, Part I (1917), Tables 23 and 24; OPCS dataset.

Table 4.11.1 *Infant and child mortality change over time, by social class and environment, OPCS*

	Infant mortality rate per 1,000 births			Absolute change		Percentage change	
	1894	1901	1910	1894–1901	1901–1910	1894–1901	1901–1910
SOCIAL CLASS							
I	106	90	57	−16	−33	−15	−37
II	124	130	76	6	−54	5	−42
III	127	128	80	1	−48	1	−38
IV	128	138	95	10	−43	8	−31
V	171	149	110	−22	−39	−13	−26
VI Textile workers	159	117	102	−42	−15	−26	−13
VII Miners	156	165	123	9	−42	6	−25
VIII Agricultural labourers	97	95	36	−2	−59	−2	−62
ENVIRONMENT							
Agriculture	81	87	47	6	−40	7	−46
White Collar	114	109	68	−5	−41	−4	−38
Light Industry	139	129	84	−10	−45	−7	−35
Staple Industry	164	166	119	2	−47	1	−28

Source: OPCS dataset.

the parents of more privileged children in similar places. In poor environments, where the threat posed by infant and childhood diseases remained high, superior resources and knowledge were able to offer some protection in the early years of life. The advantages of the better off were increasing over the turn of the century at the time when advances in medical knowledge and theories of disease causation were growing apace.[139] This prompts the suggestion that improvements in knowledge of medical and health matters relating to infants and children could partly explain the increase in the survival chances of the young. Growing class differentials imply that changes in recommended practices, preventions and treatments either were taken up first by those with most knowledge of them, or were only able to be put into practice by those with more resources, suggesting that the decline in infant and child mortality was at least to some extent affected by behavioural factors. Better-off families would also be more readily able to relocate into healthier parts of towns. The relatively good survival prospects of their children may also have been a spin-off from their fertility levels which were generally low by this time.

In Agricultural and White Collar environments, where the environment did not impose such a virulent attack on the health of the young, improvements in mortality did not proceed in this class-specific way. The meagre resources of the lower classes offered as effective a defence as the greater resources of the middle classes.[140] Perhaps information networks were more effective in such environments, with knowledge dissipating to a wider audience, but a more realistic possibility, as mentioned above, is that the middle classes' superior resources and access to know-how may not have constituted much of an advantage, simply because the environment represented less of a threat to children's health. A further possibility is that in the healthier areas, where the middle classes were concentrated, they might have used their knowledge and resources not just for their own good, but for the benefit of the whole community. Their greater numbers in such places would have lent them more political clout than in heavily industrial locations where they were a smaller group in society, and they would be able to demand, and effect, improvements to, say, the sewerage or water supply which would have enhanced the health of everyone in the neighbourhood. The upper and middle classes were therefore able to protect themselves in three ways: by avoiding the most unhealthy areas to live in, by their knowledge and resources, and by the louder voice they had in society because of their status.

In a paper published in 1995, Michael Haines examined socio-economic differentials in infant and child mortality during the mortality

Table 4.11.2 *Infant mortality percentage change over time, by social class and environment*

Social class		Environments		
	Agriculture	White Collar	Light Industry	Staple Industry
Panel A: Percentage change 1894–1901				
I	18	−16	−22	−15
II	4	21	−4	−25
III	53	−23	−3	8
IV	−10	−6	−11	17
V	−6	22	−20	−15
VI Textile workers				−34
VII Miners				4
VIII Agricultural labourers	4			
Panel B: Percentage change 1901–1910				
I	#	−45	−15	−45
II	−39	−55	−30	−42
III	#	−39	−35	−36
IV	5	−40	−32	−30
V	−48	−1	−39	−12
VI Textile workers				14
VII Miners				−25
VIII Agricultural labourers	−66			

Note:
#: no estimate for 1910 due to small numbers.
Source: OPCS dataset.

decline in England and Wales using the published 1911 census data.[141] He performed regressions on mortality levels, calculated for between 116 and 190 occupation groups, to assess changing influences on child survival for different marital duration cohorts. He used social class groupings, measures of income and urbanisation as explanatory variables.[142] Since each successive marital duration group produces estimates located further in the past, Haines interpreted the changes in the effect of the independent variables across duration groups as changes over time in factors influencing mortality. He therefore treated the lower coefficients for social classes for years nearer to the census as support for 'a phased decline in infant and child mortality across occupation and socio-economic status groups'.[143]

Haines noted that the variables measuring the average income and the percentage of each occupation living in urban areas were able to explain more variation among older marriage cohorts than younger.[144] This finding is supported by the OPCS dataset as demonstrated by Table 4.11.3, which shows regression Model 5, repeated from Table 4.8.2 and similar regressions run separately for each marital duration. The adjusted-R^2 values show that these variables also explained more mortality variation among the offspring of women who had been married for longer. Turning to the coefficient values and significance indicators, there were differences in the effects of different variables between all cohorts, but the most striking differences were between those women married less than five years and all those women married for longer. The model thus appears to explain more infant mortality variation among women who had been married for longer and whose children were therefore subject to the higher mortality of the past. This could imply that the influence of measured factors on infant and child mortality was decreasing in importance over time.

The OPCS data in Table 4.11.3 show that parity was very important in women who had been married for longer, but although the coefficient is large in the first duration group, it is not significant. This could be because a large proportion, 42 per cent, of births were parity 1. Single births were subject to higher mortality than all subsequent parities until parity 5 or 6 and this might have outweighed the adverse mortality effect of higher-parity births.[145] Because the coefficient is still large, however, the lack of significance could be due simply to the low number of high-parity births: out of 1893 women in this cohort only 17 reached parity 4 or more. Among those married for longer than five years the effect of parity decreased with marital duration, demonstrating the detrimental results of squeezing more births into a shorter space of time.[146]

Table 4.11.3 shows another striking difference between the first and subsequent cohorts: environment was not significantly associated with child death among the children of women married for less than five years. This forms a stark contrast to the powerful effect of the environment on the offspring of more established marriages. The effect of the environment was at its strongest in the cohort married 10–14 years in 1911 and this could be interpreted as an indication of change in the influence of different factors over time, giving rise to the contention that environment grew and then declined in importance, peaking when the children of women married 10–14 years were most at risk, i.e. around the turn of the century. This hypothesis tallies well with the peak in infant mortality in the final years of the nineteenth century and the urban–sanitary–diarrhoeal hypothesis but it is surely implausible to suggest that changes in the environment were so substantial and so

Table 4.11.3 *Multiple regression: the effect of social class and other socio-economic variables on infant and child mortality, with parity, by marital duration group*

Explanatory variables	Model 5	q(2) 0–4	q(3) 5–9	q(5) 10–14	q(10) 15–19	q(15) 20–24
Intercept	0.6663***	0.7052***	0. 6310***	0.5016**	−0.0630	−0.5521*
AGE OF WIFE	0.0066**	−0.0113	0.0035	0.0007	0.0243***	0.0308***
PARITY	0.1015***	0.2102	0.1812***	0.1653***	0.1143***	0.0844***
ENVIRONMENT						
Agricultural	−0.5644***	−0.2339	−0.4664***	−0.6970***	−0.6001***	−0.4810***
White Collar-rural	−0.4248***	0.0217	−0.4277***	−0.6909***	−0.3158***	−0.3244***
White Collar-urban	−0.2487***	−0.2827	−0.2202*	−0.3735***	−0.3175**	−0.2203*
Light Industry	−0.2807***	−0.1020	−0.1843**	−0.4854***	−0.2814***	−0.1964***
Manufacturing	@	@	@	@	@	@
Mining	−0.2448***	0.0768	−0.3253***	−0.2049*	−0.4397***	−0.0453
SOCIAL CLASS						
I	−0.0823	−0.1890	−0.1087	−0.0315	−0.0412	−0.0577
II	0.0018	−0.0591	−0.2187**	−0.1390**	0.2237**	0.0720
III	−0.0595	−0.4428***	−0.0949	0.0166	0.0713	−0.0683
IV	−0.0532	−0.1103	0.0414	−0.1544*	−0.0126	−0.0370
V	@	@	@	@	@	@
VI Textile workers	−0.1967*	***−0.2057***	***−0.2896***	***−0.4987****	***0.1250***	***−0.0338***
VII Miners	−0.0286	−0.0518	0.1110	−0.1903	0.1586	−0.1140
VIII Agricultural labourers	−0.2137***	−0.4724*	−0.2693	−0.3167	−0.0296	−0.2053
None	−0.3470***	***0.2542***	***−0.4258***	***−0.2041***	***−0.5001****	***−0.3505***

NATIVITY OF MOTHER						
Same county	@	@	@	@	@	@
Other United Kingdom	−0.0415	−0.2997***	−0.0396	0.0244	−0.0006	−0.0770
Ireland	−0.0200	***0.0919***	***−0.3901***	***0.5394*****	***−0.3232***	***−0.2588***
Eastern Europe	−0.4367***	***−0.6919*****	−0.2642	***−0.4549*****	***−0.5351******	−0.3798***
Other foreign	−0.1434	***−0.2941***	***−0.4326****	***0.1702***	***−0.1115***	***−0.1018***
Not known	−0.1625*	***−0.3239***	***−0.0159***	***−0.1649***	***−0.3145*****	***−0.2678***
EMPLOYMENT AND CHILD CARE						
Not employed, no care	@	@	@	@	@	@
Not employed + care	−0.0573	0.5065***	−0.1994*	−0.1186	−0.0787	−0.0586
Employed, no care	0.3591***	0.6614***	0.5722***	0.3850***	0.1339	0.2509**
Employed + care	0.2151**	***0.7735*****	***0.3394***	***0.3571****	***−0.1719***	***0.1727***
NUMBER OF ROOMS						
1–2	0.3610***	0.1957	0.0826	0.4508***	0.2784***	0.4950***
3–5	@	@	@	@	@	@
6+	−0.1780***	−0.1020	−0.0534	−0.0954	−0.1704**	−0.3566***
AGE OF HUSBAND	−0.0017	0.0038	−0.0062	0.0043	−0.0049	−0.0016
FATHER'S UNEMPLOYMENT	0.4148***	***−0.4106***	***0.0963***	***0.4187****	***0.3071***	***0.4391*****
SERVANTS PRESENT	−0.0441	−0.7371***	−0.0055	0.0157	0.0006	−0.0404
BOARDERS PRESENT	0.0991**	0.1908	0.0456	0.1319	0.0817	0.0607
R^2	0.1156	0.0943	0.0990	0.1654	0.1255	0.1524
Adjusted R^2	0.1132	0.0804	0.0888	0.1551	0.1126	0.1375

Notes:
The dependent variable is the mortality index per woman, weighted by number of births.
Figures in bold italics are based on fewer than 50 women.
*** Significant at 1% level.
** Significant at 5% level.
* Significant at 10% level.
@ Reference category.

rapid that by 1911, in the space of only a few years, environment was no longer a significant factor.[147]

Instead it should be remembered that the estimates are in fact measuring *infant and child* survival and that each marital duration, as well as producing estimates further in the past, produces estimates of survival to a different average age. Thus duration 0–4 estimates q(2), the chance of dying before the age of 2, and subsequent durations estimate the chances of dying before the ages of 3, 5, 10 and 15; q(3), q(5), q(10) and q(15) respectively. Although Haines recognised this in his paper, he did not pay enough attention to its implications with regard to the interpretation of the different influences on mortality in each cohort. The chances of dying were highest in the first year, and especially the first month, of life and thus all estimates contain a substantial element of infant mortality, but its relative contribution decreases with longer marital duration. The varying effect of factors among different marriage cohorts must reflect the fact that the influence of such factors decreased over time, but also that mortality at different ages was subject to different influences.

It has to be borne in mind that the estimates of mortality at earlier times reflect survival to older ages when environmental influences may have been more important, and class influences less important. If environmental influences were more important among older children, then differentials by environment from longer marital duration groups will automatically be larger than differentials by environment for those married for shorter times; such differentials will thus appear to narrow over time. In addition, it has been shown above that, in the absence of controls for environment, the spatial distribution of classes across environments created apparently strong infant and child differentials by class. Among longer marital duration groups, child mortality will have been a larger component of the mortality estimate for each class, therefore environmental influences on child mortality will have exacerbated class differentials. In contrast, estimates from women who have been married for shorter times will have included a smaller proportion of child mortality, and thus the absence of controls for environment will not have enhanced class differences to the same degree. As a result, when mortality estimates for any two dates are compared, class differentials may appear to narrow over time. Different mortality levels for different groups at the first date, however, mean that relative decreases could still be larger for those already at an advantage.

As an example of the problem, the absolute declines illustrated in Table 4.11.1 may reflect the fact that the estimates derived from each marital duration group consist of a different balance of mortality at different ages, and thus a different balance of influences on mortality. The estimates from longer marital durations will contain a higher proportion of older children and thus mortality will appear to be more affected by environmental influences (assuming that environment is a more important influence on the mortality of older children). In contrast the estimates from the first marital duration group will contain a smaller proportion of other deaths in comparison to neonatal, and environment will appear to be less important. A failure to realise this can mean that declines are mistakenly attributed to particular influences on mortality. Haines fell into just this trap.[148] He produced estimates of the speed and degree of mortality decline for each sub-group.[149] The more rapid declines which he found among better-off occupations and social classes led him to conclude that the decline in childhood mortality was related to occupation and socio-economic status.[150] His findings could equally be interpreted as showing that occupation and social class influenced infant mortality more than the mortality of older children.

It is thus methodologically suspect to use indirect techniques to examine *trends* in infant mortality by sub-groups. The examination of trends from the 1911 census and the OPCS dataset involves the assumption that the age structure of mortality did *not* change over time, so that estimates relating to different ages are comparable when expressed as the same life table measure. This has few repercussions when examining aggregate trends or the relative effects of different influences overall, but the assumption undermines the examination of changing influences on mortality among sub-groups, which aims to show the changing age structure of mortality over time. Differentials over time could alternatively be identifying differences in the influences on mortality at different ages. Both the interpretation of the estimates at the beginning of this section and Haines' 1995 paper must therefore be treated with caution, but it must be stressed that the same methodology was not applied in previous sections of this chapter or in *Fatal years*, which were not concerned with differentials over time.

The relevance of the points made above can be shown by observing that children do die from different causes at different ages, so their deaths are likely to be influenced by different factors.[151] There are major differences between neonatal and post-neonatal mortality, and mortality before and after weaning. Figure 4.11.2 shows the proportion of deaths due to different causes for each age group in the urban counties of England and Wales between 1906 and 1910.[152] The figure demonstrates that neonates, infants in their first month of life, were more likely to die from congenital and birth associated causes than from infectious and diarrhoeal diseases, partly because of the inherent risks associated

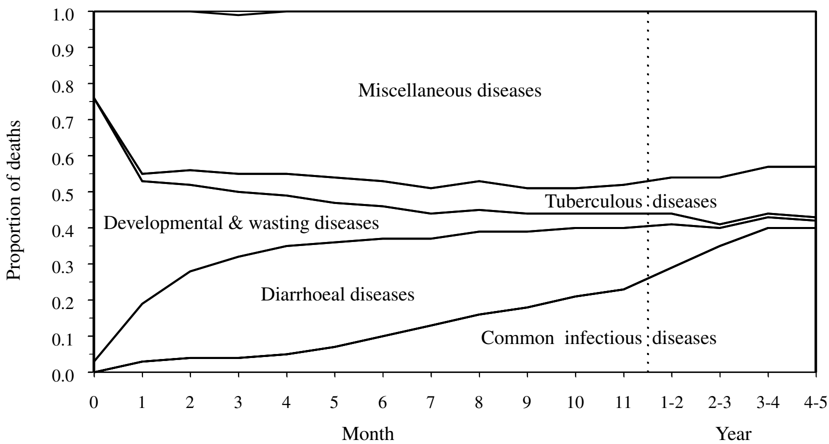


Fig. 4.11.2 The proportion of deaths due to different causes, by age, for the urban counties of England and Wales, 1906–10. *Source:* Registrar-General (1919), Table 15.

with pregnancy and childbirth and partly because the majority of newborns in this era were breast-fed, gaining immunological protection from their mothers' milk.[153] In the post-neonatal period, when children were far less likely to die from congenital and birth-related causes, diarrhoeal diseases were particularly important as babies who had been weaned or received food which supplemented their mothers' milk stood a higher risk of succumbing to a digestive tract or diarrhoeal infection.[154] From the second year on, the common infectious childhood illnesses became significant killers.

Environmental factors were, therefore, likely to have been less important influences on mortality during the first month than later on in infancy and childhood. Deaths of children of women married for longer durations, containing a smaller proportion of neonatal deaths and a greater proportion of deaths to older children, will therefore have been more affected by environmental influences than the deaths of children of recently married women, as the latter contained fewer deaths of older children. The fact that environment does not appear to have influenced mortality amongst the youngest children suggests that the mechanisms by which environment affected child health were related to the transmission of food and water-borne illnesses as well as the common infectious diseases which were more prevalent among older children. Sewerage, water supply, milk provision, crowding, air quality and the prevalence of infectious diseases in the neighbourhood are all implicated.

Returning to Table 4.11.3, the increased importance of the NUMBER OF ROOMS in influencing mortality among older children might well be another indicator of the different health risks run by children of different ages. The number of rooms was not an important influence for children in the first two marital durations, which yield estimates of mortality up until ages 2 and 3 respectively. For longer durations, representing older children, the number of rooms became much more significantly correlated to the risk of death. Airborne infectious diseases were more likely to be spread in households where occupants were crowded into smaller spaces. The number of people will also have played a part, but this has to some extent been controlled for by parity. This observation could indicate that older children were at a higher risk of death by airborne infectious diseases.[155] This should not be particularly surprising, given that older children will have had a wider range of experience and more potential contact with sources of infection, although reverse causality could be at work, families who had suffered child death being able to stay in smaller houses.

In summary, the mortality of the youngest children, represented by the shortest marital duration group, seems to have been more influenced by individual-level social class related factors such as migration, the possession of servants and women's work, although the latter correlation may well have been produced by reverse causality. In this age group, the potential child care element was related to much higher mortality, which, given the beneficial effect of servants, is likely to have signified relatives in the home. It is worth bearing in mind that higher mortality among this group, too, may also have been the result of reverse causality, a child death making room for a relative to be accommodated. Overall it appears that mortality among the youngest infants and children was influenced by individual circumstances or those within the home, aside from the number of rooms. It was mortality at older ages of childhood which was particularly susceptible to environmental factors and number of rooms.[156]

4.12 Conclusions

This chapter set out to wrest information regarding infant and child mortality from the OPCS anonymised selection of individual records from the 1911 census of England and Wales. Comparison of the results with Preston and Haines' analysis of the USA public use sample of the 1900 census and their analysis of the aggregate tables from the 1911 census of England and Wales highlights the value of individual-level datasets in demographic studies, but also indicates some of their pitfalls. In particular the chapter aimed to examine the contentious issue of the competing roles of social class and environment amongst the influences on infant and child mortality.

The analysis has concluded that environment was a more important influence than social class on the levels of infant and child mortality. A significant proportion of the class differentials which Preston and Haines drew attention to in *Fatal years* has been shown to be a product of the distribution of classes over different environments. The remaining social class effect can be narrowed down, first, to more specific socio-economic factors such as the number of rooms in the house, whether the father was in or out of work, and the work status of the mother and, second, to the influence of fertility.

As Preston and Haines suspected, 'residential segregation' helped to explain the social class differentials in England and Wales. Different areas within the same town or city were home to distinct groups of people drawn there by the location or the facilities or constrained to live there, for instance by proximity to available work or by low income. Each neighbourhood shared physical characteristics such as pollution, housing, streets, sanitation and water supply which would have influenced the risk of illness or death for infants and children. Such groups may also have shared a common culture, partly based on their occupations and resources, affecting the degree to which they were able to influence the provision of amenities and resources within the neighbourhoods and dictating whether or not they followed child care practices which could protect their children.

Environments with low infant and child mortality were characterised, once other variables are controlled, by low proportions of wives in employment, low proportions of housewives with resident potential child care and a low proportion of households containing boarders. However, the analysis has not been able to reveal the precise connection between these factors and mortality.

The offspring of women born in Eastern Europe were much more likely to survive than average. It is likely that lengthy breast-feeding and high standards of hygiene among their mothers, who were probably Jewish, put them at an advantage. Although inter-county migrants also had lower infant and child mortality, this advantage has been shown to be the product of their lower fertility and the fact that such migrants tended to end up in healthier places. The exceptions to this were those who were observed living in a Light Industry environment. This environment was not particularly healthy, and those moving in did not have significantly lower fertility than average so the health advantage of their children must be attributable to other factors, perhaps the health of the place of origin, or an ability amongst such migrants to obtain more remunerative and secure jobs.

Women who were recorded as being in paid work at the time of the census have been revealed to have had much worse infant and child survival than women not in employment on census day. However this may have been not because women's work disadvantaged children but because a child's death allowed a woman to return to the workforce and earn a little extra money. For an individual woman, a source of potential child care in the home such as a female relative or servant was associated with lower infant and child mortality. On the other hand, at a community-level, once the presence of servants had been controlled for, child care was associated with higher mortality, suggesting that places where many households contained relatives of the head were less healthy, even though those families housing their relatives may have been more healthy. The presence of boarders was a sign of poorer survival in the individual household, perhaps because such households were in greater financial need. Infants and children whose fathers were not in work at the time of the 1911 census also had higher mortality.

Infants and children living in households containing six or more rooms had particularly good chances of surviving, especially in relation to those living in only one or two rooms. An attempt was made to investigate the influence of overcrowding on infant and child mortality by calculating the number of people per room, but since a child's death reduced the number of people in the household, the analysis produced the non-intuitive result that fewer people in the household and fewer people per room were associated with higher infant and child mortality. Longitudinal data, indicating the number of people in the household at the time of death, are needed before the true effects of overcrowding can be accurately assessed.

In the OPCS dataset as a whole, agricultural labourers were associated with significantly lower mortality than average.[157] The better mortality of the children of men in class I within Manufacturing environments, and the poorer health of the children of men in class V in White Collar-rural environments, certainly implies some role for class-related factors in determining infant and child mortality, but environment and community effects appear to be much stronger in general.

The analysis has revealed that the influences on infant and child mortality in the USA in 1900 and in England and Wales in 1911 were not as different as Preston and Haines were led to suspect. The mechanisms which affected infant and child mortality were broadly similar in both countries, once allowance is made for differences in the degree of urbanisation, in racial and ethnic composition, in the climate and so on. In both nations, social class appeared to affect infant and child mortality in the aggregate, but was discovered to be the product of the covariance of class with other characteristics. Environment was found to be particularly important on either side of the Atlantic, 'behavioural variation . . . [being] swamped in its effects by broad geographic and economic factors'.[158]

Declines over time in infant and child mortality by environment and social class were examined briefly. The analysis appeared to show a decrease in the influence of environment and widening social class differentials over time. However, it was pointed out that at least part of this effect could be explained by the fact that infants and children of different ages experienced different influences on mortality. For example, older children, who contributed most to more distant estimates, were likely to be more susceptible to environmental influences and the number of rooms in the house than infants (especially those in their first month) whose deaths formed a greater contribution to mortality close to the census.

Individual parity was found to be a particularly important determinant of infant and child mortality. In particular much of the low infant and child mortality of the middle classes was attributable to smaller family size. This raises important questions about the relative timing of declines in fertility and in infant and child mortality as an area of future research. Does the fact that parity was such an important determinant of infant and child mortality mean that fertility decline must have preceded the infant mortality decline? Given the relationship between them, lower fertility must have encouraged the decline of infant and child mortality, but the persistence of high infant and child mortality among some groups of people who had low fertility (such as textile workers) means that in some cases there may have been more important influences than fertility, hindering or promoting the fall in infant and child death rates. Similarly, since there were sections of society with both high fertility and low infant and child mortality (such as agricultural labourers), declining fertility was unlikely to have been a major, or at any rate universal, reason for the infant and child mortality decline. Unfortunately the 1911 dataset does not allow any conclusions to be drawn about the timing or mechanisms of infant and child mortality decline. However, the next chapter examines what can be discovered about fertility from the 1911 census.

Notes

1 Williams, N. (1992).
2 Woods (1984); Lee, C.H. (1991); Woods and Shelton (1997), pp. 47–64.
3 Woods, Watterson and Woodward (1988); Laxton and Williams (1989); Williams and Mooney (1994); Williams and Galley (1995).
4 Watterson (1986, 1988).
5 Preston and Haines (1991). London was separated out from other urban areas. The 'areas' used by Preston and Haines were the census regions of the 'North', the 'Midlands', the 'South', and 'Wales'. See chapter 6 for a full explanation of the contents of each of these areas.
6 Watterson (1988), p. 300.
7 Watterson (1986), p. 468.
8 See for example Laxton and Williams (1989); Williams and Mooney (1994); Williams and Galley (1995).
9 Haines (1995), pp. 314–15.
10 Woods, Williams and Galley (1993); Woods and Williams (1995).
11 The figures are drawn from Woods and Shelton (1997), p. 48, Table 4.
12 Both the World Bank and UNICEF use infant or child mortality as one of a set of basic indicators of development. See World Bank (1984), p. 186; UNICEF (1993), p. 91. Recent mortality figures can be found in these two books, and for historical examples see Wrigley and Schofield (1981), p. 249.
13 Exact age is the exact difference between the date of observation and date of birth. A child born on 1 January 1910 will be exactly 1 year and 92 days, or 1.25 years on 3 April 1911. Exact age increases continuously, in contrast to the commonly used age at last birthday. Conventional mortality rates use the deaths to people in a given age group (those aged between 1 and 4 in completed years, for example) divided by the mid-year population of that age group. The denominator, the mid-year population, will exclude some people who are aged 4 at the beginning of the year but 5 by the middle, and also those turning 1 in the second half of the year, although the numerator will include their deaths if they die in that year. The denominator thus excludes some people 'at risk' of dying for some part of the year (similarly, it includes some people who turn 1 in the beginning of the year or 5 in the second half and are thus at risk for some, but not all, of the year). In contrast, the risk of dying measures mortality precisely among those at risk. It is given by the deaths to those who are in a particular age group at the start of the year, divided by those in that age group at the start of the year.
14 Because some of the children of the longest-married women included in the analysis may be well into their teens, the estimation technique encompasses mortality up to the age of 20, although in the following analysis most use is made of estimates from the first three quinquennial marital duration groups, expressing mortality between birth and age 5.
15 The methods used are outlined briefly later in this chapter and described in more detail in Appendix A.
16 Conventional age-specific death-rates require the number of deaths in a particular age group and the numbers of individuals at risk in that age group, see n.13.
17 *Fertility of marriage*, Part II (1923), p. liii.

18 For social differentials in age at marriage of men and women see *Fertility of marriage*, Part II (1923), pp. xvi–xviii. Also see discussions of nuptiality in chapters 5 and 6 below. It should also be noted that occupational mobility is often selective of certain demographic characteristics, e.g. farmers, who require both resources and experience to run their own farms, tend to be older and have been married longer than average. However they may not have been farmers when they married.

19 Standardisation for marital duration and age at marriage will also to some extent have taken account of the distorting effects of differential adult mortality among sub-groups, which removes parents from the analysis at different rates.

20 *Fertility of marriage*, Part II (1923), p. lxv.

21 *Fertility of marriage*, Part II (1923), pp. lxv–lxvi.

22 For the definition of a dwelling as given on the 1911 census schedule see section 3.2.

23 Standardised mortality per thousand children born (SCMR) ranged from 357 for single-roomed tenements to 95 for those with ten rooms or more. *Fertility of marriage,* Part II (1923), Table XXIX, p. lxix. For class I SCMR was 123, for class VII, the miners, it was 212. For further variations in SCMR with husband's occupation and class see *Fertility of marriage* Part II (1923), Table XLVIII, pp. cv–cvii; for variation with wife's occupation see Table XLIX, p. cxiii.

24 The SCMR was 199 in the North as opposed to 153 in the South, and was 200 for county boroughs and 137 for rural areas; *Fertility of marriage*, Part II (1923), Table LIII, pp. cxxii–xxxvi. Non-migrants had the highest mortality, and overseas migrants (excepting those from Ireland) had the lowest. The impact of parents' origin is shown in *Fertility of marriage*, Part II (1923), Table LXIII, pp. clxv–clxvii. Couples where both parents had been born and enumerated in England and Wales had an SCMR of 174, whereas those for couples born overseas were lower. The highest SCMRs, at 211, were experienced by those couples where both husband and wife had been born and enumerated in a Great Town.

25 For England and Wales vital registration was reliable by the second half of the nineteenth century, enabling the calculation of age-specific death-rates, but the restriction to published material limits the opportunity for simultaneous consideration of several variables, hence the use of estimates in the current work.

26 Brass (1975). For a working manual see United Nations (1983). A full explanation for this context and a worked example is provided in Appendix A.

27 Such measures are often referred to as 'life table probabilities'. See n.13 for a definition of exact age, and for the difference between life table measures of dying, and conventional age-specific death-rates. In life table notation ${}_nq_x$ denotes the chance that a person alive on their xth birthday will die before reaching their (n + x)th birthday; thus the infant mortality rate, IMR or ${}_1q_0$, is the chance of dying between birth and first birthday, and the child mortality rate, ${}_4q_1$, is the chance of a child aged one dying before it reaches the age of 5. In the text, 'chance of dying before xth birthday' has been rendered as q(x).

28 For example 17.26 per cent of the children of women married for 10–14 years in England and Wales in 1911 had died by the census. This is a fair

approximation of the risk of dying before the age of 5 (162 per thousand from the England and Wales 1911–12 life table).

29 The conversion of proportions dead into chances of death use specially developed multipliers. The multipliers and their application are discussed in more detail in Appendix A.

30 This is done using a further set of specially developed multipliers. See Appendix A for more details and a worked example.

31 Appendix A describes how a particular pattern of mortality (embodied in a life table) is used to express each estimate as infant mortality. The application of a single mortality structure to all sub-groups has been strongly contested by Woods (1993) and this is also discussed in the appendix.

32 Lack of names in the OPCS dataset is the main problem in family identification.

33 Children not resident with their parents on census night are further discussed in chapter 5, section 5.3.

34 Only three women included in the analysis, all in Bethnal Green, had married before their fifteenth birthday. In contrast, 526 women were excluded from the calculations because they were estimated to have married after their fortieth birthday. Such women may well have been on their second marriage, thus their fertility would not have been tied as closely to their marital duration as women in their first marriages. Even if they were in their first marriage, such late marriers will have had very few children, thus very few valuable data have to be discarded. Eleven women were excluded from the analysis because their ages were not given, and thus their age at marriage could not be calculated. Excluding those women with at least three children more than the number of years they have been married is another attempt to exclude those in their second or subsequent marriage, and will also have eliminated those who had a history of illegitimate childbearing. In neither case will the number of years they had been married be a good reflection of the ages of their children (two children more than the length of marriage allows for some exceptionally short birth intervals, twins and pre-nuptial pregnancies). A further seventeen women were excluded for this reason.

35 Such households generally included no young children who could have been children of the couple in question. In addition, interpreting such missing values as zeros provided a realistic parity distribution.

36 When calculating overall fertility levels it is possible to correct for underestimation using multipliers to inflate indirect estimates to national levels; see, for example Woods, Watterson and Woodward (1988), p. 364. The omission of high-risk groups, and thus the extent of underestimation, *is* likely to differ among sub-groups, and so corrections would be valuable. Unfortunately, however, no means of measuring the extent of such omissions are available, making it impossible to calculate correction factors for specific groups.

37 For assessments of the reliability of indirect techniques for the estimation of infant and child mortality see, for example, Sullivan (1972); Preston and Haines (1991), ch. 2.

38 Preston and Haines (1991). Other studies using the mortality index include Farah and Preston (1982); Trussell and Preston (1982).

39 In this case the whole population is defined as that of England and Wales.
40 See Appendix A.
41 The sample is 1-in-750, stratified and self-weighted, that is representative of the overall population of the United States.
42 The variables and their sub-categories are listed in Preston and Haines (1991), Table 3.1, pp. 91–4. They include race, residence, location, literacy, English language proficiency, husband's occupation and unemployment status, wife's labour force status, farm or home ownership, place of birth, structure of household, wife's migration status and position within her current household, and ethnicity of both husband and wife. Preston and Haines adapted some of these variables in subsequent analysis.
43 Preston and Haines (1991), pp. 153–4.
44 *Ibid.*, p. 175.
45 *Ibid.*, p. 175.
46 Census divisions and regions for England and Wales are considered in chapter 6, which discusses the application to the entire country of the conclusions drawn in this chapter and the next.
47 In Wales and Monmouth a 'language' question was included amongst the census for 1891, to allow the enumeration of Welsh speakers. See Parry and Williams (1999).
48 Marks (1994), pp. 66–78; Goldstein *et al.* (1994).
49 Preston and Haines (1991), p. 102; Fitzpatrick (1984), pp. 32–4.
50 Marks (1994), pp. 15–16. Jews tended to use the words 'the Pale' rather than ghetto and in Eastern Europe were increasingly restricted to occupations they were allowed to enter; see Pollins (1991), p. 23.
51 Preston and Haines (1991), p. 107.
52 Marks (1994), p. 32.
53 Different distributions of nationalities for fathers and mothers could explain this finding. However, the proportions of husbands used to calculate the mortality index coming from high-mortality countries such as Germany, and from low-mortality countries such as New Zealand, were similar to the proportions of wives originating from those places and so this explanation has to be discounted.
54 A similar picture, perhaps unsurprisingly, prevailed amongst the wives of these men.
55 National mortality indices were recalculated from the figures given in *Fertility of marriage*, Part I (1917), Table 2 using the life tables applied when calculating the mortality from the OPCS data. The results were identical to those of Preston and Haines, to two decimal places.
56 The extremely good prospects for the children of agricultural labourers was caused entirely by unusually low mortality amongst the children of couples in the shorter marital duration groups and it is probable that the OPCS sample of these is atypical.
57 Preston and Haines (1991), pp. 187–98.
58 The occupational classification presented for the OPCS population was specially designed and is based on the scheme used in the 1921 census. It has advantages over previous schemes, such as separating 'retailers' from the manufacturers of the items they sell. The OPCS scheme is also tailored to the occupational composition of the OPCS dataset itself, which is similar

to that of England and Wales as a whole but with over- or underrepresentation of a few occupational groups. The more limited women's occupational classification scheme (seen in Table 4.3.6) reflects the far more limited range of paid activities they undertook.

59 The OPCS sample of textile workers is too small and atypical to be used for this dimension of the analysis.

60 Schürer (1991), p. 26 and Szreter (1996b), p. 324. The responses to the question whether an individual was an employer, an employee, or working on his or her 'own account' have been combined with additional information given in the occupation column to create the distinction between employers, foremen, journeymen and assistants, labourers and other employees.

61 See Szreter (1996b), pp. 324–30.

62 See, for example, Hewitt (1958); Graham (1994); Bell and Millward (1998).

63 Ashby (1915), p. 91.

64 Reid, G. (1906), pp. 423–4, quoted in Graham (1994), p. 315. See also Holdsworth (1997).

65 Graham (1994), pp. 316, 318–19; Lewis (1980), pp. 61–88; Dyhouse (1978).

66 Jones, H.R. (1894), p. 56.

67 *Fertility of marriage*, Part II (1923), pp. lxxvii–lxxviii.

68 In the United States, on the other hand, Preston and Haines' indices suggest that children of women working in *any* field were more likely to have died. However this impression is to some extent a product of the ethnic and racial make-up of the female labour force: native white women working in agricultural, white collar and service occupations did, in fact, have lower infant and child mortality than average: Preston and Haines (1991), p. 124.

69 The 1911 census recorded higher numbers of women working in retailing than did censuses immediately before and after. This has been attributed to the particular wording of the employment question in the 1911 census which may have induced many women who helped out in the family business from time to time to record themselves as employed. Infant and child mortality for women in retailing may therefore have been slightly lowered by the inclusion of wives or daughters 'helping out' but spending most of their time at home. See Garrett (1995).

70 See, for example, Mrs Fawcett's comments in the discussion following Jones, H. R. (1894), p. 102. Szreter (1996b), pp. 244–5 summarises the sympathetic findings of two studies published by Robertson and Duncan in the 1909 and 1910 *Annual Report of the Medical Officer* to the City of Birmingham Health Department. See also Ross (1993), pp. 45–7; and Marks (1994), pp. 76–7.

71 Humphrey's comments in the discussion following Jones (1894), p. 101; Collet (1898); Roberts, E. (1984), p. 168.

72 Collet's (1898), pp. 235–8 comparison of working-class districts found no regular pattern in the relationship between women's employment and infant mortality.

73 See chapter 5, section 5.8, 'Female occupations and fertility'.

74 Although Preston and Haines developed a child care variable they did not show mortality indices for it in *Fatal years*, only considering it in multiple regression models. Therefore indices for the USA cannot be shown in Table 4.3.6. The EMPLOYMENT AND CHILD CARE variable differs from that used by

Preston and Haines in that not only did they use servants or relatives over the age of 16 but, when dealing with relatives as a source of possible child care, they did not restrict these to those without paid employment.

75 *Fertility of marriage*, Part II (1923), p. cxiv.
76 Preston and Haines (1991), p. 127.
77 See Garrett (1995) and chapter 3, section 3.1. Owing to the structure of the census it is not possible to analyse the effects of income from lodgers.
78 Aaby (1992).
79 While 16 per cent of wives married less than 15 years had husbands from class V, and 10 per cent had husbands who were miners, 20 per cent of boarding wives had class V husbands, and 18 per cent had husbands who were miners.
80 This relationship also held in the United States; Preston and Haines (1991), p. 179. 'Dwelling' is defined in Chapter 3, section 2.
81 See Aaby *et al.* (1984); Bernhardt (1992, 1994).
82 Preston and Haines (1991), p. 182.
83 The instructions on the census form requested that visitors to the household be enumerated but marked as visitors. All those thus marked have been excluded from all the analyses in this volume. The analyses thus reflect the 'normal' number of residents in a household.
84 *Fertility of marriage*, Part II (1923), p. lxx.
85 Preston and Haines (1991), p. 197; Smith, D. S. (1991), p. 236.
86 Smith, D. S. (1991), p. 236.
87 There will undoubtedly be additional variation between individual neighbourhoods, but analysis of too many categories makes generalisations impossible. Furthermore because women might have moved between particular neighbourhoods since the death of a child, mortality may be associated with the wrong location. Women may also move between environments, but this will be less of a problem because the environment categorisation is more general.
88 Textile workers are numerically small that unfortunately they have to be discounted from discussion here. As some cells in Fig. 4.4.3 contain very small numbers, the numbers of children ever born and the standard errors of the mortality estimates are provided as a guide to reliability of the latter.
89 There is also a possibility that labourers themselves were prone to poor health. The sick may have been forced to seek casual employment because ill health prevented them from taking a more permanent job. The combination of poor health and insecure wages may have forced them into cheaper housing, poor conditions then exacerbating the whole family's health problems.
90 Most comprehensive statistical texts have sections on multiple regression. For example, see Harnett and Soni (1991), pp. 515–27. A discussion of the choice of regression method applied here is given in Appendix B.
91 Expected child deaths are calculated by multiplying the number of children ever born to each woman by the proportion of child deaths for women of that marital duration in the population as a whole, adjusted by the multipliers for the indirect estimation of infant mortality as given in United Nations (1983). See Farah and Preston (1982); Trussell and Preston (1982); Preston and Haines (1991).
92 With dummy variables, the values of the variable are grouped into a few

categories and each category except one is given a separate variable, the value of which is 1 or 0 depending on whether a woman belongs to that category or not. The remaining category is used as a reference category usually representing a numerically large group often with extreme experience of child mortality. Thus each woman will have a value of 1 for the category she belongs to and zero for all the rest, unless she belongs to the reference category, in which case she has a value of zero for all categories. The indices for the different categories can then be directly compared to the reference category and also to each other.

93 The value of a continuous variable, such as wife's age, is straightforward, being the actual age of the wife. Although older women are associated with higher mortality risks for their children, this is largely taken into account by the indirect technique multipliers. Once that effect is removed, the children of older women will have been at risk longer ago on average, thus incorporating a time element. Preston and Haines (1991) use husband's age and husband's age squared as proxies for income, but when included, these variables did not produce a significant effect, and it was felt that father's age was not a useful predictor of income in England and Wales.

94 See n.93.

95 Preston and Haines (1991), p. 141.

96 Preston and Haines (1991), p. 163 obtained adjusted R^2s with a maximum of only 0.0535.

97 The OPCS collection of male textile workers, class VI, is atypical of textile workers in England and Wales as a whole, possibly owing to small numbers (there are only 130 who can be used in regression).

98 That is, those married for less than 25 years, with at least one child born, and with no missing values for any of the variables.

99 Marks (1994), pp. 43–91.

100 Preston and Haines (1991), p. 175.

101 *Ibid.*, pp. 142–5, Table 4.1.

102 Undertaking the regression using individual female occupations was not done in order to preserve comparability with Preston and Haines.

103 Stedman Jones (1976), pp. 127–33.

104 *Ibid.*, pp. 127–51.

105 Walthamstow appears to have been a healthier place than other Light Industry locales, but this is not driving the lower mortality of internal immigrants as Walthamstow has a lower-than-average proportion of these and does not dominate the total numbers of internal migrants to Light Industry places.

106 See 'Maternal employment' in section 4.3 above; also chapter 5, section 5.8; also Garrett and Reid (1994); Garrett (1998).

107 Preston and Haines (1991), p. 196.

108 Woods (1984), p. 47.

109 Miller *et al*. (1992).

110 Scrimshaw (1978).

111 Woods, Watterson and Woodward (1989), pp. 121–4.

112 See Appendix A for details on the calculation of the mortality index.

113 Age at onset of childbearing is also important: older-marrying women can be expected to have had both lower fertility and higher mortality, but as higher fertility is associated with higher mortality, such factors will only

mute the effect and any observed differences will be conservative estimates.

114 There is emerging evidence that child survival probabilities within families are linked, in other words that child deaths may be concentrated among particular women above and beyond what would be expected by the effect of parity: see Zaba and David (1996). Findings from the OPCS data would appear to support this contention.

115 Although the mortality index takes account of increased exposure between marital groups, it is unable to do so within marital groups, thus part of the differences between the values for different parities within groups may be due to the effect of exposure which will also affect fertility.

116 It must be remembered that this is mother's parity at time of census, not child's parity, as we do not know which children died.

117 With the exception of Agricultural environments where the effect of social class increased marginally on controlling for parity. This is probably due to the particularly high rates of fertility and low rates of mortality among agricultural labourers. The coefficients are small and not statistically significant, however, so firm conclusions should not be drawn.

118 Bongaarts (1982).

119 For a definition of dummy variables see n.92 above.

120 This section follows Preston and Haines (1991), pp. 170–6.

121 Explanatory power lost is measured using the marginal adjusted-R^2.

122 Kennedy (1992), p. 64.

123 An alternative strategy would be to use partial correlation, which studies correlations between variables among which no variables can be specified as independent or dependent. However, infant and child mortality is assumed to be a dependent variable, so partial correlation would be inappropriate in this situation. See Snedecor and Cochran (1967), p. 400.

124 Dummy variables have been treated as sets of variables, each representing one particular explanatory factor. When 'environment' is referred to, for example, it designates all the environment variables: Agriculture, White Collar-rural, White Collar-urban, Light Industry, and Mining. When all these are included the effect of Manufacturing, the reference category, can be gauged and can be thought of as included. When they are all excluded the reference category has no relevance and so can be thought of as excluded.

125 Sectors refer to the groups of contiguous registration districts which make up the building blocks of environments. See chapter 2, section 2.4.

126 It was suggested above that higher survival among the children of inter-county migrants to all but Light Industry environments was the result of smaller family sizes. This is contrary to the present finding: that it was the destination of the migrants which affected their mortality. However, absence of a fully controlled model at this point may account for such anomalies.

127 See Szreter (1996b), pp. 546–7 for detailed discussion of the idea of communication communities.

128 Any common variation with the variable already included is not captured by this measure even if it is really the result of the added variable.

129 Woods and Williams (1995).

130 Such as Hollingsworth's work on the peerage: Hollingsworth (1976).

131 Woods, Williams and Galley (1993); Haines (1995); Woods and Williams (1995).
132 Haines (1995), p. 315.
133 Woods and Williams (1995), p. 129.
134 The reasons for this have been discussed in chapter 4, section 4.2.
135 *Fertility of marriage,* Part I (1917), Tables 23 and 24.
136 Mortality rates varied considerably from year to year in the late nineteenth and early twentieth centuries, and therefore the selection of years between which increases or declines are calculated is crucial. Indirect techniques, however, such as are used here, produce estimates based on mortality very loosely centred around each date. They are thus already effectively smoothed and so the choice of date does not make so much difference.
137 Textile workers are too few in number for robust analysis.
138 Only four environment categories are used to ensure larger and consequently more robust numbers.
139 Fee and Porter (1992).
140 Except for class V in White Collar environments, whose particularly high mortality has already been commented upon on several occasions in this chapter.
141 Haines (1995).
142 *Ibid.*, pp. 309 and 311, Tables 4 and 5.
143 *Ibid.*, p. 310.
144 *Ibid.*, p. 311.
145 See Woodbury (1926), ch. 3; also Knodel and Hermalin (1984).
146 This result could also show that the replacement effect only showed up more when fewer children had been born.
147 See Woods, Watterson and Woodward (1988).
148 Haines (1995).
149 Using regression. Haines (1995), p. 304.
150 *Ibid.*, p. 305.
151 Preston (1976), pp. 89–119; Knodel and Kintner (1977); and Woods (1993).
152 The figure for the rural counties has lower proportions of deaths due to diarrhoeal diseases and common infectious diseases but otherwise shows a very similar pattern.
153 Most sources estimate that at least 80 per cent of working-class mothers either wholly or partially breast-fed their children. See Howarth (1905), p. 211; Dyhouse (1978), p. 255; Lewis (1980), p. 71; Fildes (1991), pp. 6–7.
154 Supplementing breast milk was common, but these ‘partially breast-fed’ babies still received some measure of protection from their mothers’ milk, and were consequently less likely to die than those who were completely hand-fed. Howarth (1905), pp. 210–13; Woodbury (1926), pp. 75–101.
155 Aaby *et al.* (1984); Bernhardt (1992).
156 Although it would be very interesting to investigate the different risks to different age groups within each environment, numbers are unfortunately not large enough to permit the analysis for each environment separately.
157 Lower even than agricultural labourers in England and Wales as a whole, suggesting an OPCS selection of agricultural labourers who were peculiarly healthy, even by agricultural labourers’ standards.
158 Preston and Haines (1991), p. 175.

5

Fertility and fertility behaviour 1891–1911

5.1 Introduction

> A student of statistics must have noticed that the birth rate had varied in accordance with the rate of interest for your money. Grandfather 'Superior Dosset' Forsyte in the early-nineteenth century had been getting ten per cent for his, hence ten children. Those ten children, leaving out the four who had not married, and Juley, whose husband Septimus Small had, of course, died almost at once, had averaged from four to five per cent of theirs, and produced accordingly. The twenty-one whom they produced were now getting barely three per cent in the Consols to which their fathers had mostly tied the Settlements they made to avoid death duties, and the six of them who had been reproduced had seventeen children, or just the proper two and five-sixth per stem.
>
> There were other reasons, too, for this mild reproduction. A distrust of their earning powers, natural where a sufficiency is guaranteed together with the knowledge that their fathers did not die, kept them cautious. If one had children and not much income, the standard of taste and comfort must of necessity go down; what was enough for two was not enough for four, and so on – it would be better to wait and see what Father did. Besides, it was nice to take holidays unhampered. Sooner in fact than own children, they preferred to concentrate on the ownership of themselves, conforming to the growing tendency – *fin-de-siècle*, as it was called. In this way little risk was run, and one would be able to have a motor car. Indeed, Eustace already had one, but it had shaken him horribly, and broken one of his eye teeth; so that it would be better to wait till they were a little safer. In the meantime, no more children![1]

The convoluted family history encapsulated in Galsworthy's paragraphs holds considerable interest for those studying the decline of fertility in England and Wales across the nineteenth century. Galsworthy's standpoint is certainly highly specific: an upper-middle-class family with income derived from the ownership of property, investment and the professions. Nevertheless, several points of interest for the demographic historian do emerge. While those children who reproduced themselves did so at a rate in step with the current rates of financial return, it is noticeable that each generation was rather less prolific than this would suggest. Superior Dosset had 21 grandchildren, a number only 2.1 times greater than the number of his children, while he had reproduced himself tenfold. Exactly half his children failed to generate offspring of their own, four because they never married and one because she was widowed at an early age. His grandchildren's generation did not even manage to reproduce themselves. By the first years of the new century 16 grandchildren had married, but only six had had any children.[2] Thus, while only a quarter of them remained unmarried in contrast to the two-fifths in their parent's generation, virtually three-quarters of those who did marry remained childless.

Given the observable historical phenomena of much-reduced fertility within marriage and a reduced tendency to marry, the ways of thinking about family size which Galsworthy implies here, and elsewhere in his text, are of interest. Some couples who married relatively late may have been childless involuntarily, but Galsworthy clearly states that a considerable proportion were making the decision not to have any children at all. They also appear to have considered postponing children until it became clearer what 'Father was going to do', that is, how well-off he might leave them as a result of his will. When, in one of the later volumes of the Forsyte Chronicles, two of the youngest generation fell in love and married, they decided (Galsworthy states that the decision was made by the wife) not to have any children for fear of the presumably genetic consequences of their cousinship.[3] 'Young' Nicholas, a grandson of Superior Dosset, married in 1877 and his children were born in 1879, 1880, 1881, 1884, 1886 and 1894.[4] The gap between the penultimate and final children was thus a considerable one, a pattern often held by demographers to be indicative of 'inefficient stopping' behaviour; the assumption being that having had their first five children without any obvious attempts to delay conception the couple had then initiated measures to avoid having any more. Managing this successfully for several years, they had eventually had 'an accident' and acquired another child. One of Nicholas' cousins, Jolyon, having had three children by two previous marriages, impregnated Irene who would later become his third wife. Having successfully avoided conception in her previous marriage to Soames Forsyte, Irene bore their child at 38 years of age and then found herself 'naturally' infertile.[5] Galsworthy thus depicts different couples within this one family deploying a variety of family building strategies, and as the narrative of the Chronicles shows, these strategies changed as circumstances altered over time.

Even though the fictional Forsytes belonged to a particular stratum of society within Victorian and Edwardian England, Galsworthy's remarks are suggestive of more general changes afoot within the country.[6] It is interesting that he ascribes reduced fertility not to decreased infant mortality as demographers have been wont to do, but to the longevity of the grandparental generation. The Forsytes were a particularly long-lived family, averaging over 80 years by one calculation, but with generally declining mortality rates the children in other middle-class families would also have seen any expectations of a relatively early inheritance recede as well as finding themselves with more surviving siblings for whom provision must be made.[7] The future therefore appeared less securely affluent, particularly in an era of increasing aspirations, growing consumerism (witness the desire for holidays and a motor car), falling returns on previously solid investments and higher taxes.[8] In conjunction, or at least in close association, with these emerging features of life, Galsworthy notes a new 'mood' sweeping the upper middle classes in the form of new ideals and views of the world and of self. In this new order even a single child was sufficient to cement a marriage, or to provide an heir.

Rather than relying solely on literary accounts such as these, demographic historians studying the phenomenon of the so-called 'fertility transition' at the end of the nineteenth century have traditionally relied on the statistical data collected by the Registrar-General on births, marriages and deaths, and on related material collected in the decennial censuses of population. Most of this information is in the form of published reports, almost always presented at the aggregate level. Readers will have been familiar with the information charted in Figure 1.1.1. The Crude Birth Rate (CBR) in England and Wales appears to have risen gently from the inception of civil registration in 1837 until the mid-1870s.[9] Thereafter it underwent a steady decline, interrupted only by the First World War, until it reached its nadir in the 1930s.

The fall in the national birth-rate has been ascribed primarily to the decline of fertility within marriage, but we should bear in mind that fertility rates are also influenced by nuptiality (the proportion of the population marrying and the average age at which they do so), as well as by the proportion of children born outside wedlock. When the civil registration of births began the proportion of births occurring outside wedlock lay at about 7 per cent.[10] This figure did not diminish much before 1860, but it fell quite steeply over the subsequent decade, followed thereafter by a rather more gentle decline. By the first decade of the new century it lay just below 4 per cent. Obviously, the proportion of first births which were illegitimate would have been much higher and, since the average number of children born within marriage dropped dramatically after the 1860s, the absolute decline in the number of illegitimate births after 1860 was much more dramatic than the percentage decline suggests. It is also worth noting that if unmarried women who found themselves pregnant were increasingly likely to marry before their baby was born, this would contribute to a decline in illegitimate fertility without markedly reducing overall fertility. This is an aspect of the fertility decline which has not been extensively explored.[11]

In the Victorian and Edwardian eras the two main factors influencing the level of overall fertility in England and Wales were therefore nuptiality and marital fertility. The latter forms the focus of this chapter, but first knowledge of nuptiality in this period is reviewed and the new insights available through the OPCS data considered.

5.2. Nuptiality

In an era when fertility within marriage is not subject to any deliberate control, the main driving force behind shifts in fertility is nuptiality.[12] With regard to the late nineteenth century this element of the demographic system has been somewhat neglected as decreasing fertility within marriage emerged as the dominant influence on overall fertility levels within the population.[13] Nevertheless, substantial differences remained between sub-groups of the population in the proportion of women who ever found husbands, and the age at which those who married did so. These differences have implications for our understanding of fertility behaviour and patterns.

It is conventional in census based studies to calculate the singulate mean age at marriage (SMAM) for historical populations to gauge differences in nuptiality. This measure has not been adopted in the present study for two reasons. First, calculations of the SMAM at the local level can be strongly influenced by migration flows. In places with high numbers of servants or with high rates of sex-specific outmigration, over- and underestimates of SMAM will be produced respectively.[14] The high numbers of single young women in the OPCS White Collar areas, for example, are due largely to the influx of servants, not to a lack of marriage partners *per se*. Undoubtedly, the turnover of servants was quite high, but each girl leaving would be replaced by a girl of approximately the same age.[15] The servant population would thus not 'age' from census to census, nor would their propensity to marry be apparent. Many of those leaving service to get married would celebrate their wedding and set up house elsewhere, and thus neither their marriage chances, nor those of their employers, would be accurately reflected by a cross-sectional measure for the district such as its average SMAM.

Second, it was possible to analyse the 1911 census data which give the age of each married woman and the duration of her current marriage and, by inference, her approximate age at marriage.[16] Such information is unobtainable from other censuses unless a couple in the census can be traced to a marriage register. This is virtually impossible on a large scale in England at present, because of restrictions on access to the civil registers. Contemporaries were well aware that nuptiality was changing, referring to the 'spinster' or 'surplus women' problem, but in general demographic historians of the era have been unable to pursue this issue in detail.[17] Figures 5.2.1A and B compare the proportions of the female and male census populations who were reported to be single, married and widowed in the 1861 to 1931 censuses of England and Wales with the equivalent proportions found in 1851.[18] For both sexes there was a trough in 'single-ness' in the period 1861 to 1881, matched by a plateau in 'married-ness', particularly among those aged less than 25, but with a noticeable impact among those aged less than 35. The very low levels of 'single-ness' amongst men in 1871 and 1881 may suggest a greater propensity to marry, but may also indicate that emigration was 'siphoning off' unmarried men. On the basis of these figures and in the absence of fertility control within marriage, an increase in the overall English and Welsh fertility rate could be expected between 1851 and 1881. In 1891 the proportion of the female population who had failed to marry by their forty-fifth birthday had returned to 1851 levels, and increased thereafter. By 1921 the proportion of women never married was 30 per cent greater than it had been in 1891. While the propensity to marry was also diminishing among men in the last decades of the nineteenth century, this situation saw an abrupt reversal in the wake of World War I. Among women the war seems to have had little effect, marginally increasing the marriage chances of those in the youngest age groups.[19] From 1891 onward therefore, women were marrying later, and more were not marrying, than had been the case in the third quarter of the nineteenth century. Overall fertility should therefore have fallen, even in the absence of fertility control measures, although the decline in widowhood evident in Figure 5.2.1, the post-War 1921 figures not withstanding, may have had a countervailing influence.

A second measure often calculated when comparing levels of nuptiality is I_m. This forms one of the four 'Princeton indices', and is taken to represent 'proportions married'. The other indices are I_g (marital fertility), I_h (illegitimate fertility) and I_f (overall fertility). To calculate I_m and I_g, the number of married women in each five-year age group from 15 to 49 is required, together with the number of all women in these age groups and the number of births occurring to women in each age

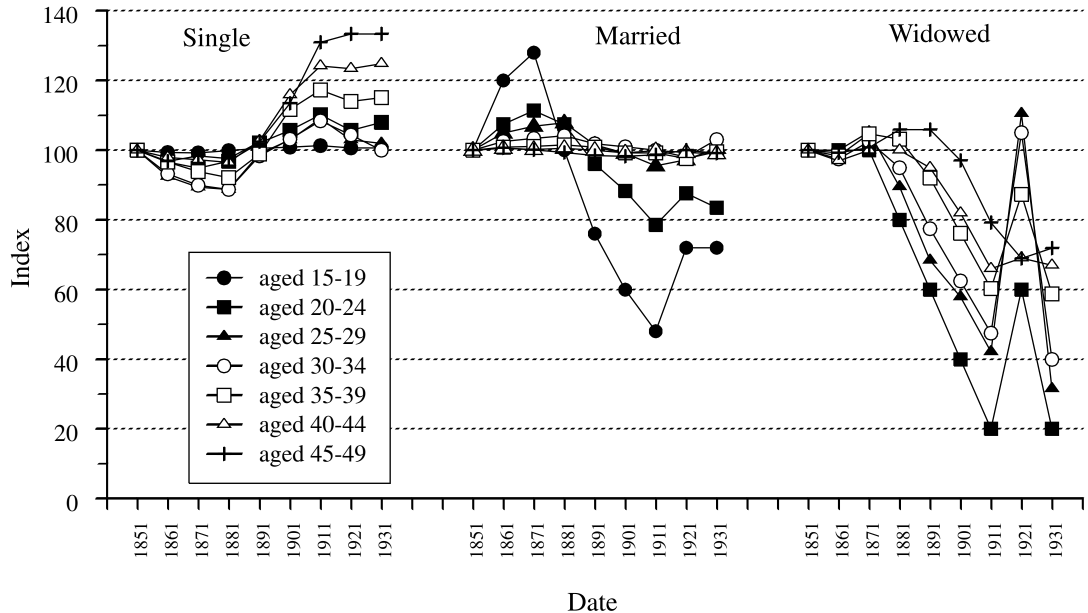


Fig. 5.2.1A The proportion of women single, married and widowed indexed against 1851, England and Wales, 1851–1931. *Note:* 1851 proportion = 100. *Source:* Mitchell (1988), Table 5, pp. 20–2.

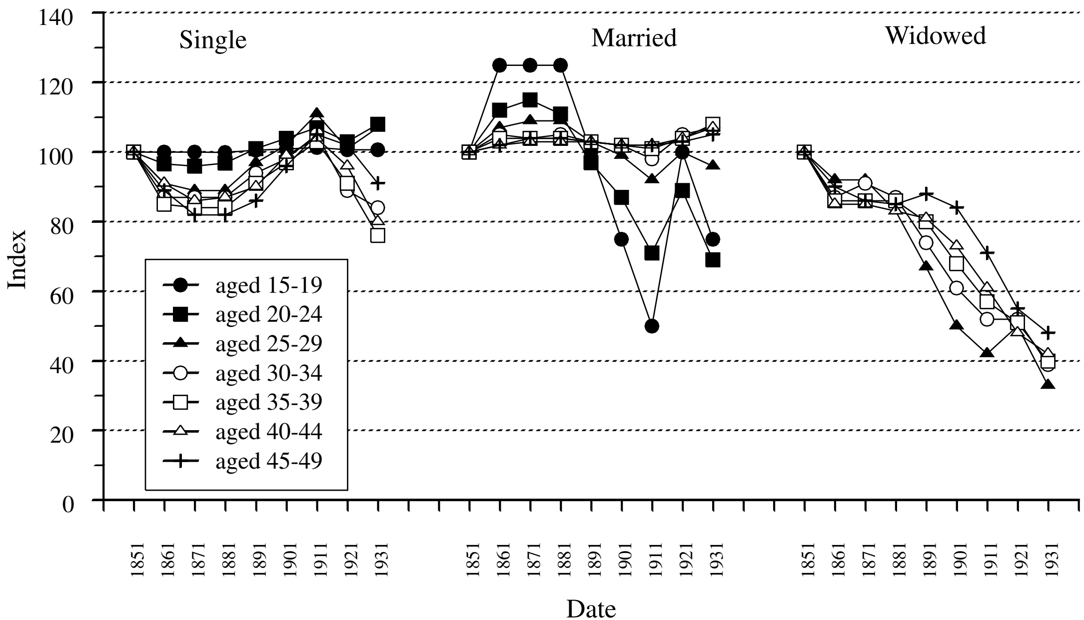


Fig. 5.2.1B The proportion of men single, married and widowed indexed against 1851, England and Wales, 1851–1931. *Note and source:* as Fig. 5.2.1A.

groups. Using as a standard the 1920s age-specific marital fertility rates of the Hutterite population, the most fertile human population reliably recorded, the number of births the married women in the study population would have had if they had experienced the Hutterite rates are calculated.[20] The number of births in fact occurring in the population is then calculated. The ratio between the hypothetical and actual numbers of births provides the index of marital fertility, I_g. To calculate the index I_m the same Hutterite age specific marital fertility rates (ASMFRs) are applied to the numbers of all women in each five-year age group in the population under observation, and then to the numbers of married women. Again the ratio of the two numbers signifies the proportion of potential marital fertility which has been squandered through failure to marry at an early age. All these figures can be derived from individual-level census returns. Ideally the index of illegitimate fertility (I_h) would also be calculated, but census data seldom yield accurate information on rates of single motherhood, and thus it is often assumed, as it has been here, that all births in the populations under observation are legitimate, and thus $I_g \times I_m = I_f$; the index of overall fertility. If the study population was experiencing the fertility rates of the Hutterites, and all women married on their fifteenth birthday and stayed married until their fiftieth birthday, then I_f would have a value of 1. Most populations, however, have overall fertility levels considerably below this, either because they marry late, because they limit their fertility within marriage, or because they do both.[21]

Values for the Princeton fertility indices, denoted below by $!I_m$, $!I_g$ and $!I_f$, were calculated using only information for women aged 20 and over in the OPCS dataset.[22] Figure 5.2.2A displays changes in the value of the Princeton indices between 1891 and 1911 for each of the OPCS environment-specific sectors, and Figure 5.2.2B shows the equivalent figures for each environment overall.[23] Each unit is represented by a 'tadpole'. The end of each tadpole's tail represents the 1891 $!I_f$, $!I_g$, $!I_m$ configuration for that unit, while its head represents the 1911 configuration. Any vertical movement between the tadpole's tail and head signifies a change in nuptiality, and any horizontal movement a change in marital fertility.[24]

A quick glance at Figure 5.2.2A reveals two major features. First, the greatest amount of movement among the tadpoles is horizontal and from right to left, signifying that fertility fell in almost every sector between 1891 and 1911. The amount of movement varies, however, from virtually none at all in the case of the Light Industry sectors of Banbury (M, Figure 5.2.2A), to a fall of over one-third in Swansea's Staple Industry (Y) or Axminster's White Collar (B) sectors. The second feature of note, best seen in Figure 5.2.2B, is that while fertility decline can be

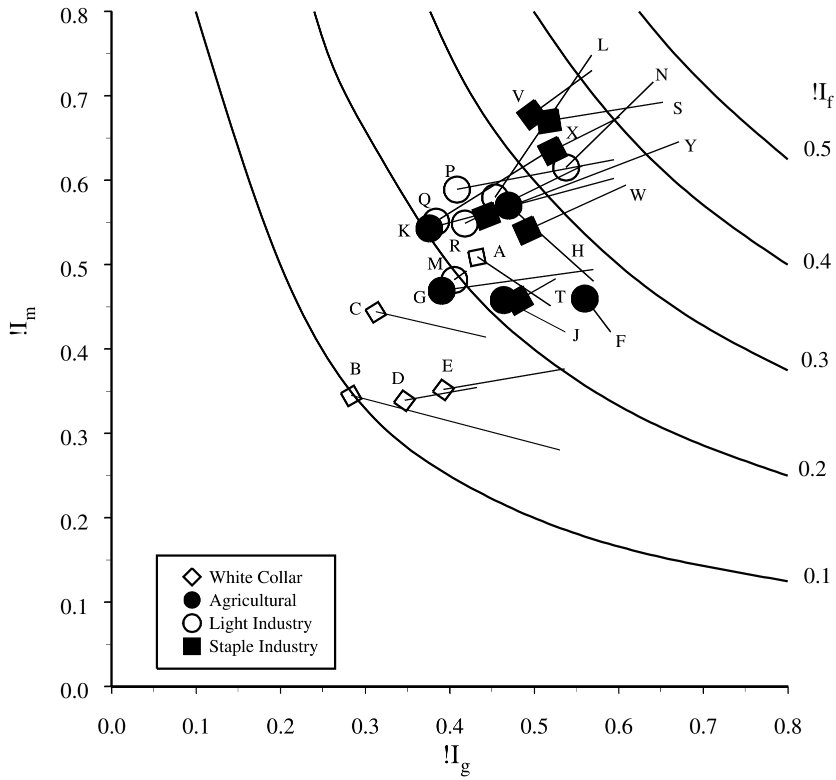


Fig. 5.2.2A Changes in the Princeton fertility indices, by place and environment, OPCS 1891–1911. *Notes:* The tail of each 'tadpole' represents indices for 1891; the head represents 1911. ! indicates indices calculated using women aged 20–49 only. The legend indicates environments; letters form a key to places within environments:

White Collar: A Abergavenny, B Axminster, C Pinner, D Swansea, E York.

Agricultural: F Abergavenny, G Axminster, H Banbury, J Morland, K Saffron Walden.

Light Industry: L Abergavenny, M Banbury, N Bethnal Green, P Swansea, Q Walthamstow, R York.

Staple Industry: S Abergavenny, T Bolton, V Earsdon, W Morland, X Stoke, Y Swansea.

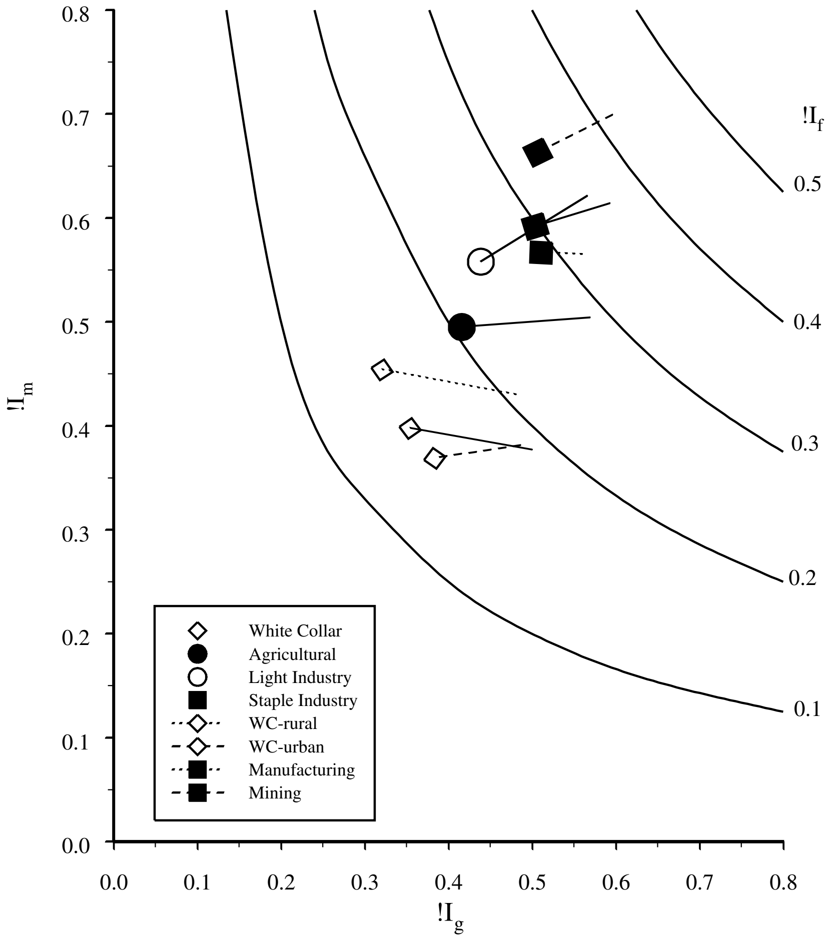


Fig. 5.2.2B Changes in the Princeton fertility indices, by environment: OPCS 1891–1911. *Notes:* The tail of each 'tadpole' represents indices for 1891; the head represents 1911. ! indicates indices calculated using women aged 20–49 only.

seen in all four environments: the level of nuptiality displayed is markedly different between environments; a situation which changes little over time. Nuptiality levels are, on average, much lower in White Collar areas than in either Staple or Light Industry areas, while the Agricultural areas lie somewhere in between. Figure 5.2.2A adds detail to this general picture. The $!I_m$ for the Staple Industry sectors of Bolton (T on the diagram) is much lower than that for any of the other Staple Industry areas; while the $!I_m$ for White Collar Abergavenny (A) is rather higher than that for most other White Collar areas, although it is considerably lower than that for the locale's Staple Industry sectors (s) in Blaenavon, just a few miles away. Marriage markets do appear to have had a local dimension.

As suggested above, while the index of nuptiality or 'proportions married' is indicative of marriage behaviour within an area, it may also be reflecting inmigration and outmigration of the unmarried of either sex. It is highly likely, with the decline of domestic service known to be occurring at the close of the Victorian era, that proportionally the number of single young women circulating through the 'servant-keeping' areas dropped.[25] Women who would previously have become maids, nurses or cooks now stayed at home with their parents or sought employment in a factory or shop, lodging in the vicinity of their workplace. Proportions married in the White Collar areas would thus have risen, there being fewer servants per married mistress while, in other areas, rates of marriage could be expected to drop as unmarried women failed to move away. Nuptiality appears to drop most markedly in the Light Industry areas, Abergavenny being particularly prominent in this respect. In those Staple Industry areas where female employment opportunities had always been at a premium, little altered. Women wishing to find employment still had to leave, and thus in these communities the proportion of women with husbands, and thus levels of nuptiality among the population who remained, stayed high.

Measures of nuptiality such as those used here may be influenced by variations in widowhood, the latter resulting either from differentials in mortality or variations in the propensity to remarry. As Figure 5.2.3 indicates, the levels of widowhood evident among women aged less than 50 in the environment-specific sectors of the OPCS dataset are very low, seldom reaching 5 per cent in 1911. The census, of course, only reports current marital status and remains silent on the incidence of remarriage. It is possible that higher rates of remarriage were contributing to the very high levels of !I_m in the mining sectors of Earsdon and Abergavenny, but it is more probable that a young average age of marriage for women, an almost universal feature of mining communities, in conjunction with the outflow of young women to jobs elsewhere, was the major factor.[26] Figure 5.2.3 brings home the role of service in increasing the proportion of single women within the White Collar areas. Only Abergavenny in this environmental group does not show a great excess of unmarried over married women, whereas in the Industrial areas the reverse is more often the case. Only Banbury amongst the Light Industry and Bolton amongst the Staple Industry areas have more single than married women, and both of these locations offered significant female

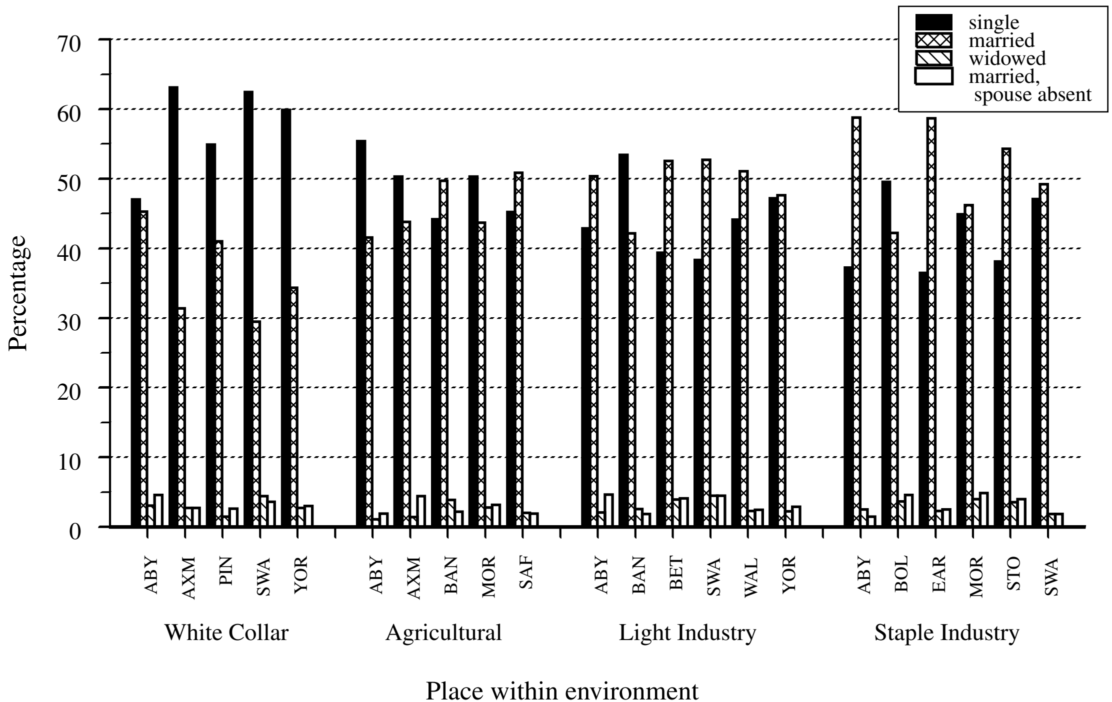


Fig. 5.2.3 The marital status distribution of females aged 15–49, by place within environment, OPCS 1911

employment opportunities: baby linen manufacture in Banbury and cotton manufacture in Bolton. The mining areas of Earsdon, Abergavenny and Stoke have large excesses of married over single women. Stoke is particularly intriguing, given that the potbanks did employ large numbers of women. This illustrates one demographic aspect of the way in which the local culture of Stoke was quite different from that of the textile towns despite their shared experience of high rates of female employment. The Agricultural areas in general tend to display a more even mix of single and married women, although the fact that the arable areas of Banbury and Saffron Walden have excess married women, while the pastoral areas of Morland, Axminster and Abergavenny have a surfeit of single ones, is worthy of note.

In the 1911 census the questions concerning age and duration of marriage allow an estimation of age at marriage for both husband and wife to within plus or minus one year, within sub-groups of the study population. There are, however, several caveats concerning the use of this information. Chapter 3 reported the 'heaping' of ages and marital durations evident in the 1911 census.[27] People tended to round both, particularly towards numbers ending in 0. As both ages and marital durations are reported in whole years we can only be accurate to within two years of a woman's actual age at marriage. A 30-year-old woman reported as married for one year could be celebrating her first anniversary on census night, or be about to celebrate her second anniversary the following day. Similarly she could be celebrating her thirtieth birthday or be on the eve of her thirty-first. An accurately reported age of 30 last birthday and a marital duration of five years could mean that the woman in question married when aged anywhere between her twenty-fourth and her twenty-sixth birthday. In practice we have added a half-year to each reported age and the same amount to the marital duration and then subtracted the second from the first to obtain an estimate of age at marriage. Women marrying aged more then 35 were excluded as there was a much greater chance that these individuals would have been marrying for a second or subsequent time, and age at first marriage is of greater consequence to measures of fertility.

Despite limiting the calculations in this way the resulting estimates cannot strictly be compared with figures of 'average age at first marriage' in other studies, as undoubtedly some ex-widows are included.[28] One further caveat is that since it is suspected that there may be a greater concentration of misreporting of marital durations among those married only a few years, in order to disguise pre-nuptial pregnancy, the figures of the most recently married cohort should be treated with considerable caution. This is particularly so when comparing across

Table 5.2.1 *The average age of marriage (under 35 years) of wives by husband's class and by environment, for selected marriage cohorts, OPCS 1911*

		Average age of marriage						Average age of marriage			
		Class						Environment			
Marriage duration	Marriage date	I	II	III	IV	V	VII	WC	AG	LI	SI
<5	1907–11	26.4	25.9	24.9	24.7	24.2	23.1	26.2	25.7	24.8	23.8
5–9	1902–6	25.7	25.3	24.2	24.2	23.8	23.3	25.7	25.4	24.0	23.7
10–14	1897–1901	25.2	24.9	23.9	24.0	23.6	23.4	24.9	25.6	23.8	23.6
15–19	1892–6	25.3	25.0	23.5	23.9	23.1	22.3	25.1	25.0	23.5	23.1
20–29	1882–91	24.6	24.2	23.1	23.2	23.0	22.5	24.6	24.3	23.1	22.9

Note:
Each figure was calculated on the basis of at least 150 couples.
Source: OPCS dataset.

classes, as differentials in the extent of pre-nuptial pregnancy could exaggerate inter-class differences in brides' age at marriage.

The left hand panel in Table 5.2.1 shows the average age of marriage of brides among those couples in selected marriage cohorts where the wife was aged less than 35 on marriage appearing in the OPCS 1911 Fertility Census population, divided into the Registrar-General's classes I to V and the mining class VII on the basis of husband's occupation.[29] While not every cohort is consistent, the general impression is that there were major differences between the classes in terms of brides' age at marriage, with miners taking the youngest wives. Amongst the survivors of the 1902–6 marriage cohort as many as 54 per cent of class I men had taken wives aged 25 or older, yet only 31 per cent of class V men and 29 per cent of miners had done so. In the previous cohort only 6 per cent of class I men took teenage brides, compared with approximately one in every five miners and class V men. Nuptiality thus appears to be strongly influenced by social milieu.[30]

When average age at marriage figures are given for the OPCS environments in the right-hand panel of Table 5.2.1 a marked contrast lies between the White Collar and Agricultural areas on the one hand and the Light and Staple Industry areas on the other. Brides in the Staple Industry areas have the lowest average age at marriage – as much as 1 to 1.5 years below that of their peers in White Collar or Agricultural

Table 5.2.2 *Average age at marriage of brides (aged less than 35) by class and environment; 10–14 year marital duration cohort, OPCS 1911*

	Class					
Environment	I	II	III	IV	V	VII
White Collar	25.6	25.5	24.5	24.6	23.7	—
Agriculture	—	26.6	25.5	25.1	—	—
Light Industry	24.8	24.2	23.7	23.8	23.3	—
Staple Industry	—	24.4	23.4	23.5	23.6	23.4

Note:
Average age at marriage only shown where more than 50 couples are found in a particular environment–class combination.
Source: OPCS dataset.

areas. The low level of female nuptiality in the White Collar areas displayed in Figure 5.2.2B must therefore be ascribed to a combination of a relatively late age at marriage as well as to the presence of a high number of unmarried servants

Table 5.2.2 shows the average female age at marriage under age 35 for the 1896–1901 marriage cohort, broken down by Registrar-General's class and environment. Much smaller numbers of couples are, of course, available to calculate each value. A late age of marriage is confirmed as characteristic of the Agricultural areas for those classes for which a calculation can be made. In general each environment saw a class gradient in age at marriage, but there is also strong evidence of an independent 'environment' effect'. The brides of class II, III and IV men in the Industrial areas tended to be younger than the brides of men in the same classes in the Agricultural and White Collar areas, a point which highlights the problems of interpretation associated with use of the Registrar-General's classes. Men drawn from a particular class in White Collar or Agricultural areas may well be in different occupations from men of the same class in Industrial areas. It may be that men in certain occupations married later because of their economic position; farmers in Agricultural areas being a case in point, or it may be, as we would argue here, that the men in white collar occupations living in Industrial areas were reacting to the social mores of their working-class neighbours, marrying 'late' relative to them but 'early' compared with their peers elsewhere. Unfortunately the numbers of men in individual occupations available for cross-sectional comparison are too small to permit thorough exploration of this point.

With the majority of classes I and II living in the White Collar areas, the average age of their brides as a whole could be expected to lie somewhere between 25 and 26, and as the categories representing the manual working classes tend to congregate in the Industrial areas their overall average age at marriage could be expected to lie between 23 and 24 years; both expectations confirmed by Table 5.2.1. It is interesting to note, however, that in Table 5.2.2 when class and environment are considered together that the notoriously low average age of marriage of miners' wives does not look particularly exceptional when compared to the wives of other working-class men in Industrial areas.

While age at marriage is important in setting levels of nuptiality, so too is the proportion never marrying.[31] Table 5.2.3 demonstrates that there were significant local and environmental variations in this parameter, too. The proportion of 45–54 year old women never married in 1911 is used, numbers being too small to permit the use of a more conventional five-year age group. Environmental differences are very marked: just within Abergavenny the proportion of unmarried women runs from 5 per cent in the mining community of Blaenavon to 17 per cent in the White Collar sector of East Abergavenny. In general the White Collar areas hold the greatest proportion of middle-aged spinsters: in Pinner more than one in four women surviving to age 45–54 had never married and in Axminster this figure was even higher at one in three. Agricultural areas had rather fewer spinsters on average, but even so in the majority of sectors comprising this environment close to 20 per cent of women aged 45–54 were unmarried. In the two Industrial environments the majority of sectors had between 5 and 10 per cent of their women in the relevant age range unmarried, although there were exceptions: Banbury and York in the Light Industry category both have higher rates, akin to the Agricultural or White Collar areas. For the most part, however, the Edwardian 'spinster problem' was very much concentrated in the middle-class residential enclaves.

When questions of nuptiality are discussed, demographic attention tends to focus on women rather than men because it is the age at marriage of the former which has the more direct impact on fertility. The 1911 census data offer an opportunity to examine the issues from a male perspective. As Table 5.2.3 shows, the variation between environments in the proportion of men never marrying is rather less than in the case of women. Fifteen per cent of men living in the OPCS Agricultural areas had never married, while in the White Collar areas this figure was 14 per cent. In the Industrial areas the percentage of never-married middle-aged men was about 10 per cent, but in both Morland (with very

Table 5.2.3 *Rates of celibacy (percentage unmarried aged 45–54) among females and males by environment and by sectors within environment: OPCS 1911*

Environment and sectors	Females: Number aged 45–54	Females: Percentage unmarried	Males: Number aged 45–54	Males: Percentage unmarried	Sex ratio: Males per 100 females
Agriculture	763	18	751	15	98
Abergavenny	67	12	95	24	142
Axminster	197	20	165	11	84
Banbury	34	18	39	15	115
Morland	186	19	170	17	91
Saffron Walden	279	17	282	14	101
White Collar	1,075	25	865	14	80
Abergavenny	105	17	105	22	100
Axminster	123	37	68	16	55
Pinner	333	26	276	13	83
Swansea	188	22	183	17	97
York	326	23	233	10	71
Light Industry	1,818	10	1,789	10	98
Abergavenny	68	10	56	7	82
Banbury	376	19	330	22	88
Bethnal Green	440	5	433	8	98
Swansea	90	2	94	10	104
Walthamstow	609	6	643	4	106
York	235	18	233	11	99
Staple Industry	1,422	7	1,536	11	108
Abergavenny	125	5	163	13	130
Bolton	349	9	326	11	93
Earsdon	209	5	275	10	132
Morland	50	14	55	24	110
Stoke	524	5	545	10	104
Swansea	165	12	172	8	104

Source: OPCS dataset.

small numbers and an atypical employment structure) and, more exceptionally, Banbury more than one in every five men aged 45–54 had never married. It is interesting to note that in the mining communities of Blaenavon, Earsdon and Stoke men were more likely to remain unmarried than women, although relative to other areas the proportion of men marrying was high. This again reinforces the impression that if women in these communities could not find a male to support them financially their only alternative was to leave. The column on the far right of Table 5.2.3 shows that while a high sex ratio in the 45–54 age group accompanies a high proportion of men never married in some cases (e.g. Abergavenny's Agricultural districts), this is by no means always so: both Earsdon and Blaenavon have low proportions never married, despite high sex ratios in this middle-aged group. In general, relatively high proportions of never-married men are seen in the White Collar areas despite some remarkably low sex ratios.

Figure 5.2.4 allows comparison of the male marriage situation with that of females shown in Figure 5.2.3. It is obvious at a glance that there are significant differences. The proportion of married men aged 25–49 and that of single men in the same age group was much more evenly balanced in the Industrial areas than was true amongst their womenfolk. This is predominantly because higher proportions of men remained unmarried.[32] The impression that in the Mining areas men were much more likely to be unmarried than were women is reinforced and suggests that these communities attracted young male inmigrants, while repelling young women. In the White Collar areas, in contrast, men were much more likely to be married than women. In Pinner and Axminster, in fact, there was an excess of married over unmarried men. In Pinner's case two factors can account for this. First, Pinner was a new area of suburbanisation, which witnessed phenomenal growth in the first decade of the twentieth century. As a residential area it attracted families: well-off men purchased the newly built houses and moved their, often young, families and servants in. Second, while well-to-do fathers might travel 'up to town' from Pinner on a daily basis, younger men learning a profession might prefer, or indeed be compelled, to lodge nearer to their place of work, or seat of learning. If the suburbs saw selective inmigration of married men, combined with an absence of the unmarried, older, more established White Collar areas may have retained sons of marriageable age because business opportunities were nearer to hand. The case for the resort town of Seaton in Axminster registration district is rather less easy to explain, but may be related to the coastal position of the town and the likelihood that many local young men spent census night at sea.

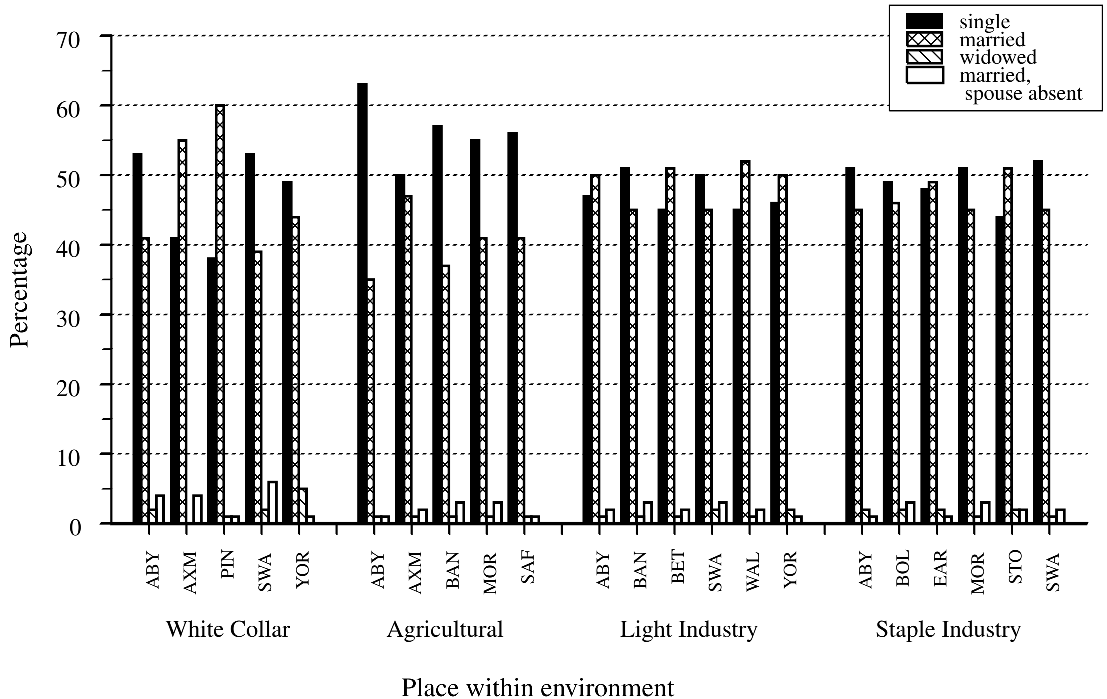


Fig. 5.2.4 The marital status distribution of males aged 15–49, by place within environment, OPCS 1911

Table 5.2.4 *The average age of marriage (under 35 years) of grooms by class and by environment for selected marriage cohorts, OPCS 1911*

		Average age of marriage						Age at marriage			
		Class						Environment			
Marriage duration	Marriage date	I	II	III	IV	V	VII	WC	AG	LI	SI
< 5	1907–11	28.1	27.2	26.4	25.9	25.8	24.8	27.8	26.9	26.3	25.4
5–9	1902–6	27.4	26.6	25.6	25.6	25.3	25.2	27.3	26.9	25.4	25.3
10–14	1897–1901	27.4	26.1	25.2	25.5	24.8	25.2	26.5	26.6	25.2	25.2
15–19	1892–6	26.4	26.7	24.8	25.0	24.9	24.7	26.2	26.4	25.2	24.8

Note:
Each figure was calculated on the basis of at least 150 couples.
Source: OPCS dataset.

Figure 5.2.4 indicates that the experience of men in the OPCS Agricultural areas was very different from that of their female counterparts in Figure 5.2.3. All the Agricultural areas, other than Axminster, show considerable excesses of unmarried men over married. Were men here delaying marriage because they found it difficult to attract marriage partners, or because circumstances made early marriage difficult, or because the men moved in to work as labourers for a short while before moving on? These questions can be answered by considering the average age at which men reported getting married in the 1911 Fertility Census.

Table 5.2.4 can be compared with the top four lines of Table 5.2.1; all the same caveats apply.[33] The table shows the class-specific average age at marriage for the four cohorts of men married, aged less than 35, between 1892 and 1911. Like their wives, men in the white collar occupations married rather later than those in the working-class groups. While the wives of miners had shown a tendency to marry earlier than the wives of others in the working classes, miners themselves appear to have married at a similar age to men in classes III to V.[34]

The average age of marriage of men married under age 35 in each of the four OPCS environments is also shown in Table 5.2.4. Once again the contrast between the older marriage ages characteristic of the Agricultural and White Collar areas and the younger marriage ages characteristic of the Light and Staple Industry areas comes across clearly. Table 5.2.5 shows the average age of marriage for those men married between 10 and 14 years, broken down by Registrar-General's class and environment. Among the female population there was a distinct break

Table 5.2.5 *Average age of men marrying aged less than 35, marriage duration 10–14, by environment and class, OPCS 1911*

	Class					
Environment	I	II	III	IV	V	VII
White Collar	27.8	27.0	25.9	26.3	25.1	—
Agriculture	—	27.2	—	25.9	—	—
Light Industry	—	25.7	24.8	25.6	24.4	—
Staple Industry	—	25.2	25.4	25.1	24.8	25.2

Note:
Only environment–class combinations including more than 50 couples shown.
Source: OPCS dataset.

between the White Collar areas and the Industrial ones, but among the male population the distinction is not so clear. Once again, miners, who were marrying at an average age of 25.2, were not particularly early marriers in the context of the Staple Industry areas. The reputedly high nuptiality of mining communities may thus reflect their highly industrial, working-class nature, not a unique behaviour pattern.

On the basis of Tables 5.2.1 and 5.2.4 it would appear that on average men in class I and Miners chose wives rather younger than themselves than did men in the other classes. However, as the two tables compare respectively brides and grooms who married under the age of 35, and therefore do not draw upon exactly the same pool of couples, such a conclusion is far from robust. In Table 5.2.6, therefore, the average age of marriage of the brides married less than 15 years from Table 5.2.1 is compared with the average age of the men they married.[35]

In two out of the three cohorts shown, miners do more closely resemble the white collar groups than they do other working-class couples. A miner's wife was not only a relatively young bride, she was also younger in relation to her husband than most women married to blue collar men. The skewed sex ratio in the pit villages would have meant that the pool of potential brides was rather younger than that found elsewhere: women must have expected to marry young. Why men of the middle classes preferred wives three to four years younger than themselves remains open to speculation, but given the relatively very late average age at which these men were marrying, a wife closer to themselves in age could well have compromised any intention to establish a family.

When the same exercise is repeated for class groups within environments (Table 5.2.7), the white collar/blue collar split re-emerges,

Table 5.2.6 *The average age of brides (F) marrying aged less than 35 years, the average age of their husbands (M) and the difference between the two (D), by husband's class for four marriage cohorts, OPCS 1911*

		Class																	
		I			II			III			IV			V			VII		
Marriage duration	Marriage date	M	F	*D*	M	F	*D*	M	F	*D*	M	F	*D*	M	F	*D*	M	F	*D*
<5	1907–11	29.4	26.4	*3.0*	28.4	25.9	*2.5*	27.3	24.9	*2.4*	26.6	24.7	*1.8*	26.7	24.2	*2.5*	25.4	23.1	*2.3*
5–9	1902–6	28.9	25.7	*3.2*	28.3	25.3	*3.0*	26.5	24.2	*2.3*	26.3	24.2	*2.1*	26.2	23.8	*2.4*	26.2	23.3	*2.9*
10–14	1897–1901	29.1	25.2	*3.9*	27.8	24.9	*2.9*	25.3	23.9	*1.4*	26.3	24.0	*2.3*	25.7	23.6	*2.1*	26.4	23.4	*3.0*

Note:
There are at least 150 couples in each group shown.
Source: OPCS dataset.

Table 5.2.7 *The average age of groom and the average difference in spousal age (in years) at marriage of couples where the bride married aged less than 35 in 1896–1901 by class and environment, OPCS 1911*

	Class											
	I		II		III		IV		V		VII	
Environment	Average age of groom	Difference in spousal ages	Average age of groom	Difference in spousal ages	Average age of groom	Difference in spousal ages	Average age of groom	Difference in spousal ages	Average age of groom	Difference in spousal ages	Average age of groom	Difference in spousal ages
White Collar	29.5	3.9	28.8	3.4	27.4	3.0	27.7	3.1	25.9	2.2	—	—
Agricultural	—	—	30.4	3.8	27.2	1.7	27.1	2.0	—	—	—	—
Light Industry	28.4	3.6	26.5	2.3	25.4	1.7	26.2	2.4	25.4	2.1	—	—
Staple Industry	—	—	27.4	3.0	25.0	2.5	25.6	2.1	25.7	2.1	26.4	3.0

Source: OPCS dataset

although it is noticeable that a large spousal age gap is experienced by all classes in the White Collar areas, bar class V. Miners once again stand out as having a large spousal age gap, but so too do class II in Staple Industry areas. Women marrying the farmers who comprised the bulk of class II in Agricultural areas were on average likely to take a husband almost four years their senior, a much larger gap than seen among couples in class III and IV in that environment. Thus the average age at which members of a community married and the proportion who never married at all were closely tied not only to the social composition of that community, but also to the economic base on which it depended. Within communities the middle classes married later than the working classes, but in the Industrial areas all classes married earlier than in either the White Collar or the Agricultural areas, and marriages were more likely to be contracted between men and women of similar ages. Nuptiality was further depressed in the non-industrial environments by the proportion of women who had not married by the time they had completed their reproductive span.

The variation in nuptiality levels between the environments of the OPCS data sample suggests that, *ceteris paribus*, overall fertility would be lower in Agricultural and White Collar areas than in Industrial areas, lower among the middle classes than the working classes, lowest among the middle classes in Agricultural areas, and highest among the Staple Industry miners. However, while the inter-environmental differences in nuptiality appear to be relatively stable over the 1891 to 1911 period, and contribute to the maintenance of relative levels of overall fertility, changes in nuptiality within environments and within environment-specific sectors are subordinate to changes in marital fertility in bringing about the declines in overall fertility levels observable in Figure 5.2.2. The following sections therefore turn away from marriage itself to focus on fertility within marriage.

5.3 Calculating age-specific marital fertility rates and total marital fertility rates from census data

Unlike parish registers, which were designed to record the important events of baptism, marriage and burial in the life of parishioners, the rationale behind censuses was to count and locate the people living in the nation at a particular point in time. Rather like a freeze-frame shot from a reel of video-tape, the ‘snapshot’ nature of the census omits much of the ‘action’ which led up to that point in the story. Demographic historians have to interpret the freeze-frame in this light, with the help of what is known of the processes of change which were in train in each community in the years leading up to the census. Later sections of this chapter will examine the fertility histories of individual couples drawn from groups within the OPCS population. In this section attention is focused on the reproductive experience of groups of couples over the five years preceding each of the 1891, 1901 and 1911 censuses. The ensuing figures therefore represent community experiences.

Child–woman ratios

A full picture of a community's fertility would include illegitimate births and the births to all women who had lived in the community within any particular period chosen for study. For reasons outlined in chapter 3, section 3.1, however, illegitimate fertility cannot be considered here.[36] Women who have migrated away from an area with their family cannot be followed, and it can only be assumed that a new family arrives to replace each one migrating away. As the census only records survivors, we cannot observe mothers who have died since the birth of any offspring. Where a woman is alone on census night, either because she has been widowed or because her husband is staying elsewhere, it is not possible to ascertain how long she has been on her own and, as this has implications for her potential fertility, such women are also omitted from fertility measures.[37]

As a preliminary step to the estimation of fertility levels within the OPCS population in 1891, 1901 and 1911, all married women of reproductive age co-resident with their husbands on census night were identified in each census. For each couple the number of their own children aged less than 5 years resident with them was also noted. The wives were divided into five-year age groups from 20 years to 49 years, and the number of their own children living with the mothers in each age group was summed.[38] The ratio of children to women for a particular age group can itself be used as a rough comparative measure of fertility, but without adjustment for differentials in infant mortality true levels of fertility may be masked.[39]

Chapter 4 has demonstrated how the answers from the 1911 Fertility Census enable measures of infant and child mortality to be estimated for various sub-divisions of the OPCS population over a period spanning the 1891, 1901 and 1911 censuses. Using these estimates, the number of surviving children observed in each census can be appropriately inflated to a figure which more closely approximates the number of children actually born.[40] This represents an advance over most previous studies, which had to rely on estimates of mortality calculated from relatively large spatial units such as registration districts.[41] While it was known that there would be considerable differences between groups within such areas, the nature of these differentials almost always remained a matter of conjecture.[42] A certain degree of caution must still be exercised over the validity of applying rates of mortality calculated from the census returns of those living in an area in 1911 to the fertility rates of those observed to be living in the same area 20 years previously (the case of Bethnal Green, discussed in Appendix A being a case in point), but such estimates of child survival are certainly more accurate for these specific local populations than more general estimates derived from much larger population aggregates.

If certain communities were more likely to board out their children with relatives or neighbours, which is possible where relatively high proportions of married women work, this too would alter the child–woman ratios.[43] It is not easy to allow for this population when undertaking the calculations. In the absence of wet-nursing it seems reasonable to assume that it was the very young children, rather than their older and more self-sufficient siblings, who were more likely to reside with their mother in the parental home. This assumption is validated by Table 5.3.1 which shows that while approximately 900 per thousand of all children under 5 were living with both their parents at each of the censuses from 1891 to 1911, the figure is closer to 850 per thousand for children aged 5–9. This difference can in part be ascribed to the fact that the older the child the higher the chance of losing one or even two parents. Children of widowed parents are not considered in the fertility measures to be calculated, so it is only the 3 per cent or so of the under-fives enumerated without their parents who are of interest in the present context. Approximately equal proportions of under-fives and 5–9 year olds were living in their grandparents' house without either parent but a greater proportion of the 5–9 year olds were living as the niece or nephew of their household head.

A certain proportion of the children without parents will be total orphans, but it is possible that some widowed parents, particularly fathers or young mothers holding down a job, might have preferred to leave the care of their young offspring to the child's grandmother. A further portion of the 'parentless' children may have been illegitimate. In either of these cases the child is excluded from the calculation of the child–woman ratios, as their mothers will not have been included in the denominator. In short, it would seem that approximately 1 per cent of children aged less than 5 who should have been included in the calculation of child–woman ratios were in fact excluded.[44] On examining each of the four OPCS environments in 1891 and 1911 in Table 5.3.2, however, it becomes clear that different strategies of child care were followed in different milieux, and that the situation changed over time.

Table 5.3.1 *Living arrangements per thousand children: all OPCS children aged <5 years and 5–9 years*

	Under 5 years			5–9 years		
Living arrangements	1891	1901	1911	1891	1901	1911
With both parents	906	907	915	848	860	872
With mother only	42	51	43	68	68	62
Mother a widow	17	18	14	45	39	31
Mother married, spouse absent	25	33	29	23	29	31
With father only	16	14	12	35	30	25
Father a widower	7	6	6	23	20	19
Father married, spouse absent	9	8	6	11	10	6
Living without either parent	36	29	30	50	41	41
Living as niece or nephew	5	6	7	13	10	12
Living as grandchild	21	17	16	24	21	17
Living as boarder	5	3	3	6	5	6
Other living arrangement	5	3	4	7	5	6

Source: OPCS dataset.

Out of every 1,000 children aged less than 5 living in Agricultural areas in 1891, roughly 60 were apparently living apart from both their parents. In the White Collar areas this figure was 46 per thousand but in Staple Industry areas it was only 29 per thousand, and in Light Industry areas only 22.[45] By 1911 a rather smaller proportion of children in the Agricultural and White Collar areas were separated from both mother and father, while the situation in the Industrial areas remained virtually unchanged. It is possible that the role of grandparents as carers of young children had altered in the first two environments, but it is also possible that as fertility fell the number of children to be cared for in the absence of their parents diminished.

If it is assumed, as argued above, that one-third of the ‘parentless’ children should be included in the child–woman ratios, then perhaps 2 per cent of children in Agricultural areas are omitted from the measures, but a rather smaller proportion from the other three environments. However, the distribution of the cohabiting couples from whose homes the children were missing cannot be ascertained. It cannot be assumed that the child’s parents actually lived in the same environment, or even in the same registration district. It is entirely feasible, for example, that a sickly city child might be sent for the sake of its health to live with its grandmother in the country. Nor is it at all certain that children recorded

Table 5.3.2 *Living arrangements per thousand children: OPCS children aged <5 years by environment, 1891 and 1911*

	1891				1911			
Living arrangements	AG	WC	LI	SI	AG	WC	LI	SI
With both parents	879	884	924	910	908	907	920	921
With mother only	48	51	41	41	35	62	44	35
Mother a widow	13	22	17	20	7	16	16	13
Mother married, spouse absent	33	30	23	20	28	45	28	21
With father only	12	19	13	20	12	14	13	14
Father a widower	8	2	7	11	5	5	4	9
Father married, spouse absent	4	17	6	9	6	5	7	5
Living without either parent	61	46	22	29	45	16	23	30
Living as niece or nephew	8	6	1	4	13	4	5	7
Living as grandchild	43	27	12	16	26	10	13	17
Living as boarder	8	4	3	6	5	1	3	3
Other living arrangement	2	8	2	4	1	1	2	2

Source: OPCS dataset.

as residing on census night in a household headed by a man of class V came from another class V household. Furthermore, given the population dynamics of the late nineteenth century and the concomitant differentials in urban–rural mortality and migration rates, the high number of children residing with their grandparents in the country may have been a result of the fact that a higher proportion of the population living in rural areas was of an age to be grandparents. Given that our estimates of mortality are in any case likely to be subject to a degree of error significantly larger than the small scale of any caused by the absence of children from the parental home on census night, no multiplier to allow for the latter was attempted in the following calculations.

One final consideration relates to the fact that when mothers and their children were being identified, some children will have been assigned to women who were in fact their stepmothers. Conversely, some men will have been allocated as the father of the children of their wife's previous marriage. For the purposes of the present study it has been assumed that such cases cancel each other out and therefore no alteration was made to the estimates.[46]

Age-specific marital fertility rates (ASMFRs)

Child–woman ratios represent fertility by age of mother at census. It is more conventional to calculate fertility rates by age of mother at birth of child, as fertility can then be represented in a 'synthetic cohort' manner.[47] To adjust the age-specific child–woman ratios to age-specific marital fertility rates, Sprague's Osculatory Interpolation formula was applied. This operation redistributes the children across the five-year age groups so that, for example, the fraction of those under-fives living with mothers aged 25–29 on census night who had been born when their mothers were aged 20–24 is added to the number of children deemed to have been born to mothers aged 20–24 who still appear in that age group in the census and so on. When the algorithm has been completed the number of mothers in each age group is divided into the number of children born to mothers in that age group to obtain the relevant ASMFR.

In calculating the fertility rates using Sprague's formula it is assumed that women married predominantly in the 20–24 age group and that their marriages were spread evenly across the five years of that age group. As has been shown in section 5.2 above, however, the OPCS population tended to marry nearer 25 than 22.5, with some sections of the population not marrying until they were, on average, in their late-twenties, and thus the ASMFR for the 20–24 age group is biased slightly downwards.

ASMFRs can be presented in tabular form, but they are most effectively displayed as ‘curves’ as in Figure 5.3.1, allowing their relative levels and shapes to be compared. The panels in Figure 5.3.1 depict the ASMFR curves estimated for each of the four OPCS environmental categories from the census returns of 1891, 1901 and 1911. To aid visual comparison a fourth line is included on each graph. This is the ASMFR curve calculated by Wrigley *et al.* for England 1800–24.[48] The nature of such ‘standard’ curves will be discussed in section 5.4 below, but at present this curve is used simply as a benchmark.

It can be seen that all the 1891 curves for each of the four environments lie very close to the standard line, except for the White Collar areas, where a considerable gap is apparent among all age groups save the eldest. Women in White Collar areas had thus left pre-transitional fertility levels behind by 1891 and a further drop in fertility occurred at all ages over the following decade among this population. In the Agricultural and Light Industry areas, too, a reduction in fertility is evident over the last decade of the century, but the curves in the Staple Industry areas remain virtually unchanged, suggesting that fertility behaviour scarcely altered in this environment. Between 1901 and 1911 decline in fertility continued in the White Collar areas, but this time almost exclusively among wives aged 25–34, and this distribution of decline is also evident among those in the other three environments. Even the Staple Industry areas saw a downward movement in their fertility over this decade, particularly among women in their thirties. The tardiness of the Staple Industry decline meant that there were considerably greater differentials between environments in the levels of ASMFRs in 1911 than there had been in 1891. In the five years preceding the 1891 census 100 wives in the 25–29 age group in the White Collar areas had produced 28 children per year. In the Agricultural areas this figure was 31 children per year, in Light Industry areas 32 and in Staple Industry areas 33. In the five years before the 1911 census the equivalent age group was producing only 19 children per year per 100 wives in the White Collar areas, while for the Agricultural, Light Industry and Staple Industry environments the figures were 23, 25 and 29 respectively. Although the drop in fertility levels looks greater among those aged less than 35, proportional declines were actually larger in the over-35 age groups, particularly in White Collar and Agricultural areas 1891–1901. However, between 1901 and 1911 the proportional decline became greater in the younger age groups in these two environments. In the Staple Industry areas over this decade all age groups over 25 experienced a similar proportional decline in fertility.

As the average woman’s fecundity falls with increasing age from her

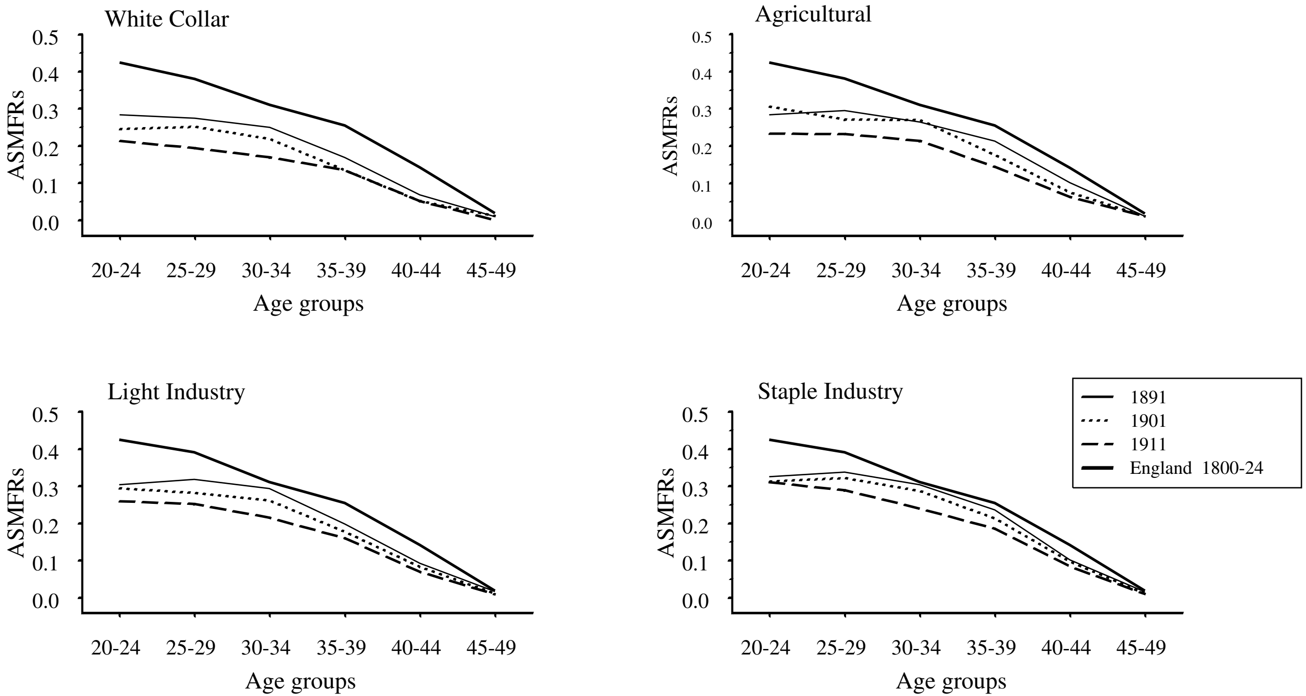


Fig. 5.3.1 Age-specific marital fertility rates for each OPCS environment in 1891, 1901 and 1911 plotted against the ASMFR curve for England, 1800–24. *Source:* Curve for England 1800–24: Wrigley *et al.* (1997), Table 7.1, p. 355.

Table 5.3.3 *Total marital fertility rates (TMFRs), by OPCS environment 1891, 1901 and 1911*

	1891		1901		1911	
	TMFR	N	TMFR	N	TMFR	N
White Collar	5.32	1,339	4.46	1,401	3.83	2,337
Agriculture	6.24	1,546	5.73	1,465	4.68	1,565
Light Industry	6.11	3,999	5.66	5,535	4.85	5,267
Staple Industry	6.36	3,075	6.09	3,683	5.52	4,250

Note:
N = number of couples on which calculation is based.
Source: OPCS dataset.

mid-twenties and especially from her mid-thirties, even a proportionately smaller reduction in fertility among wives aged less than 35 would contribute a greater absolute loss in observed fertility than would a greater proportionate loss of fertility amongst older wives. Thus, over the 1891–1901 decade 53 per cent of the total fertility decline observed in White Collar areas was due to the 11 and 12 per cent declines in fertility experienced by 25–29 and 30–34 year olds, but in the following decade they were responsible for 100 per cent of the fertility decline observed. In Agricultural areas the corresponding figures were 34 and 69 per cent. Fertility decline was so slight in Staple Industry areas over the 1891–1901 decade that proportions are difficult to calculate. However, in Light Industry areas about 70 per cent of the decline can be attributed to the 25–34 age group. A similar figure applied in both Industrial environments over the 1901–11 decade. Once fertility decline started in these areas, all age groups appear to have been affected. As the younger age groups inevitably manifested higher original levels, their fertility had further to fall, and so played the greater role in overall fertility decline within a particular population. It would appear, therefore, that different paths towards fertility decline were being taken in the different environments.

While ASMFR curves are very useful for providing information on the fertility strategies or behaviour outcomes of a group of individuals, comparison between groups is easier if fertility behaviour can be represented by one figure. The fertility described by the curves can be expressed using the Total Marital Fertility Rate (TMFR), a synthetic cohort measure. Table 5.3.3 presents the TMFRs for the four OPCS environments in 1891, 1901 and 1911.

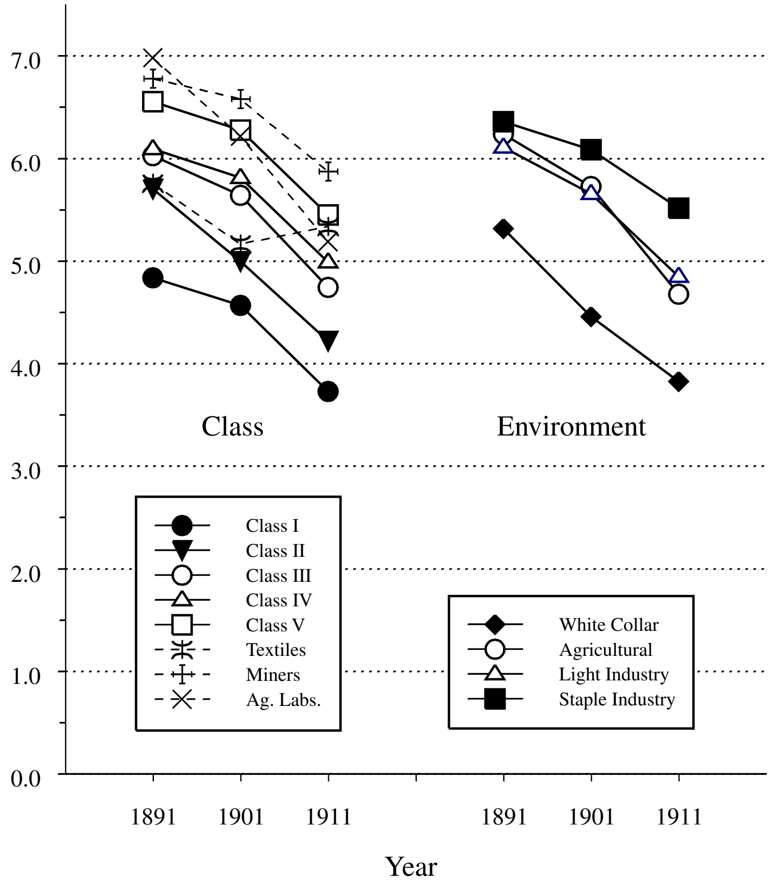


Fig. 5.3.2 Total marital fertility rates by class and environment, OPCS 1891–1911

As already suggested by the ASMFRs, fertility is shown to have been lowest in White Collar areas in 1891. With a 16 per cent decline in their TMFR these areas saw the greatest decline in fertility over the ensuing decade: virtually double the rate in the Agricultural and Light Industry areas, and four times the rate in Staple Industry areas. Between 1901 and 1911, however, it was the Agricultural areas which saw the most rapid decline, at 18 per cent, whereas the White Collar and Light Industry areas saw a more moderate 14 per cent decline. While the pace of decline was increasing in Staple Industry areas over this decade it still remained relatively modest at 9 per cent; fertility in these areas was still higher in 1911 than it had been in White Collar areas 20 years previously.

In Figure 5.3.2 the TMFR figures for the four environments at each census are plotted alongside the equivalent figures for the Registrar-General's social and industrial classes. The great difference in levels of fertility between the White Collar and the Staple Industry environments is immediately obvious from the graph, although it is also obvious that all the environments experienced some decline in the 20 years following 1891. The class graph replicates in broad detail the social class gradient in fertility reported by Stevenson, although his measures were derived from marriage cohorts while those provided here are period measures. Among the OPCS population, class I fertility lies well below that of all the other classes at each census, and class V remains well above the others, apart from Miners and Agricultural labourers. The latter, however, experienced a notable decline between 1891 and 1911. In general the working-class groups saw very little downward movement in their fertility over the first decade depicted, but much stronger decline over the second. Textile workers are the exception in the OPCS population: they actually saw a small increase in their TMFR between 1901 and 1911. They had, however, had relatively low fertility for a working-class group in 1891.

The textile workers highlight the problems of interpreting 'low fertility' as 'having experienced fertility decline'. Had the textile workers experienced a decline in their fertility in the decades before 1891, or had they always had lower levels of child bearing? The same question could be asked of class I. It has often been assumed that at some pre-transition stage in a country's history all population sub-groups had the same level of unrestrained, natural marital fertility. Not all groups may have had the same level of fertility, however, owing to different breast-feeding patterns, coital frequency, or incidence of sterility. Fertility decline does not, therefore, necessarily have to have begun among those groups with the lowest level of fertility at a particular point in time. However, if the assumption is made that natural fertility was universal, and equal, at some date in the past, then it is fair to assume that in a 'snapshot' view some time later the population with the lowest fertility has experienced either the earliest or the most rapid rate of decline. As yet too little is known about social differentials in fertility behaviour in the early decades of the nineteenth century to make a compelling argument for or against a 'ubiquitous natural fertility' scenario. When it is suggested below that class I 'led' the fertility decline this is meant in the sense that they proceeded most rapidly towards small family size, not that all the other groups were necessarily following them, having learnt methods of birth control, or having adopted the small family size ideal. In the former sense textile workers certainly seem to have been working-class leaders. It is our contention here, however, that within environments people would tend to behave like their neighbours: the dominant social group having the greatest influence over locally accepted norms of behaviour.

The TMFRs presented in Figure 5.3.3 indicate that there was, in general, a social gradient of fertility within environments: classes I and II usually having the lowest levels, and class V the highest. The relative gradient between classes is not the same in all environments, however. classes I and II appear quite distinctly below the other classes in White Collar and Staple Industry environments, but look little different from classes III and IV in the Agricultural environment. Class V clearly stands apart in the Light Industry environment, but is joined in Agricultural areas by the even higher-fertility Agricultural labourers, and by Miners and class IV in the Staple Industry areas. In the Staple Industry environment Textile workers fall into the lower group of fertility experience, more or less matching the levels of classes I and II.

The Registrar-General's special 'Industrial classes' have always been considered to have distinct features when studied in isolation, with Miners and Agricultural labourers having relatively high fertility and Textile workers relatively low. When compared to other groups in their respective environments, however, they are not dramatically different from other social class groups in these environments. It is worth considering that in many textile towns the married men remaining in the industry would, to a large extent, be overseers or among the most highly skilled operatives, and thus they might well behave as skilled members of the working-class.[49] A more puzzling conundrum is why well-paid, often highly skilled miners followed fertility patterns more akin to those of the semi- and unskilled. This feature suggests that it was not income or social standing which influenced fertility behaviour, so much as the local work-culture, belief systems and the behavioural norms of specific industrial communities or social environments. This hypothesis gathers strength when two further features of Figure 5.3.3 are noted.

First, the TMFRs for all classes in the White Collar areas lie at lower levels than those of the same classes elsewhere. This is particularly noticeable for class V. Second, although the levels of fertility within environments generally vary with class, there is nevertheless an impression that, while each of the four environments experiences different rates of fertility decline, within each environment the different classes, in broad terms, experience a similar pace of decline. All classes in Staple Industry areas saw very shallow declines between 1891 and 1911, while in Agricultural areas the declines were much steeper. Hence Figure 5.3.3 endorses the interpretation of Figures 5.2.2B and 5.3.2, showing a much slower start to fertility decline in the Staple Industry areas than in the Agricultural and

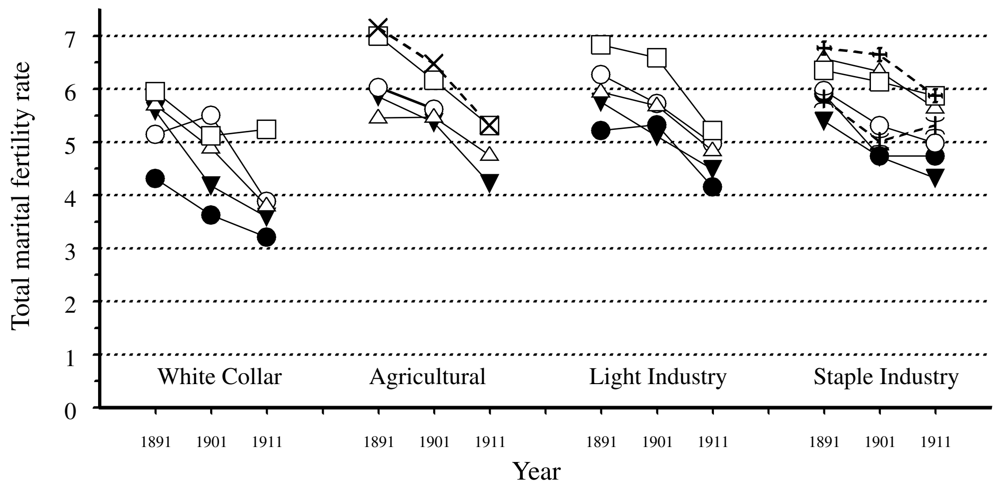


Fig. 5.3.3 Total marital fertility rate for each class, by environment, OPCS 1891–1911. *Note:* for key to classes see Figure 5.3.2.

Light Industry environments which, although starting from similar levels of marital fertility, experienced rather stronger declines in the 20 years following 1891, particularly among their less skilled inhabitants.

Thus, whereas the idea of the demographic transition has often associated falling fertility with urbanisation, industrialisation and development, in the OPCS population behaviour patterns were much slower to change in the industrial heartlands. This impression is reinforced by the plots of the TMFRs for the various classes by environment in Figure 5.3.3. The relatively flat trajectories of fertility among all classes in the Staple Industry areas contrast with the steeper slopes and faster rates of decline elsewhere. The generally lower levels of fertility among all in the White Collar areas seen in Figure 5.3.3 back Woods' contention that all classes experienced some degree of simultaneous decline in fertility, yet go some way towards demonstrating Szreter's thesis that it was communities rather than classes of individuals which were altering their behaviour to reduce fertility.[50]

Figure 5.3.4 attempts to take this point further. When environments are divided into their constituent sectors, thus showing variation between and within the 13 OPCS places, the now familiar low levels of TMFR in the White Collar environment emerge once more. However, differences are discernible among the place-specific sectors within each environment. The White Collar sectors of both Pinner and Axminster saw steep declines from 1891 to 1911, whereas the equivalent sectors in Swansea and York experienced a rather smaller drop in fertility over this period, mainly because decline was particularly sluggish between 1901 and 1911. In contrast, the White Collar areas in Abergavenny saw virtually no decline in the level of their fertility over the final decade of the nineteenth century, and only a moderate decline over the ensuing ten years, so ending up with fertility levels considerably above those of the other White Collar communities. Among the Agricultural areas Axminster saw a rapid decline in TMFR, matched by another southern agricultural area, Saffron Walden. The Agricultural sectors of Banbury and Morland saw relatively little decline and, despite a dip in TMFR in 1901, Abergavenny's fertility in 1911 was almost as high as it had been in 1891, making it the highest 1911 TMFR in Figure 5.3.4. The numbers in Staple Industry Morland are very small and therefore the TMFRs must be treated with caution, but other place-specific sectors in this environment show quite modest fertility declines, with only Swansea showing a particularly precipitous fall. All the Light Industry place-specific sectors show some elements of decline, mostly on a more substantial scale than that of the Staple Industry areas. The notable exception is Bethnal Green, which behaves in an almost identical fashion to Staple

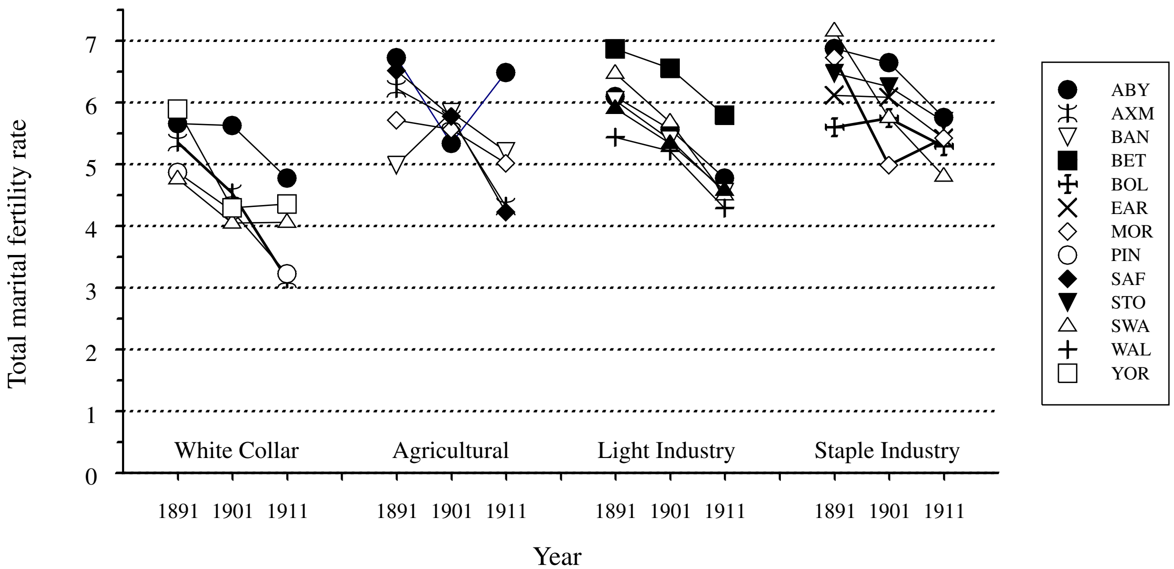


Fig. 5.3.4 Total marital fertility for places within environments, OPCS 1891–1911

Industry Stoke or Abergavenny, with a rather gradual decline from a very high original level of fertility in 1891.

Figure 5.3.4 suggests that fertility decline, starting from already quite low levels, was particularly swift in the middle-class suburb of Pinner and the seaside resort of Seaton. Seaton's neighbouring rural district of Colyton also saw a swift descent in its TMFR. The OPCS selection of enumeration districts does not contain an equivalent rural hinterland for Pinner, but if the population of such a place could have been in observation they might have been seen to behave not unlike the population of Saffron Walden, whose marital fertility also plummets.

Either Abergavenny's 'Welshness', or its proximity to a centre of mining, appears to have affected fertility levels in all its environment-specific sectors. Given that Swansea displays considerably lower fertility levels in conjunction with a rapid decline, this would favour the hypothesis that it was mining more than 'Welshness' which affected Abergavenny's fertility. This is further supported by the fact that the Staple Industry areas of Stoke, Bolton and Earsdon, which also contain mining communities, show very similar TMFR trajectories (very little decline 1891–1901, followed by modest downward movement 1901–11), despite being in quite separate parts of the country.

Figure 5.3.4 demonstrates that certain places do not fit the stereotypical fertility patterns of the environment into which they have been classified. Bethnal Green in the Light Industry environment has fertility levels on a par with Staple Industry Abergavenny or Stoke. Neither Agricultural nor White Collar Abergavenny sit neatly besides the other place-specific sectors in their environment and Staple Industry Swansea stands out from other Staple Industry communities. Of all 13 OPCS places Swansea contained the greatest concentration of metal-based heavy industry. Szreter has identified metal-based heavy industry, along with coal-mining, as a particularly strong predictor of high fertility because of its patriarchal labour market characteristics and associated *machismo* gender relations which encouraged the maintenance of high fertility.[51] The figures given here suggest, however, that the metal-working communities were at least somewhat more open to change than the mining communities, or at least more susceptible to changes encouraging fertility decline.

Having outlined ways of measuring and monitoring changing levels of fertility, the next three sections of this chapter turn to the task of gauging the alterations in behaviour which might have contributed to the various patterns so far observed.

5.4. Measures of 'stopping' behaviour in marital fertility: M *and* m

Two main schools of thought concerning the origins of fertility decline each provide a model of how the transition to small average family size took place. Those advocating the first model tend to argue that the ability to control the number of births had been desired for a very long time but the means to do so efficiently and effectively only emerged in the late nineteenth century. From certain 'pioneer' groups – usually believed to be the middle classes – knowledge concerning the new methods of birth control diffused outwards (or downwards) to the remainder of the population. In the second model it is argued that methods of birth control were not new – couples had always had access to *coitus interruptus* or other forms of sexual practice, including abstinence, which significantly reduce the chance of conception, and that therefore the fertility transition was an 'adaption' process, new circumstances within society encouraging increasing numbers of married couples to curtail their fertility. The relative strength of the two models has been the subject of prolonged and continuing debate in the demographic literature.[52]

Historical demographers have been somewhat limited, however, in the analytical tools which they have available to monitor behavioural changes which could help to distinguish whether 'innovation' or 'adaption' had taken place. As Okun writes:

> Most of the work on the historical decline of fertility in Europe that bears on the relative importance of innovation/diffusion has relied on the model of marital fertility developed by Coale and Trussell (*M* and *m*). That Coale and Trussell's index of parity-dependent fertility control, *m*, takes on low, stable values in pre-transition populations has been cited as evidence in favour of the innovation/diffusion view.[53]

In other words, because there is very little evidence among pre-transition populations of couples having a number of children with no recourse to contraceptive methods and then deciding to 'stop' child-bearing and adopt birth control, this is taken to indicate that the latter was an innovation. When couples make no deliberate attempt to restrict further births they are said to have natural fertility.[54] Those who achieve a particular family size and then adopt contraceptive measures are, according to demographers, practising deliberate 'parity-specific' limitation of births. Difficulties arise in interpretation, however, if couples intentionally or unintentionally undertake behaviour which reduces the number of births in a non-parity-specific way; that is, by introducing longer intervals between births than might physiologically be expected. Such behaviour could include lengthy breast-feeding of each

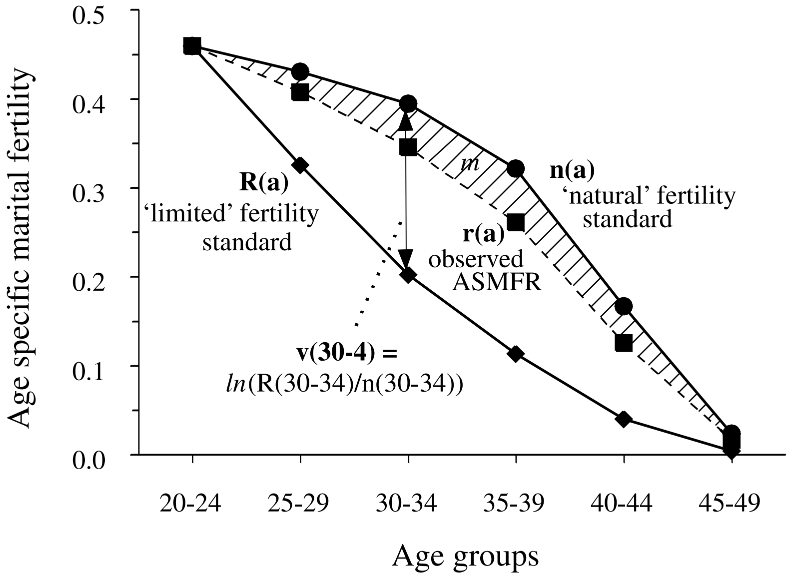


Fig. 5.4.1 The relationship between n(a), R(a), v(a) and *m*

baby or the imposition of a lengthy period of abstinence from intercourse after each birth. Technically, while such behaviour reduces the number of births, such spacing behaviour is deemed to be a form of natural fertility.

The concept behind Coale and Trussell's model is that the age-specific marital fertility schedule (ASMFR curve) of any observed population is related to the ASMFR curve from a standard population with natural fertility by the equation:

$$r(a)/n(a) = M \exp(m.v(a))$$

where r(a) is the age-specific marital fertility of those in age group (a) in the observed population, and n(a) is the ASMFR for the same age group in the standard, non-limiting, natural fertility population; see Figure 5.4.1. In his original formulation of the model Coale used the Hutterites as his standard population.[55] However, as the model developed the standard became the 'arithmetical average of [marital fertility] schedules designated by Henry as natural'.[56]

M is a scale factor, allowing for the fact that not all populations have the same levels of natural fertility, owing to different breast-feeding patterns or to different rates of coital frequency within marriage.[57] It is easiest, but not strictly accurate, to envisage *M* ('big M') as the ratio of the ASMFR in the 20–24 age group in the observed population to that for women in the same age group in the standard limiting population. Newly-weds in this age group are held to be practising unfettered fertility behaviour whether or not the rest of the population have adopted parity-dependent limitation.

Coale and Trussell identified populations they believed to display extensive, and highly efficient, parity-specific limitation, and calculated the deviation from the standard natural ASMFR curve of the curves displayed by these populations. In aggregate the limiting populations gave rise to a standard 'limiting' ASMFR curve, which has been denoted R(a) in Figure 5.4.1. Coale and Trussell measured the deviation from the level of fertility in each five-year age group in the standard natural curve of each equivalent age group in the standard 'limiting' curve, expressing this deviation as v(a). To calculate v(30–4), for example, R(30–4) is divided by n(30–4) and the result expressed as a natural log.[58] In Figure 5.4.1 the natural standard ASMFR curve, plotted by n(a), is shown against the standard 'limiting' ASMFR curve, denoted R(a).

The measure *m* ('little m') estimates how successfully an observed population (the dotted curve in Figure 5.4.1) is practising parity-specific fertility limitation. This may be visualised as the extent of the area bounded by the n(a) and r(a) curves. If *M* and *m* for an observed population were each equal to 1, then r(a) for that population would be exactly the same as the ASMFR curve described by R(a) in Fig. 5.4.1. However, if *M* was 1 but *m* was 0, then the observed population would not be practising any form of fertility limitation and would have the ASMFR curve described by n(a). Assuming that parity-specific limitation only is in operation, Coale and Trussell argue that older women, having achieved their desired family size, are most successful at curbing their fertility so, in populations successfully practising parity-specific limitation, the vast majority of children are born to women in the early years of marriage. Thus, as limitation is practised on an increasing scale within a population then the ASMFR curve for that population will become increasingly concave with respect to the natural standard curve, and the measure *m* increases.

Coale and Trussell's natural, non-limiting fertility standard ASMFR curve, n(a), their limiting standard, R(a), and the resultant set of v(a) values are set out in Table 5.4.1.[59]

A woman marrying on her twentieth birthday, and proceeding through her childbearing years experiencing the n(a) rates as given in the table would have accumulated a TMFR of 8.99 children, on average, by her fiftieth birthday. In theory the maximum number of children per woman which a population might achieve is 15, but this has never been

Table 5.4.1 *Coale and Trussell's n(a), R(a) and v(a) for seven age groups of mothers*

	Age group						
	15–19	20–24	25–29	30–34	35–39	40–44	45–49
n(a)	0.411	0.460	0.431	0.395	0.322	0.167	0.024
R(a)	0.411	0.460	0.326	0.203	0.114	0.041	0.004
v(a)	0	0	−0.279	−0.667	−1.042	−1.414	−1.671

Source: Coale and Trussell (1978); see note 59 to accompanying text.

matched in reality: differences in breast-feeding practices, levels of coital frequency and reproductive efficiency mean that one population might achieve seven children per married woman on average while another might achieve ten. Historically English populations would appear to have had fertility levels nearer the lower end of this range. Hinde and Woods, for instance note that historic English populations display 'relatively low marital fertility . . . in their twenties'.[60] The highest TMFR observed by Wrigley *et al.* in their family reconstitution based study was 7.67 children per woman in the first quarter of the nineteenth century.[61] In Figure 5.4.2 both Coale and Trussell's standard, natural fertility curve and the ASMFR curve for England and Wales 1800–24 are shown alongside three ASMFR curves derived from the OPCS study and four curves depicting the fertility experience of England and Wales in the mid to late twentieth century.

Coale and Trussell posited that an *m* of 0.2 or above signified that a substantial proportion of couples in the population under observation were limiting their fertility in a parity-specific way.[62] The measure *m* registers the shape of fertility curves; any increase in concavity away from the convex natural fertility standard curve. Such a measure appears to suggest that couples with the oldest wives were first, or certainly most strongly affected by the move to curtail family size, with increasingly younger couples becoming involved as the transition proceeded and desired family sizes became so small that they could be achieved within a very few years of marriage. The post-World War II ASMFR curves in Figure 5.4.2 indicate that by the mid-twentieth century marital fertility had become concentrated among wives in their twenties: stopping behaviour was firmly established. The highly concave national curve for the 1960s suggests a very high degree of limitation, although it would appear couples in this decade were having

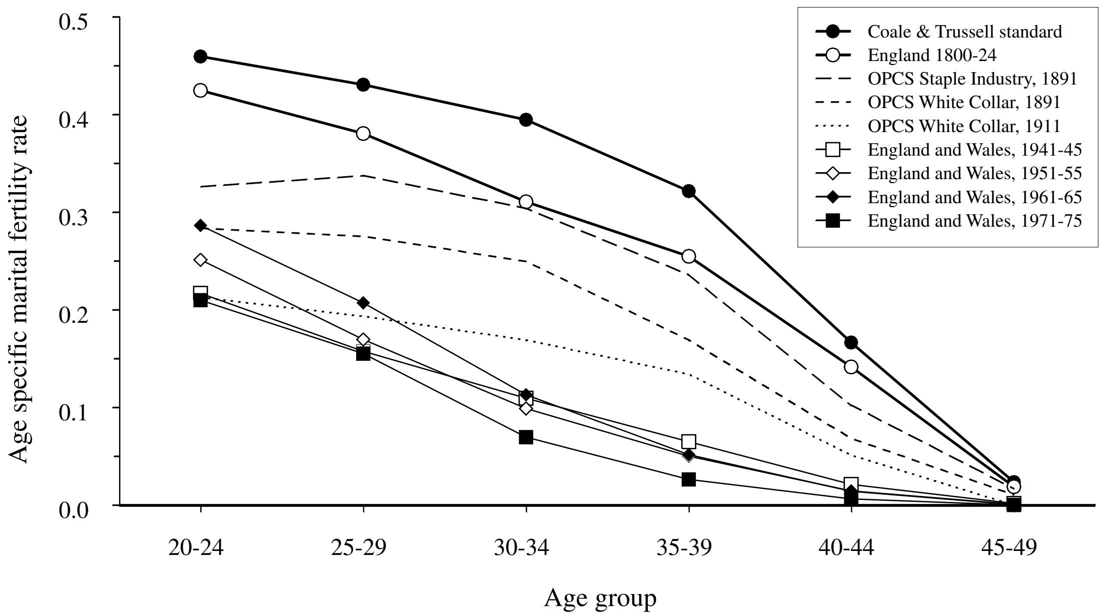


Fig. 5.4.2 Selected OPCS age-specific marital fertility schedules and four schedules from twentieth-century England and Wales compared with the Coale-Trussell standard 'natural fertility' schedule and the ASMFR schedule for England, 1800–24. *Sources:* Coale and Trussell (1978), Table 1, p. 205; Wrigley *et al.* (1997), Table 7.1, p. 355; OPCS (1987), Table 3.2, p. 55.

rather more children before they stopped, compared with couples in the 1940s and 1950s, thus fuelling the post-war baby boom. The trough in births experienced in the 1970s was a result, it would appear from the figure, of all age groups reducing their fertility – the contraceptive pill no doubt playing a major role by increasing contraceptive efficiency.

The four national curves depicted in Figure 5.4.2 are undoubtedly those of a post-transitional society. A chart of the passage from the convex, natural, pre-transitional curve to those of the post-transitional era has remained elusive, however, because until 1939 the age of mother was not recorded on birth certificates and therefore age-specific fertility curves could not be calculated. If the three OPCS derived curves depicted in Figure 5.4.2 are in any way representative of the national experience, it can be seen that the fertility transition in England and Wales did not proceed in the way suggested by the model of increasing use of parity-specific limitation. The two curves depicting fertility in the OPCS White Collar environment in 1891 and 1911, for instance, do not see a marked increase in concavity because, while the level of fertility drops in all age groups, the drop is greatest among women in their twenties and early thirties, not in older age groups. The curves therefore retain a certain degree of convexity, suggesting the retention of natural fertility behaviour, albeit at reduced levels.

Interpretation of such a pattern of change in fertility is not straightforward. It could indicate that, as the early stages of decline occurred in an era of relatively inefficient contraception, spacing was adopted by many couples as a family building strategy. Not until contraception methods became more reliable could couples be certain enough of their ability to prevent unwanted pregnancies to adopt stopping behaviour. Such an interpretation suggests that couples initiating the fertility transition sought simply to have 'fewer' children than their parents, rather than aiming for a particular family size.

A second interpretation of the pattern of curves in Figure 5.4.2 is that an increasing proportion of young couples adopted highly successful contraceptive measures, stopping their family at nought, one or two children, but at older ages a significant number of couples still retained unfettered fertility. This would reduce the level of fertility in the younger age groups but maintain a relatively convex curve. Such an interpretation would suggest that the fertility transition was a cohort phenomenon, with new generations of young couples entering marriage with a strong desire to limit their fertility from the outset, rather than adopting limitation after a relatively large number of children had been achieved, as might be witnessed if a period phenomenon were responsible for the change in behaviour. If this were the case then the

Table 5.4.2 *The values of* M *and* m *and the mean square error (MSE) terms calculated using the Coale and Trussell parameters, for the four OPCS environments in 1891, 1901 and 1911*

	M			*m*			MSE		
Environment	1891	1901	1911	1891	1901	1911	1891	1901	1911
White Collar	0.688	0.587	0.462	0.298	0.367	0.208	0.006	0.019	0.008
Agriculture	0.711	0.702	0.558	0.018	0.262	0.225	0.000	0.006	0.006
Light Industry	0.730	0.679	0.602	0.145	0.191	0.223	0.006	0.003	0.003
Staple Industry	0.769	0.737	0.697	0.170	0.120	0.209	0.008	0.003	0.001

Source: OPCS dataset.

marked concavity in the curves from the later twentieth century suggest that a small family size ideal became virtually universal, as younger generations accepted such families as the norm and the older generations, with larger family size norms, aged out of their reproductive years.

These two interpretations are not, of course, mutually exclusive. If women across the reproductive span were to begin curtailing their fertility then the ASMFR curve could retain a convex appearance, particularly if the younger women were relatively the more successful controllers. This would, however, imply a period phenomenon which encouraged all couples, whatever family size they had already achieved, to curb the number of any future offspring. Unfortunately such a scenario, when graphed using ASMFR curves derived for specific points in time, gives the impression that a cohort process was at work.

Hinde and Woods suggested that, given the fertility regime operating in England and Wales in the nineteenth century, the value of 0.2 taken by Coale and Trussell to signify the emergence of widespread parity-specific fertility control in a population was too low. We believe an *m* of 0.35 would be a more robust indicator of the widespread takeup of such behaviour in the context of England and Wales.[63]

Table 5.4.2 shows measures of *M* and *m* for the four OPCS environments, calculated using the Coale-Trussell standard for 1891, 1901 and 1911. The table also provides mean square error terms (MSE). These are given because when *M* and *m* are derived using the least squares regression method suggested in Coale and Trussell's 1978 paper, the goodness of fit of the model is signalled by the MSE.[64] Coale and Trussell observe that an MSE of 0.005 signals a 'mediocre' fit; one of 0.01 a truly 'terrible' fit. Thus in Table 5.4.2 it can be seen that while *m* for the White Collar environment for 1901 is 0.367, suggesting substantial parity-specific limitation, the MSE at 0.019 is an extremely poor fit, which should make one wary of attaching too much significance to the level of *m*.[65] This is the only instance in which a value of *m* appears sufficiently large to indicate the presence of widespread parity-specific limitation among the OPCS populations.

A major reason for the poor fit of the model to the OPCS data can be detected in Figure 5.4.2. In both standard natural curves shown, fertility is considerably higher in the 20–24 age group than in the 25–29 age group, in the OPCS populations fertility in the younger age group was virtually on a par, if not lower, than that of the older age group. It is possible that this configuration can be partly laid at the door of the method of calculating ASMFRs from individual-level census returns as outlined in section 5.3 above. In late-marrying populations such as those of Victorian and Edwardian England the calculations overestimate the number of years women spend in the married state in the 20–24 age group, thus deflating the ASMFR. When such curves are fitted to the fertility models using least squares regression, the model is mis-specified and the fit relatively poor.[66]

In an attempt to procure a better fit between the Coale and Trussell model and the OPCS data, 20–24 year olds were excluded from the regressions, only the four data points for the age groups from 25–44 being used.[67] The fit of the curves to the model did improve, although only from 'diabolical' to 'not great'. The results of this exercise suggest unequivocal use of parity-specific limitation among those in the White Collar areas in both 1891 and 1901, but none of the other environments yielded values of *m* over 0.35. If the approach recommended by Coale and Trussell, to search for a steady increase in *m* over time, rather than placing too much faith in single-period measures, is followed, conviction that even the White Collar areas were progressing steadily towards the widespread, exclusive use of parity-specific limitation evaporates as the recalculated values of *m* fluctuate between 0.409 in 1891, 0.585 in 1901 and 0.310 in 1911. Movement towards widespread family reduction may have been occurring within the wider OPCS population, but it was not being detected by models assuming 'stopping behaviour'.

The decline across time in the value of *M* is a much more consistent feature of Table 5.4.2, reinforcing the visual impression of Figure 5.4.2. Some decline in fertility at earlier age groups is expected as fertility decline proceeds, but under the supposition of parity-specific limitation this would not be expected to occur until the latest stages of the decline, and to be relatively modest. If this is not the case, then parity-specific limitation cannot be held to be the main method of bringing about the decline.

It is thus important to distinguish the behaviour of young couples from that of their elders. Coale and Trussell in their 1978 paper supply the means of observing fertility behaviour without the drawbacks of least square calculations. If $ln[r(a)/n(a)]$, i.e. v(a) for the Coale and Trussell standard 'post-transitional', limiting population where m and M are taken to be 1, is plotted for each age group it forms a straight, sloping line, showing the degree to which each age group would be expected to have reduced their fertility from natural levels under a stopping regime (Figure 5.4.3).[68] Under the latter regime, when M is 1 and m is 0 the v(a)s would all be 0 and therefore they would lie along the horizontal axes of the graphs in Figure 5.4.3. The graphs also show the v(a)s for each age group where M is 1 and where $m = 0.35$, i.e. where relatively widespread parity-specific limitation may be assumed to be being practised, at least in nineteenth century England and Wales. In moving from the $m = 0$ line to the $m = 0.35$ line and then to the $m = 1$ line one sees a marked increase in slope: the older the age group the more marked the reduction in fertility.

When the v(a)s derived from the ASMFR curves for each OPCS environment (shown in Figure 5.3.1) are plotted in Figure 5.4.3 they seldom follow the straight lines of the model populations.[69] It is also noticeable that the level of the curves decreases over time, but the shift in shape seen in the models does not occur. In all the graphs the 20–24 age group figure for all the curves lies well below 0; M, as we have seen above, hardly ever approaches 1 in these populations.[70] For the majority of the OPCS populations shown, the lines in the graphs are approximately horizontal from the 20–24 age group to the 30–34 age groups, indicating that younger wives were experiencing natural fertility, but at a rather lower rate that that predicted by the standard model. The marked downturn in fertility amongst those in their late thirties and early forties apparent in the different environments appears to approximate to varying extents of 'parity-specific' behaviour, but with the exception of the 1891 and 1901 curves in the Agricultural environment no particular increase in slope is seen: fertility reduction is being achieved, but not through the universal application of parity-specific measures. The graphs suggest that, in general, far from experiencing 'unfettered fertility', large proportions of young couples were spacing their children from early on in marriage. While it is possible that slowly increasing numbers of couples were opting to have very small families, this does not emerge clearly from the 'point in time' graphs in Figure 5.4.3. The latter do, however, undermine the contention that from a large 'average

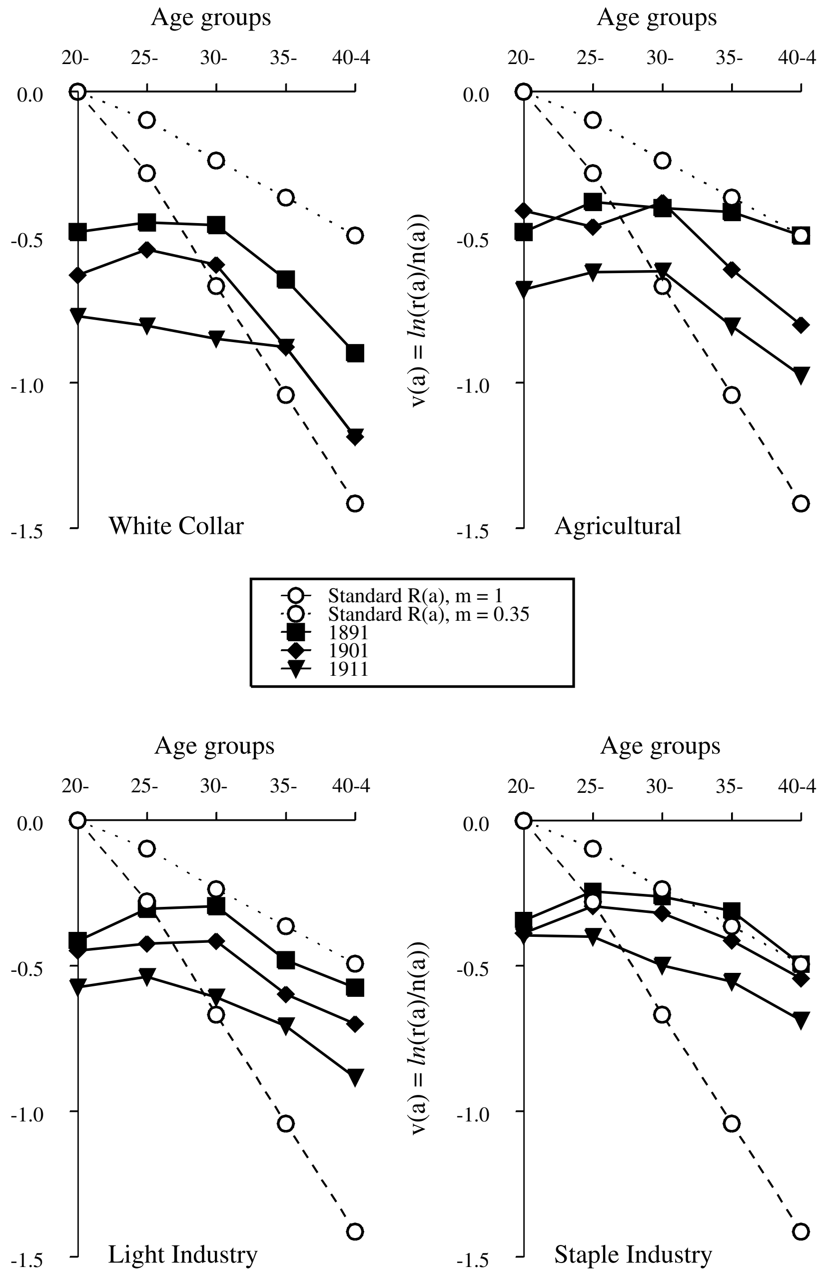


Fig. 5.4.3 v(a) = *ln*(r(a)/n(a)) for each age group of wife, 1891, 1901 and 1911, for each environment

family size' populations moved progressively, cohort after cohort, towards ever smaller families. The graphs suggest that at the end of the nineteenth century a considerable proportion of married women in all the fertile age groups were attempting to reduce the number of their children, or at least the rapidity with which they arrived. A 'quantum leap' in behaviour may have been occurring with one generation shunning the behaviour of their parents in an attempt to improve their lot in life. As a 'working woman' wrote to the Women's Co-operative Guild:

> When I got married to the man I loved, and who loves me, he said I should never suffer as our dear mothers had done, and that we would only have what little lives we could make happy, and give a chance in life.[71]

The graphs in Figure 5.4.3 indicate that over the 20-year period between 1891 and 1911 the four environments had rather different experiences. For 1891 the OPCS Agricultural areas display a horizontal line; they were experiencing natural fertility, if at a rate well below the Coale and Trussell standard. By 1901, however, fertility in the two oldest age groups had declined markedly. Between 1901 and 1911 the Agricultural environment fertility retained virtually the same shape but the level dropped; all age groups had seen a decline in fertility. In the White Collar environment the 1891 line already displayed the pattern of 'horizontal in the early age groups with a downward slope in the later ones'. By 1901 all age groups had experienced some fertility decline, but over the following decade it was only the three youngest age groups which experienced decline. While the Light Industry areas saw a muted decline in the level of fertility across all age groups the shape of their lines remained much closer to the horizontal standard than in either of the previous environments. In the Staple industry areas the lines for 1891 and 1901 were virtually identical and very close to the horizontal, only the oldest age group showing a very slight downward dip. By 1911 some downward movement had occurred, being most pronounced amongst those in their thirties. Of all the lines in Figure 5.4.3 the 1911 line for the Staple Industry areas most closely resembles that of a parity-specific limiting population. This suggests that being the latest group to alter their fertility behaviour the residents of the Staple Industry areas were more inclined to adopt a stopping regime than couples elsewhere. This could be because by the time they chose to reduce the size of their families, contraceptive technology was more efficient, or at least its use better understood and more efficiently applied. Alternatively, it may be that, as the idea of smaller families increased in currency, the option to have children rapidly at the beginning of marriage and then stop was favoured in areas where there was a more pronounced culture of 'masculinity'. Such a practice would still allow a display of virility, previously associated with large families, yet allow completed family size to drop.[72] Alternatively, it may simply reflect a 'late spacing' pattern, in the sense that there was no particular target family size being aimed at from the beginning of marriage, but an emerging desire to reduce the burden of childbearing as the end of the wife's reproductive life approached. There is qualitative evidence which suggests an increasing sensitivity on the part of at least some working-class men to the serious health implications for their wives of repeated child bearing.[73]

The only other major change in shape in the lines displayed in Figure 5.4.3, is, as already mentioned, the abrupt shift away from natural fertility among wives aged 35–44 in Agricultural areas between 1891 and 1901. The latter suggests that this decade saw an upheaval in the Agricultural sector which encouraged those with already substantial families not to have any more children, but did little to curb fertility among younger (and for the most part more recently married) couples. By 1911 couples in all age groups in this environment had reduced their fertility below that of a decade previously but the shape of the curve remained unaltered; women entering marriage were curtailing their fertility, possibly having observed the experience of their elders.

In an attempt to attain a greater understanding of the changing experience of marriage cohorts over time we turn in the next section to Cohort Parity Analysis, or CPA, a relatively recent methodological development designed to detect the changing extent of contraceptive use within a population.

5.5 An alternative measure of fertility – CPA

> We realise that it might be surprising to place the onset of the transition of marital fertility in urban Ireland as having occurred before 1890, since in the Princeton European Fertility Project it was estimated that 1922 was the date by which a decline of ten per cent in Irish marital fertility had occurred, and Teitelbaum put the data at 1921. There is a substantial difference however between the timing of the behavioural change among a subgroup . . . within a population at the beginning of its transition to control, and the date by which a fall in I_g is achieved for the whole population.[74]

Paul David and his colleagues have used the technique of Cohort Parity Analysis to examine fertility trends in Ireland and America in the immediately pre-World War I era. Just as the age-specific fertility schedules of the very fertile Hutterites have often acted as a standard for setting the characteristics of uncontrolled or natural fertility against which the fertility behaviour of other populations could be measured, so David *et al.* use the parity distributions reported in the 1911 Fertility Census by married women living in rural Ireland as their model 'non-limiting' population.[75] CPA measures the proportion of couples within a population pursuing some form of behaviour which reduces their fertility below that of the 'model' or standard population. CPA thus acknowledges that some couples may prefer to space their children (*ceteris paribus* lowering the eventual number which they achieve), rather than employ stopping behaviour. If both methods of control are being employed, however, CPA cannot distinguish their relative contribution, nor can it distinguish whether or not such behaviour is undertaken with the deliberate aim to limit family size. Thus if breast-feeding was practised to a greater degree in the observed or 'target' population than was true of the model population this would register as greater fertility control in the target, even where there may have been no intention to space births.

David and Sanderson lay out the basis of CPA methodology in their 1988 paper.[76] Couples are classified according to the wife's age at marriage and the marriage duration. For each of these groups two figures are calculated: a 'lower-bound' estimate of the proportion who have ever controlled their fertility at any date up to observation in the census, and an 'upper-bound' estimate. These two bounds represent two possible extremes of behaviour, on the respective assumptions that any discernible difference between the parity distribution of the non-limiting, 'model' population with that of the 'target' population is due entirely to stopping behaviour or else entirely to spacing behaviour. If couples, on reaching a given parity, decide to have no more offspring and are such efficient contraceptors that they immediately cease having children, they are 'perfect stoppers'. Under this scenario all contraceptors cease bearing children and thus comprise the minimum possible number of couples who could be contributing to the reduction in fertility. The percentage they form of the 'target' population provides the lower-bound estimate of fertility controllers within a study population. To estimate the upper percentage bound of controllers it is assumed that all controlling couples initiated fertility inhibiting behaviour on marriage, before they had any children. As such behaviour was not parity-specific David and Sanderson dubbed it 'pure spacing' behaviour. In such a population only those who have never initiated fertility control can be said to be non-controllers. Once the percentage of non-controllers has been subtracted from the total population the remainder sets an upper-bound on the percentage of controllers in that population. As David and Sanderson state, '[v]irtually all actual patterns of fertility control in a population contain elements of both polar regimes and produce estimates of the population controlling somewhere between the estimates derived from the two extreme cases'.[77] They acknowledge that in 'populations whose contraceptive use-efficiency was high, and where the desired pattern of childbearing also was one in which pregnancies were concentrated as closely as possible toward the beginning of the marital union' the actual percentage of ever controlling couples would lie much closer to the lower-bound percentage (which may in itself be high) than the upper-bound.[78] In such a population the measure *m* would be large.

For the logic of CPA to hold, two further assumptions must be made. First there has to be a parity level which, for any given marital duration and age of marriage combination, it is impossible to achieve if fertility control behaviour has ever been implemented.[79] The second assumption has to be that the parity distribution of non-limiters in a partially limiting population must be the same as the parity distribution of the 'model' population.

With the rural Irish as their 'no-control' model David and Sanderson proceeded to examine parity distribution of the remaining, urban portion of the Irish population, i.e. the residents of Dublin, Belfast, Cork, Londonderry, Limerick and Waterford. For those married aged 20–24 who had been married between 5 and 30 years before the 1911 Census in these county boroughs, between 20 and 30 per cent of couples had made use of some sort of control according to David and Sanderson's methodology. For those married aged 25–29 the proportion of controllers lay between 30 and 48 per cent. David and Sanderson argue, therefore, that among the urban Irish 'later age at marriage and fertility control were complements rather than substitutes'; that the later-marrying women and their husbands belonged to socio-economic strata with low fertility goals and quite extensive knowledge of fertility control which they must have been able to implement from early in marriage.[80] Szreter, in the context of England and Wales, argues to the contrary that a strong association between delayed marriage and birth control within marriage is an important indicator of a culture lacking effective knowledge and expertise in contraceptive techniques.[81] The two interpretations are not necessarily contradictory; different cultures may well arrive at different strategies to deal with perceived difficulties. A later paper by David and Sanderson, utilising a more advanced statistical method, confirms the authors in their belief that the Irish fertility transition began among the later-marrying couples of the urban areas and only spread to their younger-marrying peers after a decade or more.[82] The spread of family limitation down through the age groups is connected, the authors suggest, to the decline in age at marriage found particularly among the urban middle classes as the new century dawned.

In his work comparing Scotland and Ireland, Ó Gráda finds that CPA methods unfold a similar story of fertility transition: greater fertility control among later-marrying couples, followed by a period of accelerated diffusion of limitation behaviour in the first decade of the twentieth century.[83] Ó Gráda notes that when the target population has a considerable proportion of pre-nuptial conceptions 'the duration of marriage is not the duration of exposure and the CPA method breaks down'.[84] This is a point to note when moving on to consider populations within England and Wales. A further point Ó Gráda makes forcefully is that among the 'rural Irish' substantial differences in fertility behaviour may be discerned. While the 'rural Irish' are considered to be non-limiting, if they are compared as a target population to the model population comprised by a subset of the population of County Clare (a 'really rural' area as Ó Gráda remarks) then one-fifth of the 'rural Irish women' marrying in their twenties would be considered to be controlling their fertility in some way.[85] The importance of the particular characteristics of the chosen standard population to the interpretation of historical measures of fertility control is thus raised once again, in addition to the importance to interpretation of how the behaviours underlying fertility control are conceptualised.

Table 5.5.1 presents CPA estimates of the lower and upper bounds of the percentage of controllers calculated from the responses to the 1911 Fertility Census from the OPCS population, using the 'rural Irish' as the model population. The equivalent figures for England and Wales are also tabulated. Figure 5.5.1 graphs the figures for those married aged 20–24 and 25–29 alongside those calculated by David and Sanderson for urban Ireland and by Ó Gráda for Scotland. Of course, in the sets of figures derived from the various national populations the number of couples in each age-at-marriage, marital duration group are very large, whereas the numbers from the OPCS population are relatively very small.[86]

Two features of Figure 5.5.1 are immediately obvious. First, while the lines joining the lower and upper CPA bounds for the urban Irish population married aged 20–24 lie between 20 and 35 per cent for the majority of marital duration groups, the English and Welsh experience hovers between 40 and 65 per cent, increasing slightly over time. The 'All OPCS' figures are rather lower among the earlier marriage cohorts than the national figures, but are on the same level by the 10–14 years married cohort. This upswing is due primarily to a marked upward shift in the proportion of controllers in evidence in the OPCS Staple Industry areas. In these areas, among those women who married in their early twenties in the late 1880s and early 1890s only 30 per cent of

Table 5.5.1 *The upper (U) and lower (L) bounds of the percentages of couples controlling their fertility in England and Wales and target OPCS populations, as calculated by CPA*

Marriage			England and Wales % controllers		White Collar % controllers			Agricultural % controllers			Light Industry % controllers			Staple Industry % controllers		
duration	date of	age at	U	L	U	L	N	U	L	N	U	L	N	U	L	N
5–9	1901–6	<20	26	35							50	38	134	25	17	140
		20–24	47	60	85	66	242	74	51	145	52	40	542	43	31	475
		25–29	59	75	95	75	204	71	56	121	76	58	276	38	33	216
		30–34	50	64	76	59	90				74	56	83	65	55	69
10–14	1896–1901	<20	27	36							42	31	146	17	12	142
		20–24	48	62	73	60	196	58	44	118	56	42	510	51	38	431
		25–29	58	75	93	69	148	48	44	114	66	50	248	50	38	198
		30–34	54	74	69	53	55				78	53	76	47	37	72
15–19	1891–96	<20	26	34							45	36	141	47	28	116
		20–24	46	59	69	55	155	82	56	140	49	41	433	33	27	347
		25–29	56	72	84	64	120	65	42	98	67	51	207	49	38	128
		30–34	54	75												
20–24	1886–91	<20	23	28							20	13	137	6	10	114
		20–24	43	57	80	61	125	71	50	109	34	33	358	33	23	333
		25–29	54	70	94	70	84	73	55	53	75	51	154	87	59	114
		30–34	41	51												
25–29	1881–6	<20									32	17	125	22	23	90
		20–24			69	60	112	76	62	100	57	40	288	17	17	232

Note:
N = number of couples used in CPA calculations. Only groups including more than 50 couples are shown.
Figures for England and Wales were unavailable for marriage durations of 25 years or beyond.
Source: for England and Wales figures: *Fertility of marriage*, Part II (1923), Table 44, pp. 172–216; OPCS dataset.

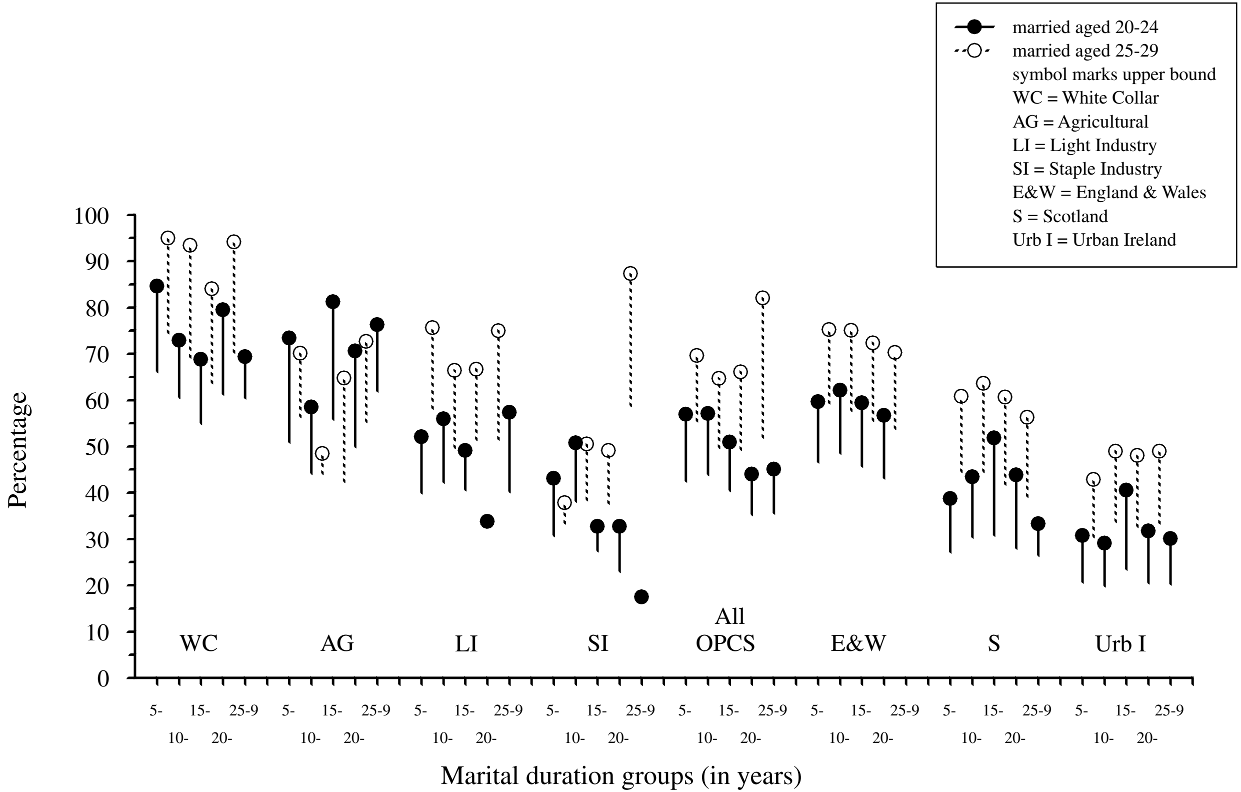


Fig. 5.5.1 Upper and lower CPA bounds for the populations of the four OPCS environments, England and Wales, Scotland and urban Ireland, 1911, by marital duration and differentiating those wives married at ages 20–24 from those married aged 25–29. *Note:* the symbol or 'head' marks the upper bound, the end of the 'tail' the lower bound. *Sources:* Figures for England and Wales calculated from *Fertility of marriage*, Part II (1923), Table 44, pp. 176–216; figures for Scotland obtained from Ó Gráda (1991); figures for urban Ireland from David and Sanderson (1990).

them would appear to have had any experience of family limitation, a rate only slightly above that of urban Ireland. Among those married in the late 1890s, however, the proportion experiencing some form of limitation had risen to between 40 and 50 per cent. The downward swing in the most recently married cohort shown may indicate that, being married a shorter time, fewer had initiated control. Under the logic of CPA this would suggest that this population was a population of 'stoppers', initiating control only after the birth of several children, thus reinforcing the impression gleaned from the ASMFR curves. In the other three environments, trends in the CPA measures over time are much more difficult to discern, although compared to the White Collar and Agricultural areas the rather lower levels of fertility control experienced in the Light Industry areas are easy to see, particularly among those married aged 20–24. In the former two areas, where the majority of the population apparently had their fertility under some sort of control, it is possible that any change occurring was in the proportion of couples using stopping as opposed to spacing. This of course could not be discerned from the CPA estimates. In total, Figure 5.5.1 would seem to suggest that some sections of the English and Welsh population had their fertility under some form of control well before the downturn in the national birth-rate in the late 1870s.

Comparing the experience of those married aged 25–29 with those married aged 20–24 in Figure 5.5.1, the Irish figures, and to a lesser extent those from Scotland, reflect David and Sanderson's conclusion that later-marrying couples included more controllers than their earlier-marrying sisters. To some extent the same is true of the figures from the OPCS environments, although it is noticeable that the ranges for the Agricultural areas lie at slightly lower levels for the older brides than is true of their younger-marrying sisters marrying at the same dates. This is suggestive, but no more than that, that late marriage in the countryside may have been accompanied by a rather quicker tempo of childbearing in an attempt to 'catch up' with the childbearing performance of younger-marrying women. In the other environments older-marrying women generally display higher levels of fertility control than their younger-marrying sisters and this is particularly noticeable among women in the Light Industry areas.

It is worth looking more closely at the relationship between the lines representing the four environments and that for the whole OPCS population in each marital duration group in Figure 5.5.1. While women marrying aged 20–24 in the 'all OPCS' set are strongly influenced by the changing fertility limitation experience in the Staple Industry and lie close in level to the fertility experience of the Light Industry areas, among those marrying aged 25–29 the influence of the White Collar areas is stronger, and that of the Staple Industry areas weaker in setting the level of the 'all OPCS' line. This results from a much higher proportion of wives in the White Collar and Agricultural areas marrying in their late twenties compared with the Staple Industry areas. In White Collar areas, for every ten women married aged 25–29, twelve married aged 20–24. In Staple Industry areas this ratio was more akin to 10:20. Thus in the population as a whole those more prone to limit their fertility, particularly the higher social classes, are more strongly represented among the later marriers. As David and Sanderson surmised, 'later marrying urban women and their husbands' would seem indeed to have 'belonged to socio-economic strata among whom desired fertility was relatively low'.[87]

The very high proportion of limiters in the White Collar areas, particularly among those marrying 25–29, could be held to indicate either an extremely small desired family size and extremely effective stopping, or the use of spacing behaviour throughout marriage. Without analysis of the actual spaces between births these two patterns cannot be distinguished.

CPA methodology would seem at first sight to be an ideal technique to be deployed with the data available through the OPCS 1911 population, where for some 17,000 co-resident married couples the duration of their marriage, their age at marriage, and the number of children born to that marriage, are known. However, in this study it has been decided to make use of the conceptual framework of the technique, but at a considerably reduced level of statistical sophistication. There are three reasons for this. First, the number of couples available in each cohort, once they have been subdivided into environment, class, etc., are so relatively small as to make elaborate manipulation impractical. Second, David, Sanderson, and their associates report their findings for the most part in terms of the maximum and minimum proportion of couples who have instigated some form of fertility limiting behaviour, although of course such behaviour might not be deliberately designed to affect fertility.[88] It is not always easy to conceptualise such maxima and minima in terms of the proportions of couples experiencing a particular size of family. Simple parity figures are more useful in this respect.[89] Third, David and Sanderson's methodology allows them to report on Irish marital fertility behaviour only for couples married between 1891 and 1911. Ireland's I_g fell 10 per cent from its peak by 1921–2. For England and Wales the equivalent date was 1892.[90] To follow the origins of the latter decline, therefore, the OPCS data needed to be probed further back towards the middle of the nineteenth century than CPA allows.

5.6 Retrospective histories of childbearing

The questions concerning 'the number of children ever born' and 'marital duration' in the 1911 census allow us to pursue the issues discussed in the preceding sections of this chapter through an analysis of parity – a feature of a woman's fertility usually denied to late-nineteenth-century demographic historians of England and Wales. Table 5.6.1 displays the number of couples for whom we have responses in the 1911 census by marital duration and age at marriage. As the table shows, the great majority (71.6 per cent) of the couples enumerated were married when the wife was in her twenties, 13.8 per cent when she was in her teens, 11.6 per cent when she was in her thirties and 3.1 per cent when she was over 40. The census does not distinguish first from second or later marriages, so we can only assume that a considerable proportion of women marrying aged 30 or over were widows.

From Table 5.6.1 it can also be calculated that some 76 per cent of couples in observation had been married less than 25 years on census night 1911. Amongst the cohorts marrying in the mid-nineteenth century mortality had obviously taken its toll, with a disproportionate number of those marrying in their teens and early twenties surviving. In the analyses which follow, therefore, we have concentrated on couples where the wife was in her twenties when she married and have considered only those cohorts married post-1866.

Table 5.6.2 distinguishes those couples eligible under these criteria for inclusion in analyses of parity distribution by Registrar-General's class, environment and marriage duration. Some couples could not be allocated to a class and are omitted from this and the following tables, as are those in class VI, the textile workers, whose numbers were too small to stand such division. Since the numbers of class I couples were particularly small in some environments they have been amalgamated with class II in this table. However, as the ensuing discussion will note, where numbers permitted, separate analysis of these two classes' behaviour showed them to be, for the most part, quite distinct; a situation which the amalgamated figures disguise. In addition, in order to extend the analysis back to 1866, the three groups covering 30–44 years marital duration have had to be amalgamated in order to accumulate sufficient couples.

Before the average parities of the couples in Table 5.6.2 could be compared, they had to be weighted to allow for the fact that, as discussed in previous sections, the proportion of women marrying in their late twenties compared with those in their early twenties differed markedly from class to class, and even more dramatically between members of the

Table 5.6.1 *Number of co-resident married women in 1911 OPCS population by age of marriage and duration of marriage*

Date of marriage	Marriage duration	Age at marriage						Total (N)	% of total
		<20	20–24	25–29	30–34	35–39	40+		
1906–11	<5	247	1,277	870	341	130	175	3,040	17.7
1901–6	5–9	330	1,415	826	290	102	120	3,083	17.9
1896–1901	10–14	348	1,273	720	243	110	101	2,795	16.2
1891–6	15–19	315	1,086	556	173	79	60	2,269	13.2
1886–91	20–24	304	942	406	139	58	32	1,881	10.9
1881–6	25–29	277	736	303	106	30	23	1,475	8.6
1876–81	30–34	183	539	211	66	24	9	1,032	6.0
1871–6	35–39	167	410	136	50	6	4	773	4.5
1866–71	40–44	105	257	100	27	3	1	493	2.9
1861–6	45–49	70	135	31	4	1	1	242	1.4
1856–61	50–54	22	53	13	3	0	0	91	0.5
1851–6	55–59	7	15	4	0	0	0	26	0.2
1846–51	60+	4	3	0	0	0	0	7	0.0
	Total	2,379	8,141	4,176	1,442	543	526	17,207	
	% of total	13.8	47.3	24.3	8.4	3.2	3.1		

Source: OPCS dataset.

Table 5.6.2 *The number of couples available to calculate parity distribution, wives aged 20–29 at marriage, by environment and marital duration, OPCS 1911*

Marital duration	Environment	Class I & II	III	IV	V	VII	VIII	Total	%
<5	White Collar	207	99	61	37			404	20
	Agriculture	41	41	47	23		60	212	10
	Light Industry	205	279	136	143			763	37
	Staple Industry	73	77	199	96	233		678	33
	Total	526	496	443	299	233	60	2,057	
	%	26	24	22	15	11	3		18
5–9	White Collar	231	85	93	49			458	21
	Agriculture	61	42	67	30		59	259	12
	Light Industry	197	290	153	145			785	36
	Staple Industry	85	90	180	107	187		649	30
	Total	574	507	493	331	187	59	2,151	
	%	27	24	23	15	9	3		19
10–14	White Collar	157	66	56	48			327	17
	Agriculture	70	43	50	32		35	230	12
	Light Industry	216	249	115	151			731	39
	Staple Industry	85	68	169	93	177		592	31
	Total	528	426	390	324	177	35	1,880	
	%	28	23	21	17	9	2		16
15–19	White Collar	116	52	53	45			266	17
	Agriculture	75	32	51	32		42	232	15
	Light Industry	180	225	114	96			615	39
	Staple Industry	54	61	126	80	140		461	29
	Total	425	370	344	253	140	42	1,574	
	%	27	24	22	16	9	3		14

20–29	White Collar	183	77	62	40			362	16
	Agriculture	111	40	66	29		73	319	14
	Light Industry	247	315	150	143			855	38
	Staple Industry	91	81	207	130	198		707	32
	Total	632	513	485	342	198	73	2,243	
	%	28	23	22	15	9	3		20
30–44	White Collar	115	58	57	27			257	17
	Agriculture	106	45	64	29		71	315	21
	Light Industry	134	203	94	93			524	34
	Staple Industry	54	61	120	73	123		431	28
	Total	409	367	335	222	123	71	1,527	
	%	27	24	22	15	8	5		13
All <44	White Collar	1,009	437	382	246			2,074	18
	Agriculture	464	243	345	175		340	1,567	14
	Light Industry	1,179	1,561	762	771			4,273	37
	Staple Industry	442	438	1,001	579	1,058		3,518	31
	Total	3,094	2,679	2,490	1,771	1,058	340	11,432	
	%	27	23	22	15	9	3		100

Note:
All percentages have been rounded to whole numbers.
Source: OPCS dataset.

same class in different environments. To illustrate this point the members of the 1896–1901 marriage cohort marrying when the wife was aged less than 35 have been tabulated in Table 5.6.3 by class, environment and age at marriage. Taking class II, which for the present purposes can be distinguished separately, as an example: the ratio of those marrying when the wife was in her early twenties to those when she was in her late twenties is virtually 10:10 in the White Collar environment, while it is 10:16 in the Agricultural environment and 10:6 in the Light and Staple Industry environments. As a means of summarising the distribution of marriage ages, the average age of marriage of the brides is provided.

In an attempt to maximise comparability, the parity distributions which follow have first been calculated for those married aged 20–24 and those married aged 25–29 in each population sub-group; these have then been amalgamated, so that each age group contributes to the marital age group 20–29 in the same proportions as in the overall OPCS population for that marital duration.

This standardised, average achieved family size was calculated wherever possible for the subdivisions shown in Table 5.6.2. The results are presented in Table 5.6.4. In certain sub-groups there were no women who had married aged 25–29 (or at least none who had survived to 1911) and therefore standardised rates could not be calculated. In other groups, while the distributions have been calculated, the numbers from which they derive are very small and thus no firm conclusions should be drawn from comparisons of their average achieved family size: groups comprising fewer than fifty couples appear in parentheses in Table 5.6.4.

Of the cohort married between 1866 and 1881, Table 5.6.4 discloses that, in combination, classes I and II in the White Collar areas had achieved by far the lowest fertility by 1911 at just over four children. In fact, in these areas class I had achieved 3.98 children on average while class II had averaged 5.59 children per couple.[91] The groups whose figures are most reliable suggest that, in general, fertility among the 1866–81 marriage cohort was slightly lower in each class in the Light Industry areas than in the Staple Industry communities, although it lay at above six children amongst all classes in these two environments – even amongst classes I and II. The experience of Agricultural areas is more equivocal but agricultural labourers certainly live up to their high-fertility reputation, achieving 7.04 children per couple on average. Among miners, standardising for age at marriage reduces wives' fertility so that, in the 1866–81 cohort at least, it lies rather below those other groups in Staple Industry areas where the figures allow reliable comparison, a feature it does not retain over succeeding cohorts. This prompts once again the interesting speculation entertained by both Woods and Hinde and Szreter that coal-miners may actually have been one social group whose age-specific fertility underwent some periods of increase between 1880 and 1911.[92]

The desirability of small family size, and certainly the means of achieving this, appear therefore to have originated with class I in the predominantly middle-class areas in the OPCS sample, and was well established among members of this group married in the 1870s. It is well worth also noting that the bottom panel in Table 5.6.4 suggests, again, that the non-white collar classes in White Collar areas were achieving lower fertility levels than their peers in other environments, the contrast being particularly marked when the White Collar areas and the Staple Industries are compared.

In general, and not unexpectedly, women married between 1881 and 1891 had accumulated fewer children than the 1866–81 marriage cohort by 1911. As noted above, an exception to this generalisation is the miners' wives, who have actually accumulated slightly more children on average.[93] This cohort strengthens the impression that all classes in the White Collar areas were reducing their fertility below levels achieved in other environments. It is also apparent that within this cohort the white collar groups in each environment were exhibiting fertility levels well below their working-class neighbours. Those in class IV living in White Collar areas who married 1881–91 had on average accumulated 4.3 children, one fewer than their peers in the industrial areas, a very substantial within-class difference. Such a difference could well reflect the fact that class IV in the White Collar areas would contain a large proportion of servants, whereas in the Industrial areas members of this class would be working in the factories and workshops. The miners, agricultural labourers and industrial unskilled workers of this cohort still managed to achieve over six children per couple. While higher rates of infant mortality can lead to higher rates of fertility it is impossible that the infant mortality differentials prevailing at this time between White Collar and Industrial areas could produce variations in fertility of this magnitude.[94] The infant mortality–fertility relationship is further confounded when it is noted that, althouth Agricultural areas have the lowest child mortality rates, the 1881–91 marriage cohort drawn from these areas achieve considerably higher fertility than their peers in the White Collar districts.

It is notable in Table 5.6.4 that the cohorts married 1891–6 and 1896–1901 in the two Industrial environments do not in general show the social class fertility gradients predicted by the Registrar-General's professional model, since class IV usually exhibits lower fertility than

Table 5.6.3 *Numbers and proportions marrying aged <35 years, by wife's five-year age group, by class and environment, 1896–1901 marriage cohort*

Age at marriage	Class I		Class II		Class III		Class IV		Class V		Class VI		Class VII		Class VIII	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Panel A: White Collar																
<20	4	3.0	8	10.0	5	7.0	9	12.0	13	19.0	—	—	—	—	—	—
20–24	48	41.0	29	37.0	41	55.0	34	46.0	34	49.0	—	—	—	—	—	—
25–29	50	43.0	30	38.0	25	33.0	22	30.0	14	20.0	—	—	—	—	—	—
30–34	15	13.0	12	15.0	4	5.0	9	12.0	9	13.0	—	—	—	—	—	—
Total number	118		79		75		74		70							
Age at marriage[a]	25.6		25.5		24.5		24.6		23.7							
Panel B: Agriculture																
<20	—	—	1	1.0	1	2.0	8	12.0	—	—	—	—	—	—	—	—
20–24	—	—	22	32.0	22	44.0	29	43.0	—	—	—	—	—	—	—	—
25–29	—	—	35	51.0	21	42.0	21	31.0	—	—	—	—	—	—	—	—
30–34	—	—	10	15.0	6	12.0	10	15.0	—	—	—	—	—	—	—	—
Total number			68		50		68									
Age at marriage[a]			26.6		25.5		25.1									
Panel C: Light Industry																
<20	7	8.0	19	11.0	48	15.0	22	15.0	46	22.0	—	—	—	—	—	—
20–24	46	52.0	90	50.0	166	52.0	80	55.0	111	52.0	—	—	—	—	—	—
25–29	25	28.0	55	31.0	83	26.0	35	24.0	40	19.0	—	—	—	—	—	—
30–34	11	12.0	16	9.0	21	7.0	9	6.0	15	7.0	—	—	—	—	—	—
Total number	89		180		318		146		212							
Age at marriage[a]	24.8		24.2		23.7		23.8		23.3							

Panel D: Staple Industry																
<20	—	—	9	13.0	21	22.0	30	14.0	33	24.0	—	—	77	28.0	—	—
20–24	—	—	34	48.0	48	49.0	127	59.0	54	39.0	—	—	127	46.0	—	—
25–29	—	—	20	28.0	20	21.0	42	19.0	39	28.0	—	—	50	18.0	—	—
30–34	—	—	8	11.0	8	8.0	17	8.0	14	10.0	—	—	21	8.0	—	—
Total number			71		97		216		140				275			
Age at marriage[a]			24.7		24.4		23.4		23.5				23.4			

Note:
[a] Age at marriage = average age of marriage for those marrying aged less than 35. Only groups containing a total of 50 couples or more are shown.
Source: OPCS dataset.

Table 5.6.4 *Average number of live births achieved, by environment, class and duration of marriage, OPCS 1911: wife married aged 20–29 (weighted)*

Class	Environment			
	White Collar	Agriculture	Light Industry	Staple Industry
Panel A: Marital duration < 5 years; marriage cohort 1906–11; all OPCS 1.02				
Class I & II	0.81	—	0.95	0.95
Class III	0.82	(0.90)	1.01	1.11
Class IV	0.87	(1.02)	0.95	1.17
Class V	(1.06)	(1.18)	1.04	1.28
Class VII	—	—	—	1.17
Class VIII	—	1.09	—	—
Panel B: Marital duration 5–9 years; marriage cohort 1901–6; all OPCS 2.35				
Class I & II	1.78	2.18	2.15	2.22
Class III	1.86	2.39	2.29	2.08
Class IV	2.06	(2.16)	2.50	2.64
Class V	1.89	2.40	2.30	2.55
Class VI	(2.46)	(2.43)	2.60	2.96
Class VII	—	—	—	2.72
Class VIII	—	2.10	—	—
Panel C: Marital duration 10–14 years; marriage cohort 1896–1901; all OPCS 3.52				
Class I & II	2.63	3.18	3.19	2.93
Class III	3.23	*2.82*	3.62	3.54
Class IV	2.79	3.65	3.54	4.03
Class V	(3.25)	(3.17)	3.82	4.32
Class VII	—	—	—	4.18
Class VIII	—	(4.43)	—	—

Panel D: Marital duration 15–19 years; marriage cohort 1891–6; all OPCS 4.44				
Class I & II	3.37	—	3.76	3.44
Class III	3.33	(3.76)	4.51	5.01
Class IV	4.40	4.86	4.42	4.80
Class V	(4.22)	(4.93)	5.04	5.20
Class VII	—	—	—	5.24
Class VIII	—	(5.75)	—	—
Panel E: Marital duration 20–29 years; marriage cohort 1881–91; all OPCS 5.35				
Class I & II	3.45	4.46	4.59	4.94
Class III	4.50	(4.66)	5.79	5.29
Class IV	4.31	5.17	5.44	5.73
Class V	(5.03)	(6.03)	6.21	6.49
Class VII	—	—	—	6.20
Class VIII	—	6.15	—	—
Panel F: Marital duration 30–44 years; marriage cohort 1866–81; all OPCS 6.28				
Class I & II	4.23	5.29	6.47	—
Class III	5.99	(6.88)	6.39	6.66
Class IV	5.95	6.24	6.05	6.89
Class V	(4.84)	(7.10)	6.76	6.80
Class VII	—	—	—	6.02
Class VIII	—	7.04	—	—

Note:
Numbers in parentheses calculated on the basis of fewer than 50 couples.
Source: OPCS dataset.

class III and, where numbers permitted disaggregation for 1901–6, class II actually records lower fertility than class I in the Staple Industry environment. In all classes where the figures are reliable, fertility is lowest in the White Collar, well-off areas; but here again the class gradient is often broken by the very low fertility of class IV. As one moves downwards through the panels on Table 5.6.4, i.e. backwards through time, social and spatial gradients become more pronounced. This suggests that when couples had been married only a short time they were all working to approximately the same fertility behaviour pattern. As marriage duration increased, differences in fertility behaviour began to manifest themselves. That said, differences between environments show up even in the most recent marriage cohort. It is apparent that all classes in the White Collar areas experienced lower fertility than elsewhere, a feature which had become marked after 1881.[95]

In order to explore further the family building strategies employed by different sub-groups of the population two methods were used. The first of these is demonstrated in Figure 5.6.1. The four panels in this figure represent the fertility behaviour found among two marriage cohorts in the White Collar and Staple Industry areas, by class.[96] The lines depict the proportion of couples who achieve a given parity. All couples will have been childless, parity 0, at some point; and a couple with three children have necessarily also achieved parities 1 and 2. Thus among the class I 1866–81 marriage cohort in the White Collar areas, 60 per cent of couples had at least three children, whereas among the members of other classes in the same cohort and environment close to 80 per cent of couples achieved parity 3. To express this another way, 40 per cent of class I couples married for over 30 years in 1911 had a family size of fewer than three children, whereas among the other classes only 20 per cent had had families this small.

To make visual comparison of the graphs easier, the achieved parity distribution of couples in England and Wales married in 1861–71 is shown. Thus, while the classes in the Staple Industry areas from the 1866–81 cohort are tightly clustered near this standard line, those in the White Collar environment graph show that among class I large families had already become far less common, with only one-third of couples having five children or more. Class II in the White Collar areas also seem to have been making some move towards a smaller family size norm. In the two upper graphs, which display the achieved parity distribution curves among the 1881–91 marriage cohort, class I in the White Collar environment still stands out for its low-lying curve. However, in these White Collar areas all other classes have also reduced their likelihood of moving on to higher parities over that of the previous cohort. In the

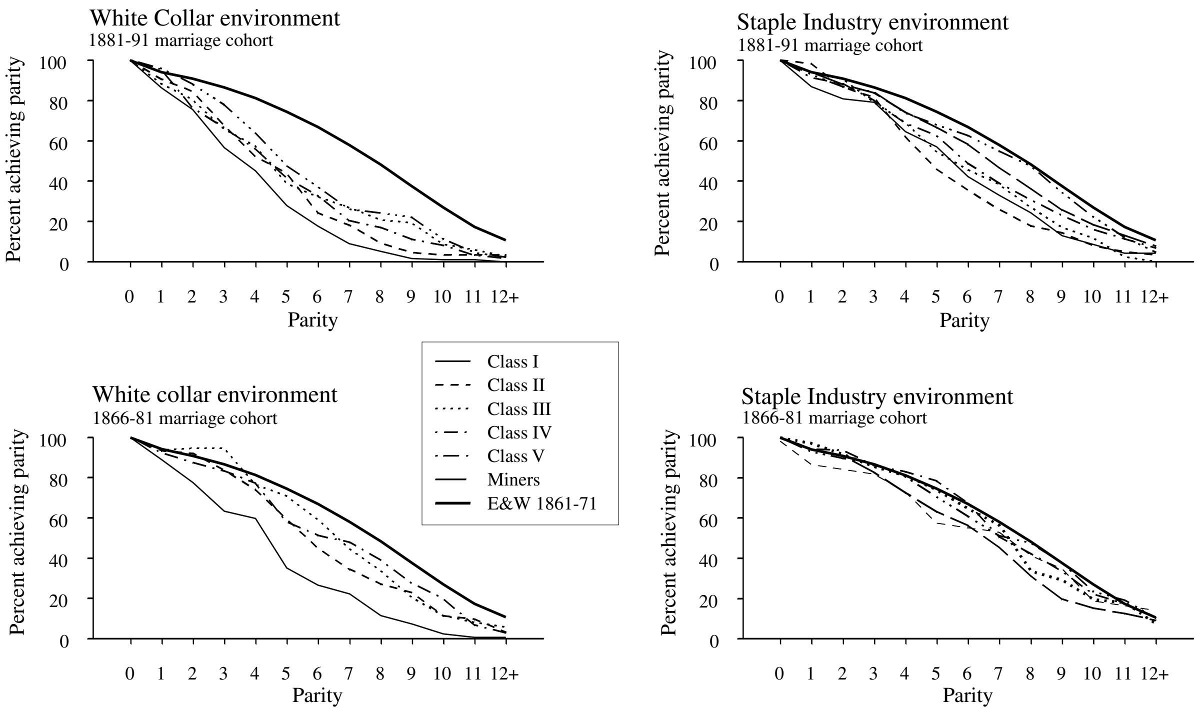


Fig. 5.6.1 The percentage of couples achieving given parities for each class in the OPCS White Collar and Staple Industry environments: 1866–81 and 1881–91 marriage cohorts. *Note:* Couples shown were married when the wife was aged 20–29; only classes represented by more than 30 couples are shown.

Staple Industry environment some differentiation has appeared, but apparently as a result of classes II and IV increasingly favouring a smaller family size, while miners and class V remain at levels comparable to those of the earlier cohort. Among this later-marrying cohort in the White Collar areas it would appear that there was some difference from class to class in the proportion of couples who had just two children, with the higher echelons being less likely to proceed beyond the 'two-child family'. In the Staple Industry areas, however, the same marriage cohort displays little class divergence until parity 4, suggesting that almost all fertile couples in these areas had at least three children. While in the White Collar areas it is class I amongst the 1881–91 cohort which displays the lowest fertility levels, in the Staple Industry areas class II holds this position.

The achieved parity figures therefore confirm the story suggested by the TMFRs in section 5.3 above. Areas where the middle classes dominated seem to have fostered lower levels of fertility from an earlier date, among all classes living within them. As smaller family sizes became increasingly favoured, so most classes in the non-White Collar areas can be seen to have reduced the number of their offspring, although with varying degrees of rapidity. Miners and class V in the Staple Industry areas were particular laggards. Again the OPCS data reveal nothing, unfortunately, of the relative timing of fertility decline among the reputedly low fertility population of textile workers. As the later-marrying cohorts in Table 5.6.4 and Figure 5.6.1 had not yet completed their fertility, however, it is possible that the variations by class were the result not of fertility reduction *per se*, but of a slower pace of childbearing among the middle classes. To this attention is now turned.

Even using the individual-level data there are certain limitations on the capacity of the 1911 census data to monitor the pace of childbearing: a child can only be reliably allocated its place in its mother's fertility history when it is co-resident with its parents on census night. In addition all ages and marital durations are given in whole years and therefore the interval between two events can only be calculated somewhat crudely.[97] To minimise the chance that children had migrated, Table 5.6.5 only shows couples from the 1896–1901 cohort (i.e. married 10–14 years) and the 1901–6 cohort (i.e. married 5–9 years). It was deemed prudent to omit those married more recently as it is known that there appears to be heaping on marital duration of two years, thus affecting even the crude calculations of intervals between marriage and first and second births made here.[98] As before, only women married in their twenties have been considered, as the numbers married at other ages are too small for robust comparison, while couples can also only be included if they have had no experience of mortality among their offspring.

Interpretation of Tables 5.6.5A and 5.6.5B requires several important caveats. Numbers would not allow the classes to be divided by environment, nor could analysis move beyond parity 2 for this reason. Variations in the incidence of infant and childhood mortality differentially remove couples from observation; only 75 per cent of all class I couples and 64 to 69 per cent of class II to VII couples in the OPCS sample married 1901–6 when the wife was in her twenties appear in Table 5.6.5A, the remainder all having lost at least one child. For the 1896–1901 marriage cohort shown in Table 5.6.5B attrition is considerably worse: only 65 per cent of class I and 62 per cent of class II couples appear; for classes III and IV the figure is 50 per cent and for class V and the miners only 45 and 42 per cent, respectively. It is likely that there is an overconcentration of childless couples among those from whom the figures in Table 5.6.5 was calculated as such couples cannot have 'lost' any children through death or migration. Further, having lost no children the couples included in Table 5.6.5 are likely to have had longer than average spaces between births, given that children born after more lengthy spaces are more likely to survive than those closing a short space. The figures in Table 5.6.5 thus probably underestimate the true extent of class differences.

The top left-hand panel of Table 5.6.5A suggests that among women marrying aged 20–24 in 1896–1901, working-class women were more likely to be pregnant on marriage than those in class I, having a child within their first year of marriage. This is a factor to be borne in mind when calculating more conventional fertility measures, and also suggests that among working-class women 'age at marriage' may as likely be a result of 'age at pregnancy' as vice versa. Before their second wedding anniversary 73 per cent of the miners' wives had had their first child, but only half of class I wives had done so. However, by their fourth anniversary virtually 80 per cent of couples in all classes had borne their first child. By the 1911 census, when they had been married on average for 12.5 years, between 9 and 13 per cent of couples in each class had not yet had their first child. The relatively small difference between classes in the proportion who remain childless suggests that in this cohort most couples had no objection to at least one child or, to put it another way, married couples of all classes still aspired to being 'a family'. The pace at which couples started their family does, thus, appear to differ between classes in this marriage cohort. Owing in part to the higher proportions of working-class wives who were pregnant on marriage, there remains a substantial social difference in the apparent

Table: 5.6.5A *Family building in early marriage by couples where the number of children ever born as reported in the 1911 census equals the number of own children living in the household on census night 1911, wives married aged 20–24*

Panel A: Percentage of couples achieving a *first* live birth by completed years of marriage by class and marriage cohort

	Marriage cohort 1896–1901 Class						Marriage cohort 1901–6 Class					
Years married	I	II	III	IV	V	VII	I	II	III	IV	V	VII
0	5	7	15	14	10	27	8	11	14	14	14	9
1	50	59	56	62	58	73	53	48	69	59	67	62
2	72	76	71	79	74	85	68	71	81	73	82	78
3	78	80	82	84	82	88	75	76	85	78	89	82
4	86	81	85	86	83	90	80	81	90	80	92	87
5	87	83	88	87	85	90	82	84	91	83	92	89
6	88	85	88	87	85	90	83	86	91	84	93	90
7–10	91	87	90	91	88	90	84	87	93	87	94	91
No child by 1911	9	13	10	9	12	10	16	13	7	13	6	9
Total (N)	78	94	137	141	98	48	76	140	210	209	134	91

Panel B: Percentage of couples achieving a *second* live birth, by completed years of marriage by class and marriage cohort

Years married	Marriage cohort 1896–1901 Class						Marriage cohort 1901–6 Class					
	I	II	III	IV	V	VII	I	II	III	IV	V	VII
0	0	0	1	0	0	0	0	1	1	1	1	1
1	0	0	4	4	4	2	3	3	4	4	4	7
2	14	16	20	16	11	25	11	17	14	14	22	24
3	29	39	41	38	35	38	29	30	43	33	43	49
4	33	48	50	51	50	54	38	40	56	46	63	62
5	41	52	60	59	60	58	43	52	64	53	74	73
6	47	61	64	64	66	69	51	58	70	58	79	77
7–10	64	68	73	73	77	81	58	66	75	66	81	78
No second child by 1911	36	32	27	27	23	19	42	34	25	34	19	22
Only one child	25	19	17	18	11	9	26	21	18	21	13	11
No children	9	13	10	9	12	10	16	13	7	13	6	9
Total (N)	78	94	137	141	98	48	76	140	210	209	134	91

Note:
All percentages have been rounded to the nearest whole number.
Source: OPCS dataset.

Table: 5.6.5B *Family building in early marriage by couples where the number of children ever born as reported in the 1911 census equals the number of own children living in the household on census night 1911, wives married aged 25–29*

Panel A: Percentage of couples achieving a *first* live birth by completed years of marriage by class and marriage cohort

Years married	Marriage cohort 1896–1901 Class						Marriage cohort 1901–6 Class					
	I	II	III	IV	V	VII	I	II	III	IV	V	VII
0	5	4	4	15	16	7	2	7	6	6	17	16
1	42	44	51	55	56	44	40	43	50	53	57	58
2	63	61	66	62	70	70	51	64	66	68	65	71
3	68	71	74	73	74	78	58	70	74	72	73	74
4	72	71	74	76	78	78	65	72	75	75	81	76
5	73	74	77	78	78	78	73	78	80	76	82	79
6	78	77	77	78	78	78	75	79	81	76	83	82
7–10	80	77	81	82	80	81	76	80	84	78	84	84
No child by 1911	20	23	19	18	20	19	24	20	16	22	16	16
Total (N)	60	101	77	55	50	27	91	105	121	118	77	38

Panel B: Percentage of couples achieving a *second* live birth, by completed years of marriage by class and marriage cohort

Years married	Marriage cohort 1896–1901 Class						Marriage cohort 1901–6 Class					
	I	II	III	IV	V	VII	I	II	III	IV	V	VII
0	0	0	1	2	4	0	0	0	2	1	1	0
1	0	1	1	4	6	4	1	2	3	3	4	3
2	3	12	6	13	18	19	3	7	10	17	12	26
3	23	28	22	25	42	26	14	19	26	32	23	47
4	38	36	38	38	46	48	21	30	45	42	34	55
5	43	43	48	44	52	52	29	38	51	47	42	58
6	45	48	53	49	58	59	37	44	56	51	47	61
7–10	52	62	60	60	68	70	46	50	62	57	53	63
No second child by 1911	48	38	40	40	32	30	54	50	38	43	47	37
Only one child	28	15	21	22	12	11	30	30	22	21	31	21
No children	20	23	19	18	20	19	24	20	16	22	16	16
Total (N)	60	101	77	55	50	27	91	105	121	118	77	38

Note:
All percentages have been rounded to the nearest whole number.
Source: OPCS dataset.

resort to delaying the arrival of children at the start of marriage.[99] This can only remain 'apparent' as there is no way of knowing whether the 'delay' was deliberate.

The lower left-hand panel of Table 5.6.5A shows rather more striking class differences. Here the rate at which the same 1896–1901 cohort achieved their second child is depicted. Some women in all classes conceived very rapidly after the birth of their first child (some may have had twins) and had two small children by their third wedding anniversary. Class I, however, was much slower in achieving a second birth than the other classes and it is noticeable that, while a proportion of class II had their second child relatively rapidly, as a class they too were slower at acquiring their second child than were the working-classes. Thus, after 12.5 years of marriage, one in four class I couples on average had had only one child, whereas this was true of only one in ten among classes V and VII. Since most couples had their first child within the first three years of marriage, this second set of figures implies that a significant proportion of class I couples had employed very successful fertility restriction after having their first child.[100]

On turning to Table 5.6.5B, it becomes apparent that among those married aged 25–29 in 1896–1901 progression to a first birth is slower in all classes than among those married aged 20–24 but particularly so among class I.[101] There does not seem to be any suggestion that these 'later' marriers are hurrying to 'catch up' lost fertility. Indeed, the contrary seems to be the case: having married relatively late, they are exhibiting signs of even greater reluctance to have large families than their younger-marrying peers; indeed approximately one in five couples in all classes did not achieve a first live birth by the 1911 census.[102] The slower rate of having children among those who do, suggests that the late marriers were also more inclined to space, either through choice or because of a preference for lower coital frequency.[103] There are also important class differences in the lower left-hand panel in Table 5.6.5B, which shows the rate of progression to second birth among those married aged 25–29 in 1896–1901. Those class I women married aged 25–29 who proceeded to have second children did so only slightly less slowly than those who married aged 20–24. In other classes, however, later-marrying women proceed much more slowly from their first child to their second than do the younger marriers in the same class. The latter fact supports Szreter's contention that there are in fact two different 'types' of reproductive strategy among the working-classes: the 'unrestrained' and the 'prudent'.[104] The former is characterised by early age at marriage, often consequent on pregnancy, and a quick tempo of childbearing resulting in a high number of children; the latter by late age at marriage and a rather smaller average family size. Thus among the working-class groups a sharp distinction in behaviour between age-at-marriage groups is to be expected, although the relative preponderance of the two groups within a particular population would depend on local social norms. Among class I, however, as relatively late age at marriage was the expected mode of behaviour, a sharp distinction in behaviour is less likely to emerge.[105] Among class I couples, if a second child had not been born by the seventh wedding anniversary such an event was less likely to happen in the next three years than was true among the younger marrying women. For this reason 48 per cent of observed class I women married aged 25–29 between 1896 and 1901 had no second child by 1911, while in classes II–IV this figure was roughly 40 per cent and among class V and the miners of class VII it was 30 per cent.

By comparing the two marriage age groups within the 1896–1901, and therefore longer-married, marriage cohort, it is possible to see that the proportions with only one child are actually rather similar within each class. It is the greater proportion with no children which increases the proportion who have not achieved a second child in the older-marrying age group; almost twice as many women in the older-marrying group are childless in each class.[106] Given the relatively small numbers in each class, the percentages reporting themselves as having no children are remarkably similar across the social scale in both marriage age groups. In the 1901–6 marriage cohort, there is a slightly stronger, if erratic, class differential in the proportion having no children. Thus comparison of the two marriage cohorts suggests, once again, that classes I and II take rather longer to start their families, but that after 10–15 years of marriage most of those who were going to do so had had a child. This leaves the difference in childlessness between the two age-at-marriage groups in each cohort to be explained. A clue may lie in the relative number marrying in each age group in the different classes. For example in the 1901–6 cohort, out of 167 class I couples married in their twenties 76 (45.5 per cent) married aged 20–24. Among class V the equivalent figure was 63.5 per cent and among the miners 70.5 per cent. If working-class marriage was often fertility driven, then among those marrying aged 25–29 there would be two groups: Szreter's 'prudential' group, postponing both marriage and childbearing, and those who had failed to marry earlier because they were naturally sub-fecund and had failed to conceive the baby which would otherwise have precipitated their marriage. Among the middle classes a more ubiquitous ethos of later age at marriage, in conjunction with great social stigma being attached to 'having to get married' because of pregnancy, appears to be associated with a slower pace of childbearing, and a smaller family size. Referring back to previous tables, the different experience of later-marrying women has important implications when we consider the proportion they comprised of various groups within and across environments. More childlessness and single-child families could be expected, *ceteris paribus*, in Agricultural and White Collar areas simply by dint of the greater proportion of their women who married late.[107]

In all classes, therefore, women who married later were able to do so by avoiding pregnancy. Whether this had occurred by deliberate, individual choice or through respecting social sanctions, it is plausible to suggest that 'early-marrying' women and their husbands may have had a different view of their sexuality and the desirability of controlling it than did later-marrying couples.[108] The extent to which this had consequences for their family building behaviour within marriage is a question which offers considerable scope for future research.[109]

To sum up: it would appear that in the OPCS study population small family size was found first among class I as the 1923 report on fertility within marriage suggested. However, within that class it was those couples living in well-off areas who reduced the size of their families at the earliest date; couples of similar elite social status in the industrial heartlands were rather slower to do so. Other non-elite classes living in the well-off, capital-accumulating areas rapidly followed the lead of their neighbours from class I, thus suggesting that there was a strong spatial element involved in the adoption of birth-controlling attitudes and practices. The mining communities and the unskilled workers of the Staple Industrial areas were the last groups to reduce family size, possibly because attitudinal change was slowest to penetrate such areas or possibly because their male-centred, labour-dominated culture meant that the new ideas met with little favour when they were initially encountered.

Within the context of Table 5.6.5 it is evident that both stopping and spacing strategies were being deployed after very small numbers of children, particularly among middle-class couples. Such behaviour would translate into low levels of natural fertility under Coale and Trussell type models, particularly if wives observed in older age groups were accumulating larger families before stopping.

Until full fertility histories can be compiled for significant numbers of women from the fertility decline era many issues surrounding how the fertility decline developed will remain unresolved; however the evidence presented and analysed here indicates that there was an important social and community dimension to the change in beliefs concerning fertility and sexual behaviour, both before and after marriage, which must have accompanied the dramatic decline in national fertility levels over the late Victorian and Edwardian eras. The role of community in the formation and assimilation of these beliefs appears to have remained strong. Individuals did not necessarily have to talk explicitly to one another about fertility *per se* in order to reflect upon how to behave with regards to family size: by observation of their neighbours in myriad daily interactions in public spaces such as the street, the church and the workplace people realised that smaller families had advantages, or conversely, that large families were becoming an object of pity. Each couple would have conceptualised these advantages in their own terms: some may have understood that fewer children meant more money to spend per member of the household; others might have realised the dividends to be gained in terms of health; or perhaps they simply came to recognise that large families were something which, somehow, the respectable and the respected in their community deemed it prudent to avoid.[110]

5.7 Male occupation and fertility

In the previous sections of this chapter the social groups considered have predominantly been those defined within the Registrar-General's classification scheme. These have been used out of necessity because of the need to amalgamate the data into relatively large social units, which remain familiar to other researchers. It is not, however, the intention of the present study to endorse the validity of the scheme in any theoretical or empirical sense. Many of the problems identified by Szreter in treating the 'Professional model' as a valid survey of the population's fertility pattern in 1911 have re-emerged in the course of the previous sections (notably the anomalous performance of class IV).[111] The various measures of fertility deployed have demonstrated that within the OPCS study population an increasing preference for smaller family sizes evolved first of all in those areas where the professional classes dominated, although in the 1891–1911 period the rate of decrease appears to have been most rapid in the OPCS Agricultural areas.

In section 5.3 it was suggested that the distribution of the classes across the environments would affect the overall level of each class's fertility, and that, reciprocally, the combination of classes within an area would contribute to that area's fertility. Several previous studies have been concerned with the role, not of class, but of occupation in influencing fertility.[112] Was it possible to show using the individual census data from 1911 that similar occupations in the different environments demonstrate the same fertility behaviour? Could it be shown that the distribution across environments of individuals following particular occupations influenced the overall fertility level of that occupation?

Small numbers precluded observation of single specific occupations, such as 'tailor', 'carpenter' or 'carter' in the OPCS population so instead 15 occupational categories were used. These comprised the Professions, Retailers, Miscellaneous Service, Clothing, Textiles, Transport, Pottery, Paper, Construction, Agriculture, Wood, Mining, Metal Manufacture and General Labourers, with all other employed individuals being placed in a residual 'Others' category.[113] Numbers in each of these categories were sufficient to allow appropriate infant mortality multipliers to be estimated in each case, and therefore measures of fertility could be calculated.

Table 5.7.1 presents the Total Marital Fertility Rates (TMFRs) calculable for the married men in the 15 occupational categories for 1891, 1901 and 1911. The 1891 column in the table is arranged in ascending order of TMFR. Not unexpectedly the Professions have the lowest fertility in this year, at 4.94 children per couple, followed closely by those in service with 5.19.[114] At the opposite extreme those in Metal Manufacture had produced 6.85 children, and those in Mining 6.74.

In general all occupations saw a greater decline in fertility between 1901 and 1911 than they did over the preceding decade.[115] Although cross-sectional comparisons down the columns of Table 5.7.1 are much more robust than longitudinal ones across its rows, some indication of the rate of fertility decline in each occupation can be gauged from the overall percentage decline in the value of the TMFR from 1891 to 1911. While some occupations saw only a minimal decline, in others it was much more significant. The Professions lost virtually a quarter of their fertility, those in Paper more than a third, and those in Agriculture almost 30 per cent.

The rate of decline in the fertility of men in Agriculture is considerably higher than that demonstrated by Agricultural labourers in Figures 5.3.2 or 5.3.3, suggesting that farmers and more skilled farmhands were experiencing quite momentous declines in their fertility. An alternative explanation is that a change in the social balance of the agricultural community had taken place between 1891 and 1911, as the number of labouring jobs in agriculture diminished, reducing their contribution to the occupational category's overall fertility levels. The validity of this interpretation is not easy to determine as the descriptions pertaining to farm work changed from census to census. In 1891 the census instructions meant that men were encouraged to return themselves simply as 'agricultural labourer' or 'farm servant', whereas in later years the instructions directed that they report whether they worked with cattle, horses or sheep, thus moving them out of the category of labourer.[116] There is the added complication that 'farmer's relative' was recognised

Table 5.7.1 *Total marital fertility rates (TMFRs), by male occupation, all OPCS, 1891, 1901 and 1911*

	1891		1901		1911				
Occupation	TMFR	N	TMFR	N	TMFR	N	1891–1901 % change	1901–11 % change	1891–1911 % change
Professional	4.94	610	4.70	805	3.75	1,074	−4.80	−20.20	−24.10
Miscellaneous service	5.19	445	5.05	591	4.24	870	−2.70	−16.00	−18.30
Clothing	5.66	319	6.26	368	5.11	381	+10.60	−18.40	−9.70
Other	5.67	1,213	5.23	1,620	4.46	1,620	−7.80	−14.70	−21.30
Retail	5.68	931	5.08	1,135	4.59	1,308	−10.60	−9.60	−19.20
Textiles	5.68	167	5.15	180	5.30	161	−9.30	+2.90	−6.70
Transport	6.16	995	5.76	1,374	4.90	1,566	−6.50	−14.90	−20.40
Potters	6.21	307	7.01	291	5.78	515	+13.70	−17.50	−6.90
Paper	6.23	135	5.51	265	4.07	281	−11.50	−23.20	−34.70
Construction	6.37	672	5.64	920	5.37	979	−11.40	−4.80	−15.70
General labourer	6.43	929	6.35	638	5.23	542	−1.23	−17.80	−18.70
Agriculture	6.48	1,078	5.64	911	4.56	918	−13.00	−19.10	−29.60
Wood	6.53	682	5.91	956	5.28	913	−9.50	−10.60	−19.10
Mining	6.74	826	6.54	1,176	5.90	1,444	−3.00	−9.80	−12.50
Metal manufacture	6.85	595	6.44	560	5.70	730	−6.00	−11.50	−16.80

Source: OPCS dataset.

Table 5.7.2 *The number of 'other workers in agriculture' aged 15–64, per 100 farmers and farmers' relatives aged 15–64, in five Agricultural OPCS locales, 1891–1911*

Locale	1891	1901	1911
Abergavenny	53	56	89
Axminster	302	158	130
Banbury	980	690	514
Morland	68	52	73
Saffron Walden	1,200	620	800

Source: OPCS dataset.

as an occupation in its own right.[117] If it is assumed that farmers and their relatives form the highest stratum in the agricultural hierarchy and their number is compared with that of all other male 'agricultural workers' aged 15–64 across the OPCS population, then it is discovered that there were 2.7 'agricultural workers' for every farmer (and farmer's relative) in 1891, but only 1.7 in 1901, rising again to 2.1 in 1911. Table 5.7.2 presents comparable ratios calculated for the Agricultural environment-specific sectors of Abergavenny, Axminster, Banbury, Morland and Saffron Walden, and demonstrates that the story was not a straightforward one.

In the pastoral, upland farming communities of Abergavenny and Morland, the ratio of non-familial farm labour to farmers, while very low, rose slowly over the turn of the new century; the 'average social status' of the Agricultural category would have decreased. In the more southerly communities of Banbury, Axminster and Saffron Walden, however, the ratio of 'farmers' to 'agricultural workers' dropped dramatically between 1891 and 1911: the average social status of the Agriculture occupational category must have risen. This experience no doubt reflects the considerable crisis in the last decades of the nineteenth century brought on by the agricultural depression, the burden of which appears to have fallen mainly on the shoulders of the agricultural labourers, many of whom probably left the rural areas to seek more secure employment.[118] As farmers made economies in the number of hands they employed, they were probably also becoming increasingly aware of the cost of additional children to their household finances.[119] Apparently such calculations were not being undertaken in the upland communities; there is an evident lack of fertility decline in these areas.[120]

Important differences between distinct farming regimes in the agricultural sector of the economy are thus indicated.

The relative impact of the Great Depression on the southern farmers and farm workers may have been much greater than even the absolute declines in fortune they suffered suggest. While the 1890s was a trying decade, the first ten years of the new century brought greater prosperity. However, the bad years seem to have made their mark: in both Axminster and Saffron Walden it was those in the 20–35 age group who conspired to produce the greatest decline in their fertility. Were they altering their lifestyles in order to stave off crisis situations, and the drops in relative income with which they had seen their parents and older neighbours contend?

Another occupational group which can be observed in different geographical locations within the OPCS data is those in 'Mining'. Table 5.7.1 shows their overall fertility falling from a TMFR of 6.74 children per woman in 1891 to 5.9 children two decades later. The rather slow pace of this decline meant that by the latter date they were the most fertile of the occupation groups. As Table 5.7.3 shows, between 1891 and 1911 both Earsdon and Blaenavon, where work for women was scarce, saw a decline in fertility of some 16 per cent, the bulk occurring over the second decade.

Over the first decade, in both of these communities, the age-specific fertility among women in their later reproductive years had actually increased, while it fell among women in their twenties. Fertility in the latter age group was lower still in 1911, and the women who had been in their twenties in the previous decade now also contributed to a decline in fertility among those in their thirties. Earsdon's lower level of fertility, compared with that of Blaenavon, stems from lower ASMFRs across the reproductive age span. It is possible that women from the North East breast-fed their babies for longer than those from Wales, because they consistently produced about 0.5 of a child less per woman than the latter.[121] There is no indication that the plentiful supply of jobs for women in the Potteries reduced fertility among the mining population of Stoke; indeed their fertility underwent only modest decline between 1891 and 1911.[122]

Other occupation groups cannot be readily split by place, and even division by environment does not prove ideal.[123] Table 5.7.4 presents TMFRs at each of the three study censuses for those occupational categories which can be broken down and yet retain 100 couples in any one environment.[124] Only two categories – Construction and Other – allow comparison over all four environments. The mix of occupations in the Other category varied considerably from one environment to another,

Table 5.7.3 *Total marital fertility rates (TMFRs) for males in 'mining' occupations for selected OPCS locales, 1891, 1901 and 1911*

	1891			1901			1911		
Locale	TMFR	N	% change 1891–1901	TMFR	N	% change 1901–11	TMFR	N	% change 1891–1911
Abergavenny	7.28	214	−2.3	7.11	249	−14.8	6.06	315	−16.7
Earsdon	6.53	373	−3.5	6.30	600	−12.2	5.53	624	−15.3
Stoke	6.44	111	+15.2	7.42	123	−18.7	6.03	325	−6.4

Source: OPCS dataset.

and therefore comparison between environments cannot be conclusive. Similarly, Construction work, as far as can be judged from the census returns, attracted a combination of peripatetic men, moving to wherever work was available, and local men who gave up other work when employment on a construction site was on offer. Such a shifting population poses problems for interpretation of changes in fertility over time. Generally, Table 5.7.4 shows that in occupational categories where cross-environmental comparison is possible those residing in White Collar areas had lower TMFRs and those living in Staple Industry areas had higher TMFRs than those residing elsewhere. The role of one's neighbours in influencing fertility behaviour is thus emphasised once again. For example, Professionals in the White Collar environment had smaller families than Professionals living in Light Industry areas.[125] The interplay of nuptiality and fertility is thus once again reinforced. The Miscellaneous Services group, while remarkable as a working-class group for their low levels of fertility, have somewhat higher levels than their professional neighbours in the two environments shown, although it is noticeable that the fertility of servants in the White Collar environment is lower, and declines more quickly than that of servants in Light Industry areas.

The numbers in most occupational groups in 1911 do not permit investigation of achieved parity across marriage cohorts and environments; however this is possible for the 'Retail' group. As Szreter has previously pointed out, there are several grades of retailer, and this is of relevance to their fertility and nuptiality behaviour.[126] The different environments might be expected to have different mixes of the sections of the retail trade, so here analysis focuses on the relatively higher-status, more highly capitalised 'Dealers'. To standardise as far as possible for differences in the distribution of age at marriage only couples where the wife married in her twenties were considered. Figure 5.7.1 depicts the achieved parity distribution for three marriage cohorts.

Beginning with those married for 20–29 years in 1911, it is evident in the Staple Industry areas that virtually all Dealers produced at least one child and some 90 per cent achieved two, whereas in the other two environments some 15 per cent of couples were childless. About 40 per cent of Staple Industry Dealers and their wives in this marriage cohort had families of six children or more, whereas this proportion was nearer 30 per cent in the Light Industry areas, and fewer than one couple in five among the Dealers in White Collar areas had such large families. The marked 'break of slope' in the White Collar curve suggests a sizeable number of couples in these communities married in the 1880s were already achieving very small families. Amongst the late 1890s marriage

Table 5.7.4 *Total marital fertility rates (TMFRs), by male occupation and OPCS environment, 1891, 1901 and 1911*

		1891		1901		1911	
Occupation	Environment	TMFR	N	TMFR	N	TMFR	N
Professionals	White Collar	4.17	201	3.75	231	3.31	530
	Light Industry	5.29	262	5.05	360	4.23	357
Misc. service	White Collar	4.85	105	4.38	148	3.96	245
	Light Industry	5.38	179	5.40	218	5.03	302
Clothing	Light Industry	6.05	200	6.68	262	—	270
Other	White Collar	4.87	159	4.24	200	3.54	288
	Agriculture	5.13	117	5.07	136	4.44	229
	Light Industry	5.67	613	5.43	933	4.47	820
	Staple Industry	6.51	324	5.44	351	5.15	376
Retail	White Collar	5.49	163	4.54	171	3.91	295
	Light Industry	5.72	505	5.22	719	4.69	730
	Staple Industry	5.45	184	4.69	182	5.01	212
Textiles	Staple Industry	5.84	129	4.96	139	5.31	129
Transport	White Collar	5.80	185	4.90	211	4.09	329
	Light Industry	6.39	585	5.85	868	5.00	856
	Staple Industry	5.75	169	6.32	221	5.28	288
Potters	Staple Industry	5.89	243	6.78	231	5.91	479
Paper	Light Industry	6.06	120	5.45	234	4.22	229

Construction	White Collar	5.33	103	5.74	92	5.29	188
	Agriculture	6.58	111	6.28	147	5.00	131
	Light Industry	6.87	315	5.37	479	5.33	443
	Staple Industry	5.83	143	5.99	202	5.87	217
General labourer	Light Industry	6.66	385	7.49	305	5.51	225
	Staple Industry	6.51	314	5.36	180	5.32	173
Agricultural labourer	Agriculture	6.62	824	5.87	694	4.93	669
	Light Industry	5.48	133	5.09	118	—	118
Wood	Light Industry	6.53	450	5.91	717	5.28	652
Mining	Staple Industry	6.74	735	6.66	1,015	5.89	1,312
Metal manufacture	Staple Industry	6.79	482	6.56	474	5.68	634

Note:
— signifies that child survival could not be calculated for this group.
Source: OPCS dataset.

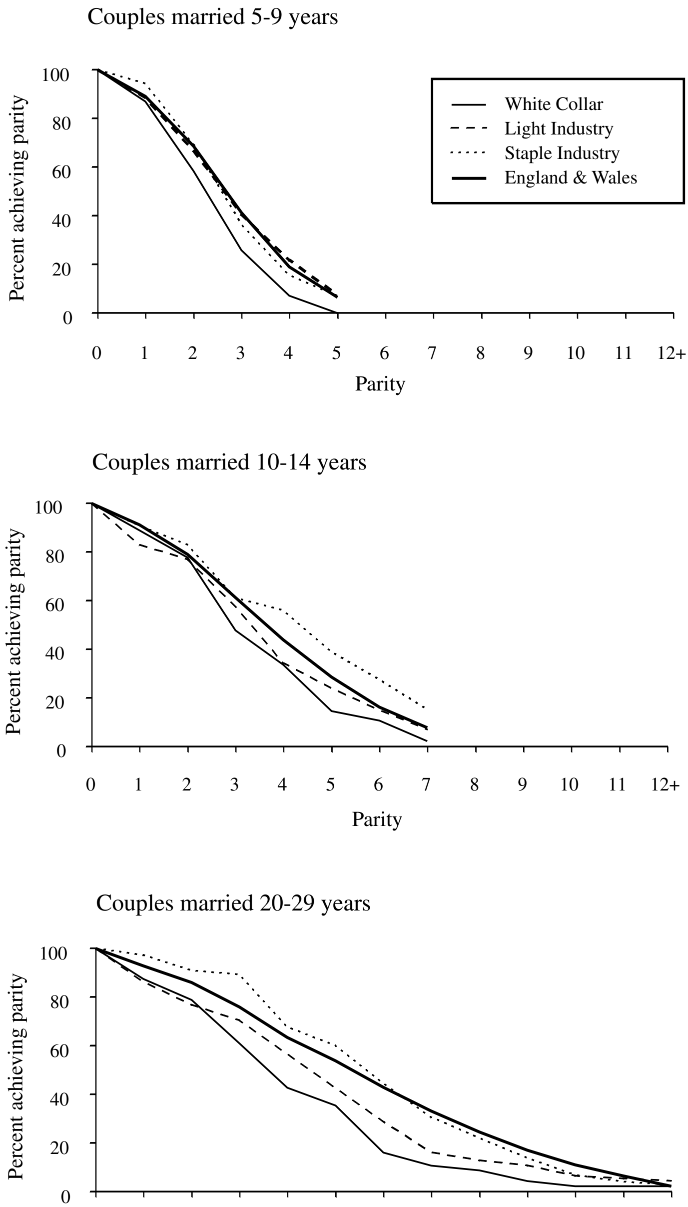


Fig. 5.7.1 Differences between OPCS environments in the percentage of couples achieving given parities where the husband is a dealer, by marital duration for wives married aged 20–29. *Note:* There were insufficient numbers for dealers in the Agricultural environment to be considered. *Source:* Figures for England and Wales calculated from *Fertility of marriage*, Part I (1917), Table 19.

cohort, married for 10–14 years, the break of slope at two children is evident in all three environments, although over half of the Dealers in Staple Industry areas still had at least four children in fewer than 15 years of marriage. Finally in the cohort of Dealers married between 1901 and 1906, while final family size cannot be deduced, it is obvious that Dealers and their wives were accumulating children rather more rapidly in Industrial areas than in White Collar ones. Ten per cent of couples in the Industrial areas had already achieved five children by 1911, a feat unmatched by their peers in the White Collar communities. The patterns of childbearing graphed in Figure 5.7.1 thus confirm that different family building strategies were operating among members of the same occupational category resident in contrasting socio-economic environments, or at least that the proportionate mix of categories differed between environments.

Fertility among male class and occupational groups had geographical as well as social complexity. The role of one's neighbours in providing a yardstick against which to judge one's own performance has been confirmed by within-environment comparison. This section, however, has concentrated exclusively on male occupations. In the next section examination is made of the fertility of female occupational divisions, often much more locationally specific than that of their husbands.

5.8 Female occupations and fertility

In his report on the Fertility Census Stevenson highlighted those couples where the husband was a coal-miner or an agricultural labourer because of their apparently high fertility levels, in counterpoint to those couples where the husband was a textile worker, whose fertility lay at levels more akin to the middle classes than to others in the working-class. The reason for this low rate of reproduction, Stevenson asserted, lay in the number of male textile workers whose wives also worked in textiles for, as he went on to show in tables correlating married female occupation with fertility, women's work in paid employment usually resulted in low levels of fertility.[127]

Stevenson could not definitely establish that it was the wives' work in the textile mills which resulted in low fertility among male textile workers, as he did not take the opportunity to calculate the fertility of married couples in particular occupational combinations.[128] He did, however, demonstrate to his satisfaction that in areas where textile workers lived fertility was generally low throughout the community, whereas the fertility of miners and agricultural labourers was much higher than the average for the areas in which they lived.[129] In these

Table 5.8.1 *Proportion of women returning an occupation in each census, by marital status and age (15 and over), OPCS population 1891–1911*

Date	15–	20–	25–	35–	45–	55–	65+	All	N
Panel A: Single									
1891	69.6	75.7	73.4	67.5	61.9	50.4	26.2	70.7	10,035
1901	69.4	75.5	71.4	64.3	65.0	47.8	29.6	69.8	12,101
1911	74.6	79.7	75.7	66.6	60.6	55.1	29.5	73.5	14,184
Panel B: Married – spouse absent									
1891	(66.7)	(30.6)	45.5	48.1	42.9	42.1	(34.2)	43.7	704
1901	(25.0)	31.2	31.9	44.0	39.0	43.5	26.1	37.2	893
1911	(0.0)	35.7	37.9	41.1	47.4	45.4	31.4	40.9	1,030
Panel C: Married – spouse present									
1891	13.2	15.0	9.6	9.6	9.2	7.8	6.8	9.5	13,171
1901	9.5	10.1	6.8	8.0	7.1	7.5	5.7	7.5	15,390
1911	(12.5)	11.8	12.2	10.5	10.3	9.7	6.9	10.8	17,730
Panel D: Widowed									
1891	(50.0)	(66.7)	69.9	70.3	54.9	43.0	23.6	42.5	3,202
1901	—	(60.0)	73.1	63.9	55.0	39.1	22.9	40.4	3,461
1911	(75.0)	(60.0)	74.3	66.8	51.3	36.2	17.1	34.9	3,740

Note:
Numbers in parentheses indicate percentages derived from fewer than 50 women.
Source: OPCS dataset.

latter two kinds of area, where there was little employment for women, the husband's occupation affected fertility, he argued, whereas in areas where women formed part of the labour force, they would marry across the spectrum of male occupations and, as the female occupation had greater influence over childbearing, all groups would see some reduction in fertility. Did examination of the OPCS data confirm Stevenson's interpretations?

While differentiation between OPCS environments can be made on the basis of the proportion of the female population aged over 15 in employment, the pattern is not a straightforward one. First, as Table 5.8.1 shows, women's reported labour force participation varied with age and with marital status.[130] Single women were most likely to be employed, and have their highest participation rates reported when in their twenties. Labour-force participation among the widowed and those who reported themselves to be married but have no husband living with them on census night (hereafter 'married-spouse-absent') ran at about 40 per cent. Widows saw quite a rapid tailing off in their participation rates after age 45, but married-spouse-absent women maintained their rate of participation into old age. These two marital status categories are smaller than the single or 'married-spouse-present' groups but they provide greater problems of interpretation as a portion of such women, having been left on their own, may have had to work to support themselves and their families regardless of their domestic circumstances.[131] Also, as both widowed and married-spouse-absent women were more likely to be filling in the census form in the absence of a male partner, they may have felt more disposed to return an occupation. No doubt a combination of these factors was at work, probably to different degrees in the different OPCS locales, but the very low reported rates of married women's participation in the labour force are beyond doubt.[132]

Female participation in the labour force also depended on the availability of employment opportunities, as well as the acceptability of women's work within the local culture. Figure 5.8.1 charts the participation rates reported in the OPCS 1911 census population by women aged 15 or over divided by marital status, environment and place. In each of the environment-specific sectors the majority of single women reported an occupation, Earsdon's mining villages being the only exception. In both Bolton and Bethnal Green nine out of every ten single women reported having a job, with Stoke falling only just short of this level. In any one of these three areas a man taking a wife would be marrying a woman experienced in 'manufacturing' who might well continue to work after her marriage. In most other areas between 60 and 80 per cent of single women worked, but in both the Light and Staple Industry sectors of Swansea this fell to 50–60 per cent, as it did in Agricultural Saffron Walden. There was also considerable contrast in the type of employment available. Figure 5.8.2 indicates that the majority of single women were employed as domestic servants in White Collar and Agricultural environments, whereas in the Light and Staple Industry environments the role of servant was generally undertaken by a relatively small fraction of all employed, single women.

While generally low, married women's rates of employment may be considered high, at almost 20 per cent, in Bethnal Green, Bolton and Stoke; but extremely low in Earsdon and Light Industrial Swansea where no more than one in every 50 married women reported an occupation.

In the Industrial sectors of Abergavenny and Swansea married women's participation rates were only one-third to a half of those of

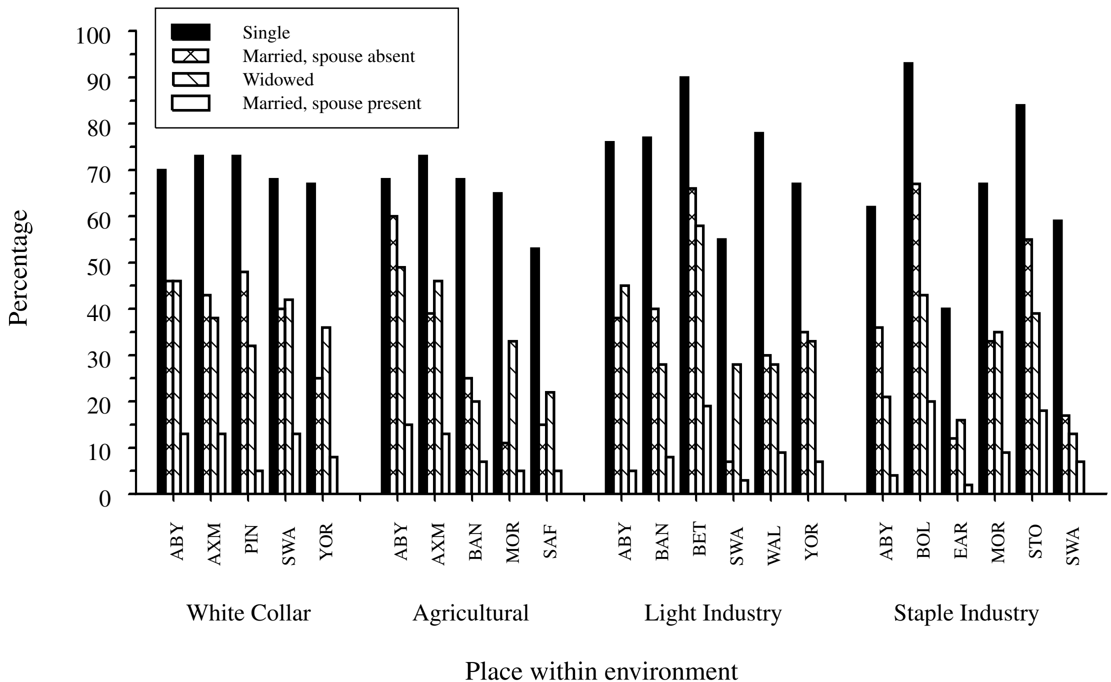


Fig. 5.8.1 The percentage of women aged 15 or over returning an occupation, by marital status and place within environment: OPCS 1911

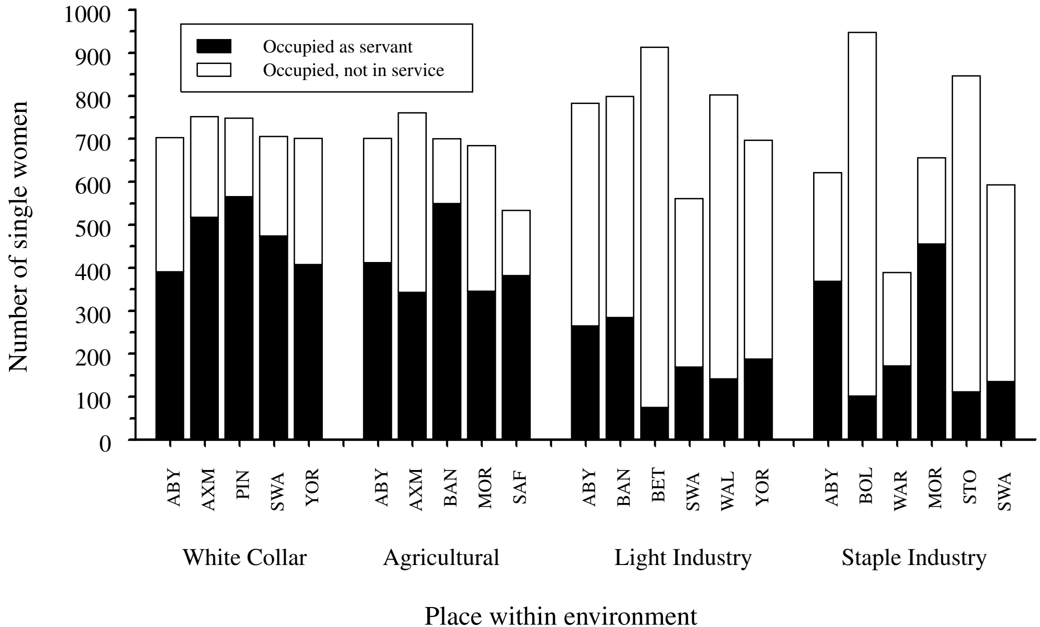


Fig. 5.8.2 The number of single women employed in service, and in other occupations, per thousand single women, by place within environment

other sectors representing these locales, suggesting that it was a lack of 'suitable' jobs, in addition to an ethos of *machismo* ruling that a man ought to be able to 'keep' his wife, which kept women out of the workforce in the mining and metal-working communities. In White Collar Pinner the rates of married women's labour force participation were also minimal, reflecting the middle-class version of the code of male breadwinner respectability.

Failure to return an occupation did not necessarily mean that a married woman was not contributing to household income.[133] The census enumerators' books give evidence that in a sizeable proportion of households with an ostensibly 'non-working' wife, the latter was nevertheless taking on additional household tasks in providing for the need of boarders in order to earn a little extra income as seen in Figure 5.8.3.[134]

Women's ability to work was severely constrained by lack of opportunity in Earsdon. The relatively large proportion of wives who were caring for boarders as well as their own husbands and families in this community suggests this was a welcome means of earning a little extra cash, while no doubt reflecting the number of young men looking for somewhere to stay when they arrived to seek work in the mines. Conversely, while the need for income may have been just as great in Bethnal Green, space must have been at a premium, and thus the ability to take in boarders must have been restricted. In the Agricultural environment, where inmigration was not a notable feature, the demand for places to board would have been relatively small. Figure 5.8.3 further suggests that taking in boarders was often a more 'acceptable' alternative to married women's employment outside the home when the middle classes found themselves in 'straightened circumstances'.

As has been shown, in 1911 single women were very likely to go out to work, but after marriage the proportions doing so fell dramatically, even in those communities where women's work was plentiful. The Victorian belief that woman's place was in the home, and that a woman's greatest role in life was that of mother, when coupled with the notion of the 'family wage' and the 'male breadwinner' ideal, meant that 'respectable' middle- and working-class women expected to give up work on marriage, and in some occupations there was no choice; a marriage bar meant it was impossible for women to remain in their job beyond their wedding day.[135] Even where it was accepted that married women could work, a woman's ability to do so would, nevertheless, be constrained by household and child care duties. In certain localities a high proportion of employed women actually worked 'at home'.[136] Married women in such a position may have found it easier to balance

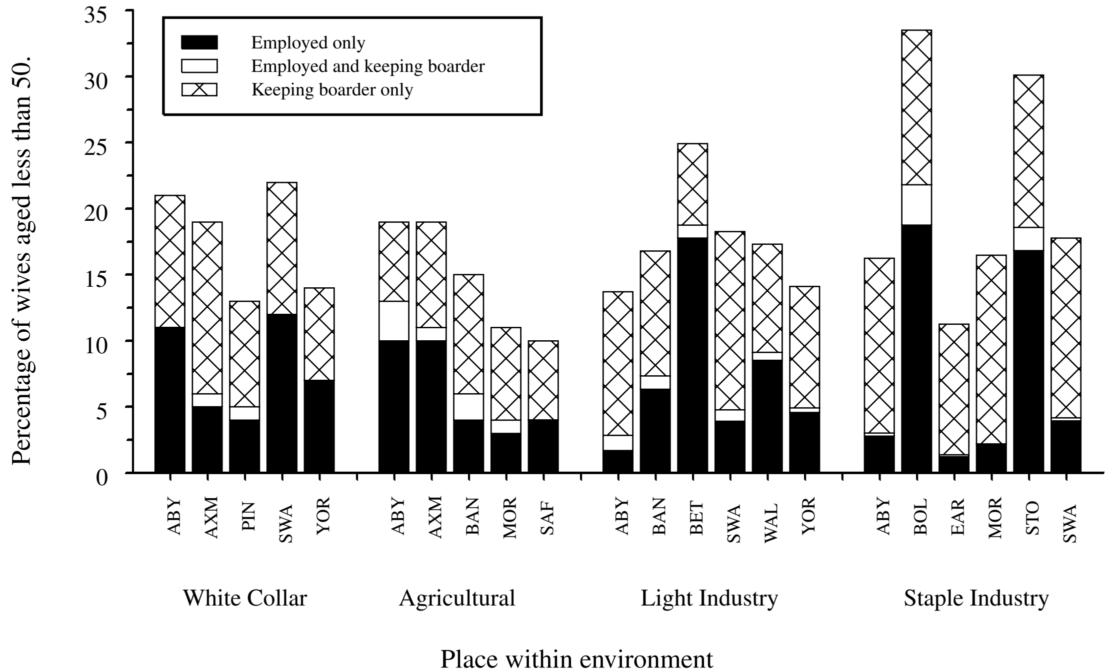


Fig. 5.8.3 The percentage of wives aged less than 50 in each place, within each environment, who are (a) in paid employment, (b) in employment and keeping a boarder, or (c) keeping a boarder only; OPCS 1911

Table 5.8.2 *Percentage of wives who were in employment, by marital duration, in selected places and environments, OPCS 1911*

		% by duration of marriage				
Place	Environment	<5	5−	10−	15−	20+
Bethnal Green	Light Industry	24	18	17	21	15
Walthamstow	Light Industry	11	8	10	11	8
Bolton	Staple Industry	33	25	20	20	13
Stoke	Staple Industry	26	19	18	16	14

Note:
Percentage figures have been rounded to the nearest whole number.
Source: OPCS dataset.

child care with the demands of their job; indeed they may have chosen this mode of earning a living in order to do just that. Certain occupations, such as dressmaking, were particularly suited to home working, while others, particularly large-scale textile production, were not. In some communities the arrival of a first child curtailed employment. In other communities, such as the textile districts, it would appear that a grandmother, neighbour or friend might look after one child to allow a mother to work but the birth of a second baby effectively removed the mother from the workplace.[137] The probability of her returning to work would be influenced by whether or not she had further children, and whether or not such children survived, as the death of a young child could 'free' a woman from child care allowing her to return to work, should the necessity, or opportunity, arise. Table 5.8.2 provides figures showing the percentage of married women reporting an occupation at different marriage durations, in the three OPCS communities with major numbers of employed married women – Bethnal Green, Bolton and Stoke – and also in Walthamstow where, although the married women's labour force participation rate was lower, a relatively large absolute number of married women were reported to be in employment.

While somewhere between a third and a quarter of women who had been married less than five years in Bethnal Green, Bolton and Stoke were still in 'apparent full-time employment', this is true of only one tenth of their peers in Walthamstow, separated from Bethnal Green by only a few miles.[138] A rather marked decline in the proportion of women in employment had occurred by the time women had been married for 5–9 years, but thereafter any decline is more muted, suggesting that perhaps some women were returning to the workforce. It is also possible that, if women had not achieved the 'threshold' fertility level which would remove them from the workforce within a decade of their marriage, the chances of their ever achieving this diminished with increasing marital duration.

It is likely, therefore, that in any 'snapshot' of the population, such as a census enumeration, married women who are reported as having an occupation are likely to have been selected by the low number of young children living with them. Such truncation of women's workforce participation makes it difficult to compare ASMFRs and TMFRs of women in employment with those of other groups, as the assumption that the women will continue to behave as observed until their fiftieth birthday does not hold. As they aged, the majority of women who continued to accumulate children would have moved into the home and the 'economically inactive' category, while those failing to add to the number of their surviving offspring would have been more likely to remain out at work, resulting in a concentration of women with low effective fertility among the older age groups reporting an occupation.

Small family size could be the result of fertility being either actually low, or being effectively low, having been reduced by child or infant mortality. The potential size of the role played in this process by child mortality is demonstrated in Figure 5.8.4 which uses the special questions from the Fertility Census to compare the 'actual' and 'effective' achieved fertility of women in Bolton, distinguishing those who were working in textiles from those who returned no occupation. For the sake of simplicity the diagram considers only parities 0 and 1.

The figure shows that of those textile workers married less than four years some 80 per cent had borne no more than one child. Among non-occupied women this proportion was about 73 per cent. Infant mortality, however, raised the proportion of women with fewer than two living children (their effective fertility) to about 85 per cent for textile workers and 76 per cent for the economically inactive. The proportion of couples who had had fewer than two children drops away to about 15 per cent for couples where the wife was economically inactive 12–15 years after marriage, while approximately 35 per cent of those couples where the wife remained out in the mills had borne fewer than two children after this duration of marriage. However, although loss via infant and child mortality stayed roughly similar over all durations of marriage for the economically inactive, the proportion of textile working wives who had had their effective fertility reduced to below two children by mortality increased steadily with marital duration. Among wives working in textiles with marital durations of more than eight

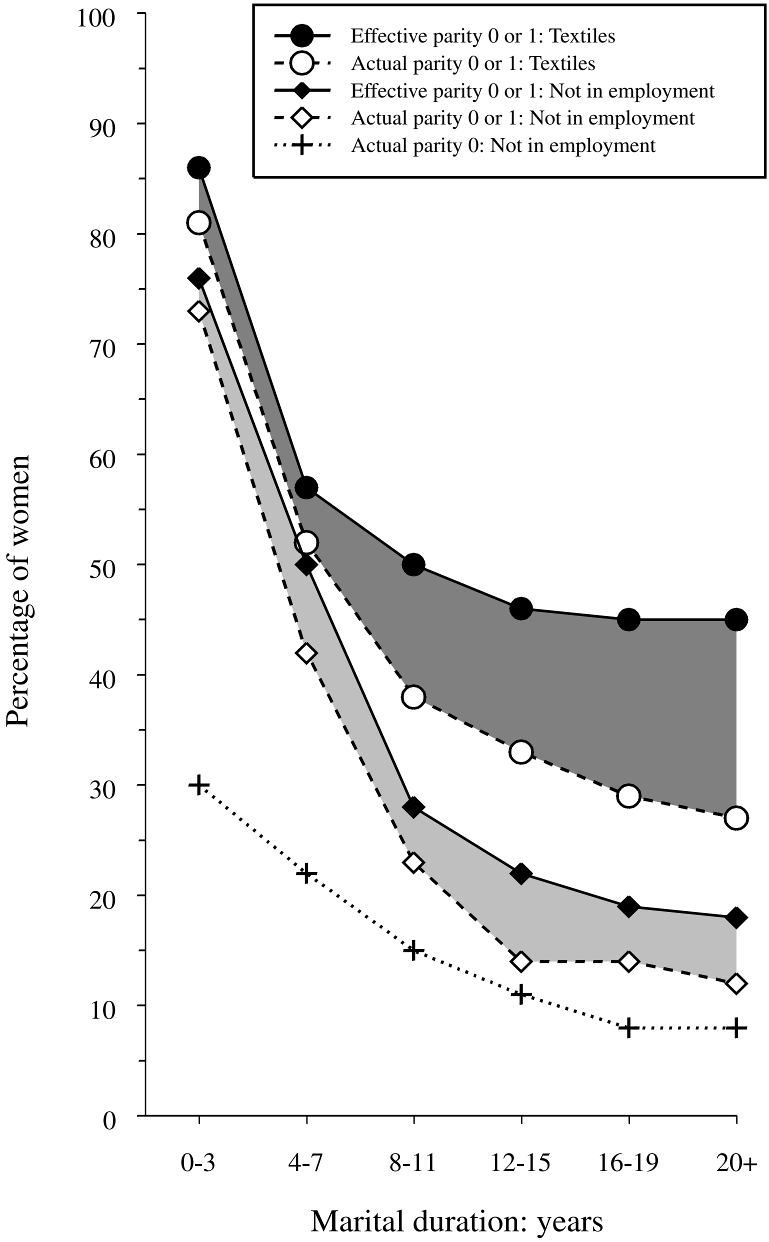


Fig. 5.8.4 The percentage of women employed in textiles achieving an actual or effective parity of 0 or 1, by marital duration, compared with women not in paid employment: Bolton 1911

years, more than 50 per cent had fewer than two children living. This low number of children to be cared for, achieved through a combination of lower fertility and higher mortality, enabled women to stay out at work longer, or return to work sooner, than their neighbours with more effective reproduction. These neighbours, certainly in Bolton, would most likely have been previously out at work but their fertility levels and lack of infant mortality had removed them from the workforce before they could be recorded in the census as having an occupation. The census snapshot thus returns a picture of women workers who had poor maternity records, giving the impression that women's work was bad for babies. There was, in short, a selection effect.

Without longitudinal data, such as those provided by record linkage or a sensitive, retrospective social survey questioning an 'at risk' population, we cannot state with certainty that women's work *per se* led to high levels of infant mortality. Having fewer children in the home does, however, seem to have been an enabling factor in allowing women to enter the labour force: as is still true today. Knowing the constraints children would place on their ability to work, did a proportion of women in the manufacturing districts curtail their fertility in order to prolong their employment opportunities, or did the poor child survival chances prevalent in the centres of industry mean that when work was available there was a pool of women 'at liberty' to avail themselves of these opportunities? Inter-community differentials in the incidence of miscarriage and stillbirth might be able to shed some light on this question, since if it could be shown that women in Bolton, Stoke and Bethnal Green suffered disproportionately, some of the lower fertility of the women in employment could be explained in this way. The necessary statistics are not available, however, so Table 5.8.3 attempts to push the inquiry forward in another way.[139] It records the proportion of couples in Bethnal Green, Bolton, Walthamstow and Stoke, divided by the wife's employment status and duration of marriage, who had borne at least two children, and the proportion who had at least two children living in 1911.

As might be expected, the proportion achieving two births rises with marital duration. Thirty per cent of all couples married less than five years in Bolton and Stoke had given birth to two children: the overall fertility of the community does not appear to have been impaired by the relatively high number of young married women working in the mills and potbanks. It is possible, however, that such figures are achieved as a result of a relatively high proportion of the women in these communities being pregnant on marriage. It is noticeable that the proportion of recently married, employed women in Bolton and Stoke who had

Table 5.8.3 *The percentage of couples in selected OPCS locales, by wife's employment status and marital duration, who had achieved an actual and effective parity of 2*

Place	Percentage who have achieved actual parity of 2 — Marital duration					Percentage who have achieved effective parity of 2 — Marital duration				
	<5	5–	10–	15–	20+	<5	5–	10–	15–	20+
Panel A: Inactive[a]										
Bethnal Green	28	85	86	87	92	24	80	84	86	87
Bolton	34	71	81	88	88	31	67	71	83	83
Stoke	32	78	83	87	89	28	71	78	80	85
Walthamstow	25	70	76	81	90	22	65	71	77	85
Panel B: In employment										
Bethnal Green	25	63	85	75	86	19	51	79	68	84
Bolton	21	57	64	63	83	16	50	53	56	71
Stoke	24	57	77	62	78	17	51	63	56	74
Walthamstow	23	52	61	79	88	13	38	61	75	86
Panel C: All										
Bethnal Green	27	81	86	84	91	23	75	83	82	87
Bolton	30	67	77	83	88	26	63	68	78	82
Stoke	30	73	82	83	87	25	67	75	76	83
Walthamstow	25	69	75	80	90	21	63	70	77	85

Notes:
[a] 'Inactive' = 'apparently economically inactive'.
All percentages have been rounded to the nearest whole number.
Source: OPCS dataset.

achieved parity 2 was much smaller than among the non-employed: 21 and 24 per cent, as against 34 and 32 per cent. This difference is maintained across the marital duration groups, and also becomes more apparent in the other communities as marital duration increases. Beyond this obvious difference, comparison is hampered by the volatility of percentages calculated from small numbers, although the clearly higher proportion of couples in Bethnal Green achieving an effective fertility of two or more can be discerned. If any community might be expected to show signs of higher rates of miscarriage or stillbirth then overcrowded, poverty-stricken Bethnal Green would be that one.[140] This, however, was patently not the case. Bolton and Stoke show rates of bearing children no slower than those of Walthamstow; they do not appear to have been plagued by abnormally high levels of endemic miscarriage or stillbirth.

Given the high rate of fertility among recently married women in Bolton in Table 5.8.3, it seems likely that pre-nuptial pregnancy was as common there as in Stoke. However, given that the average age at marriage was over a year later in the former community than in the latter, it would appear that any pregnancy-triggered marriage must have occurred later on average in Bolton.[141] Late age at marriage seems to have been characteristic of most textile towns in Lancashire and Yorkshire, suggesting either that the populations of these towns were rather more chaste (starting sexual relations later or initiating them less often), that couples were practising some other form of extra-marital fertility control, or that the chances of conceiving were for some other reason rather lower than in other working-class communities. It is possible, therefore, that pre-nuptial fertility regulating practices, whether some form of contraception, *coitus interruptus*, a culture of self-restraint, or possibly a willingness to countenance abortion, remained as part of the fertility controlling repertoire of those living in the textile districts and helped to curb fertility within marriage.

The differences in fertility visible among employed women in the various locales are much less pronounced when effective fertility is considered, suggesting that it was indeed problems connected with child care, rather than the number of children produced, which constrained women's ability to work. However, it is possible that it was at higher parities that greater variation between communities manifested itself. In Table 5.8.4 the average achieved parities of the three most recent marriage cohorts are considered, rather than simply the proportion of couples achieving parity 2. The same communities are depicted, and couples are once again divided by the employment status of the wife.

In many ways this table mirrors the previous one: the most recently

Table 5.8.4 *Actual achieved and effective fertility of employed, non-employed and all women in four selected communities, 1911, for three marital durations*

			Marital duration <5 years				Marital duration 5–9 years				Marital duration 10–14 years			
Place	Environment	Status	Actual	Effective	E/A[a]	N	Actual	Effective	E/A[a]	N	Actual	Effective	E/A[a]	N
Bethnal Gr.	Light Industry	Inactive[b]	1.05	0.98	0.93	222	2.79	2.47	0.89	266	4.37	3.49	0.80	237
		Occupied	0.93	0.88	0.95	63	2.30	1.68	0.73	57	4.23	2.61	0.62	36
		All	1.02	0.96	0.94	285	2.70	2.33	0.86	323	4.35	3.37	0.78	273
Bolton	Staple Industry	Inactive[b]	1.29	1.13	0.88	153	2.56	2.15	0.84	137	3.52	2.62	0.74	140
		Occupied	0.83	0.69	0.83	48	2.15	1.65	0.77	46	3.19	2.35	0.74	40
		All	1.14	0.99	0.87	201	2.46	2.02	0.82	183	3.45	2.56	0.74	180
Stoke	Staple Industry	Inactive[b]	1.17	1.06	0.91	353	2.78	2.27	0.82	317	4.03	3.08	0.76	298
		Occupied	0.98	0.72	0.73	107	2.08	1.53	0.73	76	3.48	2.29	0.66	65
		All	1.12	0.97	0.87	460	2.64	2.13	0.81	393	3.93	2.94	0.75	363
Walthamstow	Light Industry	Inactive[b]	1.04	0.98	0.94	326	2.24	2.03	0.91	332	2.68	2.64	0.99	324
		Occupied	0.90	0.74	0.83	35	1.83	1.63	0.89	30	2.32	2.03	0.88	31
		All	1.02	0.95	0.93	361	2.21	2.00	0.90	362	2.64	2.59	0.98	355

Notes:
[a] E/A = 'Effective fertility/actual fertility'.
[b] 'Inactive' = 'apparently economically inactive'.
Source: OPCS dataset.

married women in Bolton are as fertile as their peers in Stoke, but in the earlier, longer-married marriage cohorts Bolton's overall fertility levels are rather higher than those of Walthamstow but well below those of Bethnal Green and Stoke. Both economically active and inactive women married 5–14 years in Bolton were achieving lower parities on average than the women in the latter two communities, suggesting that couples in the textile town must have been deliberately slowing down the tempo of their fertility or, overall, were experiencing poorer reproductive performance.

The experiences of Bolton, Stoke and Bethnal Green serve to emphasise that relatively high rates of labour force participation by married women are not necessarily accompanied by low fertility rates. Communities where opportunities exist for women to work in industry do, however tend to be concentrated in insalubrious environments. Given that the various groups in Table 5.8.4 have different actual fertility levels, comparison of the extent to which these are reduced by mortality is not easily judged from the effective fertility figures. The ratio of effective to actual fertility (E/A) is therefore provided in each case. These reflect the considerable inroads made on actual fertility by mortality, poor survival chances being particularly common when mothers were in the labour force. The removal of child care responsibilities as an enabling factor in the employment of married women is thus re-emphasised.

Stevenson believed that the propensity of female employment to lower fertility reduced family size amongst certain male occupations. Given the relationships described in this section, was it in fact the propensity of certain male occupations to have a higher proportion of wives working which lowered their fertility? This question is considered in the next, penultimate section of this chapter, in which the association between the occupational combination of a couple and their fertility behaviour will be considered.

5.9 The fertility of couples where both husband and wife returned an occupation in 1911

As noted above, Stevenson failed to consider the combination of spouses' occupations, although he admitted that such an oversight was regrettable.[142] Table 5.9.1, derived from Tables XLVIII and XLVIX in the second part of the *Fertility of marriage* report, illustrates the basis for his remarks that 'the occupation of the wife entails . . . considerable reduction of fertility' and 'the loss of the mother's care frequently involves the death of the child'.[143] Although the table shows women in the labour force to have lower fertility than employed men, nevertheless the

Table: 5.9.1 *Standardised total fertility and child mortality experience of couples where the wife is aged less than 45 years and where the husband or wife works in selected occupations, England and Wales, 1911*

	Total fertility (children per 100 couples)		Child mortality (deaths per 1,000 live births)	
Occupations	Males	Females	Males	Females
Post Office officers and clerks	213	213	111	120
Teachers	198	147	105	119
Actors/actresses	158	120	186	184
Private means	166	141	93	100
Farmers/relatives assisting farmers	283	235	103	131
Domestic servants	189	146	131	235
Earthenware and china workers	304	260	221	320
Cotton spinners	259	230	221	334
Cotton weavers	229	203	217	274
Wool and worsted spinners	228	211	173	310
Wool and worsted weavers	223	167	160	262
Tailors/tailoresses	273	246	147	225
Boot and shoe makers	282	233	176	222
Milksellers and dairymen	265	233	148	157
Butchers	265	242	149	154
Fishmongers and poulterers	270	255	167	188
Tobacconists	207	184	134	159
Barmen/barmaids	283	176	200	260

Source: Fertility of marriage, Part II (1923), Tables XLVIII and XLIX.

fertility among female potters and poulterers was relatively high, even when compared to male occupations, so women's employment did not necessarily equate with absolutely low fertility in all areas.

While having a working mother was almost invariably more dangerous for children than having a father working in the same industry, having a mother who worked in either cotton or worsted spinning seems to have been particularly pernicious to child survival. As discussed previously, however, the effects of maternal employment are painted very bleakly by the census returns, owing to the selection processes at work, and to the fact that the reporting of the worker's status occurs after the birth or death of a child. It is thus unsafe to surmise that the reported employment was somehow responsible for the child's birth or death. The effects of class and environment on variations in fertility and life chances are also evident from Table 5.9.1; comparison within either the male or the female columns indicates that levels of child mortality among the industrial occupations compare most unfavourably with occupations found typically in the other environments.

The OPCS data allow us to analyse the family building behaviour of couples in a small selection of occupational combinations, although, for the purposes of comparison, the number of couples where both partners were working was rather small. This problem was compounded because wives working in the labour force were not always married to men in the same industry, entailing further division of already small populations.

Of the 17,700 couples in the OPCS sample for whom there is information from the 1911 Fertility Census, fewer than 2,000 returned an occupation for the wife. Of those who did 467 (25 per cent) of the women were in Miscellaneous services, 343 (18.5 per cent) were in Retailing, 244 (13.2 per cent) were Potters, 141 (7.6 per cent) were Textile workers and 188 (10 per cent) were in the Clothing trade.[144] There were 68 wives working in Agriculture and 74 in the Professions, but no other occupational category contained more than 40 married women whose spouse was co-resident with her on census night. This figure does not always exactly reflect the number of married women employed in an occupation. As noted in section 5.2, married women whose spouse was absent displayed much higher labour force participation rates than was true of married, co-resident women. The portion of the married female workforce in any one occupation without their husband on census night was much higher than might be supposed. While figures fluctuate, both over time and with alterations to the wording of the census questions, approximately one in every 20 married women in each of the censuses represented in the OPCS dataset recorded themselves as being apart from their husband on census night. Among married female Potters and Textile workers, however, this figure was closer to one in five or six, and among married servants one in three. An additional reason for reduced fertility among working women is introduced: the intermittent loss of their husbands.[145]

Couples with wives in five major employment categories – Pottery, Textiles, Clothing, Miscellaneous service and Retailing – were categorised by the occupation of the husband. As Table 5.9.2 shows, virtually one in every two wives employed in Miscellaneous services had a husband also working in the same employment category, and Pottery-working wives fell not far short of this ratio.

Table 5.9.2 *The occupational distribution of the wives of husbands reported to be working in selected occupations, all OPCS 1911*

Occupation	N of couples with husband in occupation	N of couples with wife in occupation	N of couples with wife and husband in occupation	% of wives in occupation with husbands in same occupation	% of husbands in occupation with wives in same occupation	% of husbands in occupation with wives in any employment
Pottery	626	244	105	43	17	20
Textiles	210	141	26	18	12	18
Miscellaneous service	1,131	467	224	48	20	23
Clothing	491	188	37	20	7	12
Retail	1,721	343	214	62	12	18
Construction	1,290				1	9
Mining	1,795				0	5
Transport	2,110				0	9
General labourer	508				1	11
Professions	1,047				0	5
Metal manufacture	947				1	7

Note:
All percentages have been rounded; 0 indicates a percentage that lies between 0 and 1.
Source: OPCS dataset.

Among wives working in Retail, nearly two in three had husbands who also did so, although a change in the occupational questions in 1911 may have been responsible for this high ratio.[146] Wives working in Textiles and Clothing had no particular concentration of occupation among their husbands. Textile-working wives in Bolton were as likely to have had a husband working in Transport as in Textiles, while among women in Clothing, Transport was as common as Clothing as an occupation for husbands. For wives in both these groups the 'Other' category occupied the greatest number of their husbands. Stevenson's comment that textile work 'by married women . . . is open to the wives of men engaged in other occupations equally with those of the male textile workers' seems, therefore, to have applied equally to workers in Clothing, although not to other female occupations.[147]

Considering Table 5.9.2 from the husband's standpoint, a rather different picture emerges. Among the wives of Potters and Textile workers respectively 20 and 18 per cent were working, while fewer than 8 per cent of the wives of Miners and Metal manufacturers were in employment. Of the Potters' wives who had occupations outside the home 83 per cent worked in Pottery, and thus 17 per cent of married male Potters had a wife who worked in the same industry. In parallel, 70 per cent of those wives of Textile workers who were working worked in the same industry, so in all 12 per cent of textile-working husbands had a textile-working wife. The proportion of men in these occupations who had a wife who had ever worked in the same industry, however, was undoubtedly much higher.

Although there were significant numbers of couples where both spouses worked in Miscellaneous service and Retail, such couples were scattered across the 13 OPCS locales, thus diminishing their numbers sufficiently to preclude analysis. In Stoke, women Potters were found as the wives of both Potters and Miners and the role of women's occupation in influencing the fertility of male occupations could be assessed by comparing the couples from Stoke in particular occupational combinations with couples from locations where married women's employment was common, as in Bolton, or rare, as in industrial Swansea, Abergavenny and Earsdon.

To compile Table 5.9.3 all couples from the OPCS Staple Industry areas were extracted by age at, and duration of, marriage, and classified by husband's and wife's occupation. These groups were then tabulated first by average parity actually achieved and then by the average number of children living. Only the 20–24 age at marriage group for the three cohorts married fewer than 5 years, married 5–9 years and married 10–14 years in 1911 contained sufficient numbers to allow

Table 5.9.3 *The actual fertility (A), effective fertility (E) and 'survival ratio' (E/A) for selected husband/wife occupation combinations, by marital duration. Selected communities, OPCS 1911*

Husband's occupation	Wife's occupation	Place	Married < 5 years			Married 5–9 years			Married 10–14 years		
			A	E	E/A	A	E	E/A	A	E	E/A
Mining	Housewife	Earsdon	1.27	1.10	0.87	2.59	2.14	0.83	4.26	3.35	0.79
		Abergavenny	1.20	1.05	0.88	2.73	2.45	0.90	4.29	3.84	0.89
		Stoke	1.34	1.29	0.96	3.13	2.58	0.83	4.96	3.67	0.74
Mining	Pottery	Stoke	*1.00*	*0.73*	*0.73*	*2.60*	*1.40*	*0.54*	*3.38*	*2.25*	*0.67*
Pottery	Pottery	Stoke	1.05	0.65	0.62	*1.88*	*1.25*	*0.67*	4.07	2.40	0.59
Pottery	Housewife	Stoke	1.30	1.23	0.95	3.06	2.35	0.77	4.45	3.55	0.80
Metal manufacture	Housewife	Stoke	1.21	1.21	1.00	2.98	2.47	0.83	5.07	3.66	0.72
		Swansea	1.00	0.85	0.85	2.42	2.18	0.90	3.50	2.54	0.73
Textiles	Housewife	Bolton	*0.83*	*0.83*	*1.00*	*3.14*	*2.86*	*0.91*	*2.80*	*2.50*	*0.89*
Mining	Potter + housewife	Stoke	1.26	1.15	0.91	3.03	2.38	0.79	4.60	3.34	0.73
Potter	Potter + housewife	Stoke	1.22	1.05	0.86	2.90	2.21	0.76	4.34	3.24	0.75

Notes:
Only couples where wife married when aged 20–24 are considered.
Figures in italics = calculations based on fewer than 15 couples.
A = actual fertility = average number of children born per couple.
E = effective fertility = average number of children surviving in 1911 per couple.
Source: OPCS dataset.

comparison and the only group of employed women large enough to be subdivided for comparison was those working in Pottery.[148] Thus Table 5.9.3 compares the experience of men who worked in Pottery, Metal manufacture, Mining and Textiles whose wives were not in the labour force with the experience of men working in Mining and Pottery whose wives were employed in the potbanks. Miners working in Stoke, Abergavenny and Earsdon are distinguished from one another in the table, as are the Metal-manufacturing workers from Stoke and Swansea.

Table 5.9.3 indicates again that it was not fertility *per se* but the number of surviving children which determined the likelihood that a woman would be observed in the workforce. In the most recent marriage cohort those couples where the wife was occupied in Pottery in Stoke were as fertile as those men working in Metal Manufacture in Swansea whose wives were economically inactive. The Pottery wives were a little less fertile than the wives of miners in Abergavenny and Earsdon who were full-time housewives, while housewives in Stoke displayed a rather higher level of fertility. In Bolton, even though the wives of the Textile workers shown were not employed, their marital fertility was less than that of the Stoke women Potters, confirming the unusually low fertility of this textile community as a whole. The major difference between those couples where the wives worked in Pottery and those where they were housewives is the higher proportion of children lost by the former, shown by their E/A ratio. This general pattern is repeated in all three marriage cohorts shown in Table 5.9.3.

It appears from Table 5.9.3 that, comparing the Miners from Stoke who had wives at home with similar men from Abergavenny and Earsdon, Stoke's Miners were particularly fertile. Husbands working in the Potteries of Stoke who had non-working wives also had relatively high average rates of achieved fertility. However, in Earsdon and Abergavenny there was very little opportunity for women to work, and therefore, no matter what their fertility experience, wives were liable to be returned as housewives. If Stoke had lacked work for married women what would the fertility experience of men in the town have been? The two rows at the foot of Table 5.9.3 illustrate the actual and effective fertility levels for Stoke Miners and Stoke Pottery workers if their wives are undivided by occupation, putting them on a par with miners from Earsdon and Abergavenny. The noticeable reduction in the effective fertility of Stoke Miners when 'all wives' are considered, compared to those whose wives were 'housewives', demonstrates that wives who worked in the Pottery industry contributed a disproportionately large amount of the infant mortality experienced by the male

Miners in Stoke. The married workforce was drawn largely from the pool of women with a low number of living children. That pool of women was, of course, present in virtually all industrial, proletarian communities, but in the mining communities, other than Stoke, such women were unable to take advantage of their low effective fertility by taking gainful employment, since the latter was unavailable.

It is not women's work, therefore, which in and of itself produces low fertility and high infant mortality within a community. The relationship between these elements, observed by Stevenson in a way so accurately reflecting contemporary thinking, is conceptualised more precisely as part of an interacting syndrome, or association, but one which can only be expressed where the opportunity of gainful employment for married women exists. Elsewhere wives with low effective fertility probably resorted to a range of alternative income-raising activities, such as taking in boarders or lodgers, home-working, keeping a stall or small shop, child-minding, helping out relatives in the family business, working on an allotment and so on, much of which has gone unrecorded because of the formulation of the census questions regarding employment. As shown above, both fertility and infant mortality in Stoke were high. Women with lower actual and effective fertility were observed in the workforce, but even their fertility was rather higher than that of, say, textile workers. Different communities had different thresholds of family size which removed women from the workforce. The low fertility among male textile workers, reported by Stevenson on behalf of the Registrar-General, would thus seem to be a result of living in towns with generally low fertility, rather than of the number of their wives who went out to work. The high proportion of working wives in the textile towns was possible because of the number of couples with small families, and because the community accepted that women who were not burdened with the care of many children could take up employment in the mills.

Stevenson observed that:

> the high fertility attaching to mining and agriculture is largely or altogether peculiar to these industries, and shared only in a minor degree by the other inhabitants of the districts in which they are centred. On the other hand, the low fertility of the textile industry is very largely shared by the general population of the areas in which it is carried on.[149]

It can now be argued that this did not solely reflect the influence of married women's work as he supposed, but instead the local community's belief systems, concerning the complex web of relationships linking family building with appropriate and acceptable gender, parental and working roles. In the textile districts the whole community was knitted together by the high proportion of young people who worked in the factories, and by the rhythm of life and shared experience which the factory hours imposed on everyone living within the sound of the factory hooter, whether textile worker or not. In contrast, the TMFR graphs displayed in section 5.3 indicate that where miners and agricultural workers shared their environments with other kinds of workers, their fertility behaviour did tend to be distinctive, although not markedly so if considered beside couples of the least skilled classes. Perhaps the communities of which they formed a part were characterised by more obvious social schisms, or a greater diversity of rhythms, mores and behavioural standards, than the more integrated culture of each mill-town.

5.10 Conclusion

The individual-level data available for the OPCS population, particularly those drawn from the 1911 census, give considerable insight into the process of fertility transition in England and Wales. The ability to calculate estimates of infant and child mortality from the data is especially valuable in allowing differentiation to be made among the fertility experiences of local population sub-groups.

There is little doubt that, as Stevenson observed, the professionals of class I were the earliest group to achieve large numbers of small families, and the miners of class VII to be one of the latest. However the importance of social environment has been highlighted in that professional and white collar couples living in predominantly working-class areas were rather slower to move towards the small family norm. This was in contrast to those working-class groups living in middle-class neighbourhoods who appear to have begun to limit their fertility earlier, or certainly with greater success, than their peers elsewhere. The occupational differences in fertility made much of by the 1923 report on the Fertility Census must, therefore, be considered in the light of their varied distribution across different social milieux. As discussion in this chapter has shown, such milieux have geographical as well as economic and class bases.

It is always possible that members of the lower orders wishing to live in salubrious surroundings had to keep the number of their offspring small in order to achieve this. It can be argued, however, that this was just one facet of a wider socialisation process through which couples came to judge their own behaviour in relation to that of their neighbours. Observing others may have helped couples to set goals, or at least to ascertain the 'norm' to which the majority of their neighbours aspired. The acceptance of such norms defines communication communities. The communication is neither necessarily verbal nor direct. It does not, therefore, always encompass discussion of the means of achieving a particular behaviour pattern such as family size; couples would be left to take the measures they had at their disposal, or felt were within their budget, in order to achieve their aspirations.

While it is usual to discuss *the* fertility transition, the evidence from the OPCS data supports those who argue that there were in fact several, or even many, transitions in as far as different types of community took a variety of paths towards low fertility. In some it was the young who appear to have initiated the new behaviour, in others it was older couples. In some the fall in fertility was precipitous, yet in others it was a very gradual process. Some groups would appear to have embarked on the transition as early as the middle of the nineteenth century; others waited until the beginning of the twentieth. Thus the overall transition was made up by myriad rather smaller alterations in behaviour.

The analysis has made clear that the English and Welsh case was not exclusively a stopping transition. Fertility decline did not progress, contrary to the implicit assumption of many models, from high to medium to low desired family size in a uniform fashion. Instead amongst some sections of the population a desire for a small family appears to have arrived abruptly amongst the younger generations who successfully restricted their fertility from very early on in marriage, indeed perhaps even before marriage, suggesting that there was a generational shift in attitudes.[150] If young people grew up with the idea that they wanted smaller families they might well have been better equipped to achieve this than if they suddenly acquired this new ideal once they had embarked upon marriage. Unfortunately the retrospective nature of the 1911 census data means that it is virtually impossible to differentiate whether, and in what proportions, young couples were postponing having children, spacing those children they did have or being very successful at restricting themselves to small families. The latter point is unlikely to be clarified until either more data from the 1911 census are released or a set of longitudinal, prospective data can be pieced together for the late Victorian and Edwardian era.

In many respects the OPCS data have provided as many questions as they have answered. Looking backwards in time across childbearing behaviour and comparing this with behaviour at a particular census date has in the past led to dubious causal connections being made, as in the case of the relationship between fertility and women's paid employment. Further work remains before a full understanding of the late-nineteenth-century fertility decline is gained. Nevertheless the individual-level data have given new insights, added new nuances to the story of fertility transition. The next stage of analysis was to re-examine the national demographic picture in the light of these new findings. It is to this exercise that the next chapter turns.

Notes

1 The quote given is from Galsworthy *In Chancery (*1967 [1920]), pp. 13–14. Galsworthy's 'Forsyte Chronicles' comprised three trilogies. 'The Forsyte Saga' contained *A man of property* (first published in 1906), *In Chancery* (1920) and *To let* (1921); 'A Modern Comedy' was made up of *The white monkey* (1924), *The silver spoon* (1926) and *Swan song* (1928). The final trilogy 'The End of the Chapter' comprised *Maid in waiting* (1931), *Flowering wilderness* (1932) and *Over the river* (1933). All page references to Galsworthy's works which follow are taken from the 1967 edition of the full series published by Penguin at Harmondsworth. Attention was drawn to the Forsytes by Kane (1995).

2 The family tree provided at the beginning of the 1967 edition of both *The man of property* and *Swan song* lists by name 16 of Superior Dosset's great-grandchildren, born to five of his grandchildren. A further grandchild, St. John Hayman, is listed only as having an undisclosed number of offspring. At these points in Galsworthy's narrative, it should be noted, not all the grandchildren had completed their families.

3 The couple in question are Holly Forsyte, daughter of 'young' Jolyon, and Val Dartie, son of Montague and Winifred Dartie: Galsworthy, *To let* (1967 [1921]), p. 47. It is commented that by making this decision Holly had 'kept her looks, her slimness, and the colour of her dark hair' after twenty years of marriage; the bearing of children, by implication, would have forfeited all three.

4 Galsworthy, *Swan song* (1967 [1928]), frontispiece.

5 This is not stated explicitly, but is strongly suggested when Galsworthy writes: 'In choosing . . . for his mother a woman of thirty-eight whose first and only child he was, little Jon had done well and wisely': Galsworthy, *In Chancery* (1967 [1920]), p. 301.

6 The question of birth control occurs at various points throughout the 'Forsyte Chronicles', from a passing remark in *A man of property* (1967 [1906]), p. 49) that one character had 'too many children', and this was to blame for her being 'as thin as a lathe', through Soames' statement in *The white monkey* (1967 [1924], p. 59) that 'the country's over populated', to Michael Mont's contribution to a parliamentary committee on the wisdom of publicising birth control methods among the working-classes in *Swan song* (1967 [1928], p. 85). Galsworthy thereby records the shifting middle-class beliefs of his era, though it should be noted that these novels depicting the period 1870–1920 were actually written and published during the period 1900–35.

7 The calculation of the average longevity was made by George Forsyte in *To let* (1967, p. 12). His figure of 88 years was based on the life-spans of Superior Dosset's ten children.

8 Reference to falling return on investments has already been made in the quotation at the head of this chapter. Galsworthy records the introduction of, and increases in, taxation almost as a mechanism for recording the passage of time.

9 The Crude Birth Rate is calculated by dividing the number of births occurring in a particular time period by the mid-period population, and is expressed as the number of births per thousand population.

10 Werner (1987), p. 7. See also Robin (1980) which demonstrates local trends following the national ones, but at a higher level; Wrigley and Schofield (1981), p. 75, for a discussion of the phenomenon of illegitimacy in the pre-registration era.

11 Blaikie (1994). If 'respectability' increasingly demanded that a woman marry if she fell pregnant then a drop in illegitimacy, accompanied by a rise in pre-nuptial pregnancy, would be expected. This aspect of nineteenth-century demography has been very little explored, mainly, it is suspected, because of the lack of access to the birth and marriage registers required to undertake such a study. However, comparison of the Cambridge Group's reconstitution data with the 1911 census data records that, in the 20–24 age group 28.6 per cent of first-time brides were pre-nuptially pregnant in 1911, compared to only 20.7 per cent of similar brides in pre-1837 marriages; whereas amongst new brides marrying aged 25–29 in 1911 only 20.0 per cent were pre-nuptially pregnant, a figure almost exactly equal to the 20.3 per cent for comparable brides observed pre-1837: Szreter (1996b), pp. 384–5, n.35.

12 Schofield (1985).

13 The works which have charted marriage patterns in England and Wales in the nineteenth century include Anderson (1976); Teitelbaum (1984); Woods and Hinde (1985).

14 Singulate mean ages at marriage (SMAMs) were first calculated by Hajnal (1953). A SMAM is a hypothetical cohort measure (see chapter 3, section 3.4), calculated from census-type data where the proportion of women who are reported to be single in each of the five-year age groups between the ages of 15 and 54 can be observed. It represents the 'average number of years lived in the single state by those who marry before age 50', and thus equates to the average age at marriage. Hajnal recognised the impact differences in mortality and migration might have on the comparability of SMAMs, but his work with national-level figures underestimated the extent of the problem when working at the local level. See Woods and Hinde (1985); Reay (1996).

15 McBride (1976), pp. 67, 74. 'Although some servants stayed in post for many years most . . . changed jobs about every 12 months'; D'Cruze (1995), p. 68.

16 Caveats to be considered in relation to these calculations are discussed below.

17 Ansell (1874) and Banks (1954) were concerned exclusively with the middle classes. Anderson (1984) surveys the more general situation as revealed by the 1851 census. See also Freedman and Klaus (1984).

18 Figures drawn from Mitchell (1988), Table 5, pp. 20–2.

19 Winter (1985). Analysis of data supplied by OPCS from the 1921 census of England and Wales supported Winter's interpretation.

20 The Hutterites are 'an anabaptist religious sect whose members live mostly on the High Plains of North America and who demonstrate very high levels of fertility. The fertility rates recorded for the group in the 1920s are among the highest of any population, women marrying at age 20 bearing on average 10 or more children': Pressat (1988). Debate still remains as to why the Hutterite fertility schedules remained at a high level at later ages, even when compared with other anabaptist sects: see for example Ericksen *et al.* (1979). It has been argued that these high rates could have been engendered by the Hutterites belief in maintaining high levels of coital frequency throughout a woman's reproductive span. In most other populations coital frequency is observed to diminish with age, usually as a correlate of marital duration, thus making it unlikely that they would achieve the Hutterite levels of fertility. Eaton and Mayer (1953) argue that members of the sect did not have 'a theological mandate to have sexual intercourse' but the authors did not ask specific questions regarding coital frequency. Larsen and Vaupel (1993), p. 85, report that 'no data about [Hutterite] coital frequency are available'.

21 The indices, as devised by Coale, have been extensively used in the volumes resulting from the Princeton European Fertility Project. See for example Lesthaeghe (1977); Teitelbaum (1984); Coale and Watkins (1986).

22 In devising the suite of Princeton indices, Coale used women aged as young as 15 in his calculations: Coale (1967; 1969). While such calculations could be replicated here, very few teenage women were reported to be married in the OPCS census returns, and it was also obvious that in certain areas the throughflow of teenage servants must have been very high. As many of these young girls would have left the area in which they were employed when they married, it was decided that to include them in the calculations would be to nullify objections to the use of SMAM, and therefore only women aged 20 or over are included in the estimates of the fertility indices presented here. To highlight this difference each index is preceded by an exclamation mark. Note that while the proportion of women married on census night is taken directly from the census returns, the age-specific marital fertility rates are calculated in such a way that they represent maternity in the five years preceding the census. 'Mothers' used in the calculation of $!I_g$ are thus on average 2.5 years younger than 'wives' used to calculate $!I_m$.

23 The environment-specific sectors for 13 communities are outlined in Table 3.5.1.

24 If these figures are compared with those presented by Coale and Treadway for the counties of England and Wales, the measure of $!I_m$ given here is much higher than their I_m but the measure of $!I_g$ is not very different from their I_g, reinforcing the belief that very few English women married and started families in their teens. While the values of the indices reported in the body of the chapter were calculated omitting women aged 15–19, Coale's calculations were replicated for each of the 13 OPCS places from the 1891, 1901 and 1911 censuses and compared with the county figures given by Coale and Treadway. It was found that the values for some of the 13 OPCS places lay outside the range of the county values. However, when comparison is made with the figures calculated by Woods for the 600 or so registration districts of England and Wales in 1891, the 13 places fall

comfortably within the rather wider range of variation. See Woods (1982), ch. 3, especially Fig. 3.11; Coale and Treadway (1986).

25 Lewis (1984), ch. 4, Table 10 suggests that while 36 per cent of the female workforce were in 'indoor domestic service' in 1881, by 1911 this had fallen to 27 per cent, and by 1921 to 23 per cent. See also Ebery and Preston (1976); Garrett (1995).

26 It is always possible that in areas where there is a lack of paid work for women, widows with young families to support may also migrate away if remarriage does not immediately occur, thus intensifying the measures of nuptiality. Without longitudinal data, analysis cannot be undertaken to see whether this is of more importance in some OPCS areas than in others.

27 See chapter 3, pp. 67–9 on the extent to which age mis-reporting had diminished when compared to earlier censuses.

28 The figures calculated can only be a crude guide to the existence of contrasts in marital behaviour. Their interpretation is complicated by the fact that, because the 1911 census is a retrospective survey, many women did not survive to report their marital duration, and many who did survive from mid-nineteenth-century cohorts had lost their husbands, and were thus not required to complete the marriage and fertility questions on the census form. In addition, with declining mortality rates over the course of the nineteenth-century the chances of survival do not remain constant. We cannot, therefore, compare the 'average ages at marriage' produced over time. The steady increase in the female age of marriage as the cohorts approach 1911 shown in Table 5.2.1 can, for example, be as easily ascribed to the fact that fewer of the older brides in the early marriage cohorts survived to appear in the census as to actual changes in nuptiality. For this reason comparisons must be restricted to within cohorts, although even here differential survival rates may affect the resultant figures.

29 Classes VI (Textile workers) and VIII (Agricultural labourers) did not muster sufficient numbers among the OPCS population to be included either in the tables or in discussion. Those figures available suggest that on average the wives of men in both groups married rather later than the working-class in general.

30 Szreter (1996b), pp. 335–50, discusses further within-class variation in nuptiality, demonstrating the influence of occupational milieux. See also Friedlander and Ben Moshe (1986).

31 Hajnal (1953); Schofield, R. S. (1985).

32 In many of the areas the proportion of married men is equal to the proportion of married women, but this is as a result of a smaller number of men being widowed or reporting themselves as separated from their spouse on census night.

33 Many more men married when aged 35 and over than was the case for women. It could be argued that calculations should have been based on those men whose brides had married when aged less than 35.

34 The exception to this is the most recently married cohort. Given evidence produced in a later section of the likelihood that a high proportion of miners' wives were pre-nuptially pregnant it may well be that couples claimed to have been married longer, and therefore at a younger age, than was strictly true.

35 It cannot, of course, be discerned whether these are second or later marriages for either party.
36 Trends in illegitimacy and pre-nuptial pregnancy may well shed light on childbearing patterns within marriage: Shorter *et al*. (1971); Hair (1990).
37 It is possible that some women reporting themselves to be widowed or married but living apart from their husband on census night were in fact unmarried and trying to disguise their situation when reporting the presence of a child or children in their household. In *Fertility of marriage*, Part I (1917), Table 10, pp. 368–9, it is demonstrated that at the national level 7.4 per cent of women returning themselves as married were not co-residing with their husband on census night. Amongst married men 5.5 per cent were in the 'spouse absent' category. In all over 134,000 more women than men reported themselves to be married. Some husbands may have been abroad or at sea. Men living away from the marital home may have been more reluctant to admit to being married. However among 'married' women in their teens 10.5 per cent were living apart from their spouse; among those aged 20–24 8.3 per cent were similarily placed. Being younger and less encumbered with children, individuals in such couples may have been more mobile, but it seems likely that the disguising of illegitimacy played some role in these statistics. Unfortunately it is difficult to tease out the question of spousal co-residency in full because the tabulations in the census report are presented by age group and, obviously, spouses do not always fall into the same age category.
38 Wives aged 15–19 could be included, but so few wives in the OPCS population were in this age bracket that they are not considered in the discussion which follows.
39 Haines (1979) demonstrates the use of child–woman ratios.
40 The inflation figure has to be applied to every age group considered: account cannot be taken of variations in mortality with age of mother.
41 See, for example, Woods and Smith (1983); Garrett (1987).
42 Woods and Smith (1983) and Williams (1992) were able to calculate more detailed estimates of infant mortality thanks to the existence of high-quality information recorded for those buried in Sheffield's municipal cemetery in the mid-nineteenth century.
43 Roberts, E. (1984), pp. 173–5 gives some examples of such arrangements, and the reasons for them, as does Gittins (1982), pp. 137–8. In identifying children within households who are not the children of a co-resident married couple in our anonymised dataset we rely heavily on the 'relationship to head of household' information.
44 This is a rather smaller estimate of the proportion of children under 5 absent from the parental home than the 3–8 per cent suggested by Haines (1979), p. 183, n.15.
45 These figures suggest that children had not been separated from their parents by the latter's demise, as a higher proportion would be expected *ceteris paribus* to have lost their parents in the industrial areas. There remains the question of whether orphans or illegitimate children would be sent from the towns to live with grandparents in rural areas.
46 In fact, of all children under 5 in the OPCS 1891 census sample, only ten were returned as 'step-child'. In both 1901 and 1911 this figure was 18. This,

it should be remembered, is 'step-child to head of household', signifying in most cases that the wife had brought children from a previous marriage into her new husband's household. When the children were the issue of the husband's previous marriage they would almost always be returned as 'son or daughter of the head', disguising the fact that the father was in his second or subsequent marriage. Even although this 'invisible step-mother' problem means that some women will have their husband's previous wife's fertility accredited to them, it is likely from the figures just given that the dimensions of this factor were very small and may thus be ignored.

47 See Grabill and Cho (1965).

48 Wrigley *et al.* (1997), Table 7.1, p. 355.

49 The fact that mule spinners in the cotton industry, who were among the textile industry's most skilled and highly paid workers, also had some of the industry's highest fertility may argue against this conjecture. However the cotton industry was so organised that mule spinning was the preserve of only a very few towns. It may be argued that in textile towns where the 'normal' operative was male, local culture might be rather different and akin more to the local culture in other male-dominated industries than to that in towns where the 'normal' operative was female. Garrett (1990) has suggested, for example, that men in the West Riding worsted industry found it difficult to support large families unless they rose in seniority. Those with large families who did not rise had to seek alternative, presumably more remunerative, employment.

50 Woods (1987); Szreter (1996b), pp. 546–58.

51 Szreter (1996b), pp. 356–8, 493–4.

52 The two models were first discussed as alternatives by Carlsson (1966). Szreter (1996b) comes out strongly on the side of the adaption model.

53 Okun (1994), p. 194.

54 The concept of natural fertility was first mooted by Henry (1961).

55 Coale (1971). See n.20 above.

56 Coale and Trussell (1974), p. 188. Henry (1961) listed 13 'natural fertility' populations. Coale and Trussell accept ten of these as reliable and incorporate them into the calculation of n(a): Coale and Trussell (l978). The ten populations are: Hutterites pre-1921, Hutterites 1921–30, Canada 1700–30, the Genevan *bourgeoisie* pre-1600, the Genevan *bourgeoisie* 1600–49, the Europeans in Tunis 1840–59, Sotteville-les-Rouens (Normandy) 1760–90, Crulai (Normandy) 1674–1742, Norway 1874–6 and Taiwan *c.* 1900.

57 On the relationship between the duration of breast-feeding and that of post-partum amenorrhoea see Thapa *et al*. (1992). On the impact of variations in coital frequency and for a consideration of other factors influencing variation in fertility see Bongaarts and Potter (1983).

58 Coale and Trussell derived their v(a) curve from the 43 fertility schedules listed in the United Nations Demographic Yearbook of 1965: Coale and Trussell (1974), p. 188.

59 Coale and Trussell (1974) provided one set of figures which were subsequently amended in Coale and Trussell (1975). In Coale and Trussell (1978) the 1975 figures were repeated, except for v(30–4) which was given as '−0.667' rather than '−0.677'. Experimentation has shown that the difference between results using the two figures was minimal.

60 Hinde and Woods (1984), p. 315.

61 Wrigley *et al.* (1997), Table 7.1, p. 355.
62 Coale and Trussell (1978), p. 203.
63 The value of 0.35 for *m* necessary to indicate the presence of widespread parity-specific limitation is even higher than the 0.3 value which Hinde and Woods believed necessary: Hinde and Woods (1984) p. 319. We increased the figure after reviewing Hinde and Wood's methods of calculating n(a) and v(a). They specified a British Standard natural fertility ASMFR curve using 'age-specific marital fertility estimates derived from English family reconstitution studies . . . in combination with a schedule for Scotland, 1855': Woods (1996). Anderson believes that Hinde and Woods omitted to allow for the 8 per cent or so underregistration of births in Scotland in 1855, when civil registration was introduced there, and that this created a distortion in their standard curve: Anderson (1999, p. 11). Hinde and Woods also estimated a new schedule of v(a)s, using data derived from Denmark 1860–1944. However, as Coale and Trussell's intention in calculating v(a) for a 1965 set of populations appears to have been in order to use a 'definitively post-fertility transition' a more robust procedure might have been to calculate the new values of v(a) using Hinde and Woods' natural fertility schedule but the same standard limiting population used by Coale and Trussell. If fertility was reduced by one fifth of the gap between Hinde and Woods natural fertility schedule and Coale and Trussell's 'limited fertility' schedule, and the resultant curve treated as that of an observed population then, using the Coale and Trussell parameters, *m* for the latter would be 0.34. Thus if the Coale and Trussell parameters are used to detect parity-specific limitation in nineteenth-century Britain a value of 0.35 for *m* would have to be achieved before such behaviour could be securely identified.
64 Coale and Trussell render the regression equation as: $ln[r(a)/n(a)] = lnM + mv(a)$ which is equivalent to $y = a + bx$ allowing *M* and *m* to be calculated by least squares regression. Coale and Trussell (1978) use a five point regression, omitting the values for the 45–49 age group, a practice also followed by Hinde and Woods, and replicated here. The intercept of the regression yields a measure of ln*M*, and the slope of the curve equals *m*. The line predicted by the equation is then compared to the observed ASMFR curve, the goodness of fit being signalled by the mean square error term or MSE.
65 *M* and *m* were also calculated using Hinde and Woods' British Standard parameters, and using the British Standard n(a) alongside Coale and Trussell's v(a). In each case the models were a poorer fit to the observed data than was the case with the full Coale and Trussell model, and therefore only the results calculated using the latter are shown in Table 5.4.2.
66 One remedy would be the re-inflation of r(20–24) but a different inflation factor would be required for each population group studied. In addition to variations in age at marriage different levels of pre-nuptial pregnancy would have to be taken into consideration. Further, other studies have suggested that 'teenage subfecundity' may have extended into the early twenties in populations where the average age at menarche lay at 16 or 17. Frisch (1982), Fig. 1, suggests that in England average age at menarche lay between 15.5 and 16.5 years in the mid-nineteenth century. It is likely that there would have been notable class differences in this figure, a feature

complicated by the incidence of health related factors implicated in reducing fecundity among Victorian women: Hinde and Woods (1984).

67 In terms of regression this is rather unsound, but should produce more consistent results than an inflation exercise.

68 Coale and Trussell (1978) suggest using log [r(a)/n(a)] but the rest of their arguments concerning *M* and *m* make use of natural logs: *ln* and we have therefore chosen to render their suggested method using *ln*.

69 Which would certainly explain the very poor fit of the model to the curves discussed above.

70 Fig. 5.4.3 has been drawn to highlight the change in the level of the lines across time. If one were instead interested solely in their changing shape, the graphs could be redrawn, subtracting the value of *ln*[r(20–4)/n(20–4)] from each point so that all the lines pass through the origin, 0.

71 Llewelyn Davies (1978), pp. 73–4. The mothers both of the author and of her husband had suffered from abusive drunken husbands. In addition the author was one of 15 children, 12 of whom survived (the number of her husband's siblings is not stated). The couple had only had one child. See also Ross (1993), pp. 97–106.

72 Differences in family building strategies according to expectations of marriage and status can be observed in modern less developed countries. In cultures where widow remarriage is rare, and status is gained through having sons, such as India for example, women have an incentive to have their family quickly after marriage; stopping would thus be a preferred strategy of limitation. Elsewhere, where both divorcees and widows are much more likely to remarry, women may be under less pressure to produce children rapidly. We are grateful to Monica Das Gupta for bringing this point to our attention.

73 Seccombe (1990) provides an overview of these issues. See also Llewelyn Davies (1978); Spring Rice (1981); Hall, R. (1981); Gittins (1982); Roberts, E. (1984) for contemporary and near-contemporary comments on the risks of pregnancy and childbirth.

74 David and Sanderson (1990), pp. 436–7. For a critique of CPA see Okun (1994).

75 On the use of the Hutterites as a standard population see n.20 above. In David and Sanderson's work rural Ireland is taken to be all areas lying outside the County Boroughs of Dublin, Belfast, Cork, Londonderry, Limerick and Waterford: David and Sanderson (1988). However, '[i]n fact the labelling is inexact; approximately 14 per cent of the total population outside the County Boroughs in 1911 were living in [urban] places having a population of 5,000 or more': David *et al.* (1988), p. 108, n.15.

76 David and Sanderson (1988).

77 *Ibid.*, p. 704.

78 *Ibid.*, p. 702.

79 See 'Erratum' following David and Sanderson (1988). For the purposes of their paper David and Sanderson set these 'cut-off' parities to lie as close as possible to the uppermost quintile of the rural Irish parity distribution at each age-at-marriage and duration-of-marriage combination. It has not been thought necessary to adjust these figures in the present study.

80 David and Sanderson (1988), p. 707.

81 Szreter (1996b), pp. 392–4.

82 David and Sanderson (1990).
83 Ó Gráda (1991).
84 *Ibid.*, p. 540.
85 It should perhaps be noted that Ó Gráda largest cell size for this comparison was 40 couples, and that he only provides figures for those married less than ten years, possibly overemphasising his case on this point.
86 The problem of unfortunately small numbers militates against any attempt to replicate the work done in David and Sanderson (1990) to convert CPA measures in to period rates or to reproduce their CPA measures for those married for four years.
87 David and Sanderson (1988), p. 707.
88 David *et al.* (1988).
89 As done very effectively by Reay (1994).
90 Coale and Treadway (1986), p. 38, Table 2.1.
91 Unfortunately, small numbers mean that figures for class I cannot be reliably calculated for the other environments, illustrating the concentration of class I in White Collar areas.
92 Hinde and Woods (1984); Szreter (1996b), pp. 364, 501.
93 While Hinde and Woods' and Szreter's speculation concerning rising fertility among miners may well be correct, it is as well to remember that Table 5.6.4 reports *cohort* fertility, not *period* fertility. Interpretation of the slightly higher fertility among miners' wives in the later married cohort is not straightforward. There may be a survival effect operating on those observed in the census: women who achieve higher parities may have been slightly less likely to survive as long as their less prolific sisters. Hence women marrying at a later date may actually be observed to have achieved higher parities on average than those observed who married in an earlier cohort. However, as Knodel has pointed out, when fertility is natural it is actually women with higher parities who are seen to survive for longer as those with low parities are more likely to have a poor health record, undermining their reproductive performance and their survival chances: Knodel (1988), ch. 11.
94 See Szreter (1996b), pp. 624–5, Appendix H, for an estimation of the scale of this effect.
95 Low levels of pre-nuptial pregnancy in the White Collar areas may reduce estimates of fertility. It is a pity that low numbers in the Agricultural areas prevent their patterns being more reliably compared with those in the other environments. It is a particular limitation that there are insufficient representatives of class VI, the Textile workers, available in the OPCS population for discussion, since it is well established that their fertility patterns were unusual for a working-class group: *Fertility of marriage*, Part II (1923), pp. lxxvii–civ, cxi; Haines (1979), ch. 7; Szreter (1996b), pp. 317, 489–90.
96 The other two environments are not shown in order to save space. The agricultural curves follow a pattern not dissimilar to those of the White Collar areas, although among the 1881–91 marriage cohort there is rather greater inter-class variation in the level of fertility achieved, with classes V and VIII seeing rather small movements downward, away from the English and Welsh 1861–71 curve. The 1866–81 marriage cohort in the Light Industry areas, like their peers in the Staple Industry areas, have fertility levels very close to the 1861–71 curve for England and Wales. The succeeding marriage

cohort achieves a distinct decline in fertility, of a lesser magnitude than that experienced in the White Collar areas but a little greater than that achieved by the same cohort in the Staple Industry communities. As in the latter environment, it is class II in the Light Industry areas which achieves the lowest level of fertility amongst the later marriage cohort.

97 The intervals between marriage and first birth and marriage and second birth have been calculated for those couples in two marriage cohorts who have the same number of their own children living in the household on census night as they report ever having borne, and the results are expressed as a proportion of couples having achieved a first or second birth by completed years of marriage (see Table 5.6.5). The 'children born equals those alive in the household' constraint severely reduces the numbers observable as many women lost children through death and some children, particularly those in their later teens, may have migrated from the family home.

98 *Fertility of marriage*, Part II (1923), p. viii. In omitting the most recently married couples the chance to examine subtle differences in the incidence of pre-nuptial pregnancy may have been forfeited.

99 Delaying the birth of the first child is sometimes distinguished as starting behaviour: Knodel (1987); Szreter (1996b), p. 433.

100 In order to ascertain whether couples did in fact have any further children they would have to be observed until the wife completed her childbearing years. This is, of course, impossible with retrospective data. Glass and Grebenik (1954), Table A.1–97, present figures which allow achieved parity figures to be calculated for those married aged 20–24 and 25–29 in 1890–9 and 1900–9 in nine 'class' groups. Sadly none of these categories is comparable with the classes used here and they cannot therefore be used to resolve the question of stopping versus spacing. They do suggest, however, that all groups have between 8–10 per cent of couples who remain childless, and it is not until parity 2 that differentiation between classes emerges.

101 But note that Szreter (1996b), pp. 375, 386–7, found that the most marked tendency in this respect was among class VI Textile workers, who remain absent from the present analysis.

102 Prospective, longitudinal studies observing historical populations have noted that women marrying later in life have higher fertility at later ages than do women who married earlier. This has, on occasion, been ascribed to the later marrying women wishing to make up for lost childbearing years. It is, however, now more commonly attributed to the facts that coital frequency tends to be greater within marriages of shorter duration, irrespective of the age of partners; that women who have borne fewer children are less likely to have experienced birth-related injury and associated sterility; and that recently married women, whatever their age, are liable to have their fertility levels enhanced by the inclusion of pre-nuptially conceived children in the calculation of their fertility rates. See for example Knodel (1988); Wilson *et al.* (1988).

103 As argued by Szreter in his 'culture of abstinence' thesis: Szreter (1996b), ch. 8.

104 Szreter (1996b), p. 387.

105 It should be remembered that the term 'late' age at marriage is a technical one, and refers to a standard set by global populations. The populations involved would operate in terms of 'acceptable' or 'expected' ages of mar-

riage. Women might be 'on the shelf' or 'never going to find a husband' at 23 in some British communities, while in others it would be considered scandalous that they were marrying 'so young'. Such norms also change over time, as has been shown over the course of the twentieth century: Haskey (1987), pp. 11–19.

106 As noted previously, it is likely that there is a concentration of childless couples in the population under observation. Childlessness, and also in this context a very long marriage to first birth interval, may be the result of physical problems experienced by either spouse. Alternatively they may result from fertility-related behaviour of either a voluntary or an involuntary nature. In the discussion which follows it is assumed that physical problems are experienced equally by all sectors of society, and thus that any observed differences in the figures reported are indicative of relative, if not absolute, differences in behaviour.

107 Agricultural areas may have had a more relaxed attitude to illegitimacy, men being more prepared to marry women who had already borne children, for example. This would be compatible with a later age of marriage and yet higher fertility after it, but is not an issue which can be pursued using the OPCS data.

108 Szreter (1996b), p. 387.

109 One aspect of such research could usefully be a consideration of the decline in illegitimate fertility over the course of the second half of the nineteenth century; see n.11 above.

110 Mass Observation (1945), pp. 74–5 quotes women on their experiences of being made to feel the object of ridicule because of their 'large' number of children.

111 Szreter (1996b), ch. 6.

112 Haines (1979); Banks (1981); Friedlander and Ben Moshe (1986); Szreter (1996b).

113 The Miscellaneous service category includes general cleaners, army servants, servants in the theatre, servants in clubs and colleges, hospital orderlies, school cleaners, undertakers, hairdressers, coffee- and eating-house keepers, innkeepers, beer sellers, barmen and chimney-sweeps, in addition to servants in private homes. A sixteenth category, Clerks, has been omitted from all tables presented here owing to small numbers. The selection of these categories has been informed by Szreter's findings regarding groups of individual occupations with similar fertility characteristics, but numerical constraints limited the extent to which this could be followed through: see Szreter (1996b), ch. 7, especially Diagram 7.1.

114 Szreter (1996b), pp. 465–6 amongst others has posited that those in service would be very likely to have fertility levels close to those of the masters they serve. Banks (1954) highlights the opportunities domestic servants would have to learn methods of birth control from their employers. However, as Stevenson notes in *Fertility of marriage*, Part II (1923), p. cix, 'instances of low fertility imposed by conditions of life are afforded by domestic indoor service . . . Doubtless a butler or valet would find a large family particularly inconvenient' and we must wonder if those returned in such occupations might not be selected for their low fertility, or at least for a small number of surviving children.

115 The increase in fertility in the Clothing and Pottery categories between 1891

and 1901 and that amongst textile workers 1901–11 can largely be ascribed to compositional shifts within the OPCS data, rather than to changes in fertility behaviour. Similar shifts within other categories cannot be discounted, but remain undetectable in Table 5.7.1.

116 In the 'special instructions' for filling in 1891 census schedules it was stated that 'sons or other relatives of farmers employed on the farm should be returned as 'Farmer's son', 'Farmer's brother' etc'. In addition 'agricultural labourers, shepherds, and others employed on Farms must return themselves as such. The term "labo'rer" [*sic*] must not be used by itself to describe an "Agricultural labourer"': 1891 Census of England and Wales (1893), *General report*, pp. 428–9**.** In 1901 the instructions regarding farmer's relatives stayed the same, but agricultural labourers were told that they 'should be entered according to the particular work on which they [were] usually engaged – such as "Shepherd" . . . "Cattleman on farm" . . . "Ordinary agricultural labourer" ': 1901 Census of England and Wales (1904), *General report*, Appendix B, p. 321**.** By 1911 the farmer's relatives instruction had been extended to give female examples. A further instruction noted that farm servants should 'state [the] nature of [their] work and indicate if [they were] mainly in charge of horses, cattle, etc. . . . a Labourer on a farm whose work is of a general character should be described as a "Farm Labourer," not simply as a Labourer': 1911 Census of England and Wales (1917), *General report*, p. 852.

117 1911 Census of England and Wales (1917), *General report*, p. 113, states that the numbers of persons reported to be in Agriculture in the 1901 and 1911 censuses were directly comparable, but that to compare these figures with those of the previous censuses 'domestic gardeners' had to be added in and farmers' *male* relatives under the age of 15 and all female relatives had to be deducted. This meant subtracting 5,755 males and 5,395 females from the agricultural population as registered in 1901, but 18,618 males and 56,856 females from the 1911 total. This suggests that the 1901 and 1911 figures were perhaps not as comparable as the 1911 report stated, the subtle word changes in the census instructions having a substantial impact on the numbers reported. See Garrett (1995).

118 Rowntree and Kendall (1913); Howkins (1991).

119 Szreter found for the national occupation of 'farmer, grazier' that whereas this category had been relatively late marrying in the 1870s and 1880s by the 1900s they had become an extremely late-marrying group; Szreter (1996b), Appendix C, Posn. 104, p. 611; Appendix F, Posn. 165; and see p. 376, n.21 for guidance.

120 See Fig. 5.3.4.

121 On the basis of the evidence provided by Buchanan (1985) and Fildes (1998) it is unlikely that different breast-feeding patterns account for the difference in fertility observed in Earsdon and Blaenavon. However, the possibility remains open.

122 The dramatic rise in fertility amongst miners in Stoke in 1901 is also seen amongst the locality's potters. Perhaps a localised 'baby boom' was occurring, but it is also possible that the rise in fertility is due to a shift in the OPCS sector boundaries, which in 1901 leads to the exclusion of a set of houses where workers of a higher social standing lived, thus raising the average fertility observed.

123 The national aggregative figures supplied by the Registrar-General were not, on the face of it, so beset by the problems of migration, shifting boundaries and the vagaries of the local economy and therefore render a more coherent picture of occupational variation in fertility: Szreter (1996b), p. 320.
124 Even with this constraint infant mortality, and therefore fertility, could not be estimated in every case.
125 The lower fertility of the Professionals in the White Collar environment was predominantly due to very low levels of fertility among those aged less than 25. Marriage within this age group was relatively uncommon within this class and environment, and as women would have spent only a short period as wives in this age group, they would have had little time to accumulate births.
126 Szreter (1996b), pp. 316–18, 326–8. The grades of retailer identified were substantial dealers, other dealers, established retailers, and more temporary sellers, stall-keepers, or those selling, often from home, home-produced items as a side-line. There were insufficient dealers in Agricultural areas to include those in the analysis.
127 *Fertility of marriage***,** Part II (1923), pp. cxi–cxxi.
128 The original cards punched for tabulation did, in fact, provide the information necessary to calculate fertility and infant mortality by occupational combination of the parents but 'the demand for [this calculation to be done] was not foreseen when the tabulation was being carried out' which was, Stevenson later admitted, 'unfortunate': *Fertility of marriage***,** Part II (1923), pp. cxiv, cxii.
129 *Fertility of marriage***,** Part II (1923), p. cxvii.
130 See Garrett (1995) for a discussion of the problems besetting interpretation of women's reported employment, with particular reference to the 1911 census.
131 Single women's participation rates, as has been seen, were much higher than any other female marital status group and just a few single mothers trying to disguise their circumstances by reporting themselves as either widowed or married-spouse-absent would have been sufficient to elevate the participation rates of the latter two groups.
132 Anderson (1999) argues, in the face of many statements to the contrary, that rates of married women's employment recorded by the census were an accurate reflection of participation rates. See also Garrett (1995).
133 See Garrett (1995) for a discussion of the 'hidden employment' with which both women and men supplemented their family income.
134 The census instructions of 1901 and 1911 mean that those households supplementing their income by renting out rooms to 'lodgers' cannot be identified. By definition, however, lodgers who ate their meals separately from their 'hosts' should have represented rather less work for their landlady. For further discussion see chapter 3.
135 See Zimmeck (1986); Rose (1993), pp. 149–52.
136 See chapter 3, Table 3.2.5 and accompanying text.
137 Hewitt (1958); Anderson (1972a); Burr Litchfield (1978); Garrett (1990).
138 The term 'apparent full-time occupation' has been used to signify the fact that in the 1911 census reports the first occupation recorded on the census form was treated as though that was the sole occupation, followed full time by that respondent. See Garrett (1995).

139 Statistics on stillbirths were not collected by the Registrar-General until 1927. Full statistics on miscarriages would be very difficult to collate centrally as so many go unrecognised, even in the modern era. It is believed that probably up to one fifth of all conceptions result in a miscarriage, but it is likely that in the nineteenth century far fewer were actually recognised for what they were. All, however, would serve to space births, and if certain communities were more prone to them, those communities would register lower ASMFRs as a result; see Hart (1998). For examples of differentials in the incidence and reporting of stillbirths see Mooney (1994b).

140 The large Jewish community in Bethnal Green, with its cultural practices apparently reducing the chance of death amongst its infants, may well have mitigated the deprived circumstances found throughout the community. See Marks (1994).

141 Among couples married for five to nine years where the wife was aged less than 35 at marriage, the average bridal age of marriage was 23.4 years in Stoke and 24.6 years in Bolton. In Earsdon it was 23.3 years and in Bethnal Green 22.6 years. Bolton's 'late age at marriage' should, however, be seen in the context of industrial working-class behaviour. In Pinner the equivalent figure was 26.0 years, and in Agricultural Saffron Walden 25.0 years. All figures quoted are calculated from more than 200 couples. See section 5.2 on the accuracy of these calculations of average age at marriage.

142 See n.128 above.

143 *Fertility of marriage*, Part II (1923), pp. cxii, cxiv.

144 For a definition of the 'Miscellaneous service' category see n.113 above.

145 Women whose husbands were absent on census night were omitted from our fertility calculations. However, if women reported as working and with their husbands present had, in the past, been more likely to have had their husband's away perhaps in the army, at sea or on the tramp, then they would have had a reduced risk of conception. This may well have contributed to the longer time the women observed in employment appear to have taken to conceive.

146 See Garrett (1995). The question mark over the Retail group decided their omission from the analysis outlined below.

147 *Fertility of marriage*, Part II, p. cxvii.

148 When couples married while the bride was aged less than 35 are considered, more than 70 per cent of couples where the wife worked in the Potteries had been married for less than 15 years. Among couples where the wife did not report an occupation only 50 per cent, approximately, had been married for less than 15 years.

149 *Fertility of marriage*, Part II (1923), p. cxvii.

150 Greater attention needs to be paid to the possibility that certain sections of the population may have been successful limiters from the onset of fertility decline; a point well made by Anderson (1998b).

6

The national picture

6.1 Introduction

In the preceding chapters it has been argued that 'environment', the physical and social surroundings in which an individual lived, was very important to the experience of child bearing and rearing in the late Victorian and Edwardian era. Living in insalubrious physical surroundings was, it has been demonstrated, more lethal to young children than being born into poor circumstances, although sight cannot be lost of the fact that the chances of experiencing these two conditions were often very closely related. Nevertheless poverty-stricken couples living in the countryside could rear broods of relatively healthy children, while even the well-off incurred a 'penalty' with respect to child survival if they chose to rear their families in centres of industry. Social environment, the composition of one's neighbours in the community, on the other hand, appears to have played a major role in determining a couple's childbearing strategies, in conjunction with their expectations and behaviour in relation to courtship and marriage. The conclusion had also been reached that social class differences in fertility and the life chances of children were somewhat exaggerated by the differential distribution of occupations and therefore social classes across the spectrum of environments.

These conclusions were, however, reached solely on the basis of the OPCS dataset, a very small and possibly unrepresentative fraction of the population of England and Wales. They strongly suggested that an urban–rural dichotomy was an insufficient framework on which to build models of variation in fertility and mortality at the turn of the century; a continuum running from 'agricultural-rural' through 'white collar suburb' to 'industrial centre' was to be preferred. Could analysis utilising such a continuum provide additional understanding of previously charted patterns of child survival and fertility at the level of the nation as a whole?

As calculated in the 1911 Census of England and Wales Report, Vol. XIII, *Fertility of marriage,* Part II (1923) (hereafter the *Fertility of marriage* report), the standardised child mortality rate (SCMR) for England and Wales stood at 174 children per thousand born, and standardised fertility (TF) at 282 children per 100 couples, among couples reporting their experience in the 1911 census.[1] The report demonstrated considerable variation in each of the measures, both regionally and across the rural–urban hierarchy. Stevenson presented his findings using the new 'administrative units' for local government introduced in 1910. There were five types of such administrative unit: the metropolitan boroughs (forming both the county and the census division of London); county boroughs; large urban areas not designated as county boroughs yet containing populations of over 50,000; other 'urban districts'; and 'rural districts'. Stevenson's figures for each of these categories were aggregated to the levels of regions, census divisions and counties, units mapped in Figure 6.1.1, with a key provided in Table 6.1.1.

In his report Stevenson considers only 11 'regional' divisions, but for the purposes of much of the analysis which follows we have distinguished 12 regions by dividing Wales into South Wales (Division XI) and North Wales (Division XII). Table 6.1.2 reproduces Stevenson's measures of mortality for an undivided Wales and the ten other census divisions.[2] Unsurprisingly, the mortality figures reveal that rural administrative districts were considerably less lethal than the urban districts, and that the county boroughs had a poorer health record than the other, generally smaller and less densely settled, urban administrative districts. Further, a marked mortality gradient from the north and Wales, in the west, to the south of the country is indicated: the county boroughs of the North West (Division VIII) had SCM rates 48 per cent higher than equivalent units in the South East (Division II), and SCM rates in the rural districts of the North (Division X) were 62 per cent higher than those of rural districts in the South East. Compared to the county boroughs of the South East and South Midlands, London's SCM rate of 178 deaths per thousand births looked relatively high, but the health of the capital's children compared favourably with that of their peers in the principal towns and cities in the northern census divisions. London's health profile had been commended as early as 1841 by William Farr, and is a point to which discussion will return below.[3]

The spatial patterns of fertility reported by Stevenson also revealed a rural–urban gradient, as Table 6.1.2 shows, rural fertility generally being rather higher than that of the towns and cities and the county bor-

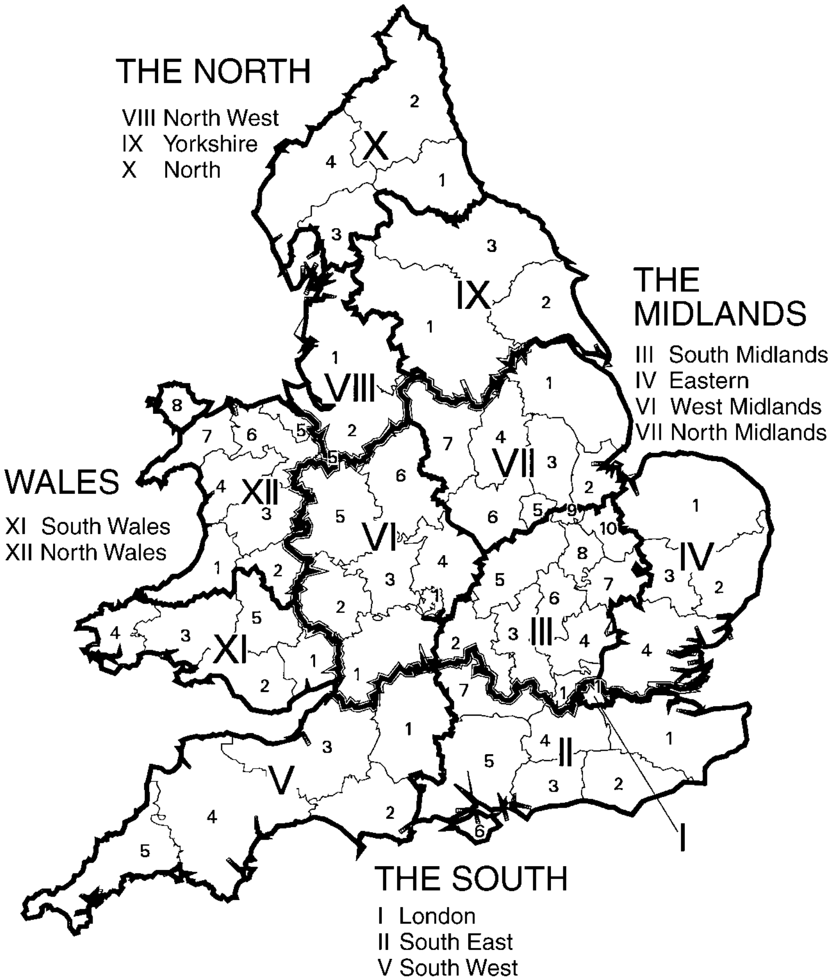


Fig. 6.1.1 The location of the areas, census divisions and counties of England and Wales used in analysis. *Note:* as Table 6.1.1 below.

Acknowledgement: see Fig. 2.2.1.

oughs usually having slightly lower fertility than the 'urban districts'. The figures suggest that there was some inter-regional variation in the difference between urban and rural fertility levels, the southern divisions of England having a much wider gap between levels of TF in town and country than was true of the North (Division X) or the West Midlands (Division VI), for example. The figures again reveal a

Table 6.1.1 *The constituent geographical divisions of England and Wales*

Area	Division	County
South	London I	1 London
	South East II	1 Kent
		2 Sussex, East
		3 Sussex, West
		4 Surrey
		5 Hampshire
		6 Isle of Wight
		7 Berkshire
	South West V	1 Wiltshire
		2 Dorset
		3 Somerset
		4 Devon
		5 Cornwall
Midlands	South Midlands III	1 Middlesex
		2 Oxfordshire
		3 Buckinghamshire
		4 Hertfordshire
		5 Northamptonshire
		6 Bedfordshire
		7 Cambridgeshire
		8 Huntingdonshire
		9 Soke of Peterborough
		10 Isle of Ely
	East Anglia IV	1 Norfolk
		2 Suffolk, East
		3 Suffolk, West
		4 Essex
	West Midlands VI	1 Gloucestershire
		2 Herefordshire
		3 Worcestershire
		4 Warwickshire
		5 Shropshire
		6 Staffordshire
	North Midlands VII	1 Lincolnshire – Lindsey
		2 Lincolnshire – Holland
		3 Lincolnshire – Kesteven
		4 Nottinghamshire
		5 Rutland
		6 Leicestershire
		7 Derbyshire
Wales	South Wales XI	1 Monmouthshire
		2 Glamorganshire
		3 Carmarthenshire

Table 6.1.1 (*cont.*)

Area	Division	County
Wales		4 Pembrokeshire
		5 Brecknockshire
	North Wales XII	1 Cardiganshire
		2 Radnorshire
		3 Montgomeryshire
		4 Merioneth
		5 Flint
		6 Denbigh
		7 Carnarvonshire
		8 Anglesey
North	North West VIII	1 Lancashire
		2 Cheshire
	Yorkshire IX	1 West Riding
		2 East Riding
		3 North Riding
	North X	1 Durham
		2 Northumberland
		3 Westmorland
		4 Cumberland

Note:
The geographical areas, and registration divisions I–X are as defined in *Fertility of marriage,* Part II (1923), p. cxxi. The registration division of Wales has been divided into South Wales (XI) and North Wales (XII) for the present analyses.

north–south gradient, the various types of administrative unit in southern divisions generally having lower fertility than the equivalent types in the North and Wales.

We would argue, however, that Stevenson's figures, as presented in Table 6.1.2, are misleading. Like is not being compared with like. The rural designation of an administrative district was not necessarily reflected in the composition of its workforce. An 'urban' district could be a white collar suburb or a mining town, a seaside town or a textile community. Class- and occupation-based fertility studies mean that one would not generally expect such diverse types of settlement to have similar fertility experiences, and recent papers on contemporary Britain have demonstrated that different 'types' of area have marked health differences.[4] Conventionally these have been ascribed to the different social mix of people living in areas at the opposite ends of the spectrum, it being argued that the least healthy areas were unhealthy because they

Table 6.1.2 *Geographic variation in child mortality and fertility in the census divisions of England and Wales, 1911*

		Standardised Child Mortality				Standardised Fertility			
		London	County boroughs	Other urban districts	Rural districts	London	County boroughs	Other urban districts	Rural districts
I	London	178				274			
II	South Eastern		148	132	111		252	257	273
III	South Midlands		152	142	117		256	265	281
IV	Eastern		186	144	117		300	270	289
V	South Western		174	140	113		248	257	281
VI	West Midlands		197	175	131		288	292	297
VII	North Midlands		187	174	147		261	286	299
VIII	North Western		219	197	146		288	270	283
IX	Yorkshire		203	192	159		268	277	304
X	Northern		202	193	180		309	313	321
XI	Wales		194	196	160		294	313	316

Source: Fertility of marriage, Part II (1923), Table LIII, p. cxxii.

were inhabited by people with unhealthy lifestyles. However, as MacIntyre *et al*. asked in 1993, 'should we be focusing on places or people?' They argued that:

> many [present-day] health promotion or public health policies focus on individuals and their behaviour . . . A large proportion seem to be based on the principle that if working-class *people* could become more like middle class *people* then their rates of illness and premature death would become more like those of middle class people. An alternative approach would be to try to make working-class *areas* more like middle class *areas* by improving the social and physical environment.[5]

6.2 'Environment' at the national scale

In order to pursue the debate concerning the role of 'environment' in fertility and child mortality patterns at the national level and in terms of the rural–urban–industrial spectrum set out in the OPCS study in the previous chapters, it was necessary to classify all the constituent spatial units of England and Wales by 'environment'. Previous studies of the geography of nineteenth-century demography had, in general, used registration districts as their smallest spatial units. However, as noted above, from 1910 the Registrar-General switched to reporting events and rates by administrative district. The latter had the advantage over registration districts in that they were less likely to contain large pieces of rural hinterland with urban areas, which had confounded much earlier research.[6] Also there were approximately 1,800 administrative units: roughly three times the number of registration districts.

Each of the administrative units was classified by 'environment', as each of the OPCS communities had been, according to the occupational profile of its workforce. Ideally this exercise would have been undertaken using data from the 1911 census, but the requisite occupational tables were, unfortunately, insufficiently detailed, and thus it was necessary to use data from the 1921 census where the numbers employed in 32 occupation 'orders' were listed for each of the nation's administrative districts.[7]

The same criterion of at least 20 per cent of the labour force in agriculture used as in the OPCS study was taken to designate an administrative unit as Agricultural. It should be noted however that, because of the very large number of units, this allowed for a spectrum of experience within the Agricultural environment, running from those areas where virtually the whole workforce worked in agriculture to those where more than half worked in the white collar occupations or one of the staple industries. In 18 per cent of the 634 administrative districts classified as Agricultural and hence rural there were more white collar workers in residence than there were workers in agriculture and in 21 per cent of cases more workers in industry than in agriculture.

As discussed above, the administrative units devised in the early twentieth century distinguished between the metropolitan boroughs of London, county boroughs, large towns with over 50,000 inhabitants, other smaller urban districts and rural districts. In the following discussion county boroughs and large towns are considered and referred to collectively as 'great towns'.[8] Their locations are given in Figure 6.2.1. It might be thought that the spatial hierarchy provided by the administrative districts would facilitate urban–rural comparisons. However, the environmental classification reveals that 12 per cent of rural administrative districts actually fell into the Staple Industry category and a further 2 per cent fell into each of the White Collar and Light Industry categories. Conversely, very occasionally an 'urban administrative district' was classified as Agricultural: the cathedral city of Ely in the Cambridgeshire Fens is a notable example.

Production restrictions make it difficult to present the distribution of environments across England and Wales on one map. Figure 6.2.2A differentiates all urban administrative districts (black) from those designated rural (white). The urban agglomerations of London, Lancashire, Yorkshire, the North East, the West Midlands and South Wales stand out. However, two important points emerge from Figures 6.2.2B, C and D, which map those administrative districts designated White Collar, Light Industry and Staple Industry in our environmental schema. First, there is considerable concentration, indeed polarisation, of environments; virtually no Staple Industry districts appear south of a Severn–Humber line, and the White Collar districts are focused on London and the surrounding counties, with another concentration on the Lancashire and Cheshire coast. Areas of Light Industry appear mainly in the Midlands, with a substantial component in London. Second, on comparing D with A in Figure 6.2.2 it is noticeable that many rural administrative districts in the northern half of the country actually fall into the Staple Industry environmental category.[9]

Spatial patterns can be misleading, in that they give little indication of the relative populations contained within them. The 634 units classified as having Agricultural environments held just 15 per cent of the nation's population, yet covered 80 per cent of the acreage. Table 6.2.1 lists the distribution of the population in each environment across census divisions. The table indicates that the spatial patterns disguise the fact that 36 per cent of the population lived in Light Industry environments; this is partly a result of several great cities, such as

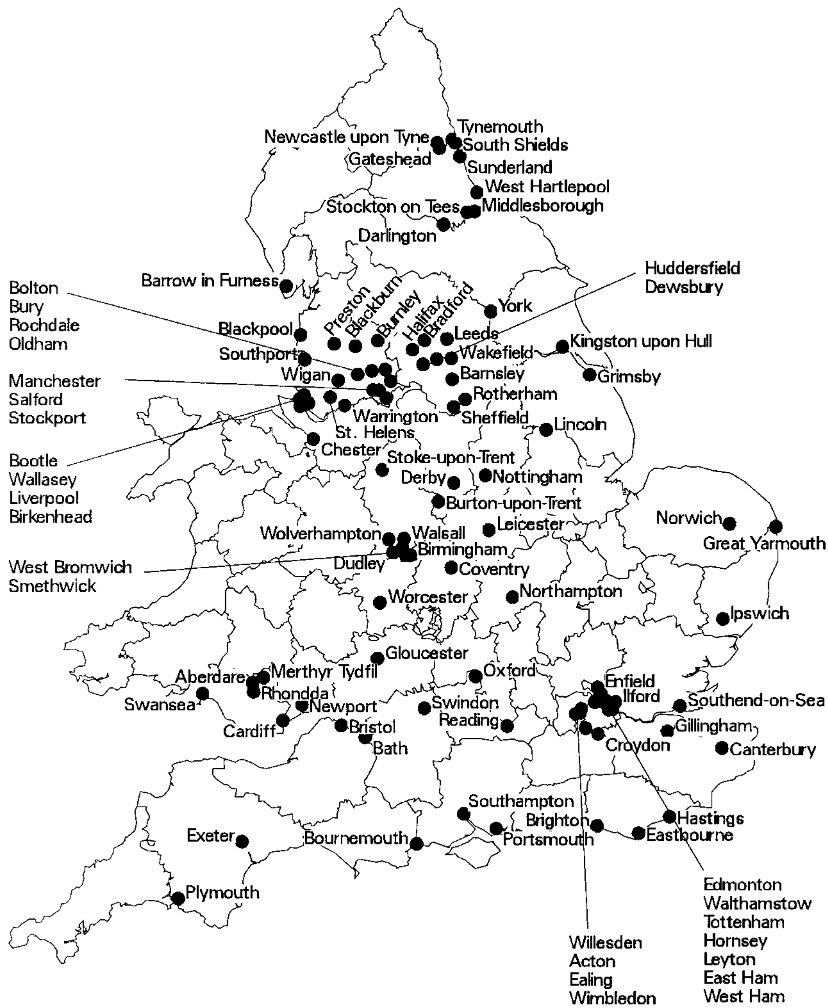
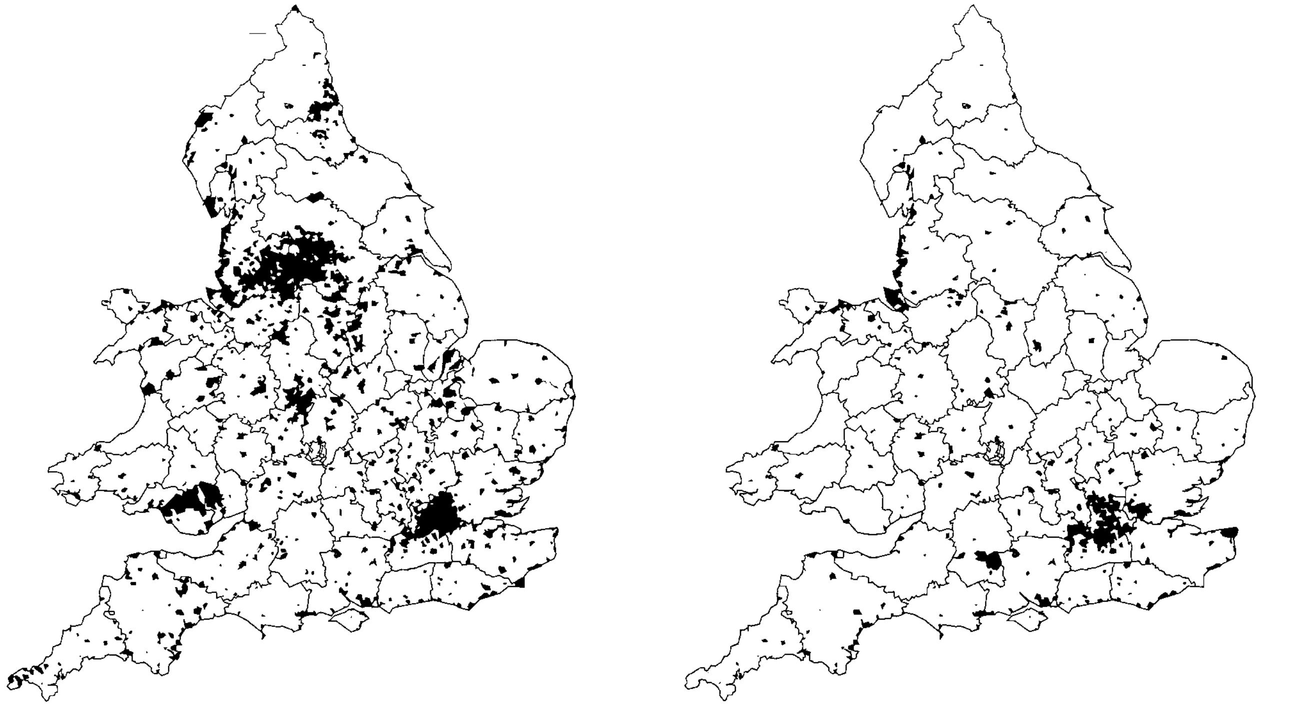


Fig. 6.2.1 The location of the great towns of England and Wales, 1911. *Note:* For the definition of a great town, see note 8 in this chapter.

Manchester, Liverpool, Birmingham and Newcastle, falling into this category as a result of the diverse nature of their economies. The polarisation of the White Collar and Staple Industry populations is even more apparent from Table 6.2.1. Over half of those living in the former environment are located in London and the South East, while fewer than two people in 100 in a Staple Industry environment live south of a line joining the Severn and the Wash. The table further reveals that those

A. Urban administrative districts

B. White Collar



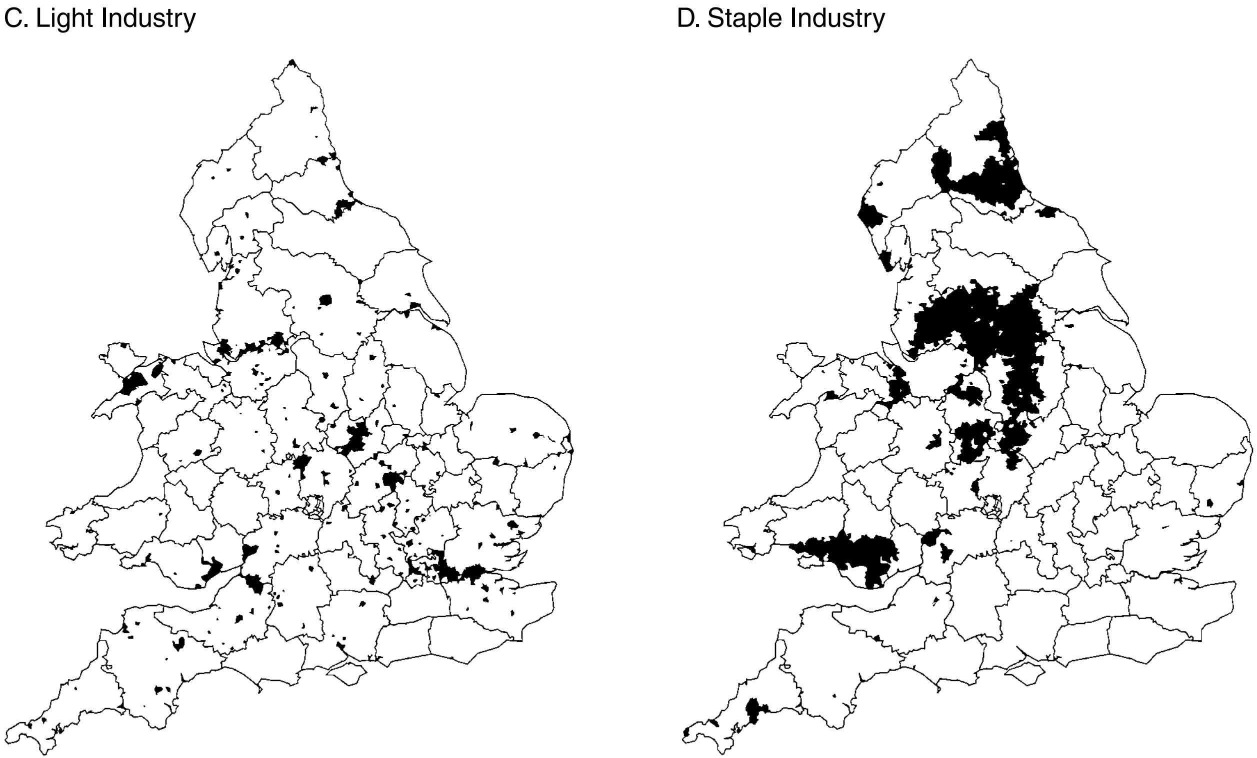


Fig. 6.2.2 The geographic distribution of A: all urban administrative districts, B: all administrative districts with a White Collar environment, C: all administrative districts with a Light Industry environment, and D: all administrative districts with a Staple Industry environment: England and Wales, 1911

experiencing an Agricultural environment are more likely to live in the southern portion of the country than is immediately apparent from the distribution of rural administrative districts.

In comparing the demographic experience of the census divisions, or indeed of their constituent counties, administrative districts or registration districts, their environmental profile needs to be taken into consideration. In comparing demographic rates across the 'great towns' and the urban and rural administrative districts of the census divisions (Table 6.1.2), Stevenson was not comparing like with like: 'rural administrative' districts in the North (Division X) were very often industrial by nature, and therefore might be expected to have a different demography from the rural administrative districts of the South (Divisions II and V) which were predominantly Agricultural. An exercise comparing infant mortality rates (IMRs) for rural administrative districts classified as Agricultural under the environment schema from Divisions VIII, IX and X in the North with directly comparable districts from Divisions II and V in the South over the 1901–10 decade demonstrated that their IMRs were virtually indistinguishable.[10] As Agricultural districts were thus healthy for children in both North and South, the ill health of the Northern rural administrative districts was very likely ascribable to the large proportion of the latter which were industrial in nature. Unfortunately, attempts to carry out a similar comparative exercise for fertility are confounded by the fact that the Registrar-General's *Annual* and *decennial reports* provide only Crude Birth Rate figures. Higher crude birth rates are found in the northern Agricultural districts than in the southern, but it cannot be discerned whether these are the result of different fertility patterns or variations in population structure.

As they are standardised the fertility and child and infant mortality figures provided in the *Fertility of marriage* report provide an excellent basis on which to pursue an examination of the role of 'environment' in influencing demographic patterns. Unfortunately, however, the 1800 plus administrative districts are reduced to only 220 units which can be used for analysis, namely London, each of the other 'great towns', and the aggregated urban and aggregated rural administrative districts for each county. Each of the great towns could be allocated to an environmental class on the basis of the workforce profile, although in the absence of finer-level data their total population (100 per cent) had to be assumed to be experiencing that environment, an assumption which we recognise has inherent weaknesses.

The environmental classification assigned to each of the 'great towns' is depicted in Figure 6.2.3A.[11] The map indicates that the vast majority of great towns of a White Collar nature (denoted by stars) lay in the

Table 6.2.1 *The geographic distribution of the population living in each of the OPCS environments: England and Wales census divisions (percentages based on 1921 population figures)*[a]

		OPCS environment				
Census divisions		Agricultural	White Collar	Light Industry	Staple Industry	Total
I	London	0.0	24.3	18.7	0.0	11.8
II	South Eastern	17.9	30.2	4.7	0.1	10.8
III	South Midlands	12.8	12.4	8.0	0.0	7.5
IV	Eastern	11.7	5.6	8.4	0.9	6.3
V	South Western	14.7	9.8	2.1	0.8	5.3
VI	West Midlands	11.3	3.4	12.8	15.1	11.2
VII	North Midlands	8.2	1.1	6.9	9.2	6.5
VIII	North Western	4.9	6.7	18.8	24.6	15.7
IX	Yorkshire	6.5	2.5	7.9	24.1	11.0
X	Northern	3.9	1.2	6.8	12.5	6.8
XI	South Wales[b]	4.1	0.9	4.3	11.3	5.5
XII	North Wales[b]	3.9	1.8	0.5	1.2	1.5
	Total	100.0	100.0	100.0	100.0	100.0
N of total population (in 000s)		5,892	7,883	13,698	10,421	37,894
Environment population as % of total		15	21	36	28	

Notes:

[a] The table could have been presented using 1901 figures in place of those for 1921. The 1901 figures paint only a slightly different picture, the main difference being that the population of London comprised 14 per cent of the national population rather than 11.8 per cent.

[b] See note to Table 6.1.1.

Source: Population figures taken from 1921 Census of England and Wales, 1927, *General report*, Tables 10 and 11.

Environmental Classification

Map A

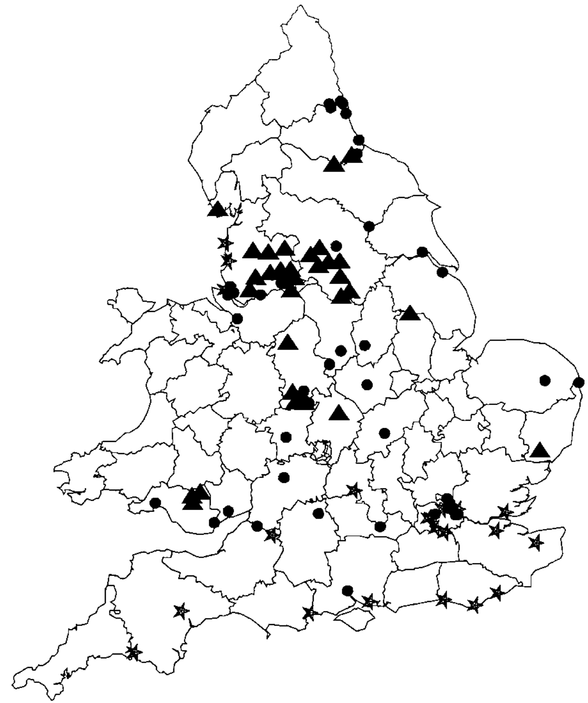
▲ Staple Industry
● Light Industry
★ White Collar

Maps B and C

60+% of population live in:

- Staple Industry
- Light Industry
- White Collar
- Agricultural
- See note

A. Great towns



B. 'Other urban' districts

C. Rural districts

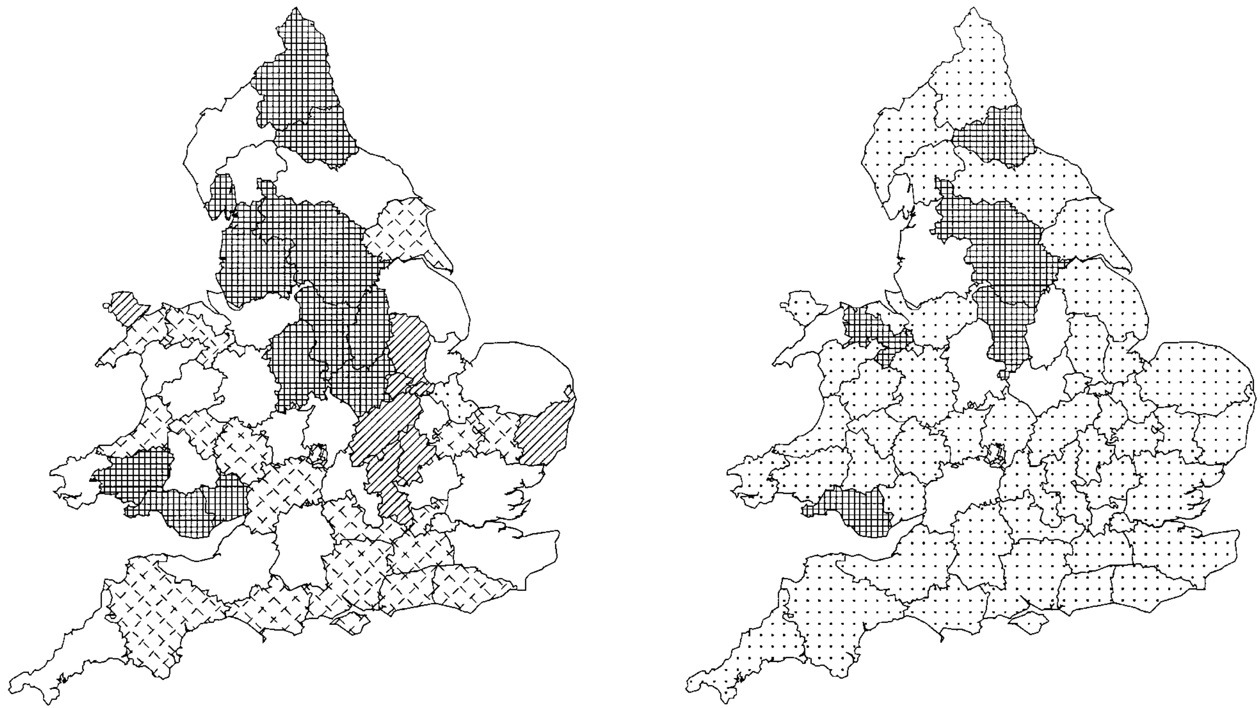


Fig. 6.2.3 The distribution of environments amongst A: the great towns, B: the other urban administrative districts aggregated at county level and C: the rural administrative districts aggregated at county level: England and Wales, 1911. *Note:* In the case of great towns each unit falls into just one category of environment: 100 per cent of the population of that town live in the given environment. In the case of the urban and rural aggregates the population of a particular county live in a variety of environments; only those counties where 60 per cent or more of the population live in districts with a particular environment are shaded.

southernmost counties, the only exceptions being Blackpool, Southport and Wallasey in the North West. The large number of 'great towns' in Lancashire and the West Riding of Yorkshire classified as being centres of Staple Industry highlights not only the industrial nature of these counties but also their highly urbanised populations. The environmental profile of each county's aggregated urban and rural administrative districts were calculated by allocating each of the constituent districts to an environmental category and then summing the populations allocated to each of the four categories. The distribution of environmental experience was then expressed in percentage terms. In order to depict these graphically, Figure 6.2.3 shows those counties where more than 60 per cent of the population in the other urban (Figure 6.2.3B) or rural (Figure 6.2.3C) administrative districts inhabit a particular environment. The point that urban areas form a spectrum of experience running from the intensely industrial to the acutely middle class is brought home by B, while C underscores the claim that not all so-called 'rural' districts hold populations devoted to tilling the land or raising animals.

Because of the units for which data are available, the distribution of population across the great-town–urban–rural hierarchy within any spatial unit also has to be taken into account when undertaking comparisons of the effect of environment. For example, 69 per cent of the population of Cardigan in west Wales lived in rural administrative districts, all Agricultural in environment. Just over 30 per cent of the county's population lived in small urban areas, the vast majority of these designated White Collar, as might be expected of relatively small market and service-orientated towns. In Warwickshire, in contrast, the 'great towns' of Birmingham and Coventry, both of them classified as having a Light Industry environment, held over 75 per cent of the population. The most urban counties, apart from London, were Lancashire and Middlesex with fewer than 5 per cent of the inhabitants living in rural administrative districts, and fewer than 2.5 per cent living in rural districts with Agricultural environments. The counties outside the capital with the lowest percentage of their population living in Agricultural environments were in fact Durham and Glamorganshire, however. Despite virtually 30 per cent and 18 per cent of their respective populations living in rural administrative districts, fewer than 2 per cent of their inhabitants lived in an Agricultural environment.[12]

The relative size of the counties, plus their different environmental make-up, obviously affects the 'national average' urban, rural and environmental demographic experiences: the 'great town' figures are dominated by the, mainly industrial, towns of Lancashire, West Yorkshire and Warwickshire, which contain approximately one-third of the great town population, and London, which contains a further quarter of that population. Furthermore, Lancashire and the West Riding between them contain some 45 per cent of the population living in a Staple Industry environment, while London and the South East contain over half of those living in a White Collar environment.

Would a consideration of infant and child mortality and fertility from an environmental perspective enhance understanding of the national and regional patterns of these demographic phenomena beyond that provided by an urban–rural model? Using regression analyses to remove the effects of variation in population size and composition, sections 6.3 and 6.5 below address this question with reference to infant and child mortality and fertility respectively. Before attention can be fully focused on the latter, however, there has to be a consideration, in section 6.4, of nuptiality and its relation to fertility.

6.3 National patterns of infant and child mortality

The debate over the relative roles of urbanisation and industrialisation in influencing national rates of infant mortality in particular and mortality in general has received considerable attention in recent years. In 1990 Williamson used regression analysis to examine the 'determinants of infant mortality rates in 109 urban parishes surveyed in the 1834 Poor Law report' and '72 cities and towns included in a 1905 survey taken by the Board of Trade'. He concluded that 'it was not industrialisation that generated the dis-amenities associated with high infant mortality rates but, rather, urbanisation'.[13] His regression included such variables as temperature, hours of sunshine, density, size, a measure of crowding, and a 'Satanic Mills' index which included the proportion of the population employed in manufacturing, mining and other non-service/non-agricultural occupations to 'capture the alleged effects of factory work environment and industrial pollution on the mortality environment'.[14] Lee, however, in 1991, stressed the importance of industrialisation and employment structure in creating regional variations in the infant mortality rate between 1861 and 1911. He also described how inequalities between counties grew over the 1881–1931 period as the healthier ones saw faster decreases in their IMRs, although almost all regions actually experienced a decrease in mortality rates. Lee emphasised the 'divergence' of mortality rates, pointing out that certain counties where industry was booming saw an increase in the proportion who were living in the most unhealthy of districts. Overall mortality rates in such counties would have appeared to deteriorate, at least in relation to counties where the population was gaining most benefit from progress in public health, even if rural rates and urban rates were both experiencing decline. Lee clearly believed that the structure of employment and a disproportionate population shift into areas with notoriously high IMRs served to 'retard' the national decline in infant mortality.

Working with smaller spatial units, Woods had also stressed the importance of population movements from the countryside to the urban areas in relation to national mortality rates. In contrast to Lee, however, Woods stressed the convergence of mortality rates as the nineteenth century progressed, arguing that the gap between urban and rural rates narrowed owing to a faster rate of decrease in urban mortality, rural areas already having achieved low levels by the mid-nineteenth century. This argument has partly been undermined, Szreter and Mooney having argued that rather than urban mortality rates seeing continuous improvement over the first half of the century as Woods had speculated, there had been a significant deterioration in mortality in industrial towns and cities during the second quarter of the nineteenth century.[15] The work of Williams and Galley has further suggested that in certain towns such as Blackburn, Preston, Tynemouth and Newcastle little improvement in infant mortality was seen until the close of the nineteenth century.[16] However, since pioneer life tables were constructed by William Farr in 1841, it has been believed that the nation's capital was unusually healthy, certainly by comparison to the rather smaller northern centres of Liverpool and Manchester.[17] London's advantage was still clear in 1869, provoking Farr to comment that London's 3 million inhabitants had every reason to be satisfied with their relative survival chances if they compared themselves with the populations of the 'principal northern towns'.[18] Williams and Mooney also commented that 'low IMRs' seem to have been a general feature of southern towns.[19] Given the environmental composition of 'southern towns' (Figure 6.2.3A), including London, these points are not surprising: cities in the north and south had quite different occupational and hence environmental complexions.

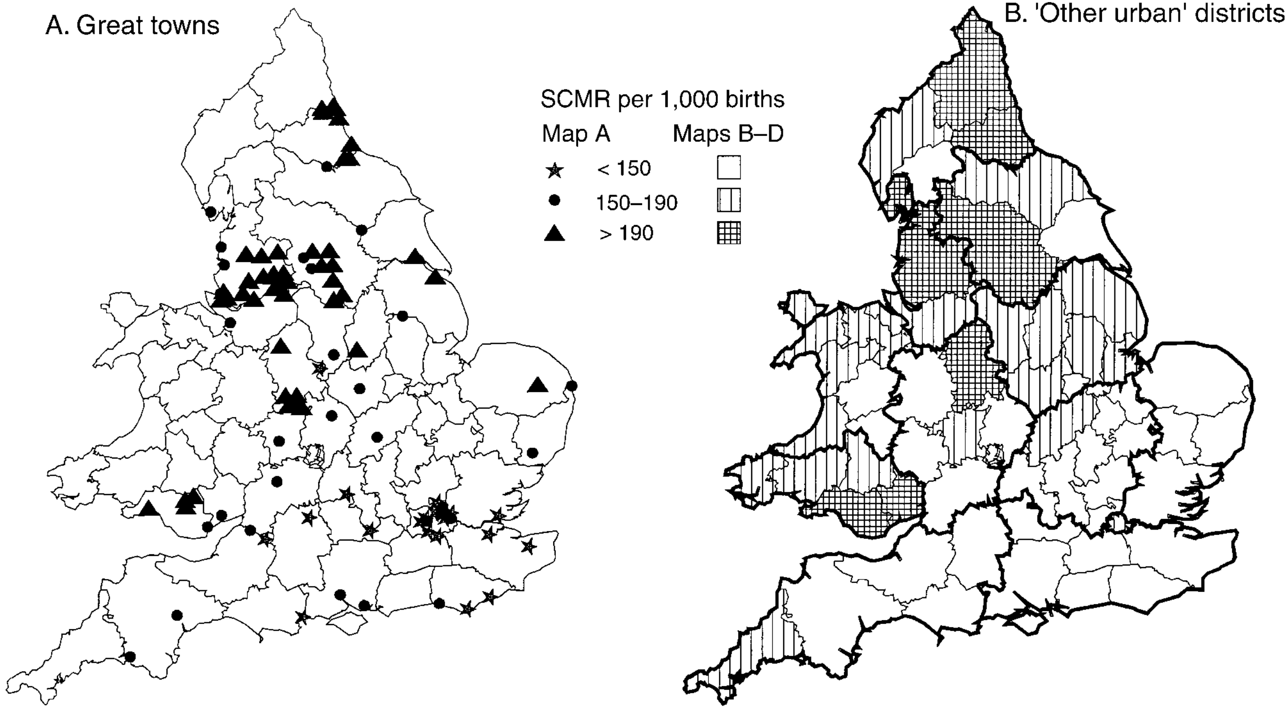
The role of environment, particularly the nature of a particular urban place, over and above any urban–rural distinctions in influencing mortality has thus often been hinted at, but seldom tackled directly.[20] With the environmental classification for the great towns, other urban and rural districts of each county and the standardised child mortality rates (SCMRs) provided for each of these units by the *Fertility of marriage* report, it was possible to test the role of environment in creating the north–south and urban–rural gradients observed in the early age mortality figures presented in Table 6.1.2.

The SCMRs for industrial great towns and for aggregates of other urban and rural administrative districts of each county are mapped in Figure 6.3.1A–C. Although county level figures are not given in the *Fertility of marriage* report, they can be estimated by combining the SCMRs for each unit within a county weighted according to the proportion of the county which it contained. The resultant figures are mapped in Figure 6.3.1D. An impression of a healthy South and an unhealthy North emerges forcefully from the series of maps, and particularly map D. An urban–rural gradient is also suggested on comparing A, B and C, but the nature of the gradient differs from location to location. The maps further underscore the unhealthiness of counties with a large proportion of the population living in Staple Industry environments or in large urban areas.

As a means of determining whether it was 'urban-ness' or 'industrialness' which had a greater impact on geographical patterns of child survival, Ordinary Least Squares (OLS) regressions were performed on the SCMRs.[21] First of all the SCMRs were regressed on individual variables: a geographic variable, CENSUS DIVISION; a variable representing position in the urban–rural hierarchy, TYPE OF PLACE; and a variable considering environment, ENVIRONMENT.[22] The results are shown in Table 6.3.1, columns I, II and III.

In the case of the CENSUS DIVISION variable, Division I (London) is taken as the base line or comparator category. The intercept of 178 reflects the capital's SCMR while the coefficients indicate, as might be expected from the preceding maps, a strong North–South divide in child survival with the South West, South East, South Midlands and East Anglia all reporting significantly lower infant and child mortality than the capital, as does North Wales, but Lancashire-Cheshire and Yorkshire having significantly higher mortality. The adjusted R^2 figure indicates that geographic location, taken on its own, could explain almost 60 per cent of total variation in infant and child mortality.

When the TYPE OF PLACE variable is considered, using great towns as the comparator category, the advantage of rural places in terms of infant health is immediately seen, smaller urban areas having a more moderate advantage over major centres. The urban–rural gradient in child mortality is thus confirmed, but the adjusted R^2 figure suggests that the urban–rural spectrum could only explain around one-third of variation in SCMR. The 'environment' variable is rather different in nature from the previous two. Rather than a *categorical* variable, the ENVIRONMENT variable was the percentage of a particular unit's population living in each environment.[23] The coefficients therefore indicate the increase or reduction in SCMR that accompanies a 1 per cent increase in population living in that environment. The comparator category is the Light


A. Great towns
B. 'Other urban' districts
SCMR per 1,000 births
Map A
Maps B–D
< 150
150–190
> 190

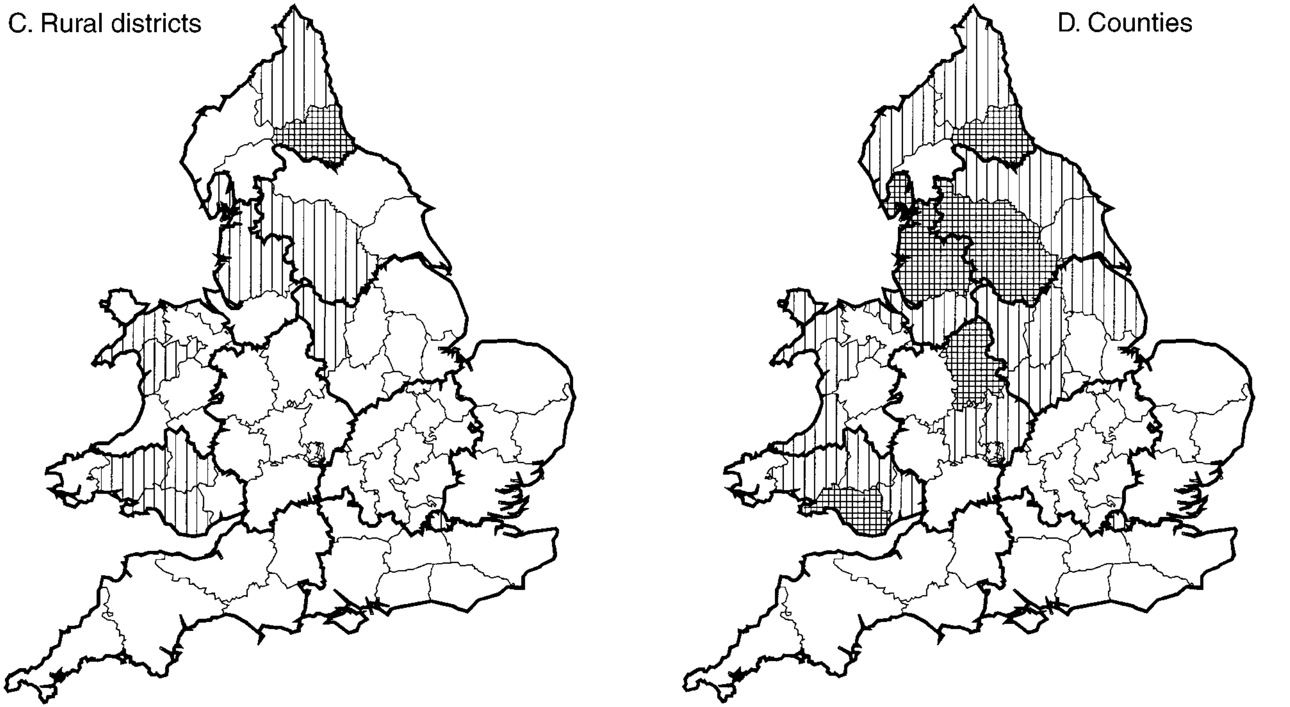


Fig. 6.3.1 Standardised Mortality Rates for A: the 'great towns', B: 'other urban' administrative districts aggregated at county level, C: rural administrative districts aggregated at county level and D: the counties of England and Wales, 1911. *Source: Fertility of marriage,* Part II (1923), Table LIII, pp. cxxii–cxxvi.

Table 6.3.1 *The relationships between standardised child mortality and other factors: regression analysis, England and Wales, 1911*

		I	II	III	IV	V	VI
Intercept		178	187	186	161	50	115
CENSUS DIVISION[a]							
I	London	–					–
II	South East	−46.44 ***					−25.10 ***
III	South Midlands	−42.74 ***					−23.53 ***
IV	East Anglia	−42.60 ***					−32.37 ***
V	South West	−47.72 ***					−19.20 ***
VI	West Midlands	−2.52					−7.63
VII	North Midlands	−9.84					−6.16
VIII	Lancashire–Cheshire	26.53 ***					17.74 ***
IX	Yorkshire	13.28 **					5.53
X	North	13.52 *					2.49
XI	South Wales	11.28					−1.92
XII	North Wales	−29.04 **					−10.70
TYPE OF PLACE[a]							
Great town			–				–
Other urban areas			−19.12 ***				−21.47 ***
Rural areas			−53.14 ***				−40.88 ***

ENVIRONMENT[b]						
Agricultural			−0.73 ***			−0.22 ***
White Collar			−0.47 ***			−0.14 ***
Light Industry			–			–
Staple Industry			0.16 ***			0.15 ***
DENSITY[c]				0.53 ***		−0.16
FERTILITY[c]					0.43 ***	0.29 ***
R^2	0.60	0.34	0.62	0.09	0.08	0.85
Adjusted R^2	0.57	0.33	0.62	0.09	0.07	0.83

Notes:
The dependent variable is the Standardised Child Mortality Rate (SCMR).
See text for definitions of variables: [a] = binary variable, [b] = percentage variable, [c] = continuous variable.
*** Significant at 1 per cent level, ** Significant at 5 per cent level, * Significant at 10 per cent level.
Source: OPCS dataset.

Industry environment. Both the Agricultural and White Collar environments show significantly lower mortality than the comparator, whereas that in the Staple Industry environment is significantly higher, although not by a large amount. The environmental gradient observed in the OPCS dataset is thus confirmed at the national level, and with an adjusted R^2 of 0.62 offers a great deal more explanatory power than that offered by the urban–rural hierarchy.

As shown above, the national distribution of environments is more spatially polarised than that of great towns or rural administrative districts. It is perhaps not surprising, therefore, that the CENSUS DIVISION and ENVIRONMENT variables offer very similar amounts of explanatory power. Interaction between variables can mean that some variables will appear to explain variations which really should be attributed to other variables. Multiple regression was thus deployed in an attempt to clarify whether the ill health of the North was a result of the concentration of Staple Industry urban areas there, while the South benefited from its more White Collar and rural character, or whether additional factors were at work.

On the basis of previous studies two additional variables, one representing population DENSITY (1921 population per acre) and the other a measure of FERTILITY (standardised total fertility (TF) as given in the *Fertility of marriage* report), were added to the regression model.[24] Independently neither of these continuous variables offered more than 10 per cent explanatory power of SCMR distribution but both were significantly related to child survival, each additional person per acre being associated with an increase in mortality of 0.53 children per thousand born, and each additional child born per 100 couples being associated with a 0.43 increase in SCMR (Table 6.3.1, columns IV and V). Density is, of course, highly correlated with place in the urban–rural hierarchy, and fertility, as has been shown in previous chapters, is closely associated with environment, so it was of interest to see whether the relationship of these variables with SCMR was removed when other factors were held constant.

Column VI, Table 6.3.1 shows the multiple regression results. The full model offers explanation for 83 per cent of the variation of SCMR across the nation, so the individual variables had been capturing some of the same variation. The first striking feature of the table is the sizeable reduction in coefficients within the CENSUS DIVISION variable: a considerable amount of geographic variation was therefore due to the different urban–rural and environmental make-up of the various divisions – differences between London, Yorkshire and North Wales disappear once the other variables are held constant. Lancashire-Cheshire now

Table 6.3.2 *Mortality regressions, the national picture: the relative importance of variables, as shown by adjusted R^2 and marginal adjusted R^2 for each variable*

Variable	Adjusted R^2: variable regressed on its own	Adjusted R^2: full model without predictor	Marginal adjusted R^2
Panel A: Full model includes census division			
CENSUS DIVISION	0.5747	0.7167	0.1174
TYPE OF PLACE	0.3345	0.7991	0.0350
ENVIRONMENT	0.6190	0.7998	0.0343
DENSITY	0.0904	0.8339	0.0002
FERTILITY	0.1719	0.8200	0.0141
All variables	0.8341		
Panel B: Full model excludes census division			
CENSUS DIVISION	0.5747		
TYPE OF PLACE	0.3345	0.6746	0.0421
ENVIRONMENT	0.6190	0.5428	0.1739
DENSITY	0.0904	0.7177	−0.0010
FERTILITY	0.0719	0.6898	0.0269
All variables	0.7167		

Source: OPCS dataset.

remains the one census division significantly more pernicious to child health than London, while the southern divisions remain much healthier than the rest of the nation, even once environmental and urban–rural composition are allowed for. Rather than interpret the latter counties as being much healthier than the capital, it is perhaps more accurate to read the figures as indicating that London was much less healthy than its neighbouring divisions. Farr's comments concerning the healthiness of London are not borne out once the high proportion of its population living in White Collar environments and its southern location are taken into consideration.

The extreme advantage of Agricultural and White Collar environments in the individual regressions was in part reflecting the respectively rural and small-town nature of these environments. An environmental gradient remained, however, when other variables were controlled. The Agricultural environments still enjoyed the lowest child mortality rates, even once their location in predominantly rural administrative districts is taken into account. A hierarchy within urban areas also remained, running from low-mortality White Collar to high-mortality Staple Industry, which cannot be explained by the division between 'great towns' and other urban areas. 'Environment' does, therefore, add a new dimension to the understanding of mortality patterns based on more conventional spatial classifications.

Another convention, that high population density engendered poor survival chances, is overturned by the multiple regression model shown in Table 6.3.1, which indicates that high density is in fact associated with low mortality, although the relationship is not statistically significant. Path analysis shows that the positive correlation between density and mortality arose because great towns were the most densely populated areas and rural areas the least. However, the population of many southern towns lived at high density yet enjoyed low mortality: Brighton, for example, the third most densely populated administrative district in the dataset, with 56 persons per acre in 1921, had an SCMR of only 153, well below the national average of 178.

The relationship between fertility and SCMR remains positive and significant, but somewhat diminished in scale, in the multiple regression analysis. This relationship will be discussed further in the sections of this chapter dealing with fertility.

Within a regression model a large coefficient does not necessarily mean that a particular factor explains a large proportion of the total variation in child survival. The adjusted R^2 for each variable, or set of variables, regressed on its own shows the maximum amount of explanatory power which that variable might possess. However, some of that explanatory power might be held in common with other variables. The minimum variation attributable to each variable or set of variables, that is with any common variation removed, is provided by the 'marginal adjusted R^2'.[25] Table 6.3.2 provides the adjusted R^2 and marginal adjusted R^2 associated with each group of variables in Table 6.3.1.

In Panel A of Table 6.3.2, which represents the model with census division as one of the variables, it can be seen that there must be considerable common variation as the minimum explanatory power of each variable (marginal adjusted R^2) is pitifully small. Geography, as represented by CENSUS DIVISION, is able to explain the most variation (approximately 12 per cent). The TYPE OF PLACE and ENVIRONMENT variables account for only 3.5 per cent apiece. If, however, the regression is re-run omitting the CENSUS DIVISION variable (Panel B, Table 6.3.2), it can be seen that the minimal explanatory power of the ENVIRONMENT variable rises to just over 17 per cent; that of TYPE OF PLACE alters only marginally. As the maps presented earlier in the chapter had suggested, there was considerable geographic concentration of ENVIRONMENT across the nation – Staple Industry environments being a particular phenomenon of the North, and White Collar ones being concentrated in the South. The urban–rural hierarchy is much more evenly distributed and this does little to explain the national spatial patterns of child survival: ENVIRONMENT is rather more important in this respect.

Some additional explanatory power might have accrued to ENVIRONMENT if it had been possible to define this variable more finely, particularly for different neighbourhoods within large towns. The OPCS data demonstrated that different districts within towns could be characterised by very different environments and demographic experiences. The figures provided by Stevenson, however, include those for entire towns and cities, and thus potentially mask important environmental variation. That the different mortality experience of the north and south of the nation could be ascribed to their different 'environments' has already been discussed with reference to the comparison of occupational distributions within 'rural administrative' districts. The Registrar-General's Statistical Review for 1921 provides the number of births and number of deaths for those aged less than 1 for each 'great town' for that year.[26] It is impossible to compare and contrast centres of Staple Industry from the North and South as there is none in the South. However, when the southern White Collar towns of Brighton (Sussex), Bournemouth (Hampshire) and Bath (Somerset) have their infant mortality experience compared with that of the northern town of Blackpool, little difference is found. The three southern towns have 1921 infant mortality rates (IMR) of 77, 75 and 72 deaths per thousand births respectively; Blackpool's IMR was 66. More typical rates for industrial towns in Lancashire and West Yorkshire ran between 90 and 120; however, Lancashire's other White Collar great town of Southport returned an IMR of 70, and that for Wallasey in Cheshire was 61. These figures suggest very strongly, therefore, that environment, rather than geographic location, dictated a town's health experience, and the close association of geographic location with environment was a result of the concentration of industrial and white-collar service centres in particular regions. However, even when urban and environmental structures were controlled for, the southernmost reaches of England still held a particular health advantage, an advantage that remained intact when the lower fertility evinced by couples in these counties (a feature further explored in section 6.5) is controlled for. Questions concerning the particular healthiness of the southern counties for young children remain, but the role of environment and place in influencing class differentials in child survival can now be seen more clearly. As in the OPCS population, class I and II occupations at the national level would have been concentrated in White Collar areas, and thus in the south of the country: their children's survival chances would therefore be higher than if they had been spread evenly across the nation.[27] The opposite would be true of most unskilled workers in Staple Industry areas and thus 'class' differentials in mortality were enhanced.

The superimposition of an environmental framework over the more conventional urban–rural dichotomy, it is suggested, pulls together themes considered by previous researchers. Unfortunately data do not exist at present which would allow full exposition of our argument; much of the picture we can paint remains as inference, awaiting validation from future research.

As the nineteenth century progressed, there is no doubt that England and Wales became more urbanised, but there was also increasing industrialisation: a phenomenon particularly concentrated in the three most northerly census divisions (VIII, IX and X) and in South Wales (XI). Industrial enterprises were not, as demonstrated above, necessarily centred on large urban areas, but very often the two went hand-in-hand. The exodus from the rural areas to the urban ones is well documented but, it is argued here, the type of places to which the rural outmigrants were moving is of considerable importance. In 1831 13 per cent of the national population lived in London and 35 per cent in the southernmost counties (those in the South East, South West, South Midlands and East Anglia census divisions). Twenty-seven per cent lived in divisions VII, VIII, IX and X. By 1911, while 13 per cent of the population still lived in London, the southernmost counties now held 30 per cent of the population and the northernmost 34 per cent. The balance of the population had shifted: migrants were not just moving from rural to urban areas, they were also gravitating towards the industrial end of the spectrum. Although environmental classifications have not yet been constructed for earlier in the nineteenth century, it would seem likely that as the proportion of the nation's population living in industrial surroundings grew, so a greater proportion of the nation's offspring were exposed to the pernicious effects of the concomitant disamenities.

By the early decades of the twentieth century Britain's industrial dominance was on the wane and the importance of the service sector was already established. Between 1901 and 1921 White Collar administrative districts were the fastest growing, their population increasing some 25 per cent, compared with the national figure of 16.5 per cent.[28] However, as White Collar areas were also the most likely to have been experiencing fertility decline, a growth in their population did not necessarily indicate an equal increase in the proportion of the nation's young children enjoying the health benefits of living in such areas.[29] It is unlikely that the downturn in IMR at the turn of the century was due to a shift in the population distribution across environments. It is entirely possible, however, although at present conclusive evidence remains elusive, that the increasing proportion of the children born into the country's industrial heartlands, and the diminishing proportion beginning life in agricultural districts, in the last quarter of the nineteenth century may well have retarded the downturn in the national IMR.[30] Had the inhabitants of industrial, working-class districts had a sufficiently strong political voice to demand improvements in their living and working conditions earlier in Victoria's reign, infant survival may well have shown a more prompt decline. As it was, once the 'great cities' did effect public health improvements which benefited the majority of their inhabitants, the size of their populations meant that the decline in infant mortality rates was dramatic when registered at the national scale.

The addition of an environmental spectrum to a more traditional urban–rural model of child health differentials does, therefore, cast additional light on national patterns of mortality, and also uncovers several features worthy of future research. First, the importance of population density as a predictor of mortality may have been overemphasised by previous analyses. Crowded places were not *necessarily* unhealthy, but it is probable that mortality in unhealthy places was exacerbated by overcrowding. Second, London's reputation for 'healthiness' is questionable once the relative absence of Staple Industry within the capital is acknowledged. The environmental distinction also allows the co-existence of both convergence and divergence of child survival rates across the nineteenth and early twentieth centuries. At the national level urban–rural rates might have been converging, but not all urban rates were improving at the same rate nor from the same date. Regions with centres of Staple Industry could have seen increasing portions of their populations concentrated in those districts making the slowest progress, so that their mortality characteristics would look increasingly unfavourable when compared with counties containing a large rural population and burgeoning middle-class suburbs.

In preceding chapters the physical aspects of the environment shared by a neighbourhood's inhabitants were stressed when discussing child survival, and this perspective appears to be justified at the national level. Being able to address questions at the latter scale has highlighted the role of geography and of changing population structures as the fortunes of different sectors of the economy waxed and waned in creating the national levels and trends in mortality. Was the same true for the nation's fertility rates? Before this question can be answered, a consideration of nuptiality is required.

6.4 Nuptiality

Chapter 5 signalled the potential of nuptiality as an indicator of community beliefs and norms concerning sexuality, childbearing and child rearing. The overall fertility patterns of any population are, of course, the combined result of its rates of illegitimate fertility, childbearing within marriage and nuptiality, as encapsulated by the 'Princeton' formula:

$$I_f = (I_m \times I_g) + (1 - I_m) \times I_h.$$

Regrettably, in the context of this volume little can be said on rates of illegitimacy, either at the local or at the national level. Spatial variations across the nation at the turn of the century in the proportion of the population who married, and the proportion of their fertile lives which women spent in marriage (governed particularly by their age at marriage), can be mapped, however, and assist understanding of the regional patterns of marital fertility.

Teitelbaum provides county level values for the Princeton index of nuptiality, I_m, for 1911, and these are mapped in Figure 6.4.1.[31] The map can be read in either of two ways. In the first interpretation the Severn–Wash line once again marks something of a watershed: south of this line only one county, Essex, had an I_m value of more than 0.5. Far more counties north of the line showed values of this magnitude; indeed both Monmouth and Durham exceeded 0.55. In the second reading a north-east, south-west split can be discerned, lower rates predominating in the latter. The picture is, however, a little obscured by the division of Wales into only two units. It seems likely that the mining county of Glamorgan would have had high nuptiality, much the same as that of its neighbour Monmouth. If Brecknock too had an above-average figure, then this would explain the relatively high I_m of the South Wales region. Stevenson himself commented in the *Fertility of marriage* report on the low nuptiality of North Wales, describing very late age at marriage in Cardiganshire, but unfortunately the I_m figures presented here do not reveal whether this feature was shared by more southerly counties in the Principality.[32]

As an index, I_m indicates only what proportion of a population's potential fertility was being lost either through delayed marriage or through a failure to marry: 'celibacy', to use the demographers' term.[33] By itself the index does not indicate which of the two elements reduces a population's rate of nuptiality, nor whether the two were acting in com-

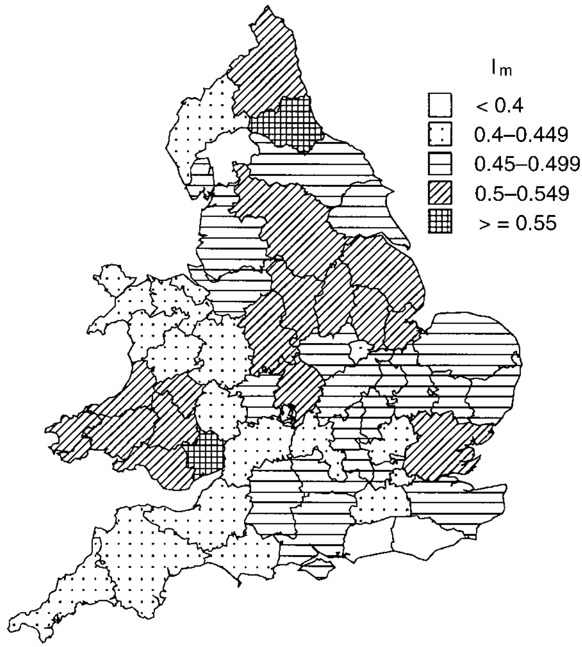


Fig. 6.4.1 I_m for the counties of England and Wales, 1911, as calculated by Teitelbaum. *Source:* Teitelbaum (1984), Appendix Table 5.A.1, p. 112.
Note: the counties of Wales are shaded as only two units; North and South Wales to reflect Teitelbaum's division of the Principality. Monmouth is treated separately.

bination. Using tables provided in the 1911 census reports it is possible to gain some impression of the spatial variations in the two facets of nuptiality.[34] For each unit the rate of celibacy was calculated by dividing the number of women aged between 45 and 50 reported as never married by the total number of women in that age group. This was repeated for males. In 1911, in England and Wales, 16.5 per cent of women and 12.7 per cent of men aged 45–49 in England and Wales had never been married.[35] There was, however, considerable variation in experience. Many great towns, particularly those associated with mining and other heavy industry, had fewer than 10 per cent of their female population in their late-forties never married; indeed, in the Rhondda less than 3 per cent of women of this age were described as unmarried. Certain of the great towns encircling London also demonstrated low rates of celibacy. In stark contrast, in the White Collar great towns of the south coast, in Bath, in Oxford, and indeed even in Southport, Lancashire, more than a quarter of the 45–49-year-old female population were reported to be unmarried. In the smaller urban areas a further contrast emerged between the southernmost portions of the country where female celibacy was high, and the counties of the North Midlands, the eastern West Midlands, the West Riding of Yorkshire, Northumberland and Durham, where it was low. Women in the urban areas of North Wales showed high rates of celibacy, contrasting sharply with the very low rates of the women of the coalfields of Glamorgan and Monmouth.

The majority of rural areas had around average rates of female celibacy; 15–19 per cent of women never married. Although in rural Surrey and Sussex relatively high proportions of women were celibate, only in rural Cardiganshire were over one-quarter of women unmarried by their late forties. The very high nuptiality of the urban North East was only repeated in rural Durham – which was after all predominantly industrial. In contrast female marriage chances in rural Northumberland, North Yorkshire, Cumberland and Westmorland were below the national average. It is possible that the industrial towns of the North acted as effective marriage markets, whereas those individuals remaining in neighbouring traditional rural areas and occupations 'missed out'.

The overall proportions of females celibate for each county are reproduced in Figure 6.4.2A.[36] Once again compositional features are reflected in the overall figure for each county. For example, Northumberland's largely urban population, with relatively low proportions celibate, obscures the fact that women's marriage chances were much poorer in the county's rural districts. Teitelbaum's 'South Wales' region is shown to have held counties with both very low and, in Cardigan, exceptionally high proportions of women celibate.[37] Figure 6.4.2A suggests a marked difference between the counties to the north of a Thames–Mersey line and those to the south. The 'industrial' counties of the North Midlands and their neighbours had predominantly low levels of celibacy. The presence of industry, and hence a concentration of the working-classes, seems therefore to have enhanced women's chances of being observed as married. Among the major textile towns of Lancashire and West Yorkshire, however, the majority had rates of celibacy around the national average; relatively high compared to other great towns in the 'industrial' counties.[38] This has been interpreted as indicating that women working in textiles, being financially more independent, were less disposed towards marriage, but it is equally possible that such towns attracted single women in need of employment.

The OPCS data from the previous chapter allow a small insight into the positions in which single, middle-aged women found themselves. As numbers of the 45–49 age group are small, Table 6.4.1 considers each of the four environments, rather than the individual communities, but

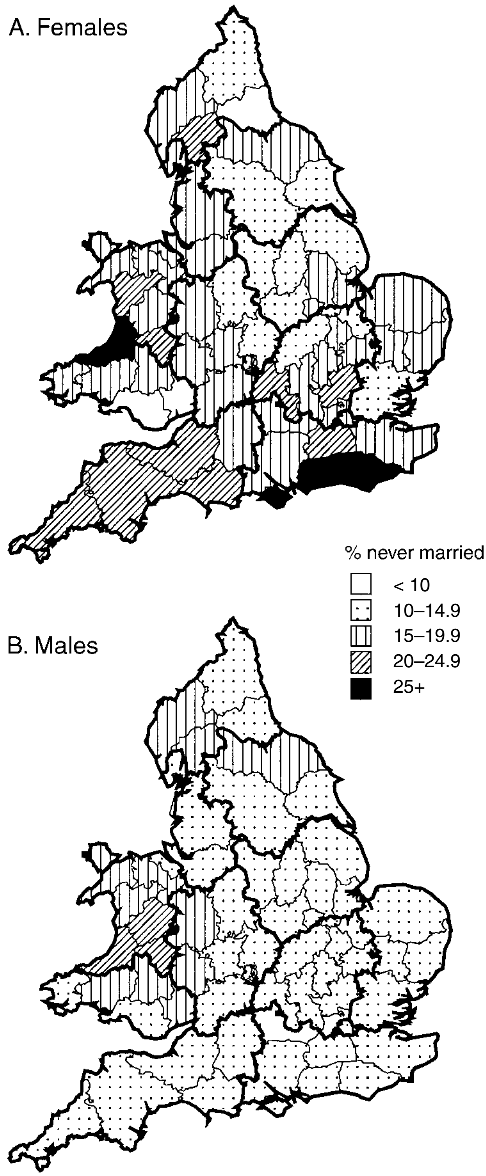


Fig. 6.4.2 Celibacy rates for A: females and B: males, as measured by the proportion of those who have never married aged 45–49, by county, England and Wales, 1911. *Source:* 1911 Census of England and Wales (1913), *Ages and condition as to marriage*, Table 9, pp. 211–66.

Acknowledgement: see Fig. 2.2.1.

Table 6.4.1 *The position within their household of unmarried women aged 45–49, by OPCS environment, 1911*

	Environment							
	White Collar		Agricul-ture		Light Industry		Staple Industry	
Relationship	N	%	N	%	N	%	N	%
Head	36	23.4	20	29.4	25	22.7	15	21.7
Related to head								
Daughter	29	18.8	21	30.9	24	21.8	15	20.8
Sister/sister-in-law	22	14.3	8	11.8	25	22.7	20	29.0
Other relation	7	4.5	6	8.8	3	2.7	4	5.8
All relations	58	37.7	35	51.5	52	47.3	37	53.6
Unrelated to head[a]								
Servants	48	31.2	8	11.8	16	14.5	6	8.7
Boarder/lodger	3	1.9	1	1.5	7	6.4	8	11.6
Other[b]	9	5.8	4	5.8	10	9.0	3	4.3
All unmarried women	154		68		110		69	

Notes:
[a] In a few instances a servant in the relationship to head column is indicated to be the daughter or niece of the household head in the occupation column. If so the individuals have been assigned to the relations panel.
[b] Other = in an institution, not known, or unclear.
Source: OPCS dataset.

nevertheless interesting contrasts emerge.[39] In the White Collar areas 26.8 per cent of women in their late forties were unmarried, in the Agricultural areas 17.8 per cent and in the Light Industry areas 14.2. Despite the inclusion of Bolton, which might be expected to have had a slightly higher rate of celibacy, in the Staple Industry areas only 6.9 per cent of women aged between 45 and 50 remained unmarried. Single women were most likely to head households in the Agricultural areas. Women were much more likely to be boarding in Staple Industrial areas than elsewhere (predominantly reflecting the situation of Bolton, which in turn suggests confirmation that such women were attracted into textile towns because of the availability of work). In Agricultural districts around 30 per cent of single women in their late forties were the daughters of the head of household, a much higher proportion than elsewhere. This may reflect the greater average longevity of the rural population, with a higher number of elderly people surviving as heads of household, or the greater propensity for unmarried daughters to remain at, or return, home to look after ageing parents, or the poorer marriage market in rural areas. In Industrial areas the spinsters were rather more likely to be the sister or sister-in-law of the head of the household than was true in either the White Collar or Agricultural areas. The major difference demonstrated in the table is, unsurprisingly, the proportion of women who were servants: 31.2 per cent in White Collar areas as opposed to less than 15 per cent in the other areas. Even if servants are removed from the table, there were still proportionately three times as many unmarried women in White Collar communities than there were in the Staple Industry ones. Thus, while to a large degree the observed differences in female celibacy rates were due to the uneven demand for servants across the nation, class differences in the ability of women to survive without the financial support of a spouse in the absence of paid employment must also have been playing a part.

That men were less fettered by such constraints is reflected by their celibacy rates, which, again measured as the proportion unmarried in the 45–49 age group, were spatially much more homogeneous and almost never as high as the female rates for the same county (Figure 6.4.2B).[40] Apart from Glamorgan and Pembrokeshire, Wales and the neighbouring counties of the Welsh marches demonstrated rather higher rates of male celibacy than the majority of English counties, a feature they shared with the upland pastoral counties of Cumberland, Westmorland and North Yorkshire. Possibly the proximity to the industrial counties of Northumberland, Durham, Lancashire and West Yorkshire served to unbalance the marriage market of these counties, but it is also possible that the small-scale pastoral farming which typified the rurally based economies of the majority of the high male celibacy counties in some way influenced local marriage patterns. Did these counties in fact represent an older economic, and possibly demographic, system centred around inheritance patterns in which men, and the women they hoped to marry, had to wait until they fell heir to a farm before tying the matrimonial knot?

Rather than the industrial centres, for men it was the southern counties of Berkshire and Middlesex which showed rates of less than 10 per cent celibate. It has been argued in chapter 5, using Pinner as an example, that as areas of middle-class housing increased so they were filled primarily by married men with their families and any accompanying servants. The low rates of celibacy among men in their late forties in Berkshire and Middlesex may thus have been symptomatic of the early establishment of a 'commuting' belt outside the capital in the 1890s and 1900s.

As Figure 6.4.3 indicates, geographic and gender differences in celibacy apparent at the national level were also manifest within the capital, as they no doubt were within other large urban centres.[41] Among the women of London celibacy rates show a decided 'East End' versus 'West End' split – more than a quarter of all women aged 45–49 being unmarried in the 'upmarket' boroughs of the latter, fewer than one in ten being without a spouse in the notoriously poverty-stricken boroughs of the former. Undoubtedly women moved from east to west to take up employment in service but, as the OPCS data for Bethnal Green demonstrated, there were relatively abundant employment opportunities available for women in the East End. Thus the dearth of unmarried middle-aged women in the predominantly working-class areas supports the contention that it was very difficult for women from the lower orders to survive without a spouse. The higher rates of celibacy among middle-class women were indicative of their families' more secure financial footing: women of the working-classes were more constrained in their life choices.

Among men in the capital 1911 celibacy rates took on a concentric pattern. More than 25 per cent of all men aged 40–45 resident among the offices, law courts and seats of power in Westminster and Holborn had failed to marry, a concentration virtually twice the national average. These two boroughs were surrounded by a circle of others where celibacy rates were also well above average. Such a pattern may, however, reflect no more than the fact that, as the census was taken on a Sunday night, it captured single men's greater use of the many available clubs and apartments to remain in town over the weekend, while married men joined their families in the suburbs or their rural retreats.[42]

Straightforward measures of average age of marriage are not available at the small scale for the turn of the century. However, the *Fertility of marriage* report does break down those couples observed in the census where the wife was aged less than 45, by the duration of the marriage and the wife's age at marriage. From these data a synthetic birth cohort for the decade 1871–81 was created. From among wives in their thirties in 1911 the number of women married aged 15–19, the number married aged 20–24 and the number married aged 25–29 were drawn.[43] The proportion of those marrying aged less than 30 who were aged 25–29 on marriage was then calculated for each great town, and the urban and rural aggregates for each county.[44] An area where fewer than 35 per cent of women who married aged less than 30 did so when they were in their late twenties was deemed to be 'early marrying'; one where more than 40 per cent were married in their late twenties was designated 'late marrying'.[45]

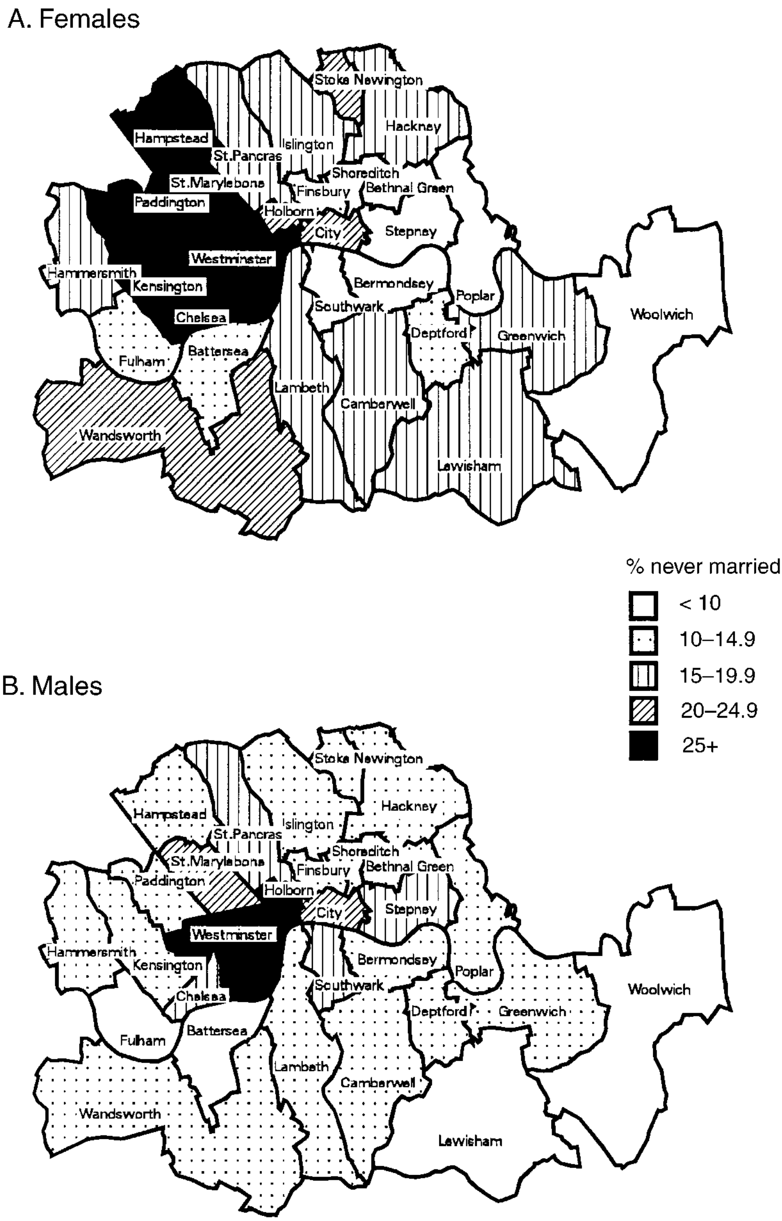


Fig. 6.4.3 Celibacy rates for A: females and B: males, for the metropolitan boroughs of London, 1911. *Source:* As Fig. 6.4.2.

As ever, differences could be found between the experience of the great towns, other urban areas and rural districts. In general, the age of marriage for women was lowest in the great towns, particularly northern great towns, although once again the very varied experience of the great towns of Lancashire and Yorkshire and those skirting London could be perceived. Among the other urban and rural areas, the main feature to emerge was the late average age of marriage in general of the South East and South West regions.

County level figures for age at marriage tended to disguise intra-county variations between rural and urban areas and between centres characterised by different economic bases. The early-marrying rural areas and great towns of Monmouthshire, for instance, were balanced by the rather later marrying other urban areas, so that at the county level Monmouth experienced medium proportions of late marriers (so has no vertical lines on figure 6.4.4). Lancashire and Cheshire were also in this middle range, while the other textile county, West Yorkshire, returned a relatively low age at marriage, the very young ages at marriage and the great size of its coal- and metal-producing centres outweighing the very late age at marriage but relatively small sizes of its woollen and worsted centres. Overall, however, the counties once again divided along a Thames–Mersey line, with women in the north and east marrying younger, with the particular exceptions of the rural counties of Westmorland and Rutland which stood aloof from their more industrial neighbours, their higher marriage ages perhaps representing throwbacks to an earlier, pre-industrial era.

In Figure 6.4.4 whether a county had, in the aggregate, a late- or an early-marrying female population is combined with levels of female celibacy to delineate 'marriage' regions. High-nuptiality counties are those with fewer than 15 per cent of their 45–49-year-old women still single, and those where fewer than 35 per cent of the synthetic 1871–81 cohort who had married had done so in their late twenties. These counties can be seen to fall predominantly to the north-east of a Thames–Mersey line and in most cases both characteristic features occur in tandem. The story to the south and west of the divide is rather more complex. In North Wales, it would appear that low nuptiality was predominantly associated with late marriage, whereas in the South East and South West regions of England higher rates of celibacy were more widespread. The industrial counties of South Wales, of course, mirror the high nuptiality regimes of mining areas elsewhere.

Careful interpretation of 'marriage regions' and their relation to fertility is required. As argued in chapter 5, it is likely that measures of celibacy and of age at marriage monitor different aspects of community

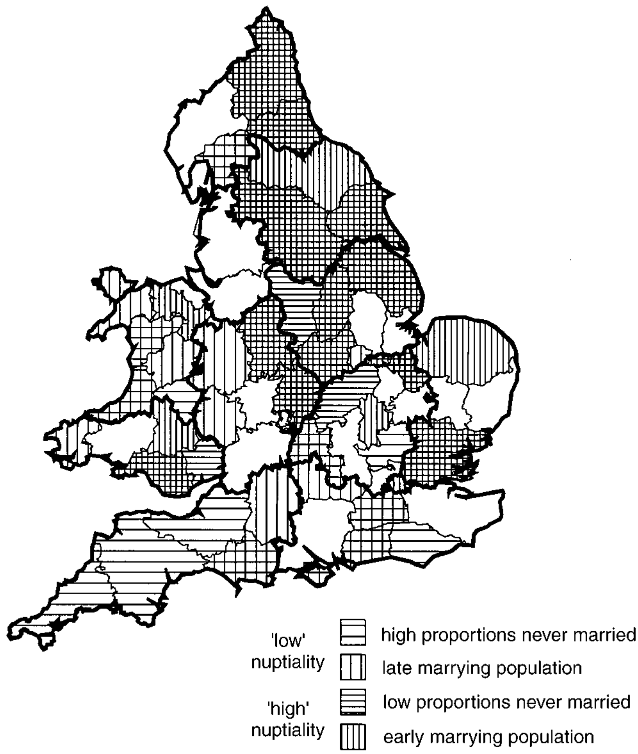


Figure: 6.4.4 The female marriage regions of England and Wales, 1911
Note: for definition of 'high', 'low', 'late' and 'early' see text

life. The reported proportion of women never married by the end of their reproductive span reflects more on economic circumstances encountered by these women and their possible partners over their life course: chance played a larger role than expectations.

'Proportions celibate' may, thus, influence overall fertility levels but have little impact on marital fertility behaviour. 'Average age at marriage', on the other hand, both acts in a direct demographic capacity as a limit on family size, and also represents a spectrum of community *mores* which collectively act to create differences in marital fertility behaviour across space and time. Young people would have been made aware, both explicitly and implicitly, of the 'proper time to marry' by the society around them. With such awareness would come an understanding of the 'acceptable circumstances' under which marriage took place, with the associated norms of behaviour concerning sexuality, sexual expression and fertility-related behaviour both outside and within marriage.

The distinction between the two levels of nuptiality is not obvious using measures such as I_m. For example, the relatively low nuptiality of North Wales and the counties in the South West of England in Figure 6.4.1 is seen in Figure 6.4.4 to result mainly from later marriage in the former and high proportions never married in the latter. If Figure 6.4.4 is imagined denuded of any horizontal lines (i.e., minus the celibacy figures), some five areas can be distinguished where different social systems concerning reproduction might be expected to operate. Two late-marrying regions exist: one in the central South and one in North Wales. The counties of Herefordshire and Shropshire appear to belong in the latter region, which may well encompass a system of pastoral agriculture also found in the counties of Westmorland and Rutland. A large swathe of counties to the east of the country display a relatively early age at marriage. Further work remains to be done to ascertain whether this is one 'eastern' region, or whether a distinction should be made between its 'industrial' and 'agricultural' divisions. The mining and quarrying counties of Flint, Glamorgan and Brecknock in Wales also return low average ages of marriage. Those counties with around the 'average' age at marriage form the fifth 'marriage region', but it is of course likely that such 'average' experience is masking differences within counties.

While in the analysis which follows the 'age at marriage' index was favoured over the 'never married' index as a proxy for varying views on nuptiality, sexuality and therefore fertility, it was not expected that all areas reporting a high average age at marriage would display the same fertility behaviour characteristics; not all communities, be they occupational or locational, would be communicating the same norms to their members. This expectation, as the discussion of marital fertility in the next section shows, was not disappointed.

6.5 The jigsaw that was national fertility in 1911

In 1982 Woods published maps showing the Princeton indices I_f, I_m and I_g for the registration districts of England and Wales in 1861 and 1891.[46] The same indices were mapped for the counties of the British Isles for the census years 1871, 1891, 1911 and 1931 by Teitelbaum in his 1984 book.[47] Woods' figures indicated that in 1861 there were very few registration districts with an I_g level of less than 0.6; there did, however, appear to be a belt of particularly high marital fertility (I_g greater than 0.7) running from the northern counties, down through Mid- and South Wales and on into Cornwall and Devon.[48] By 1891 RDs with I_g below 0.6 had become much more common; indeed a few, particularly among the textile districts along the Lancashire–Yorkshire border, had fallen below

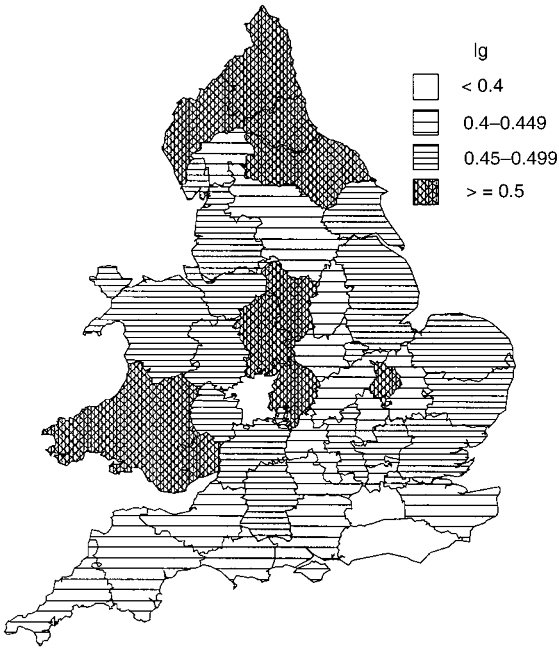
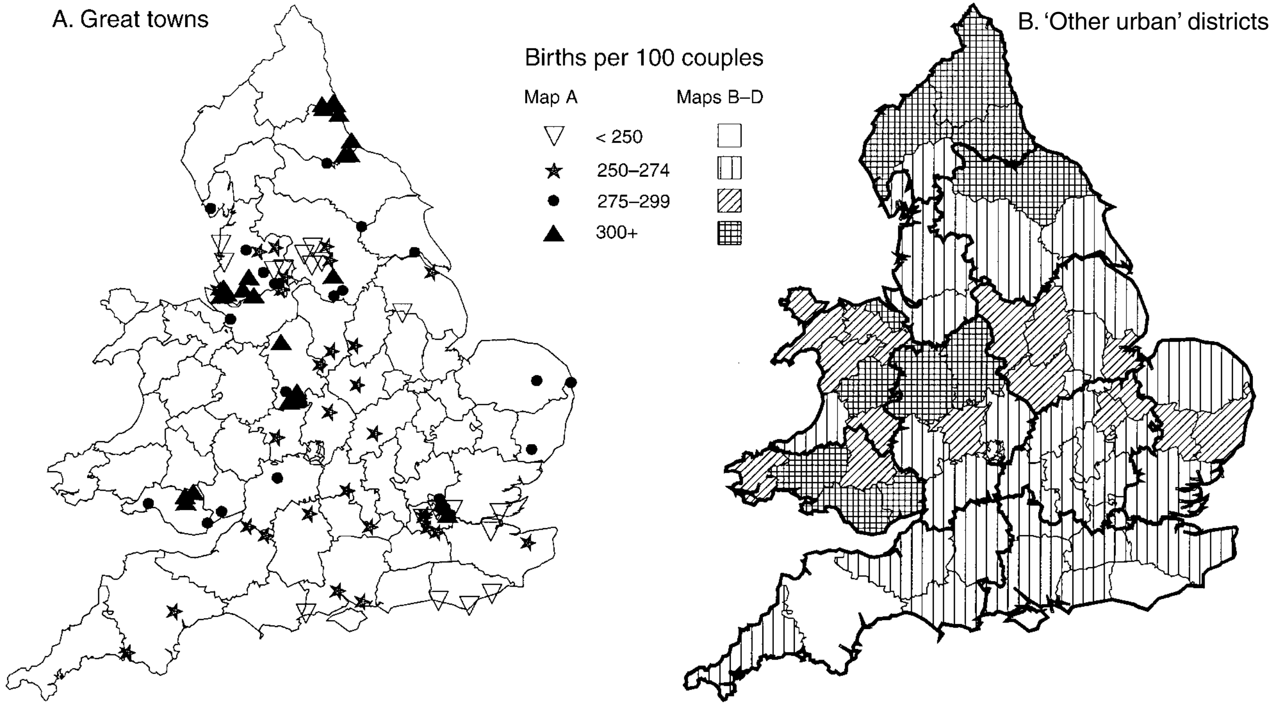


Fig. 6.5.1 I_g for the counties of England and Wales, 1911, as calculated by Teitelbaum. *Source:* Teitelbaum (1984), p. 128.

0.5. With registration district level data being superseded by data for administrative districts after 1910 the story has to be continued at the county level. Teitelbaum indicates that by 1911: 'marital fertility below 0.500 had spread to almost all counties of England and Wales. The principal exceptions [were] in South Wales, Monmouthshire, west Midlands and the north of England.'[49] A map based on Teitelbaum's figures (Figure 6.5.1) depicts a 'spine' of relatively low fertility (I_g less than 0.45) extending down the middle of the country from Westmorland and the West Riding in the north to meet the South East and South West census divisions where virtually all counties experienced low fertility. Indeed the counties of Sussex and Surrey in the South East each returned an I_g of less than 0.4.

Table LIII in the *Fertility of marriage* report presents standardised fertility figures for each of the 'great towns' and for the aggregated other urban and rural districts for each county. These have been mapped in Figure 6.5.2. Stevenson did not provide standardised fertility measures for each county. In Figure 6.5.2D these have been estimated by expressing the 1921 population of each constituent great town, and that of the urban and rural aggregates, as a proportion of the county's total


A. Great towns
Births per 100 couples
Map A
Maps B–D
< 250
250–274
275–299
300+
B. 'Other urban' districts

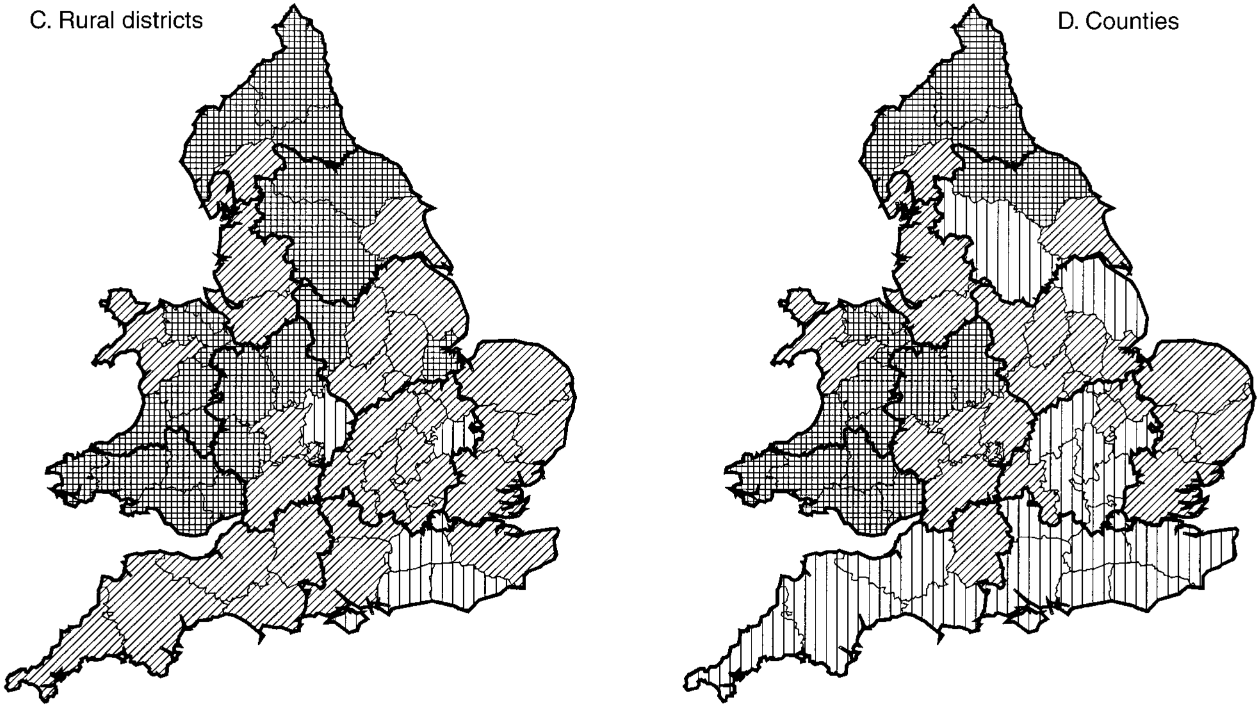


Fig. 6.5.2 Standardised fertility rates (TF) for A: the great towns, B: other urban administrative districts aggregated at county level, C: rural administrative districts aggregated at county level and, D: the counties of England and Wales, 1911. *Source: Fertility of marriage*, Part II (1923), Table LIII, pp. cxxii–cxxvi.

population in that year.[50] Each proportion was multiplied by the appropriate standardised fertility figure and the results summed to provide a total fertility figure for the county.

Figure 6.5.2D presents a slightly different picture from that of Figure 6.5.1. While North and South Wales remain regions of high marital fertility and the South East, the South West and the South Midlands regions of low fertility, the 'spine' of low fertility has been dismantled leaving only the West Riding showing up as having relatively low fertility. As the other maps show, however, the story is far more complex. Among the rural aggregates (Figure 6.5.2C) there is a strong divide along a Severn–Humber line, regions to the north and west having higher fertility rates. The urban aggregates (Figure 6.5.2B) show a different and more intricate picture. Generally speaking these rates are lower than the rural ones, although in the North, South Wales, Shropshire and Staffordshire urban couples as well as rural were registering over three children per couple on average.

Among the great towns shown in Figure 6.5.2A the majority of high-fertility centres (over 275 children per 100 couples) lay to the north of the Severn–Humber line, although high rates were also seen among the large urban areas to the east of London, and in the great towns of East Anglia. Great towns producing fewer than 250 children per 100 couples were also found in the environs of London (Hornsey's figure of 223 being the lowest reported), as well as lining the south coast, sitting on the Lancashire coast and straddling the Lancashire–Yorkshire border. The relationship of low fertility with White Collar environments and textile communities seems obvious from Figure 6.5.2A. In order to tease out whether environment could help to unravel spatial patterns of national fertility and clarify the factors underlying them, another regression exercise was undertaken. For the sake of brevity the spatial units used in the discussion are the census divisions, although county level regressions were run and are used occasionally for illustrative purposes. It was assumed that the regional patterns were largely due to the great-urban, other urban and rural composition of the constituent counties, but that the 'environmental' make-up of each of these 'types of place' would also significantly influence observed fertility. Separate regressions were run on these three variables, using standardised fertility, TF, as the dependent variable.

When Census Division I, London, was taken as the standard spatial unit (Model I, Table 6.5.1) the regression indicated that the South East had significantly lower fertility levels than the capital (at the 1 per cent level), while the North and the divisions in Wales had significantly higher fertility. At the 10 per cent level the South West had lower and

Lancashire-Cheshire higher fertility than the standard. In total the 'census divisions' variable 'explained' 41 per cent of the variation observed in the fertility rates.

The TYPE OF PLACE Model II, Table 6.5.1 variable indicated that there was a strict urban–rural dichotomy to fertility, rural populations having significantly higher fertility than their urban counterparts. This variable, however, only explained 7 per cent of the variation in fertility. The ENVIRONMENT variable (Model III), explaining 29 per cent of observed variation, was a much better predictor of fertility. Out of the four environmental categories, however, only the White Collar districts had significantly different fertility, their low rates corroborating evidence from the OPCS data that fertility behaviour in these areas was distinct from that of more working-class communities.

It had to be acknowledged, however, that the Staple Industry environment encompassed both textile districts and mining communities renowned for their low and high fertility respectively. When separate regressions were run considering the 'percentage of the Staple Industry workforce working in mining' (MINING), Model IV, Table 6.5.1, and the 'percentage of the Staple Industry workforce working in textiles' (TEXTILES), Model V, it became obvious that the two were cancelling each other out within the coefficients for the Staple Industry environment. A 10 per cent increase in the proportion of an area's workforce who were miners was associated with an increase of eight children per 100 couples in the fertility rate, whereas an equivalent increase in the proportion of the workforce who were working in textiles saw a *reduction* of five children per 100 couples. Both these groups were subject to the poor child survival rates characteristic of Staple Industry areas, yet they experienced very different patterns of marital fertility and indeed of marriage. Agricultural environments had been seen in the OPCS study to have very different marriage and mortality patterns from the miners and yet seemed on the whole to share their fertility. The interaction of fertility, marriage and child survival was to be explored in a multiple regression: when individual regressions were run on the latter two variables they were both found to be significantly correlated with fertility. The standardised child and infant mortality rate, SCMR, Model VI, was positively related to fertility while the nuptiality variable, MARRIAGE, Model VII, represented by the proportion of the 1871–81 marriage cohort under the age of 30 who married when aged 25–29, i.e. relatively late, was negatively related. The mortality variable, however, 'explained' little of the variation in fertility, while nuptiality could explain almost one-quarter of the variation. As outlined previously, 'nuptiality', or at least the propensity to marry at late ages, was taken as a proxy for beliefs and practices surrounding sexuality and

Table 6.5.1 *The relationships between standardised fertility and other factors: regression analysis, England and Wales, 1911*

Model	I	II	III	IV	V	VI	VII	VIII
Intercept	274	278	286	275	284	247	360	248
CENSUS DIVISION[a]								
I London	–							–
II South East	−13.35***							−9.23**
III South Midlands	−5.88							−7.16*
IV East Anglia	8.17							2.62
V South West	−10.13*							−7.21*
VI West Midlands	18.63***							1.73
VII North Midlands	8.19							−10.09**
VIII Lancashire-Cheshire	7.51*							5.66
IX Yorkshire	2.57							−10.80***
X The North	39.62***							7.65*
XI South Wales	37.36***							5.70
XII North Wales	30.16***							9.21
TYPE OF PLACE[a]								
Great towns		–						–
Other urban areas		0.38						16.02***
Rural areas		15.83 ***						21.42***
ENVIRONMENT[b]								
Agriculture			0.04					0.11
White Collar			−0.36***					−0.16***
Light Industry			–					–
Staple Industry			0.06					0.03

MINING[b]				0.81***				0.22**
TEXTILES[b]					−0.48***			−0.90***
SCMR[c]						0.20***		0.30***
MARRIAGE[c]							−2.23***	−0.59**
R^2	0.44	0.08	0.30	0.29	0.07	0.09	0.23	0.79
Adjusted R^2	0.41	0.07	0.29	0.28	0.06	0.09	0.22	0.76

Notes:
The dependent variable is the standardised fertility rate (TF).
See the text for the definitions of other variables: [a] = binary variable, [b] = percentage variable, [c] = continuous variable.
*** Significant at 1 per cent level, ** Significant at 5 per cent level, * Significant at 10 per cent level.
Source: OPCS dataset.

courtship as well as marriage, its impact on fertility patterns thus being greater than might be expected on purely demographic grounds.

It is of little surprise that the combined explanatory power of the variables in Models I to VII, Table 6.5.1 sum to well over 100 per cent. The spatial concentration of the White Collar and Staple Industry environments, and of textile and mining communities within the latter, and the different marriage behaviours associated with various class and occupational groups, in addition to the industrial–urban–rural spectrum of child mortality experience, mean that very close inter-correlation between variables was to be expected. It is also highly likely that certain relationships were associative rather than causative.

When multiple regression is undertaken using the same variables the full model offers an explanation for 76 per cent of the variation in fertility. Four main points emerge from the model; Model VIII in Table 6.5.1. First, once the effects of the other variables are removed the difference between the great cities and both the smaller urban and rural districts is enhanced – to the extent that the smaller urban areas are seen to have fertility considerably higher than the great towns. Second, the relationships between the MINING and MARRIAGE variables and fertility, while still significant, are substantially reduced, while third, those between fertility and both child mortality and, particularly, the presence of textile workers are enhanced. Fourth, the regional pattern, as represented by the census divisions has markedly altered. Most noticeably the high fertility observed in Wales and the West Midlands has been 'explained away' by the variables included in the model.

The South East still registers fertility levels significantly below those of London (at the 5 per cent level), even when the effects of the large proportion of its population living in a White Collar, and thus low-mortality experience, area are allowed for. The North remains as the only division to have fertility significantly higher than that of London, and then only at the 10 per cent significance level.

A feature that is not apparent until all the other variables have been controlled for is that both Yorkshire and the North Midlands had fertility levels well below those of London. If the regression is repeated, but this time using counties rather than census divisions as the spatial unit, then it emerges that the West Riding, Nottinghamshire, Leicestershire and Lindsey, one of the parts of Lincolnshire, all have significantly lower levels of fertility than their environmental, occupational and urban–rural composition would predict. The neighbouring counties of Warwickshire in the West Midlands, and Northamptonshire and Bedfordshire in the South Midlands, also displayed low levels of fertility. In contrast, two other West Midlands counties, Hereford and

Table 6.5.2 *The employment of women aged 10 and over in the counties of England and Wales, 1911; showing (A) the percentage of women in each marital status reporting an occupation, (B) the percentage of women working in an occupation other than 'indoor' domestic service, (C) the total number of employed women and (D) the number of women employed in various orders per 1,000 women in employment*
(Only occupational orders where at least one county registers 100/1,000 women shown in Panel D.)

	A % of women in employment				B % of women in non-service employment	C Total N employed	D Number of women per thousand employed in			
County	Unmar.	Mar.	Wid.	All			Dom. Serv.[a]	Agric.	Textiles	Dress
Bedfordshire	56.3	15.6	30.8	35.9	27.1	29,848	324	11	28	423
Berkshire	52.2	8.1	31.5	31.0	15.7	25,214	623	16	2	120
Buckinghamshire	50.2	7.3	28.1	28.4	16.5	25,621	523	20	19	133
Cambridgeshire	49.2	7.6	30.2	28.8	17.3	15,680	546	20	6	141
Cheshire	56.5	11.8	28.9	34.7	24.5	99,744	348	39	233	145
Cornwall	45.4	4.7	23.4	25.6	17.1	37,402	422	94	7	202
Cumberland	47.1	5.3	28.8	28.0	19.8	30,311	364	98	66	149
Derbyshire	47.9	6.4	23.8	25.8	19.1	54,551	317	39	291	109
Devon	54.1	8.8	31.2	32.8	19.8	66,537	496	75	31	160
Dorset	50.2	7.6	28.2	29.5	17.6	27,101	514	39	29	163
Durham	29.9	2.9	19.8	15.8	10.1	53,197	439	40	21	162
Isle of Ely	45.3	6.1	26.4	24.2	15.3	6,636	447	111	4	182
Essex	49.1	6.1	25.2	27.0	18.6	116,163	400	10	18	213
Gloucestershire	50.5	9.4	28.1	30.7	19.5	43,189	469	31	49	203
Herefordshire	49.1	7.3	31.1	29.6	15.9	14,186	557	96	1	110
Hertfordshire	53.7	7.2	26.3	31.4	18.8	41,566	506	9	10	151
Huntingdonshire	46.2	6.1	27.1	25.2	14.7	5,608	509	53	6	154
Kent	48.2	8.0	29.7	28.8	17.0	122,254	532	20	5	131

Table 6.5.2 (*cont.*)

County	A % of women in employment				B % of women in non-service employment	C Total N employed	D Number of women per thousand employed in			
	Unmar.	Mar.	Wid.	All			Dom. Serv.[a]	Agric.	Textiles	Dress
Lancashire	64.4	18.6	26.1	40.9	35.8	298,379	157	20	559	83
Leicestershire	58.7	11.6	28.8	34.5	27.1	34,615	256	26	352	192
Lincs-Holland	45.1	6.2	28.6	25.1	16.3	8,350	425	96	7	151
Lincs-Kesteven	44.5	4.9	25.8	24.1	13.4	10,758	527	63	3	136
Lincs-Lindsey	41.4	5.0	26.5	22.3	12.6	20,908	514	78	9	121
London	62.3	13.2	39.8	39.6	29.2	769,552	387	0	12	224
Middlesex	54.9	8.3	27.7	31.8	21.0	152,581	473	5	9	165
Monmouthshire	33.4	4.0	22.4	17.6	11.0	18,967	447	49	1	176
Norfolk	45.0	5.9	26.0	24.6	13.7	32,009	542	50	6	130
Northamptonshire	56.9	8.3	25.2	31.0	22.7	26,758	325	19	9	454
Northumberland	37.2	3.0	22.9	20.3	12.0	28,882	478	115	8	127
Nottinghamshire	50.7	5.6	25.4	26.6	19.3	35,425	342	26	217	153
Oxfordshire	49.2	8.1	26.9	28.8	16.2	17,350	544	25	38	158
Soke of Peterborough	49.5	5.1	21.4	26.2	17.8	4,939	408	13	40	257
Rutland	53.2	5.9	32.5	29.8	14.8	2,402	634	44	3	108
Shropshire	46.9	6.1	29.4	27.6	15.1	27,235	534	83	10	113
Hampshire	48.5	6.5	28.2	27.0	14.0	44,649	596	20	2	128
Somerset	54.5	10.9	29.1	33.4	22.5	58,917	433	51	44	242
Staffordshire	48.7	7.9	24.8	27.5	20.1	78,068	317	29	64	158
Suffolk East	46.9	5.9	29.0	26.3	15.2	21,462	521	34	45	128
Suffolk West	48.5	9.4	25.9	28.5	17.3	13,515	483	23	47	178
Surrey	55.2	7.9	28.9	33.3	16.2	99,566	630	6	3	107
Sussex East	52.1	7.9	30.5	32.5	15.9	35,719	635	18	3	93

Sussex West	51.2	7.8	29.6	30.9	16.3	23,643	590	19	5	107
Warwickshire	56.8	9.4	29.5	33.0	23.5	55,274	363	16	57	152
Westmorland	55.1	7.1	32.6	34.3	22.9	9,555	421	136	48	126
Isle of Wight	50.4	7.6	30.8	30.8	18.7	12,070	515	19	3	133
Wiltshire	47.2	6.2	25.3	26.0	16.1	29,931	471	29	40	194
Worcestershire	56.1	11.1	28.4	33.7	24.7	60,481	340	21	74	123
Yorks East Riding	47.1	5.7	29.9	27.5	14.2	17,511	547	84	5	109
Yorks North Riding	44.0	5.8	30.0	26.1	15.5	33,016	498	98	7	126
Yorks West Riding	55.2	9.3	23.2	30.8	25.2	195,308	228	22	438	110
Anglesey	46.7	5.5	36.8	28.5	17.2	6,113	457	175	7	138
Brecknockshire	46.7	6.6	32.7	27.6	16.7	6,218	462	134	2	143
Cardiganshire	52.6	8.0	39.5	35.6	25.6	9,913	371	259	12	142
Carmarthenshire	50.6	5.5	34.4	29.9	21.7	18,811	326	214	18	196
Carnarvonshire	45.3	6.5	30.5	27.5	17.9	14,829	451	88	3	147
Denbigh	44.1	5.3	27.8	25.6	15.4	14,610	478	108	2	127
Flint	42.3	5.6	28.3	25.0	15.9	9,223	435	89	36	119
Glamorganshire	34.7	3.9	20.7	17.9	11.6	46,220	413	33	3	226
Merioneth	46.5	7.1	33.5	29.3	18.6	5,722	448	157	2	131
Montgomeryshire	51.8	7.7	42.0	33.0	20.8	7,155	436	216	45	122
Pembrokeshire	50.1	6.8	35.7	30.6	20.7	11,475	393	219	10	169
Radnorshire	52.5	9.3	40.4	33.8	20.7	3,069	485	164	1	92
England & Wales	52.9	9.1	29.8	31.7	21.7	3,126,563	398	28	32	166

Note:
[a] 'Domestic service' is restricted to 'indoor domestic service'.
Source: 1911 Census of England and Wales (1915), Vol. X *Occupations and industries,* Part I, Table 15B, pp. 424–61.
Acknowledgement: the authors are very grateful to Humphrey Southall, now of the Geography Department, University of Portsmouth, for providing the occupation data in electronic form, and to Katariina Göschl for preparing it for analysis.

Shropshire, had much higher fertility than their make-up would predict, a feature they shared with their near-neighbours, the mid-Wales counties of Montgomery, Cardigan and Pembroke. Despite the relatively elevated ages at marriage in the rural districts of these counties, fertility rates were high. In the full regression, when the presence, or absence, of miners, textile workers and white collar persons is controlled for using data at the county level the regression results indicate that none of the 'mining counties' had levels of fertility significantly different from those of London. This suggests that it was primarily the expectations, *mores* and behaviour patterns which permeated the mining communities that conspired to raise their fertility levels. Conversely, the regression suggests that while the West Riding, Nottinghamshire and Leicestershire had a considerable textile presence, there were factors in these counties above and beyond the presence of mills and mill-hands which were acting to reduce fertility levels. Textile workers may have had low fertility but they lived in districts where fertility appears to have been generally low.[51] The fact that county-level analysis is insufficient to capture the fine outline of the 'low fertility' region is highlighted when the residuals from the regression are considered. At that point it emerges that a clutch of textile great towns in both the West Riding and Lancashire had considerably lower fertility than the model would predict, even allowing for the presence of textile workers. Bradford, Dewsbury and Halifax in Yorkshire fell into this category, as did Bury, Manchester and Rochdale in Lancashire.[52] Bootle, Preston, St Helens and Warrington, however, further to the west in the latter county, all presented higher than expected fertility, even after the presence of miners and textile workers and the lack of white collar workers in these towns had been allowed for.

The geographic patterns of low fertility, and the contrast in fertility levels within Lancashire, suggested two phenomena which might underpin the fertility patterns but had not been explicitly included in the predictive model. One was how the participation of women in the workforce might colour local perceptions of fertility and fertility-related behaviour and the second was more nebulous 'cultural' influences such as religion.

In considering how women's presence in the workforce might influence fertility one has to ask whether it is the employment which they undertake or their proportional presence that seems to be most closely associated with fertility patterns. Women workers had been counted in the workforce profiles used to classify districts by environment, but no indication of the proportion of the workforce which was composed of females had been included in our regression equations.

Obvious county differences emerge when women's workforce participation is considered, as in Table 6.5.2. When considering fertility it is very often *married* women's paid employment which is the focus of attention, but as has been shown in earlier chapters many of the married women who worked for wages did so because their husbands were absent.[53] Further, women who worked after marriage often did so in the face of adverse infant mortality experience; and in those places where many married women were reported with an occupation, single and widowed women also showed high employment rates, a point confirmed by the first panel of Table 6.5.2.

The type of work available to and sought by women no doubt influenced their outlook on many aspects of life. In an era when the concepts of woman as the 'spiritual angel of the home' and man as the 'rational breadwinner' were still very strong among both the middle classes and those of the working-class who aspired to 'respectability', domestic service as an occupation for women could be seen as preparing working-class girls for their role as wife and mother, as subservient and dependent on the 'higher authority' of their employer or husband, bound to life within a short radius of the hearth and kitchen. As has been seen, however, in certain areas there were few middle-class families requiring servants. In some of these areas there were alternative employment opportunities for women, while in others there were very few. In these latter places women who did not move away fulfilled the role of servants within their own family home, usually without the benefit of pay.[54] Only in areas where women were removed from the 'domestic sphere' might ramifications for fertility behaviour be expected, over and above those resulting from the dominant male employment. The figures in Table 6.5.2 tell a far from straightforward story. Approximately 30 per cent of women aged 10 or over returned an occupation in England and Wales, although this figure was heavily influenced by the high proportions so returned in the large populations of London and Lancashire. In fact only 24 of the 62 counties and part-counties listed had as many as 30 per cent or more of their women working. When those employed in domestic service are removed from the calculations just over 20 per cent of the nation's women are reported as having an occupation. The concentration of servants in certain counties and regions meant that in only 18 counties did more than one-fifth of women find employment outside domestic service.[55] Leicester and the West Riding are two of these, but Nottinghamshire falls just short of inclusion on these criteria.

A surprising number of the Welsh counties show a relatively high rate of non-domestic service employment. Table 6.5.2 shows that in

Cardigan, Carmarthen, Montgomery, Pembroke and Radnor, where fertility was exceptionally high, considerable numbers of employed women were working in agriculture.[56] Was this a further signal to an older, pre-industrial culture where the whole family was involved in the collective enterprise of running the farm? Here, rather than seeing the fertility regime as exceptional it might be taken to represent continuation of early-modern fertility behaviour, curbed only by late age of marriage which in turn was encouraged by the wait a young man had to endure before he could inherit the position which would allow him to support a wife and family.[57] The employment of women *per se* does not, thus, necessarily preclude a region from having high fertility rates, as observation of the OPCS populations of Stoke and Bethnal Green has shown.

It is only when the proportion of the female workforce who worked in textiles is considered that Leicestershire, Nottinghamshire and the West Riding emerge as significantly different from other counties. In each of these counties over one-fifth of women worked in textiles and fewer than 350 in 1,000 worked as domestic servants. Here then was considerable support for a fact which Stevenson had contended: it was not just the presence of textile workers but the additional factor that a significant proportion of those workers were female that served to reduce fertility within the textile regions. A conundrum remains, however. Derbyshire, Lancashire and Cheshire also had high proportions of their female workforce employed in textiles, yet they did not show the same extent of low fertility as their eastern neighbours.

One aspect of culture often hypothesised to affect fertility behaviour may well have been influencing cross-Pennine differences: religion.[58] This variable has been shown to have considerable impact on fertility in a number of countries but the dearth of information on the topic of religious observance in England and Wales has led to this interrelationship remaining underresearched in the British context.[59] Table 6.5.3 displays the number and percentage of marriages conducted in each county in 1910 by the denomination of the service, differentiating between Church of England (C of E), Roman Catholic (RC) and other religions (Other) as well as those marriages conducted by a Registrar in a registry office.[60] The latter somewhat confound interpretation of the table, as the incidence of registry office weddings varied very much from one county to the next, but as such weddings constitute to some degree a decision *not* to seek a religious service it was considered important to include them.[61] Civil ceremonies seem to have been particularly popular in the coalfields of the North East and South Wales, although it is possible that this was forced on the populace as church building may

Table 6.5.3 *The proportion of marriages by denomination, by county, England and Wales, 1910*

County	N of marriages	Percentage of marriages in county			
		C of E	RC	Registrar	Other
London	39,149	62	4	26	8
Surrey	5,681	68	2	23	7
Kent	6,864	68	2	21	9
Sussex[a]	4,189	72	2	18	9
Hampshire	6,573	64	2	24	10
Berkshire	2,039	74	1	17	8
Middlesex	7,370	65	2	25	8
Hertfordshire	1,781	74	1	14	11
Buckinghamshire	1,172	76	1	10	13
Oxfordshire	1,411	75	2	15	8
Northamptonshire[b]	2,576	67	1	17	15
Huntingdonshire	343	80	1	8	11
Bedfordshire	1,348	71	1	14	15
Cambridgeshire[b]	1,562	75	1	14	10
Essex	8,858	69	2	19	9
Suffolk[a]	2,629	74	0	15	11
Norfolk	3,499	72	1	16	11
Wiltshire	1,905	67	1	16	17
Dorset	1,502	71	1	15	13
Devon	5,106	58	1	26	15
Cornwall	2,426	49	1	16	34
Somerset	3,343	68	1	13	18
Gloucestershire	4,807	63	1	23	13
Herefordshire	723	73	2	16	9
Shropshire	1,696	69	1	18	12
Staffordshire	10,137	72	4	14	10
Worcestershire	4,040	72	2	18	8
Warwickshire	8,114	71	3	19	8
Leicestershire	3,724	63	2	20	15
Rutland	119	77	2	9	12
Lincolnshire[a]	4,200	69	1	14	15
Nottinghamshire	5,580	64	1	22	12
Derbyshire	4,102	66	2	15	16
Cheshire	6,303	62	6	15	17
Lancashire	37,301	58	11	13	18
Yorkshire West Riding	23,578	64	4	15	17
Yorkshire East Riding	3,851	66	4	18	12
Yorkshire North Riding	3,041	62	7	16	15
Durham	10,642	51	8	27	14
Northumberland	5,003	49	7	30	14
Cumberland	1,926	63	7	15	15
Westmorland	446	73	1	8	18
Monmouthshire	2,906	41	3	31	25

Table 6.5.3 (*cont.*)

County	N of marriages	Percentage of marriages in county: C of E	RC	Registrar	Other
Glamorganshire	8,448	28	4	47	21
Carmarthenshire	1,084	22	0	46	32
Pembrokeshire	589	39	2	30	29
Cardiganshire	442	23	0	40	37
Brecknockshire	386	37	3	15	46
Radnorshire	105	53	0	10	37
Montgomeryshire	329	38	0	22	40
Flint	474	48	3	13	36
Denbigh	917	33	2	33	32
Merioneth	327	17	0	28	54
Carnarvonshire	844	28	1	34	37
Anglesey	211	17	6	23	55
England & Wales	26,772	62	4	20	14

Notes:
[a] Figures for the separate parts of Lincolnshire, Suffolk and Sussex are not presented.
[b] In the above table the Isle of Ely has been amalgamated with Cambridgeshire and the Soke of Peterborough with Northamptonshire.
Source: Registrar-General (1912), *73rd Annual Report*, pp. 206–9.

have been one aspect of development which did not keep pace with the burgeoning mining population. However, the importance of 'Chapel' as opposed to the 'established (Anglican) Church' is obvious in Wales, as is the fact that Church of England marriages were slightly less likely in the north than in the south of England, although both Devon and Cornwall displayed particularly low rates. The most pertinent feature of the table, however, is the point that while 4 per cent of all English and Welsh marriages conducted in 1910 were Catholic in denomination, this rose to 7 or 8 per cent in the northern counties of Cumberland, Durham, Northumberland and the North Riding, and reached 11 per cent in Lancashire. Cheshire was some way behind, although still well above the national average at 6 per cent.[62] Was a considerable Catholic presence serving to counterbalance the fertility suppressing effect of the large female textile presence in Lancashire and Cheshire, and could it also have been contributing to the high fertility of the North, Census Division X?

A search through the late-nineteenth- and early-twentieth-century reports revealed that the Registrar-General only published marriage denomination data at the county level.[63] The only readily available figures hinting at the strength of religious affiliation at a more local level are those given in the 1851 census report on religious observance.[64] Just as the 1911 census became known as the Fertility Census, so that of 1851 was dubbed the Religious Census, a special report being produced.[65] Religious officials were asked to return the number of sittings available in their particular church, chapel or meeting-house, and also to state the number of persons attending services in the morning, afternoon and evening of Sunday, 30 March 1851. While such figures, taken some 60 years before 1911, might not immediately seem relevant to the present study it can be argued that beliefs concerning courting, sexuality, gender relations, fertility and marriage are imbued into young people by their parents and grandparents. While their choice of marriage venue may have been the result of more immediate practicalities than adherence to a particular religion, the religious affiliation of previous generations may well have acted as a reasonable index of differences in the way in which individuals had been raised and under the influence of which they acted. It was decided to concentrate on Lancashire and Yorkshire's West Riding, to see if Lancashire's greater Catholicism did appear to affect fertility, and if this was sufficient to outweigh the low fertility of the county's textile districts.

Several problems arise. First, while the 1911 Total Fertility (TF) figures are given for individual great towns, and amalgamations of the other urban and rural districts of each county, the 1851 religious information is given for registration districts.[66] Second, the calculation of an index of religiosity can be, at best, only haphazard. The census report is full of caveats recording the many churches and chapels which failed to submit, or properly complete, their returns.[67] Also the number of sittings available and numbers attending services bear little relation to one another. Catholic chapels in particular report far more attending than there were seats available – a result no doubt of holding multiple services.[68] On the other hand the number of 'spare' Church of England seats in some districts must have been giving Church elders considerable cause for concern.[69] Finally the age structure of a community and the origins of its members might well have influenced the amount and nature of religious observance within it. For the purposes of the present exploratory exercise the number of those attending morning service was chosen as the best comparative index of a community's religious adherence.

It was not expected that proportions attending different morning services in 1851 would be exactly reflected in the proportions of marriages undertaken under the auspices of different religions in 1910. To begin with there would be no equivalent of the 'registry office' weddings, and secondly the 1851 census fell at the time of a great influx of Irish to mainland Britain as a consequence of the Potato Famine. Given the constraints on travel many of the new, largely Catholic, arrivals would have been unable to range very far beyond their ports of entry on the west coast. Over the ensuing half-century, however, they would work their way across the county, establishing pockets of Catholicism as they went.[70] Nevertheless, a rough and ready exercise was considered feasible.

Table 6.5.4 lists all the great towns of Lancashire and of Yorkshire's West Riding, giving the numbers of men and women working in selected occupations per thousand of that sex occupied in 1911. The towns are listed in ascending order of the proportion of women working, and the value of their standardised fertility, TF, is given. Also shown is the ratio of female to male textile workers and the proportion of the 1851 religious attendance at the various denominations within the registration districts named for the great towns which they contain. Figures are also provided for the amalgamated rural districts of each of the two counties and for the counties as a whole, although data for 1851 are not available for the rural districts.

The ratio of female to male textile workers in the various towns has to be treated with caution, as very small numbers of male workers can give spuriously high ratios. Wigan stands out as having had a relatively high proportion of its female workforce in textiles, and yet very few men in the industry; four in every ten of its male workforce were miners. Warrington, too, had over one-fifth of its female workforce employed in textiles, but very few of its males; men in Warrington were chiefly employed in metal work. Among those towns where at least 10 per cent of male workers were employed in textiles, it can be seen that Bury, Preston and Blackburn had particularly high numbers of female workers per 100 male workers: none of the Yorkshire towns with at least 10 per cent of male workers employed in textiles displayed such high ratios.[71] Despite the female textile presence fertility was high in both Wigan and Warrington, at over 300 children per 100 couples. Such figures might suggest that male occupation factors overrode those of female occupation when it came to fertility, but an additional factor has to be considered: in both Wigan and Warrington over 20 per cent of those going to a religious service on census day 1851 went to Catholic chapels. In both Manchester and Liverpool Catholic presence was also notable; Liverpool's fertility was particularly high for a town with neither mining nor metal working, and even Manchester's fertility was high (278) when compared to its textile working neighbours – apart from Bolton (277) and Preston (294). In all respects the latter town's occupational profile was very similar to that of Bury, yet Bury had a TF of 239, Preston a TF of 294. Bury had only 6 per cent of its church-goers attending Catholic ceremonies on the morning of 30 March 1851, but in Preston the equivalent figure was 36 per cent. It seems very likely that Preston's high fertility was associated with the sizeable portion of the town's population which was Catholic. Interpreting the case of Bolton is more complicated. Figures on religion are, as noted, very difficult to obtain for the late nineteenth century. If the Irish-born are assumed to be in the majority Catholic, then the proportion of Irish-born in a population could be taken as a proxy for the proportion Catholic. The 1871 census report reveals that Lancashire held over one-third of all the Irish-born living in England and Wales.[72] Four per cent of men and women over the age of 20 living in England and Wales in 1871 had been born in Ireland, but in Lancashire 11 per cent of men and 12 per cent of women were Irish by birth. In Liverpool 24 per cent of the adult population had been born on the other side of the Irish Sea, in Manchester 15 per cent. Preston, with its Anglo-Catholic presence firmly established, returned 10 per cent of its population as Irish-born. In Bolton this figure was higher at 12 per cent. It is possible that the Irish diaspora reached Bolton after 1851; this would account for the lack of Roman Catholicism reported in the town in 1851 and yet be commensurate with the relatively high fertility levels found there in 1911. Certainly Pelling remarks that Bolton had a Catholic minority of close upon 10 per cent in the 1880s, thus confirming that there was a substantial Catholic presence in the town in the closing decades of the nineteenth century, which tallies well with its elevated fertility levels, at least for a textile centre.[73]

Table 6.5.4 makes clear that, even where female labour force participation was high, there was a strong correlation between Catholicism and high fertility in Lancashire. This relationship suggests that, were church attendance figures available for the western Lancashire towns of St Helens, Bootle and Barrow-in-Furness, all three towns would have shown significant rates of Catholicism to complement their high fertility rates.[74] The Catholic presence in Lancashire may also go some way towards explaining why the county's cotton workers tended to return slightly higher fertility levels than the wool and worsted workers of the West Riding.[75] The complex interaction between class, religion, beliefs, migration and fertility behaviour is brought into focus by the low rates of fertility in Blackpool and Southport. These two towns do not feature in the 1851 religious census report, but while the presence of the middle classes in these two towns undoubtedly reduced the average family size, it may also have served to exclude the Irish, by pushing the cost of

Table 6.5.4 *Occupations, fertility and religion in the great towns and rural districts of Lancashire and the West Riding, 1851 and 1911*

Town	Per 1,000 of sex occupied[a]				Textile workers: females per 100 males	% women occupied	TF	% religious attendance a.m., 30.3.1851[b]		
	Miners (M)	Metal workers (M)	Textiles (M)	Textiles (F)				C of E	RC	Other
Panel A: Lancashire										
St Helens	293	71	1	17	371	20	345			
Barrow-in-Furness	3	559	3	105	683	21	289			
Bootle	1	122	5	88	586	27	316			
Warrington	2	405	10	274	919	30	316	49	20	31
Liverpool	1	92	4	24	291	32	315	34	44	22
Wigan	419	110	39	475	545	37	334	45	29	26
Southport	4	73	12	9	60	38	240			
Blackpool	3	47	11	14	82	39	230			
Salford	17	174	80	262	160	39	294	42	15	43
Manchester	10	178	44	144	167	39	278	32	34	34
Bolton	45	190	294	642	125	44	277	47	8	45
Oldham	13	280	315	698	126	46	254	41	5	54
Rochdale	5	180	333	696	133	48	238	34	3	63
Bury	4	158	247	647	170	50	239	43	6	51
Preston	2	138	256	686	202	54	294	39	36	25
Burnley	98	79	404	775	138	56	258	34	5	61
Blackburn	12	110	367	744	161	59	258	44	9	47
Rural Districts	94	68	137	383	125	36	288			
Total	134	103	230	559	127	41		42	22	36

Panel B: West Riding										
Rotherham	239	320	1	7	207	18	294	53	3	44
Barnsley	361	65	11	126	328	27	308	45	7	48
Sheffield	41	450	1	3	134	28	278	44	10	46
Wakefield	164	155	61	316	182	29	269	55	2	43
Leeds	30	212	46	146	157	38	268	32	14	54
Dewsbury	131	66	276	557	106	40	242	30	2	68
Huddersfield	12	120	296	511	97	41	244	43	1	56
Halifax	22	199	224	554	146	43	229	38	1	61
Bradford	20	97	294	603	124	45	231	23	9	68
Rural Districts	316	72	37	153	107	23	305			
Total	247	102	146	438	110	31		40	5	55

Notes:
[a] M signifies male workers, F female workers.
[b] Religious attendance refers to the 1851 registration districts of the same name, not the administrative units listed.
Source: 1911 Census of England and Wales (1915), Vol. X, *Occupations and industries*, Part I; Male occupations: Table 15A, pp. 386–423; Female occupations: Table 15B, pp. 424–61; 1851 Census of Great Britain (1853), *Religious worship, England and Wales*, Summary Table F.
Acknowledgement: see Table 6.5.2.

accommodation way beyond their limited means, just as all but the most 'prudent' and aspirational of the working-classes were excluded from such communities.

The cases of Preston and Bolton in Table 6.5.4 highlight the fact that a high proportion of women working in textile mills was not necessarily associated with low fertility within a community. However, in those towns in both Lancashire and Yorkshire where nonconformism and textile employment were found in combination, fertility was low. The combined population of Preston and Bolton in 1911 was just under 300,000 souls. Oldham, Rochdale, Bury, Burnley, Blackburn, Dewsbury, Huddersfield, Halifax and Bradford were home to just over one million individuals; on this basis the majority of textile workers lived in low-fertility nonconformist areas. The association between textile employment, be it male or female, and low fertility may not necessarily be a direct one, but one mediated by belief and behaviour patterns rooted in religious convictions prevalent in the localities where textile employment was to be found. It is possible that nonconformism condoned, or certainly did not condemn, women's work outside the home and thus found favour in the textile regions, but it is impossible to ascertain which came first; religious beliefs which may have coloured local political behaviours both on the grand and the intimate scale or the form of work which favoured particular religious and political expression. We must be careful, however, not to view all nonconformist churches as the same. The Welsh chapels appear to have encouraged, or certainly not discouraged, high fertility, quite unlike the Pennine brand of nonconformism, which appears to have reinforced, or at least not impeded, beliefs and practices adopted by a population endeavouring to balance the cares of home and family with the obligations of a factory regime.

These observations result in two research agenda. First, can it be shown that the teachings of the various faiths of England and Wales had different things to say about the role of sexuality, marriage and reproduction in the lives of their adherents?[76] Such teachings may not necessarily have been explicit, but views on the role of women, or that of men, within the home, or on the position of individuals within society, or on a person's right to health, independence and expectations of life, could all form the basis of attitudes, norms and behaviours within a community which in turn would have implications for fertility.

Second, a reassessment of the geography of employment may further our understanding of fertility behaviour. If nonconformism is indeed the element which underlies the lower than expected fertility of the West Riding, Nottinghamshire, Derbyshire and Leicestershire, then differences should emerge between the fertility levels of miners in the

Yorks–Derby–Notts coalfield and those of West Lancashire, the North East and South Wales. It is possible that the combined experience of the latter three would 'swamp out' any tendencies to lower fertility among the former in the overall occupational fertility figure for 'miners', just as the high fertility centres of Manchester and Liverpool with their concentrations of Catholicism mask the lower-fertility textile towns of east Lancashire when county-level data is being considered. If such differences could be found among the mining communities, then this would act as confirmation that there were strong social, as well as economic, factors underlying observed spatial and temporal demographic patterns: factors which have so far largely escaped the demographers' trawl for explanations of the 'fertility transition'.

6.6 Conclusion

Chapters 4 and 5 investigated the influences on infant and child mortality and on fertility using the set of individual returns to the 1911 census for 13 selected communities, and came to the conclusion that while child mortality was heavily influenced by the physical environment in which children were born and brought up, fertility levels were more affected by the social environment and community norms. This chapter has attempted to assess the validity of these conclusions for all of England and Wales using the aggregate results provided in the 1923 *Fertility of marriage* report. The analysis has been far from rigorous or exhaustive, and the restrictions of the available census data have limited the value of the exercise. In particular, the restriction to such large units as counties and large towns has disguised much environmental variation and prevented identification of smaller communities which may have been environmentally or socially very different in ways which affected their demographic experience. Nevertheless, the analysis offers tentative support for the earlier conclusions regarding both child mortality and fertility. It encourages us to look beyond the conventional 'urban–rural' dichotomy to an 'agricultural–industrial–white collar' spectrum of experience and to acknowledge that the complex patterns of employment, class, place and religion revealed at the national level can be understood only when taken in the context of communities, not of occupational or social groups. People modelled their behaviour on and acquired their beliefs from parents, friends and neighbours. Where a couple lived largely dictated the life chances of their children: who they lived amongst provided their guidelines for 'acceptable' behaviour in choice of partner, the type of courtship they enjoyed, their expectations of marriage and the number of children they were likely to have.

The foregoing discussion has also shown that there is a need to consider how the experiences of such individual communities fit together to form the mosaic which is the national picture. Changing demographic patterns, such as the fall in fertility over the last quarter of the nineteenth century and the first quarter of the twentieth century, can seem monolithic, but as has been demonstrated above they are the result of many more subtle, possibly longer-running changes in the nation's economy and industrial structure, in its religious and political complexion, and no doubt in popular culture. Each of these will have had regional and local dimensions, influencing the local population's fertility behaviour. The relative contribution of each locality to each region, and each region to the nation will colour the figures which are finally published as representing the national experience. Only when the complex temporal and spatial configurations linking economy, space and society have been fully disentangled will we truly understand how place, class and demography together forged the basis for the unprecedented national falls in both marital fertility and infant and child mortality in England and Wales at the end of Victoria's reign. On the basis of the findings reported in this and the preceding chapters, chapter 7 outlines a preliminary overview of how this 'demographic revolution' evolved.

Notes

1 The calculation of these measures is described in *Fertility of marriage*, Part II (1923), pp. lxv–lxvii, civ.
2 It is not clear from *Fertility of marriage,* Part II whether, in the census division data, towns with over 50,000 inhabitants but not of county borough status are included in the figures for county boroughs.
3 Registrar-General (1869), *Thirtieth Annual Report*, p. liii, quoted in Mooney (1994a), p. 165.
4 References to fertility studies may be found in chapter 5. On the unhealthy place against unhealthy people debate see Charlton (1996). Charlton bases part of his paper on a trial authority area classification first laid out by Wallace *et al.* (1995). He shows, for example, that male life expectancy differed by over four years between the 'most prosperous' areas and those dominated by 'ports and industry' in 1992.
5 Macintyre *et al.* (1993).
6 Williams and Mooney (1994); Williams and Galley (1995).
7 We are indebted to Dominique Benjuya for collecting the 1921 data from 1921 Census of England and Wales (1923–4), *County Parts,* Tables 16 and 17, and undertaking the classification procedure. In the classification of environment for the OPCS sectors, only general labourers were excluded from the workforce profile. In using data from the 1921 census reports for the present

exercise a whole occupational order (XXXII, 'other and undefined workers') had to be excluded as they could not be allocated accurately to a particular sector of the economy. 'Agriculture' included both orders I (Fishermen) and II (Agricultural occupations). White Collar occupations comprised orders XXIII ('Commercial, Financial and Insurance occupations); XXIV (Public Administration); XXV (Professional occupations); XXVI (Entertainments and Sport); XXVII (Personal Service); XXVIII (Clerks and Draughtsmen); and XXI (Gas, Water and Electricity). The Staple Industries were represented by orders III (Mining and Quarrying); V (Bricks, Pottery and Glass); VII (Metal Workers); and XII (Textile Workers). All other orders represented the Light Industry category.

8 In this use of the term 'great towns' we follow Williams and Galley (1995) and *Fertility of marriage*, Part II (1923), Table LV, p. cxxxi, which defined the 'great towns' as 'County Boroughs [whatever their size] and other towns over 50,000 population'. In the analyses which follow, occupation information was drawn from the 1921 census, making it impossible to include four of the great towns listed: by 1921 Devonport CB had been subsumed into Portsmouth CB and Aston Manor MB, King's Norton and Northfield MB and Handsworth UD had all become part of Birmingham CB. These four CBs are not shown in Fig. 6.2.1.

9 Some 'rural administrative districts' also fall into the White Collar or Light Industry categories when classified by environment, but this fact is much less easy to discern from Figs. 6.2.2B and C.

10 Reid and Garrett (1996). IMR figures were derived from the Registrar-General (1919), *Supplement to the seventy fifth annual report.* In both the northern and southern Divisions the IMRs ranged from 75 to 120 deaths per thousand births.

11 The occupation information from 1921 used to designate an administrative unit to the environmental category was not available for four of the great towns referred to in the *Fertility of marriage* report: see n.8 above.

12 See Appendix D for a breakdown of each county or part-county by environment and type of place.

13 Williamson, J. G. (1990), p. 244.

14 *Ibid.*, p. 244.

15 Szreter and Mooney (1998).

16 Williams and Galley (1995).

17 Registrar-General (1843), *Fifth Annual Report*, pp. 33–53.

18 Registrar-General (1869), *Thirtieth Annual Report*, quoted in Mooney (1994a), p. 165.

19 Williams and Mooney (1994).

20 Watterson (1986) called for study of industrialisation rather than urbanisation with relation to infant mortality.

21 See chapter 4 and Appendix B for discussion of this technique.

22 Regressions were also carried out at the county level but in the interests of space only the results of regressions on census divisions are displayed in Table 6.3.1.

23 See Table 6.1.1 for census divisions and their constituent counties. The environment distribution variable was the percentage of the population living in each environment. Each CB or LU formed one administrative unit, and therefore each 'great town' received just one environment classification, 100

per cent of its population being assigned to one environment. Because the resulting covariance between type of unit and environment might cause problems in the analysis, an alternative definition was investigated. For great towns the percentage of each town's non-agricultural workforce which was working in the White Collar sector and the Staple and Light Industry sectors of the economy were taken as proxies for the population living within each environment in these great town units. Although this is different from the proportion of the population living in an environment which is characterised by the composition of its workforce, this mode of measurement was considered to reflect the range of environments encountered within large towns and cities at, say, the enumeration district level. In fact, the alternative specification of environment produced very similar results to the original, so the original was used.

24 Woods, Watterson and Woodward (1988, 1989).

25 See chapter 4, for a fuller discussion of the adjusted R^2 statistic.

26 Registrar-General (1923), *Statistical Review, 1921,* Tables 14 and 20. One year provides a very small amount of data, and can be no more than illustrative.

27 As an example, if barristers are taken to represent this white collar group they are found to be more likely to live in London and the small urban areas of the South East, South West and South Midlands than anywhere else: Reid and Garrett (1996). It is less easy to choose an occupation to represent the lower working-classes, but it can certainly be argued that they would be concentrated in non-White Collar, usually urban environments, and therefore subject to much less healthy environments.

28 Despite their rapid growth the White Collar areas still only contained 21 per cent of the total population. The Staple Industry areas in contrast contained 28 per cent of the population, and Light Industry areas 36 per cent.

29 Hart (1998), p. 225.

30 Attempts to gauge the changing proportions of the population living in different environments over the course of the nineteenth century are hampered first and foremost by changes both to boundaries and to the nature of the units for which population figures are returned in the decennial census.

31 Teitelbaum (1984), Appendix table 5A.1, p. 112. I_m is a 'measure of the proportions married at each age, weighed by the Hutterite fertility rate': Pressat (1988), p. 32. It can be calculated as the ratio of births to all married women to those of all women if each experienced Hutterite fertility rates: Newell (1988). See chapter 5, section 5.2.

32 *Fertility of marriage,* Part II (1923), p. cxliii. On page xix of the report Stevenson comments that 'marriage between old women and young men . . . appears to be a special feature of rural life, being very much commoner in class VIII than in any other'. The relationship between these two observations is cemented on page cxliii, where Stevenson comments that in Cardigan 'the majority of the rural population is directly engaged in agriculture . . .'

33 In common usage a 'celibate' is taken to mean an individual who abstains from sexual intercourse either deliberately or through lack of a partner. Historical demographers use the term to indicate someone who remains unmarried and thus is assumed to have a much lower risk of conception than an individual who is in a stable sexual union. Of course not all unmarried individuals were without sexual experience.

34 1911 Census of England and Wales (1913), Vol. VII, *Ages and condition as to marriage*, Table 9, pp. 211–66.
35 Calculated from *ibid.*, Table 1, pp. 1–2.
36 See n.34 above.
37 Teitelbaum's South Wales region includes both Cardiganshire and Radnorshire, whereas these two counties are constituent parts of our 'North Wales' Census Division XII.
38 Anderson (1976). Occupation differences in nuptiality are considered in Szreter (1996b), pp. 335–50, 382–9.
39 This table in part replicates Anderson (1984), Table 9, p. 389, derived from a national sample of the 1851 census.
40 Exceptions to this general statement are Montgomery and Radnor.
41 Figures are not available at present to allow variations in nuptiality within other large urban centres to be mapped. With the release of a machine-readable version of the 1881 census such an exercise becomes increasingly possible.
42 The Forsyte novels (Galsworthy 1906–33: see chapter 5, section 5.1) depict the various members of the families central to the narrative moving from club to home as the demands of the working week dictated.
43 Women from the cohort who married aged more than 30 were excluded as it was felt that a greater proportion of them would have been marrying for at least a second time.
44 An alternative strategy would have been to choose one or more marital duration groups, assume that all those married aged 15–19 were married when the wife was aged 17.5 (or possibly 18.5 as only a minute number of girls married before they were 16), all those married aged 20–24 were married when the wife was 22.5, and so on; and then calculate an 'estimated age of marriage'. There is the danger, however, that in doing this those women who had married aged 15–19 would be overrepresented, as those who had been married at the same date but were ten years older at marriage would have experienced higher mortality in the interim. It is further likely that the various sub-sections of society, whether defined spatially or socially, might have experienced rather different rates of survival. The method used does not eliminate the problem of differential mortality, but it does reduce it.
45 The same exercise could be performed for men, but as male age at marriage has less bearing on fertility within marriage than that of females the former is not considered here.
46 Woods (1982), Figs. 3.12–3.19.
47 Teitelbaum (1984), Tables 4.6a, 5A.1, 6.4a and Fig. 4.4, 5.5, 6.3.
48 Woods (1982), Figs. 3.15 and 3.16.
49 Teitelbaum (1984), p. 133.
50 This exercise was also carried out using only the childbearing population of each county. When the results were compared with those derived from the total population counts, however, the maximum difference was less than two percentage points. As all other figures were calculated using the total population it was decided to retain the county levels TFs based on the latter figures, rather than those based on the childbearing populations.
51 Stevenson attributed this to the fact that 'factory work by married women . . . is open to the wives of men engaged in other occupations equally with

those of male textile workers. Where the wife works little . . . the husband's occupation alone can influence fertility; but where the wife works much, as in textile production, it may be that her work largely or even mainly governs the situation.' *Fertility of marriage* (1923), Part II, p. cxvii.

52 Lancashire's White Collar resorts of Blackpool and Southport also displayed lower than expected levels of fertility.

53 See chapter 3, section 3.2; chapter 5, section 5.8.

54 Higgs (1987); Hudson and Lee (1990), p. 33 offer discussion of 'regionally divergent, gender-specific labour markets and local configurations of female employment opportunities in both formal and non-formal activities'.

55 'Domestic service' here is restricted to 'indoor domestic service', and therefore chars, laundry workers and those working in clubs and institutions are counted with the 'non service' employees, on the grounds that they retain an element of independence in their lives forgone by 'living in' servants. A small proportion of the 'indoor servants' may not actually have lived constantly under their employer's roof, but this minority cannot be identified from the published census returns. Because servants were not required to fill in their employer's name and address in the 1911 census even the individual-level returns shed little light on the number of servants 'living out'. See Garrett (1995).

56 Garrett (1995) argues that the 1911 census questions served to inflate the number of women reported as working in agriculture, because wives and daughters living on the family farm saw themselves as 'helping out' on a regular basis. Widows may also have continued to run a farm after their husband's death, if out-migration led to a loss of the younger generation previously expected to take over. In a region largely devoted to agriculture this may have had implications for the proportion of women reported to be employed in the agricultural sector. Higgs (1987, 1995) strikes further notes of caution in the interpretation of statistics concerning the role of women in agriculture.

57 While some men would literally have had to wait for their inheritance, others had to accumulate the wherewithal to support a wife and family. Some might migrate away in order to find more remunerative employment, allowing them to marry more speedily and so at a younger age, but those staying in the agricultural areas would usually have to wait longer to achieve this goal. Smith, R. M. (1981), pp. 595–622.

58 McLeod, H. (1986) presents maps of religious observance, based on the 1851 Census of Great Britain (1853), *Religious worship (England and Wales).*

59 For studies of religion and fertility in other countries see Van Heek (1956); Coward (1980); Kyriasis and Henripin (1982); Lesthaeghe and Wilson (1986); Cleland and Wilson (1987); Ó Gráda and Walsh (1995). The role of religion in demographic behaviour is further examined by, amongst others, Simons (1980); Banks (1981); Vann and Eversley (1992); Mason (1994a).

60 Figures were taken from the Registrar-General (1912), *Seventy Third Annual Report*, pp. 206–9. Those ceremonies conducted by a registrar but in accordance with the rites of a particular denomination have been assigned to that denomination, rather than being taken as 'non-religious' ceremonies.

61 The decision to be married in a registry office could be affected by many factors. Access to an office may have been easier than to a church or *vice versa*, particularly for those tied to a particular work schedule. A greater incidence

of inter-denominational weddings might have prompted greater resort to the registrar, as might a higher proportion of secularisation within a community. Proscriptions placed on those who wished to marry by the Church may have prompted couples to seek civil marriages. In 1841 approximately 2 per cent of marriages in England and Wales were conducted by registrars. By 1871 this had increased to 10 per cent, and by 1901 to 16 per cent: Haskey (1987). By 1910, as Table 6.5.3 shows, the figure had risen even further to 20 per cent.

62 Anglesey too saw Catholic marriages making up 6 per cent of its total, but the numbers here are very small and are therefore not included in the discussion.

63 The denomination under whose auspices a marriage was conducted is noted on each marriage certificate. If these were available for scrutiny a more accurate picture of the distribution of religions within England and Wales could be gleaned.

64 Figures could be collated from various sources relating to each denomination, but this would be a major undertaking and was not contemplated here.

65 1851 Census of Great Britain (1853), *Religious worship (England and Wales)*. See Drake (1972), pp. 15–19; Thompson, D. M. (1978); McLeod (1986).

66 In the following analysis religious figures for those registration districts are used as estimates for the administration units of the same name.

67 1851 Census of Great Britain (1853), *Religious Worship (England and Wales).* For example: Table B, 'Accommodation and attendance in registration divisions', lists the number of places of worship and sittings, the number of attendants at public worship on Sunday, 30 March 1851 and the number of places *open for worship* at each period of the day, on Sunday 30 March 1851, and the number of sittings thus available 'for each denomination'. For Division IV, the Eastern Counties, the following caveats are noted: 'The number of *sittings* is not returned for 237 out of . . . 3015 places of worship . . . the number of *attendants* is not returned for 93 of the 3015 . . . of the 2269 places of worship *open* in the morning. 198 did not return the number of sittings, and a similar omission with respect to 184 of the 2373 open in the afternoon, and 60 out of the 1083 open in the evening.'

68 Multiple services could indicate that many more people could be accommodated than there were seats available, or it could indicate that parishioners were able, and possibly expected, to attend more than one service in the course of a Sunday. As an indicator of religiosity the first suggested a high proportion of faithful within the community and the latter suggested a core of highly committed church-goers within a community. Both were considered to indicate a 'religious' community.

69 1851 Census of Great Britain (1853), *Religious Worship (England and Wales),* Summary Table A shows that there were 4,546,521 sittings available in Church of England and Church of Ireland places of worship on the morning of 30 March 1851, but only 2,371,732 attendees. For Roman Catholics there were 160,865 sittings available, but 240,792 attendees reported.

70 See Lees (1979); Schofield, R. A. (1990).

71 Cotton weaving towns tended to employ a greater number of females in the mills in relation to the number of males than spinning towns. Bury, Preston and Blackburn can all be classified as weaving towns on the basis of their loom to spindle ratio: Laxton (1986), p. 113. However see also Kenny (1982)

who notes that although weaving was traditionally concentrated in the north of Lancashire and spinning in the south, 'by 1884 [the distribution of the branches of the industry] could not be depicted simply as a contrast between north and south': p. 45.

72 1871 Census of England and Wales (1873), Vol. III, *Ages, civil condition, occupations and birthplaces,* Tables XX and Table 17, Division VIII.

73 Pelling (1967), p. 254.

74 In 1851 St Helens, Bootle and Barrow did not qualify as 'large towns' and therefore did not appear in 1851 Census of Great Britain (1853), *Religious Worship (England and Wales)*, Summary Table F. The town of Bootle appears to have lain in the registration district (RD) of West Derby, Lancashire which reported 21,503 attendants at Church of England services on the morning of 30 March 1851, and 12,654 attendants at Roman Catholic services. St Helens lay in the RD of Prescot where 6,479 Church of England and 4,097 Roman Catholic attendants were reported, supporting the supposition of a considerable Catholic presence. Barrow in Furnace must have lain in the registration district of Ulverston, but it does not appear in the gazetteer of parishes, etc. provided by the 1851 census. The RD of Ulverston reported 7,733 attendants at Church of England services, but no Catholic presence at all. However in her book covering the 1890–1940 period Roberts notes: 'Both Lancaster and Barrow had significant Roman Catholic minorities, while Preston had a very substantial one': Roberts, E. (1984), p. 73. Roberts does not quantify either 'significant' or 'substantial', but her remarks in this context highlight the argument made in the text for the role of migration in influencing changes over time in the national map of religion. Davies, R. (1984), Table 2.3, p. 36 reports that in 1901 6.4 per cent of the population of Barrow-in-Furness was recorded as Irish-born.

75 Szreter (1996b), p. 312; *Fertility of marriage,* Part I (1917), Table XLVIII, p. cvii and Table XLIX, p. cxiii.

76 See n.59 above.

7

Class, place and demography: the mosaic of demographic change in England and Wales from Waterloo to the Great War

. . . however frugal, however unostentatious, however rational we may be, however resolute to live as we think we ought, and not as others do around us, it is . . . simply *impossible* not to be influenced by their example and to fall into their ways, unless we are content either to live in remote districts or in an isolated fashion.[1]

7.1 Environment and demographic change

In chapter 1 it was argued that understanding of fertility and nuptiality change in England and Wales, particularly during the critical half-century before the 1911 Fertility Census, has been strongly constrained by the preoccupations of those compiling the original report from that census. Interpretation of the changes in the survival chances of young children also continues to be much influenced by the agenda set by late Victorian and Edwardian investigators. Chapter 1 concluded by holding out the prospect that the small but significant amount of individual-level 'raw data' from the 1911 census inquiry available to the present study would result in a range of new, relatively independent empirical findings. Has this volume succeeded in getting behind and going beyond the Edwardians' agenda? What have been the principal findings, and what directions for future research are indicated?

This concluding chapter will not attempt to recapitulate or summarise all the detailed points to emerge from the analyses reported in chapters 4 to 6. Rather it will try to draw out the principal findings of general significance – those which revise or challenge previous views of the ways in which fertility, nuptiality and mortality changed in England and Wales. The chapter will include a consideration of the implications which the approach taken here has for the notion of demographic transition and for our longer-term view of demographic change in England

and Wales, embracing the whole of the modern period from the late eighteenth to the mid-twentieth century.

The individual-level data available to the present study have highlighted an important general methodological point regarding the weaknesses of census-based inquiries into the dynamic social processes of fertility and mortality change. It has been clearly demonstrated that Edwardian contemporaries were somewhat beguiled by the phenomenon of 'reverse causation', as it has been termed in chapter 4. As a result of the retrospective nature of the questions concerning marital fertility asked at the 1911 census certain influential causal misinterpretations arose or were apparently reaffirmed, notably the notion that maternal employment caused high infant mortality and led to low marital fertility. It has been shown here that in each of these cases the statistical association in question arose because of a selection effect. A retrospective survey will tend to record a disproportionate number of married women in the workforce who had been able to take up employment because of their relatively small child care burden: a consequence of low fecundity, high infant mortality, or both. The paths of causation underlying the association between variables were thus revealed to be the reverse of those supposed by contemporary investigators.

Probably the most important general finding which has emerged from this study concerns the superiority of environment over class as an explanation of the observable variation found in 1911 in both fertility and mortality among the young. It has previously been considered that 'class' differentials (measured according to the Registrar-General's social classification scheme) comprised the principal social feature of demographic change in England and Wales. Although periodically reaffirmed, most recently in the work of Preston and Haines, this orthodoxy dates back to the official enquiries of the GRO at the beginning of the twentieth century.[2] However, as the historiographical review in chapter 1 indicated, the class model has recently been subjected to a fundamental theoretical and empirical critique, with a number of studies giving more prominence to occupation, industry, geography and community in their analyses of both fertility and mortality change.[3] Following the latter type of approach, and developing a typology encompassing four main socio-economic environment categories, the analysis performed in chapter 5 showed that to the extent that fertility tended to vary as a function of the Registrar-General's classes, this was largely attributable to a statistically more powerful environmental effect. It was where a couple stayed, and particularly who they lived amongst, rather than their own social status which had the greatest impact on their family building behaviour and the survival prospects of their children. Greg's mid-nineteeth-century observations on the role of one's neighbours as a yardstick of acceptable behaviour, as quoted at the beginning of this chapter, seem an equally apposite summation of the context in which people operated 50, or indeed 150, years later.

Thus the White Collar (WC) communities included in this study, where those working in the service sectors of the economy predominated, were composed of families with relatively low fertility, whatever their official class affiliation; while families in traditional and heavy industry (SI) areas, with the notable exception of most textile communities, exhibited the opposite characteristics. Where families lived in more mixed urban environments (LI) their fertility lay at an intermediate level. Rural (AG) areas, although amalgamated into a single category for much of the analysis here, actually fell into two main types depending on their experience of the great agricultural depression, which dominated the history of this sector of the economy during the late Victorian era. All rural areas exhibited relatively high fertility in 1891 but after this date the two southernmost communities, Axminster and Saffron Walden, which had much more labour-intensive farming than the other agricultural areas included in the analysis, exhibited dramatically falling fertility and an increasing disinclination to marry among both the propertied farmers and the property-less farm labourers.

Where mortality among the young was concerned, the analysis in chapter 4 indicated that environment once again exerted a statistically more powerful effect than 'class'. In addition, the multivariate analysis deployed there identified an extremely important, confounding statistical association between parity and mortality amongst the young which accounted for most of the remaining variance in the latter variable between the Registrar-General's classes. It was, however, underlined that the evidence available from the 1911 data does not allow any causal attribution to be made to the association between parity and mortality.

The fact that within classes there was a great deal of local and environmental diversity in levels of child survival underscores the importance of certain 'community-level' characteristics. This raises the questions of, first, the extent to which different kinds of environment entailed the need for protection of the young against life-threatening hazards and, second, the extent to which the inhabitants of a particular environment both perceived this need accurately and could mobilise the necessary political and economic resources to deal effectively with those hazards they faced. In an era when public health and sanitary activism varied widely from one local authority area to another this was an issue of central importance.[4]

Findings outlined in chapter 4 suggest that living in the countryside afforded substantial protection to young lives, regardless of socio-economic status. Within the towns and cities, however, chances of survival were more strongly influenced by access to money and power. The propertied classes were able to afford the most spacious dwellings, internally equipped with such health-promoting facilities as running hot and cold water and trapped water closets. They also had a sufficiently powerful 'voice' in urban affairs to be able to ensure that the districts in which they resided were provided with the best sanitary measures available, including proper sewerage systems, paving and lighting. In addition, being among the best-educated members of society, they were most likely to be aware of the nature and significance of healthy and hygienic living practices. Our analyses suggest that this capacity of the propertied classes to alleviate the general health hazards of the urban environment of their residential districts also benefited, at least relatively, those individuals of the lower classes who lived in these areas. By contrast, the inhabitants of the more industrial, proletarian towns and districts were apparently much less able, either individually or collectively, to mobilise the necessary resources to defend their children adequately from the deficiencies of their urban environment.

It has long been known that the relative levels of fertility and of child survival dramatically varied between different environments and social groups during the Victorian era: mill towns having low fertility and high infant mortality; middle-class environments exhibiting low levels of both; mining and heavy industry districts displaying high levels of both; and most agricultural communities combining low infant mortality with high fertility. In common with several other studies it has been concluded here that fertility changed quite independently of developments in infant and child mortality during the period under observation. Thus, while it is certainly being argued here that local environment influenced both aspects of demography, it is envisaged that is did so in distinct ways with respect to fertility and to infant and child mortality.

A further substantive finding of this study concerns the type, or character of a town, city or district. It was this, and not the mere density of settlement or overall size of the urban agglomeration, which was of primary importance to its demography, particularly where mortality was concerned. The environmental classification used here distinguished three principal 'types' of urban environment (WC, SI, LI) and, rather than an urban/rural polar scale reflecting density of settlement, mortality tended to reflect a spectrum of environments running from rural, through suburban/residential, to urban/non-industrial and finally to urban/industrial.

Such a spectrum can also be seen to apply in the case of reproductive behaviour, although, as already emphasised, we do not envisage environment as influencing fertility, nuptiality and courtship patterns in precisely the same way as it influenced mortality among the young. For example, the urban/industrial category has to be subdivided, given that towns with strong non-domestic, factory-based female labour markets tended to exhibit low fertility and later female marriage, making them quite unlike other urban/industrial towns from a reproductive point of view.

In those of our communities where the middle classes were virtually absent, the role of women's paid employment in shaping family building patterns has received considerable attention, looking particularly, but not exclusively, at variations in the availability and acceptability of married women's work outside the home. The mill towns of Victorian Lancashire and West Yorkshire have long been recognised as having had remarkably low levels of fertility. If the community of Bolton is representative of such centres, then this study indicates that their low fertility was not confined to textile operatives, but was a feature of the community in general.[5] It is a notable finding that the regression analyses in chapter 6 have further suggested that the region of low fertility and relatively low nuptiality typified by the cotton, woollen and worsted towns of Lancashire and West Yorkshire also extended to those parts of Derbyshire, Nottinghamshire and Leicestershire where several other branches of the textile industry employed women. However this relationship between female employment and community fertility levels was apparently not a ubiquitous one, but dependent on the precise details of local work practices and community norms, a point emphasised by Hanley, our community representing the Staffordshire Potteries, where, despite high levels of female workforce participation, both fertility and nuptiality levels were very high.

That both direct and indirect influences may have been operating simultaneously to create a community's demographic signature further complicates interpretation of the processes involved. In middle-class Pinner, for example, the substantial, resident bourgeoisie influenced the courtship, nuptiality and fertility patterns of the whole locality. On the one hand, their visibly late marriage would set the tone for 'acceptable' behaviour in the neighbourhood, and thus directly influence nuptiality patterns. On the other hand, through their household consumption patterns and demand for domestic labour, they also defined the job opportunities for the more plebeian sectors of Pinner society, thus moulding the age and sex structure of the community and indirectly influencing the courtship opportunities and marriage prospects for its inhabitants.

Clearly 'culture' and 'economy' were too closely interwoven to be seen as mutually exclusive 'explanations' of either demographic behaviour or experience. Male and female employment opportunities and work patterns were inextricably linked to courtship patterns and family building behaviours, with added diversity being provided by the ethnic, religious and political character of particular communities. The Jewish immigrants to Bethnal Green in the early years of the twentieth century provide an obvious, and well-documented, example of the strong interrelationships between demographic regime, family structure, religious and ethnic character, and industrial and labour market complexion.[6] The comparative perspective allowed by the relatively large number of communities available within the OPCS dataset suggests that such complexity was the norm, rather than the exception.

Even when the operation of the subtle relationships within individual communities has been mapped, however, it will not be until the changing, evolving nature of the nation's constituent communities, both in absolute terms and in relation to each other, has been unravelled that our understanding of English and Welsh demography over the Victorian and Edwardian eras will be complete. The following section accordingly turns to an examination of developments in the nation's social and spatial characteristics over the nineteenth century.

7.2 Class, place and demography

A number of previous authors, notably Woods, have convincingly argued that the secular demographic trends of nineteenth century England and Wales cannot be properly assessed without reference to changing composition, at the very least in terms of an urban–rural continuum.[7] The analyses developed in the preceding chapters show that it is necessary to recognise different kinds of urban and even rural environment in order fully to incorporate compositional effects into interpretations of secular demographic change, including the role of the large-scale regional differences in social and demographic characteristics evident during this period.

Our argument, it should be made clear from the outset, is not that all secular change resolves down to compositional shifts; that there was little actual change in fertility or mortality in any place and merely a reassortment favouring the disproportionate expansion of low fertility and low mortality sections of the community relative to those with high fertility and high mortality. Clearly the distinct individual local demographic regimes did change significantly throughout the industrial and post-industrial era, as economic, social and cultural mutation proceeded. However, there were also important large-scale shifts both in the proportions of the national population composing its principal social groups and in the distribution of these groups over the main types of environment. The period from 1815 to 1914 and beyond witnessed, overall, a substantial expansion in the number of families aspiring to live a comfortable, middle-class existence – predominantly in the suburbs. It also saw, especially during the second and third quarters of the nineteenth century, a significantly greater proportionate rise in the percentage of the population residing in poor, industrial, urban neighbourhoods; a feature further emphasised if the proportion of children born into such districts is considered. A third major compositional development was the reciprocal of urban expansion: a diminution in the percentage of the population living and working in the countryside. Table 7.2.1, adapted from work published by Law and by Woods, charts these changes in indicative terms.[8]

The upper line of the lower panel of the table shows that the average decadal rate of growth of all provincial towns of more than 10,000 inhabitants had been very substantial during the eighteenth century, at 24 per cent per decade. During the first decade of the new century the rate was running at 29 per cent, but over the following three decades, 1811–41, urbanization so intensified that these towns and cities were expanding at an average rate in excess of 40 per cent per decade. The hectic pace of urbanization then eased slightly, to around 30 per cent per decade between 1841 and 1881, before slackening to about the average rate for the eighteenth century in the 1880s and 1890s, and finally falling to a much lower rate than anything experienced during the nineteenth century in the first decade of the twentieth century. The first line of Table 7.2.1 shows that, in contrast, the population of London, although growing massively in absolute terms, grew only gradually in proportionate terms across the nineteenth century. The bottom line of the upper panel confirms the consistent decline, at a substantial rate, of the percentage of the population living in the rural residual – places with less than 10,000 inhabitants, from the 1810s onwards.

Table 7.2.1 hardly offers revelatory observations. It merely indicates, in quantitative form, some well-known general socio-demographic trends of the nineteenth century. The massive absolute, but more moderate proportionate growth of London (bottom line of lower panel) more or less mimics the demographic growth characteristics of the white collar environments in the nation, while the greater expansion, on both absolute and proportionate counts, of the provincial towns and cities primarily reflects the even more phenomenal growth of the environments dominated by the industrial working-classes. The latter was

Table 7.2.1 *Percentage distributions for the population of England and Wales, 1700 and 1801–1911; by size of place, and percentage growth per decade in all towns and cities with over 10,000 inhabitants*

	1700	1801	1811	1821	1831	1841	1851	1861	1871	1881	1891	1901	1911
Size of place													
London	11	11	11	12	12	12	13	14	14	15	15	14	13
Over 100,000	0	0	3	4	7	8	12	15	18	22	25	30	31
10,000–100,000	2	13	12	13	15	18	19	20	22	23	25	26	26
Rural	87	76	74	71	66	62	56	51	46	41	36	31	30

% growth per decade	1700–1801[a]	1801–11	1811–21	1821–31	1831–41	1841–51	1851–61	1861–71	1871–81	1881–91	1891–1901	1901–11
of provincial towns[b]	24	29	42	43	37	33	27	29	28	24	25	16
of London	5	19	21	20	18	21	19	16	17	10	7	0

Notes:
Percentage figures have been rounded to the nearest whole number; columns in the upper panel may not sum to exactly 100.
[a] The figure for 1700–1801 is averaged over ten decades, allowing for compound growth.
[b] 'Provincial towns' are all urban areas with populations over 10,000 and excluding London.
Source: Figures for 1700: Corfield (1982), Tables 1 and 2, pp. 8–9; figures for 1801–1911: Law (1967), Appendix Table 11, p. 141; Woods (1985), Table 2, p. 645.

a particular phenomenon of the first two-thirds of the nineteenth century; it rather tailed off in the four decades before the Great War, while the white collar sector continued to expand.

These developments, although well known, may be highly relevant to our overall interpretation of the secular trends in fertility, nuptiality and mortality in England and Wales in ways that may have been insufficiently appreciated. In particular, the compositional approach may help to explain two long-standing enigmas regarding modern British demographic history, first the stalled mortality decline of the nineteenth-century and second, the curiously 'late' decline in fertility. However, before developing our arguments in detail in sections 7.3 and 7.4 below, it is first necessary to sketch out the social, political and spatial evolution of class dynamics across the two centuries following 1750, since this provides the explanatory context from which to understand compositional change.

In very broad-brush terms British society was initially pulled apart into two opposing camps over the hundred years beginning in 1750, in consequence of the intrinsically disruptive forces of rapid, market-orientated economic growth.[9] By the 1830s and 1840s a marked social and political polarisation between the propertied middle class and the property-less working-class had clearly emerged. As the era's most acute and rigorous observer, Marx deduced that the source of this polarisation lay in the exploitative logic of the capitalist system of production. What he did not anticipate, however, was that the ensuing century would then witness a very gradual, but by no means uneventful, process of negotiated socio-political incorporation of the interests of labour by the state. The net effect of this was that by the third quarter of the twentieth century, social and associated demographic divisions within the nation, although not entirely removed, had been reduced significantly. This was not a smooth linear process and it is certainly arguable, for instance, that the General Strike of 1926 and the Jarrow March of 1936 indicate that the inter-war decades were as fraught with class conflict as any period of British history. Nevertheless the latter protests took place within the context of a constitutionally recognised, organised labour movement. One generation later, with the election of the post-war Attlee government, this movement had succeeded in democratically 'capturing' direction of the state apparatus itself and committed the nation to becoming a comprehensive welfare state, thereby bringing the capacities and entitlements of full citizenship to the great majority of the population.[10]

In order to appreciate the nature and timing of the earlier bifurcation within the new industrial society, it has to be realised that in eighteenth-century Britain the manufacturing interest, whether employer, merchant, artisan or wage-labourer, was a relatively united one. There was a precarious social and political alliance between these various manufacturing interests, the self-styled 'productive classes' of Britain's northern and midland towns. They were united by their lack of political voice in a constitution run by the aristocratic, Anglican, landed, predominantly southern Establishment, castigated as 'unproductive' *rentiers*. By the 1820s there had been literally decades of pressure to have industrial and commercial interests directly represented in Parliament and to have the glaring inequities of the electoral system reformed. When this radical, nonconformist, liberal reform movement emerged from the era of the patriotic wars against France still stronger and more insistent than ever, the landed Establishment finally decided to make its peace. Having removed the constitutional disabilities on Dissenters in 1828 and Roman Catholics in 1829 the landed elite proceeded, in 1832, to enfranchise the most powerful segment of the urban productive classes: the property-owning commercial and industrial bourgeoisie.

The Great Reform Act of 1832 was a brilliant 'divide and rule' device, which deftly terminated the precarious 'urban alliance' of masters and men. It formally demarcated the propertied middle classes from the property-less working-classes and endowed each with a distinct constitutional character, thereby allowing the division of economic interests between these two agents, always there *in potentia*, to come fully into play. The manifest political and social fissures which then rapidly opened up between the 'two nations', as decried by Disraeli at the time, was due to the harsh economic realities of the new economic system of capital accumulation. Income and wealth inequality had already widened during the last third of the eighteenth century and would continue to do so throughout the first two-thirds of the nineteenth century.[11] With the 1832 Reform Act the division of economic interest became both politically and socially obvious. Class polarisation in the growing industrial, urban centres manifested itself in the growing spatial segregation between the two groups over the same period, brought about principally by the commercial middle classes' flight to the suburbs. This effectively curtailed the possibility of informal, residential civic interaction between the two groups, and contact became increasingly restricted to more formal or functional exchanges such as those between tradesmen and their clients, between charity recipients and providers of philanthropy or via local officials such as the police.

As the two principal emerging social groups in a novel industrial, urban world, the middle and the working-classes both faced a search for a stable and viable class identity with which to define their goals and purposes in life. The middle classes were unsure of their new-found, elevated status, uncertain of the acceptability of their social credentials in the eyes of the traditional, landed elite, who had so recently been their political foe. Often precariously dependent on their commercial income-earning abilities, they were also less secure than the *rentier* elite in the scale and nature of their personal resources. Given these worries the nineteenth-century middle classes were anxious to separate themselves as clearly as possible from the un-enfranchised common urban working man and woman. As well as using their superior incomes to move to the desirable 'suburbs', and to spend ostentatiously in order to signal their distinction via the possession of the 'paraphernalia of gentility', to use J. A. Banks' term, they subscribed to a culturally distinctive form of 'respectable' family life and socialisation for their children.[12] This involved the evolution of ideal conjugal, parental and child roles, the specifically gendered definitions of which are now recognised as the quintessentially 'Victorian' code of 'separate spheres'.[13] The male virtues of activism, foresight, commercial or professional acumen, self-control and financial independence were extolled and the reciprocal female graces of passivity, chastity, household economy, spiritual, Christian elevation and moral nurturing were lauded. Exponents of this ideology devoted great attention to avoiding a mismatch between financial resources and the burdens involved in raising a large family.[14]

The working-classes, on the other hand, faced a quite different context and predicament. They knew themselves to be explicitly politically excluded and formally oppressed, despite their growing numbers and importance to the national economy. Both the 1830s and 1840s saw a whole series of bitter protests, which produced some tactical concessions from the governing alliance of land and capital but no move towards the manhood suffrage demanded by the working-class Chartists.[15] On a day-to-day basis, survival, avoidance of the Poor Law and the maintenance of financial independence across the lifecycle provided the main aim of the 'respectable' working man and his family. As a result standards of decorum, dress and material consumption tended to be socially conservative and locally circumscribed within proletarian communities. There was enormous geographical variability in the character of such plebeian communities according to their specific *mores*, many of which depended on the unique configuration in any specific town of the locally available survival resources, notably the conditions and practices of work that could be had by different members of the family and the relative success of trade union policies, if any, in the locally dominant industries.[16]

The polarisation between the two principal urban classes peaked in the second quarter of the nineteenth century, as is so evident in the contemporary literature, of all political persuasions from Disraeli and Shaftesbury through Chadwick and Farr, to Dickens, Gaskell or Engels. These deep divisions in society and culture only began to attenuate – initially very gradually indeed – over the last third of the nineteenth century. This process of reintegration was underpinned by two separate developments, one ideological and political, the other socio-economic and structural. First, there was a perceptible shift within the dominant paradigm of liberal thought from the late 1860s onwards away from uncritical endorsement of the tenets of classical *laissez-faire* economic individualism. This shift only finally produced a political programme at the highest levels early in the next century when the so-called New Liberals introduced a raft of centrally funded and centrally administered social welfare reforms such as pensions and workers' health and disability insurance. However, long before the final conversion of Cabinet and Whitehall to these principles, the municipal governments of the country's leading cities had been implementing an ever-widening range of collectivist policies designed to alleviate the social and environmental costs of industrialism for the urban working-class. The 'civic gospel' originated in Birmingham in the late 1860s and spread to all major industrial centres over the next three decades. Representing the response of a new generation of urban patricians to the dangers of urban squalor, poverty and the inexorably mounting claims of the working-class to some voice in urban affairs, it was derided by its detractors as 'municipal socialism' and often opposed in its aims by ratepayers' associations.[17] Nevertheless, the result was a much enhanced proclivity on the part of the urban propertied classes to go well beyond earlier moralising and piecemeal philanthropic initiatives and to countenance systematically taxing themselves significantly more, both directly and indirectly, in order to fund a range of environmental and health improvements which disproportionately benefited the lives of the poor.

The second, contemporaneous development was the numerical rise of the white collar, lower middle classes in a maturing economy of large-scale public and private enterprise. In an increasingly wealthy and ever more service-orientated economy, professional and commercial sources of employment both continued to increase slightly more than the general increase in the workforce; but there was even more disproportionate growth in employment for both the classic elements of the lower middle classes: clerks and shop assistants.[18] Demand for the former was expanding by virtue of both the increased scale of firms and the domestic and global rising demand for services, while the 'retailing revolution' accompanied the significant rise in real wages and in the standard of living of the majority of the population, which characterised much of the second half of the nineteenth century.[19] The Education Acts of the 1870s and 1880s meant that there were increasing numbers of working-class children with the literacy and numeracy skills required to fill the posts offered. The proportionate size of the middle classes, if widely defined as those in non-manual trades, was further swollen by the growing armies of secretaries, teachers, postmen, policemen and petty officials. An additional factor to be borne in mind is the altering gender balance within this sector of the economy. In 1851, for example, there were 91,000 men but fewer than 2,000 women in 'commercial' occupations. By 1911 this had risen to 739,000 men and 157,000 women.[20]

The late Victorian and Edwardian expansion of the lower middle class was a particular phenomenon in London and the Home Counties, although most of the largest provincial cities also experienced the trend. There was both a burgeoning of the small, existing genteel districts and their fringes and a strong demand from the various ranks of the ever increasing middle classes for the construction and expansion of new respectable suburbs, as the histories of both Walthamstow and Pinner testify. As a result, there was a significant geographical and demographic increase in the proportion of the population residing in aspirational 'middle-class' and mixed communities, with compositional consequences for demographic trends both at the regional and at the national level.

The marked regional pattern, whereby 'middle-class' jobs and communities expanded disproportionately in the south and south-east of the country was also independently exacerbated by the reciprocal trends occurring in the North and in South Wales, where, outside the very largest commercial centres, such as Manchester and Leeds, communities and regions became, if anything, increasingly dependent on heavy industry, providing ever more relatively well-paid but male-only proletarian employment right through the period down to the Great War. By 1911 there were about 1½ million men in iron and steel, metal-making, engineering and shipbuilding and a further million males in mining. In combination this came to more than one-fifth of the entire male workforce above age 10; substantially more than all white collar males at that time who, despite the rapid growth since the 1860s described above and taking the category at its widest definition, numbered only about 2 million.[21] Across the period 1841–1911 we have relatively detailed employment information from the census. Brian Mitchell's analysis shows that the three 'middle-class' categories of

Administration, the Professions and Commerce together more than doubled their proportionate share in the nation's total workforce from about 5 per cent to about 12 per cent.[22] Furthermore, this disproportionate growth is clearly concentrated into the period after the 1861 census. Textiles, by contrast, peaked early, with almost 14 per cent of the workforce at the 1851 census and falling back to 8 per cent by 1911. The large and male-dominated sectors of Mining and Metals each doubled their share of the national workforce while that of Transport tripled. Together the three accounted for 12 per cent of the workforce in 1841 but, growing steadily, they represented 26 per cent by 1911. Agriculture, of course, shrank dramatically, from 22 per cent to 8.5 per cent over the same period. However, the other major 'traditional' sector, Domestic Service, held on to its extremely low-paid and predominantly female workforce throughout the period, with numbers dwindling so gradually that they still accounted for 14 per cent of the workforce in 1911.[23]

The somewhat surprising resilience in the large numbers of domestics employed in the British economy was, of course, intimately related to the household expenditure and lifestyle patterns of the expanding middle classes, a point underlined by the southern concentration of work in domestic service. According to the 1911 census, 52 per cent of English and Welsh men in the Professions, 59 per cent of those in Government, 52 per cent of those in Service and 35 per cent of those in Commerce lived in the three southernmost census divisions: London, South East and South Midlands, which between them contained only 29 per cent of the population.[24] These three divisions also contained 49 per cent of the nation's female domestic servants as well as 67 per cent of all women employed in Commerce. By contrast the four northern divisions (North Midlands, Lancashire and Cheshire, Yorkshire, the North), along with the South Wales division, between them contained only 20 per cent of males in Government, 25 per cent of those in the Professions and 21 per cent in Service, despite representing 43 per cent of the 1911 population. In contrast to the South Commerce was, proportionately, poorly represented in the five divisions of the North; the latter held only 35 per cent of all males and a paltry 14 per cent of all females who worked in this sector. They also contained only 25 per cent of the nation's female domestic servants, but included almost 90 per cent of all miners, over 90 per cent of all textiles operatives and 44 per cent of those in the Metal sector.[25]

Secular trends in fertility, nuptiality and mortality across the two centuries post 1750 thus need to be interpreted with the backdrop of an historical drama of class conflict, class formation and then gradual *rapprochement* held firmly in mind. *Ceteris paribus*, it would be predicted that as the urban middle and working-classes disengaged over the first hundred years so their demography would also diverge; and *vice versa* over the ensuing century of gradual reintegration after the 1860s. Furthermore, there were also powerful geographical and regional dimensions to Britain's evolving class system, which need to be recognised. Sources of large-scale industrial employment became extremely diverse across the nineteenth century, with many communities and whole regions in the North, in South Wales and in the West Midlands reliant on distinctive local industries, creating diverse demographic regimes. There was also a massive regional imbalance in the creation of the more comfortable middle class, and lower-middle-class service sector sources of employment for both sexes. This occurred predominantly in the South, centred on the imperial and global financial capital, endowing the Home Counties with their own distinctively genteel, regional demographic regime.

The next two sections will attempt to explore further the possible advantages of interpreting secular demographic change from this perspective, by suggesting that such a socio-geographical 'compositional' interpretation of demographic change can throw new light on the nature of mortality and reproductive change during the nineteenth century.

7.3 Mortality in the nineteenth century from a compositional perspective

Historical demographers of Victorian Britain have been challenged to account for the fact that although the early stages of industrialisation from about 1740 until the 1810s were accompanied by a secular decline in mortality, in the second and third quarters of the nineteenth century this trend came to a halt. Despite both a strong general relationship in the long term between economic growth, rising living standards and falling mortality and the fact that the British economy was growing as never before during the mid-nineteenth century, after the 1810s there would be little further improvement in the nation's health until the last quarter of the century.[26]

Looking first at health in general terms, Szreter and Mooney have shown that, while it is highly likely that the eighteenth-century trajectory of improving health was continuing for the rural section of the population throughout the nineteenth century, there was a demonstrable deterioration in the mortality experience of the fastest growing section of the population – the urban industrial working-class – during the second quarter of the nineteenth century, with little in the way of significant improvement until the 1870s and 1880s.[27] As we might predict from our findings on child and infant mortality, Szreter and Mooney's figures indicate that among the 24 largest provincial cities, it was the less industrial, predominantly southern towns which experienced least deterioration in their health prospects; and that the outer suburbs of all big cities – predominantly white collar environments – tended to be much healthier than the central areas. The stable pattern of national average mortality for several decades across the middle of the nineteenth century therefore masks widely divergent environmental experiences, compounded by compositional shifts in the proportion of the nation residing in the very different environments. Urbanisation *per se* was not inherently lethal, but during the second and third quarters of the nineteenth century urban growth was strongest amongst the most heavily industrial, proletarian centres and it was their hazardous environments which acted to bring improvements in national life expectancy to a standstill for two generations at precisely the point when the nation's per capita economic growth rate was rising to new and unprecedented levels.

Thus, the four environmental categories which the analysis in chapter 4 demonstrated to be so influential in explaining mortality differentials among the young during the period 1891–1911 probably reflect important compositional influences of several generations' standing, which originally emerged in Britain during the first half of the nineteenth century through the formative and regionally uneven process of class conflict and residential polarisation described in the previous section. Rural communities, southern market towns and the more socially exclusive suburbs on the outskirts of large cities had probably become at that point the healthiest places to live and remained so throughout much of the nineteenth century. The most heavily industrial towns and big city centres of the North and the Midlands were at the opposite end of any salubrity scale, as still reflected at the end of the century in the demography of the SI category of environment. Between these two extremes lay the residual of towns and cities with a more mixed and less relentlessly industrial economic complexion.

As the different classes became increasingly entrenched in their own environmentally segregated enclaves the widening gap in their ability to protect their children from hazards to their health had become increasingly obvious. The middle classes could rear their children amidst clean, leafy streets, privately paying for their own efficient and hygienic refuse disposal and for the most up-to-date medical advice and attention. Their education allowed them to learn about and disseminate new knowledge concerning health and hygiene. The bulk of the working-classes, in contrast, had insufficient income to purchase their own hygienic and spacious homes and, by contrast, lived in overcrowded communities governed by councils who lacked the spending power and the necessary political drive to improve the physical surroundings of their constituents. Access to medical practitioners was restricted because the only alternative to paying the crippling fees charged was resort to the Poor Law's medical services, which carried the formal stigma of pauperism until the Medical Relief (Disqualification Removal) Act of 1885; thus, little contact was possible with those *au fait* with the latest health practices.[28] Even if certain items of knowledge were widespread, the infrastructure of the areas inhabited by the less well off, and the paucity of resources available to them, often prevented the implementation of prophylactic hygiene practices.

In the second half of the century the trajectory of infant mortality stalwartly refused to budge from its high plateau, diverging significantly from that of early childhood which began to decline in the last three decades of the century.[29] In chapter 4 the suggestion was made that mortality in the first year of life and that between the first and fifth birthdays were responsive to different elements of the environment.[30] For infants, long durations of breast-feeding would have protected them from a large proportion of the hazards which would otherwise have been introduced by deficiencies in the environment, such as poor sanitation or inadequate water supply.[31] Only on weaning would such dangers begin to exact their greatest toll. Amongst older children, however, other aspects of the physical environment would have exerted an influence: both the infectiousness and severity of diseases such as measles and whooping cough are known to be particularly sensitive to overcrowding, for example.[32] However, if breast-fed infants were less susceptible to exposure, they were more at the mercy of the knowledge and practices of their mothers and others caring for them. Levels of information and knowledge, probably a key to the health of younger infants, undoubtedly differed between environments. Where knowledge of the pathways of transmission of diseases was lacking and where the provision of local facilities was inadequate there was little individual mothers could do to improve their children's prospects of survival.

With the gradual emergence of the civic gospel and ultimately municipal socialism in the last third of the nineteenth century, environmental and health improvements were eventually wrought in many of the country's poorest districts, a development which would have had the most positive effect amongst those most susceptible to infectious diseases – the 1 to 5 year olds. That infant mortality did not enjoy a similar decline may be connected to the difficulty in transmitting information about child care, health and hygiene across environments or between communities until the advent of the mother and child welfare movement opened channels of communication via domiciliary health visitors, clinics and related services. It is also the case that even after Chamberlain's energetic launch of the campaign for municipal improvement in Birmingham in the early 1870s, it took anything up to two or three further decades before Britain's ratepayers in other towns all around the country could be cajoled into raising the very substantial amounts of revenue needed to improve their cities' environments. Preventive public health spending did not hit its peak in Britain's industrial towns and cities until the 1890s and 1900s, meaning that many working-class homes had to wait until these decades before they acquired basic sanitary facilities.[33]

Compositional factors were, however, also at work to prevent the early decline of infant mortality levels. As Woods first pointed out, the growth of large urban areas played a large part in keeping infant mortality high at the end of the nineteenth century.[34] In part this was due to the proportionate decline in the population enjoying a relatively healthy, rural existence. Teasing out different environmental aspects of the urban districts has, however, made it clear that the continued growth of centres of heavy industry, such as mining towns, did nothing to diminish the risk run by the average child of encountering a health hazard which might prove lethal. In addition, with fertility remaining high in such communities into the twentieth century, high-parity births, always at greater risk of infant death, were being born in increasing proportions into areas characterised by insalubrious industry. Such reasoning suggests that fertility reduction may well have accelerated the decline in the national level of infant mortality seen after the Boer War. The decline in British fertility could not, however, have been engendered by a greater ability of the nation's parents to keep their newly born offspring alive.

Thus, thinking in terms of compositional demography helps to make sense of the non-linear relationship between economic growth and mortality change in modern British history. With the most heavily industrial and urban proletarian communities of the northern staple industries growing most strongly during the second and third quarters of the nineteenth century, the unhealthiness of their residential environments, indexed by particularly high infant and child mortality, was sufficient, despite continued health improvements in other less industrial environments, to bring the population's overall, aggregate health improvements to a standstill for two generations at precisely the point when the nation's per capita growth rate was rising to new and unprecedented levels.

What, then, can the compositional perspective offer us when applied to the reproductive enigma of Britain's 'late' fertility decline?

7.4 Decomposing fertility and reproduction

Demographers have always considered it intriguing, given the highly general association between rising living standards and falling fertility that has been observed in most developing countries during the last century and a half, that marital fertility in England and Wales remained so high for so long during and even after the initial era of rapidly rising prosperity and economic growth, in the century following 1750.

As conventionally told, using such measures as the number of births per thousand head of population (the Crude Birth Rate, or CBR), or the number of children born per married couple (the Total Marital Fertility Rate, or TMFR), the story of fertility decline in nineteenth century England and Wales does not appear to begin until well after mid-century. As Figure 1.1.1 demonstrated, the Crude Birth Rate rose to a peak in the late-1870s and then fell precipitously. The beginning of the 'fertility transition' is thus usually dated to 1876–7, and tied to the trial of the two neo-Malthusian birth control propagandists, Charles Bradlaugh and Annie Besant, which came to court at that time.

If, however, the story of 'fertility transition' is told using measures of *reproduction*, the number of daughters born per woman, such as the Gross Reproduction Rate or GRR, then a rather different picture emerges. Figure 7.4.1 shows that reproduction had been declining since just after the beginning of the nineteenth century, although it experienced a marked hiatus, even a possible reversal, over the 1850s and 1860s. In 1816, just after the Napoleonic wars, according to Schofield, the English and Welsh GRR reached its apogee with each woman producing 3.06 daughters. Such high levels of reproduction were possible because the mean age of marriage for women was very low, at approximately 22.5 years; in addition, virtually nine in every ten women married before their forty-fifth birthday; an exceedingly low level of celibacy within the historical British context.[35] The 1816 peak in GRR was the culmination of an uninterrupted century and a half of rising overall fertility. Schofield has shown that over the course of the seventeenth century age at marriage in England had been fairly late, at well over 25 years, but the proportions of women getting married varied considerably, reaching a nadir in 1641 when more than one woman in five remained unmarried in her early forties. In contrast, by the early eighteenth century proportions of women marrying had risen to a high plateau level and the rest of the century, particularly the latter half, was

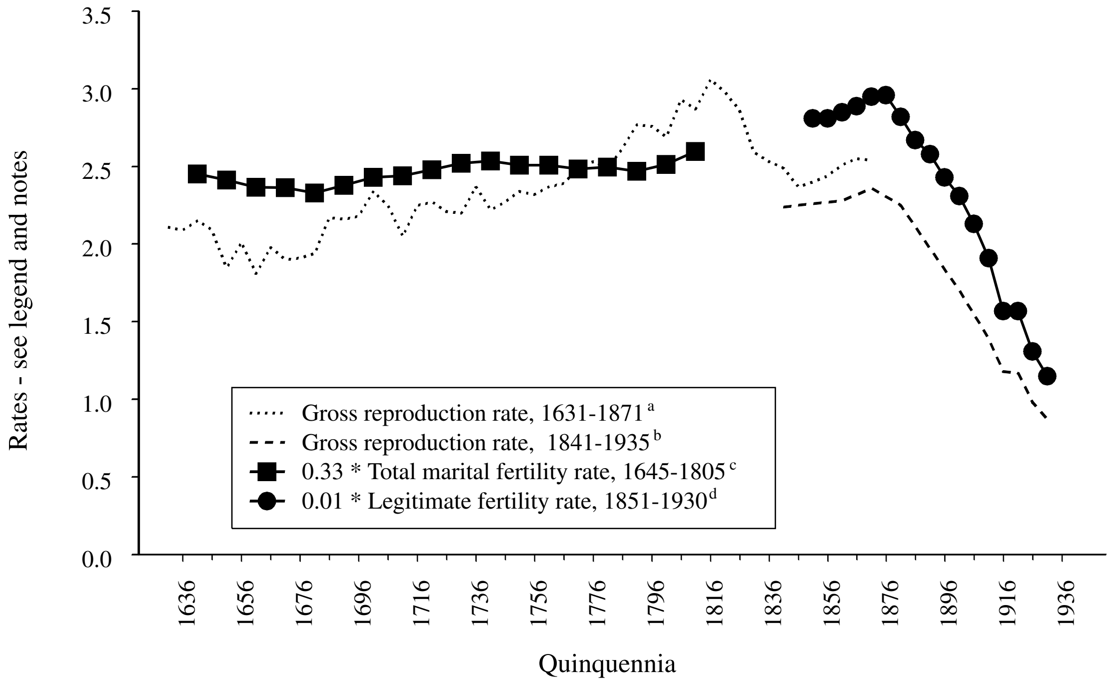


Fig. 7.4.1 Trends in gross reproduction and marital fertility, England and Wales, 1631–1935. *Notes:* a. Figures shown are for quinquennia. The Gross Reproduction Rate is measured as 'daughters per woman'. b. Figures shown are for alternate quinquennia. c. Figures shown are for decades, calculated as five-decade moving averages. The Total Marital Fertility Rate is measured as 'number of children per married woman'. d. Figures shown are for quinquennia. The Legitimate Fertility Rate is measured as 'number of legitimate births per thousand married woman'. *Sources:* a. Wrigley and Schofield (1981), Table 7.15; b. and d. OPCS (1987), Table 1.4; c. Wrigley *et al.* (1997), Table 7.37.

characterised by a decrease in the average age of brides. However, over the quarter-century following the brief post-Napoleonic war baby-boom, the average age at marriage for both men and women rose again by virtually three years; by 1841 female age at marriage stood once more at about 25.5 years.

Schofield's outline of events comes to a close in 1841, unfortunately just before the noticeable break in the downward trend in GRR depicted in Figure 7.4.1, and it is necessary to turn to other sources and measures to follow the story further into the nineteenth century. Wilson and Woods, using the Princeton fertility indices I_f (overall fertility), I_g (marital fertility) and I_m (proportion married) suggest that there was very little change in any of the indices between the second and third quarters of the century; nuptiality and fertility remained virtually constant.[36] By the fourth quarter of the century, however, the index of marital fertility had begun its inexorable decline.

This chronology of events has generally been interpreted as showing the dominance of nuptiality in governing levels of overall fertility until the final quarter of the nineteenth century.[37] The fall in fertility in the early nineteenth century has been viewed, notably by Wrigley and Schofield, as the 'normal' reaction, in terms of a pre-industrial homeostatic demographic regime, of an early-modern population beset by economic difficulties. Following the prosperous early stages of industrialisation, large scale technological redundancy, particularly amongst northern handloom weavers, and an increasingly strict Poor Law regime in the South meant that large proportions of the labouring poor were once again being encouraged to practice prudential marriage.[38] Such encouragement has often been depicted as a societal level phenomenon, unconsciously followed by individual couples but effectively reducing overall levels of fertility.[39] Such 'traditional' behaviour has been placed in strict contrast to that of the post-1870 era and the emergence of 'modern', conscious, parity-specific control of marital fertility.

When the population of England and Wales is viewed in this way as essentially homeostatic right down to the 1870s, then the key to understanding the demographic transition lies in the factor, or factors, which conspired at the end of the nineteenth century to break the oscillating, nuptiality-driven cycle. The nature of these factors remains an unresolved enigma, despite the best efforts of the demographic historians. It may therefore be that attention should be refocused to the start of the century when, in the wake of the Napoleonic war, the nation left behind a century and a half of increasing reproduction to become increasingly anti-reproductive.

It has often been remarked that the non-industrialised French population began to limit their marital fertility during the late eighteenth century, yet the English, 'the first industrial nation', along with many other European populations did not limit theirs until the 1870s. If, however, *reproduction* rather than fertility is considered, then England experienced a down-turn much closer in time to her cross-channel neighbour. The English appear to have had little need to resort to fertility control within marriage during the first half of the nineteenth century because of the substantial scope available for fertility reduction through postponing marriage; over the 25 years between 1816 and 1841 the national Gross Reproduction Rate dropped by 30 per cent as a result of reduced nuptiality.

The chronological demarcation between 'traditional' and 'modern' fertility regulation practices is made on the grounds that the forms of behaviour typical to each era appear so distinct. However, such a view fails to consider the possibility that different practices at different times may have been undertaken for essentially similar kinds of motivation. Choosing to marry later may have been as conscious an act as choosing to use a particular method of contraception. Szreter has argued that the different paths to low fertility taken by France and England may be related more to their very different conjugal and sexual cultures, rather than to differences in motivation.[40]

Can it be argued, however, that postponement of marriage was a 'conscious choice' by individual English couples and thus equivalent to the fertility regulation being practised by their cross-channel neighbours? The evidence is somewhat circumstantial. If we begin from the premise that early-modern England had a homeostatic demographic regime, experienced by the predominately rural society as an unconscious impersonal socio-economic control on access to marriage, certain groups within that society can, nevertheless, be observed going against the pronounced general trends in nuptiality. For example, in the seventeenth century the lower ranks of the peerage, and the more substantial tradesmen in London tended to marry off their daughters considerably younger than average but their sons slightly older than the norm, creating a characteristically larger age gap between spouses than that found among the rest of the population.[41] Amongst urban Quakers at this time, however, both sexes married extremely late, and non-urban Quakers a little later than the national average.[42] Over the ensuing century and a half non-urban Quakers delayed marriage more and more, quite contrary to the national trend, so that by the first half of the nineteenth century all Quakers were marrying remarkably late. Unfortunately, although drawn predominately from the 'middling sort', the Quakers cannot be taken as truly representative of the middle classes. Nevertheless, these examples indicate that the 'late marriage regime', first identified by Hajnal, was not the uniform institution it may at first appear. Particular social groups displayed different, but undoubtedly conscious, appreciation of the importance of marriage timing to their management of the perceived costs of family formation and thus to any bid to avoid prejudicing social status aspirations and material living standards. This carefully calculating approach to marriage is also reflected, recent research suggests, in the behaviour of certain representatives of the governing classes, such as Poor Law administrators, who were making conscious efforts to manipulate and influence the marriage opportunities of the very poor throughout the early-modern period.[43]

The marked secular fall in the national average age at marriage during the second half of the eighteenth century must, thus, have been a particularly plebeian phenomenon, marking an historic crossover in the social differentials characterising nuptiality behaviour. By the beginning of the nineteenth century the common people, including even those of relatively modest means, were generally marrying much younger than the propertied classes. For the people of the time this would have been an unprecedented development and, no doubt, formed an important part of the context in which Malthus wrote his famous *Essay* as a contribution to the heated contemporary debate being conducted over the prolific poor and the Poor Laws.[44] Across the ensuing half-century late marriage, coupled with a high chance of remaining unmarried, became the established norm for the propertied upper and middle classes, particularly their menfolk. The pattern of the social incidence of celibacy established over the two centuries prior to 1750 was thus reversed.

Hampered by the nature of the nineteenth-century demographic sources available to them, by their preoccupation with the retrospective search for the origins of 'modern' parity-specific fertility control, and by their too exclusive focus on *female* marriage age only, demographic historians have largely missed the significance of this historic change in the reproductive behaviour of the bourgeoisie. Only the Bankses, in their historical sociological approach to declining fertility, have given postponed marriage among the bourgeoisie the prominence it merits.[45] In an age which did not use credit or even mortgages to any great extent, for many Victorian would-be gentlemen postponing marriage until one's late twenties and thirties was the only respectable mechanism available to defray the inevitable expenses of running the marital home. It was an effective tactic which could crucially alter the balance of timing between one's income earning trajectory and the incidence of familial outgoings, thereby reducing the relative costs of child rearing. Indeed, significant middle-class institutions, such as banks, had formal rules prohibiting their young employees from marriage before reaching a certain stage of seniority and associated income level, institutionalising and making quite explicit the calculation that it was reckless to take on familial responsibilities too early in one's career.[46] Careful and conscious evaluation of the relative costs of child rearing was thus being systematically practised, and behaviour adjusted accordingly, by certain better off sections of British society long before this same group took to the systematic use of appliance methods of contraception. The notion of 'too many children' was firmly established decades before any concept of 'ideal family size' emerged. Indeed, the propertied class effectively enshrined the concept in the philosophy underpinning the New Poor Law of 1834, in order to impress it upon the labouring poor.

Further evidence that the late-marrying bourgeoisie were operating with a distinct demographic regime from the rest of the population by the second quarter of the nineteenth century comes from the different relationship between marriage and short-term real wage fluctuations among the two segments of society found at that time by William Farr. He showed that the propensity to marriage among the proletarian sectors of society remained highly sensitive to annual real wage fluctuations in the first half of the nineteenth century, in a way that that of the bourgeoisie did not.[47] However, since the middle classes remained a relatively small section of society, the nation's aggregate nuptiality trends across this period reflected the fortunes of the working-classes, falling dramatically when the rural and urban working-classes encountered hard times in the three post-Napoleonic war decades, but seeing something of a revival during the mid-Victorian boom in factory expansion when marriage ages ceased to rise, or even fell slightly.[48]

The year 1876 should not, we would thus argue, be taken as a chronological marker either of the emergence of novel ideas or attitudes concerning family size, or of the advent of new methods of birth control. Indeed, Szreter has seriously questioned the extent to which there is any plausible evidence that there was any dramatic social change or cultural innovation in the widespread use of appliance methods of birth control before the inter-war decades of the next century. He has pointed out that careful scrutiny of the available quantitative, qualitative and survey evidence all indicates that 'traditional', non-appliance techniques of birth control, involving attempted abstinence, *coitus interruptus* and abortion, were the main methods of birth control used before the Great War.[49] There may well be more in the way of continuities and gradualism in the history of reproductive change during the two centuries, 1750–1950, than has previously been assumed to have been the case.

It has, for instance, been underemphasised that the late-marriage regime of the entire early-modern period entailed systematic sexual restraint with intended partners before marriage and that a sexual culture of this sort might lend itself to restraint after marriage, if and when the need arose. Certainly the early-modern pattern (before the late eighteenth century when illegitimacy temporarily increased) of universal, relatively late marriage with a low illegitimacy rate indicates a population of young adults systematically abstaining from sexual intercourse for long periods before marriage, and almost always marrying wherever pre-marital intercourse did lead to pregnancy.[50] Given the institution of late marriage itself, relatively low survivorship of children, and, especially, the role of service and apprenticeship as highly effective forms of *ex post facto* family planning, there was probably little need among the labouring poor to return to such abstinence after marriage.[51]

England had thus long fostered a culture which was generally conducive towards sexual restraint among young adults and which encouraged an ethos of 'self-control' in sexual matters.[52] Although by no means monolithic and no doubt always subject to periods of negotiation and 'liberalism', this culture manifested itself, in a series of well-documented, pronounced bouts of Puritan concern with 'the reformation of manners' designed to promote sexual propriety.[53] The last of these began around 1780, possibly as a response on the part of its proponents to the novelty of a relative absence of sexually abstemious social values which they perceived around them. Such novel licence can certainly be conjectured from the trends of both legitimate and illegitimate fertility levels for the mid- to late eighteenth century. The early-nineteenth-century evangelists calling for a reformation of manners were, thus, working within a culture and appealing to a population deeply familiar with the centuries-old ideology of restraint and with the concepts and practices required for 'controlled fertility', without evident resort to mechanical means of 'birth control'.[54] Mason's research has shown that by the second third of the nineteenth century the codes of 'anti-sensualism' and self-control had become popularly endorsed in both genteel *and* plebeian moral codes.[55]

Such an interpretation is, in general, supported by a number of recent studies of changing sexual codes of behaviour across the eighteenth and nineteenth centuries.[56] That there were parallel value changes in gendered familial roles and ideals is further suggested by Gillis, who argues that in the late eighteenth century women were seen as 'breeders'; the value of a wife was judged by the number of children she bore rather than by the number and quality of those who survived. By the late nineteenth century, however, women were judged by their ability to 'mother' or rear children, and it was no longer quantity which counted.[57] Whether such changes in attitudes and beliefs resulted from, or resulted in, the more quantifiable changes in English reproduction over the course of the nineteenth century remains an intriguing question.[58]

Thus, adoption of the compositional perspective and its sensitivity to the demographic differences opening up between the middle and working-classes across the century 1750–1850 indicates that at least one important section of British society, the property-owning bourgeoisie, may have become committed to a regime of relatively tight and conscious control over the costs of child rearing much earlier than previously supposed. What is rather less clear, however, is the extent to which 'prudential marriage' was a path chosen by the labouring classes in the first half of the century, or foisted upon them by the economic circumstances of the time. The great fall in GRR in the post-Napoleonic decades indicates that most strata within society were less inclined to marry. However in the prosperous years after 1846, the disproportionately growing numbers filling the industrial towns and cities of the North and the Midlands once again embraced slightly earlier marriage and consequently higher marital fertility for a further generation, effectively obscuring what may have been a trend towards decreasing reproduction and certainly obscuring the permanent nature of the shift to very late marriage on the part of the bourgeoisie. The question therefore remains as to whether the urban, proletarian decrease in nuptiality, 1816–46, was an unconscious, homeostatic response to temporarily deteriorating economic conditions in the classic mode of operation of the pre-industrial regime expounded by Wrigley and Schofield, or whether couples throughout the nation shifted permanently towards later marriage though subsequently relaxing slightly during the mid-Victorian boom. Whichever of these interpretations is correct it is nevertheless also clear that something further of great significance happened during the last quarter of the century so that once again even greater control over marital fertility became a high priority for ever larger sections of the population. That the 'working-classes' were not one amorphous mass, but many communities, each with its own fluctuating local economy and *mores*, goes a considerable way to explaining why different sections of the national population took different paths, at different rates of progress, to smaller family sizes. The changing composition of the population may well have obscured the true chronology of developments, however, as may a preoccupation with 'fertility' as opposed to 'reproduction'.

7.5 Conclusions

The findings in this volume, by contributing to the re-evaluation of our understanding of demographic change in the nineteenth century, carry implications for the long-standing model of demographic transition. The idea of demographic transition has enjoyed a remarkably long career within the social sciences and has been variously interpreted as a theory, model or descriptive generalisation. Its most fundamental, core idea, regardless of these various manifestations and usages by different authors, is that there is some kind of important, determinate linkage and transmission mechanism between economic growth and both mortality and fertility change. It asserts that this is something visible in the historical record across a wide range of national populations and that the investigation of this international phenomenon constitutes the primary subject for modern demographic research. As discussed in chapter 1, the influential idea of demographic transition has been under increasingly critical review, though it certainly still has its proponents and its terminology persists in the literature.[59]

The original version of the theory posited a pair of strong causal links: first with economic growth reducing mortality; and second, with rising survivorship of infants feeding through into reduced fertility. Although previous research has failed to uphold such a picture, as recently as 1995 Williams and Galley have speculated that there may be a sense in which an original phase of infant mortality decline can be traced to the 1860s, and they appeared to be mooting the possibility of resuscitating the demographic transition thesis of a prior fall in infant mortality triggering a subsequent fall in fertility as an interpretation of Britain's nineteenth century demographic history.[60]

Some empirical evaluation of the possibility of a link between fertility and mortality among the young was undertaken in chapter 4. This showed that there was an association visible in some White Collar areas, in that they exhibited both low fertility and low mortality among the young. But in general there was great variability in the relationship between fertility and mortality among the different environments, supporting the notion of multiple demographic regimes. Of course, it is possible that a relationship between fertility and mortality does exist, but in a different guise from that implied by the demographic transition approach. The association could follow from both mortality and fertility being jointly influenced by a third factor or set of forces, rather than there being a direct relationship between the two. The third factor involved may not have been the same across space or time. For example, a possible important part of the explanation for the low fertility of, on the one hand, the middle classes and the middle-class environments, predominantly located in the south of the country, and, on the other hand, the mill town communities in the north, may have been that in both cases there was a recognised premium laid by the men in the community on maintaining the health of wives and women in general. In the case of the genteel classes this may have reflected a general health consciousness, which had become extremely pronounced in the age of stinks and cholera. The general health consciousness in genteel areas resulted in a simultaneous association with relatively low infant and child mortality. In the mill towns, however the premium on female health may have arisen from the combination of the low wages of many male operatives and the relatively high potential for an income-earning contribution from work in the factories on the part of healthy, active wives. In such circumstances, and with very little ability to influence their external environment, attempts may have been made to lessen any avoidable risks, such as pregnancy and childbirth, to the health of female members of the community in order to maintain their income-earning capacity. Changes in adult health only, rather than that of infants, may thus have been most closely connected to declining fertility in these mill towns.

The present study has indicated that, while communication communities may well be a helpful way of envisaging the social dimensions of demographic variation within a population, they also had strong geographic and environmental facets to their formation and existence which must be included in any interpretation.[61] The middle classes, while defining themselves with reference to a general or national status hierarchy, nevertheless could, as a group, be as residentially rooted and regionally localised as were the proletarian communication communities in their colliery villages or mill towns. In addition it is clear that the concept of 'communication' should be understood to encompass not just direct, spoken or written exchanges but an element of 'example', 'shared experience', 'local ambience' or 'social environment'. Individuals and couples formed their attitudes towards appropriate family life and monitored their own behaviour with reference to those around them, including both those with whom they worked and, especially, those amongst whom they lived. In residential neighbourhoods with a strong white collar presence, fertility and nuptiality behaviour and the infant and child mortality levels of all residents, even those who were defined as 'working-class' on the basis of their employment, looked very 'middle class'. Conversely, when those in white collar occupations were found as scattered residents within a preponderantly industrial environment, they displayed demographic characteristics closer to the proletarian majority among whom they lived.[62]

Despite espousing middle-class values, the doctors, vicars, lawyers and schoolmistresses living in towns or villages dominated by particular industries were also strongly influenced by the social character and plebeian values of their neighbourhood. Attuned to local values and norms of behaviour, they would have measured their own behaviour against this standard. They no doubt retained a strong sense that they were distinct from and 'superior' to most of those around them, but the point is that the encompassing social reference point for defining their own 'middle-classness' in their everyday environment was plebeian and not genteel.[63] They were not surrounded by a host of like-minded, bourgeois households and neighbours and this means that their middle-classness was different from that which prevailed in the middle-class heartlands of large stretches of the Home Counties and certain exclusive residential suburbs of the major provincial cities, the White Collar social environments which have been identified in this study. The evidence of the reproductive and mortality patterns of such middle-class households located in plebeian environments indicates that they were more similar to their neighbours than they would have cared to acknowledge. While their personal circumstances may have been some protection against the health hazards created by the local environment, they were present in insufficient numbers to be able to provide the wherewithal to remove those hazards entirely from the local environment; and as a result their health profiles, or at least those of their children, looked closer to those of the working-class than to those of the majority of 'the middle class'.

Thus, as has been emphasised in the preceding three chapters, the residential segregation, environmental concentration and regional disparities in the distribution of the different social classes by the end of the nineteenth century exacerbated the differences in fertility and child survival which were simply attributed to 'class' by the official analysts of the 1911 census. The research reported in earlier chapters has attempted to demonstrate the considerable extent to which, in so far as demographic differentials were concerned, 'class' was geography. Hence, the fourfold typology of social environments created here, crude as it necessarily has had to be, has been shown to be a superior statistical discriminator of the demographic differentials in the data from the 1911 census than the official, professional model of 'class'. What the census of that year could not show was how the degree of segregation and relative composition of the environments had altered over time during the preceding century. Indeed, mapping out the fine detail of such changes remains an important research task for the future. A major conclusion to be drawn from this study is that the demographic history of the nineteenth century cannot be properly understood without a full evaluation of this complementary social and spatial history being woven into any interpretation of events. This concluding chapter has argued that such a compositional approach can considerably enhance our understanding of Britain's modern demographic history, as the conventional temporal charts of, first, mortality decline and, second, reproductive change across the Victorian and Edwardian era each take on new contours.

The significance of the kind of awkward, complicated findings that are reported here can be, and frequently have been, ignored by those seeking the Holy Grail of neat, simple answers and accounts of human affairs. This is most easily and frequently done by invoking the intellectually lazy rhetorical device of taking a very long-term and a grandiose, national or even international perspective. For instance, on this basis, it can and has been asserted that 'the fertility decline' is a simple dramatic event. The typical practice of systematic, contraceptive family planning – which had indisputably become a social norm in British society by the end of the second third of the twentieth century – was something quite different from anything that had been practised in Britain during the last third of the eighteenth century. It can then be proclaimed that a 'revolution' must have occurred and so our investigative work and our explanations should simply focus on identifying the nature of the relevant 'revolution' – in *mentalité*, beliefs, attitudes to family life, child rearing or whatever. But this conveniently simplifying fixation on identifying the nature of a single 'revolutionary' change seems singularly inappropriate if in fact we are studying, as has been argued in this final chapter, a complex set of phases and changes in reproduction which probably span well over a century of time. If 1816 is as significant a turning point as 1876, the changes we are studying must have occurred in an extremely gradual, evolutionary manner. There was probably a sequence of contingent stages of change as young adults and spouses in a wide range of different socio-economic environments or communication communities were prompted at different points in time throughout the entire period from the close of the Napoleonic Wars to the outbreak of World War II, to negotiate a series of relatively slight, though cumulatively highly significant, innovations in both beliefs and practices.

Thus, although the changes in the demography of family life which occurred during this period were undoubtedly massive in scale and revolutionary in their still reverberating implications, the processes of change themselves were highly complex, locally fissured and much more gradual and developmental than is suggested by adherence to the metaphor of revolutionary transformation. This metaphor remains essentially a term of description relating to the long-term consequences of demographic change, retrospectively visible at the national level with hindsight. But this can be a rather misleading perspective if the primary aim is to analyse the causal forces involved and the full range of prospective options available to contemporary agents themselves as they continually re-evaluated the changing perceived relative child rearing costs which they faced. They were each living in a particular time and place, strongly influenced by the characteristics and circumstances of their local social environment and by what others did around them.

Notes

1 Greg (1857), p. 633 quoted in Banks (1954), p. 67.
2 Preston and Haines (1991); Haines (1995).
3 The critique is contained in Szreter (1996b). See chapter 1 for references to other recent studies of relevance.
4 Smith, F. B. (1979); Wohl (1983); Woods and Woodward (1984); Szreter (1988); Hamlin (1990); Hardy (1993); Eyler (1997); Szreter (1997); Bell and Millward (1998); Millward and Bell (1998).
5 A point which is also supported on the basis of more extensive data for other textile towns, too, by the analysis reported in *Fertility of Marriage,* Part II (1923), p. cxvii.
6 Feldman (1986, 1994); Marks (1994).
7 Woods (1985); but see Szreter and Mooney (1998) for an empirically based revision of the substantive trends hypothesised by Woods.
8 Law (1967); Woods (1985).
9 Szreter (1997).
10 There is, of course, a vast historiography on the complex history of class relations during the period 1850–1950 and most generalisations are subject to a range of qualifications. For the interpretation offered here, emphasising the extent to which the British state was increasingly involved in regulating industrial relations, gaining the ‘consent’ of the working-classes to the collectively bargained rules of the game and thereby regularising and channelling class conflict within relatively ‘safe’ confines see, in particular, Reid, A. J. (1992); also Davidson (1985); Lowe (1986); Addison (1994). On the importance of the universal social services provided by the welfare state for citizenship, see Marshall, T. H. (1963), ch. 4. On entitlements and capabilities Dreze and Sen (1989), pp. 9–19.
11 Perkin (1969), pp. 135–6, 419; Phelps Brown (1988), chs. 11.1, 14.3–14.4; Hay and Rogers (1997), Fig. 5, p. 225.
12 Banks (1954).
13 Mintz (1983); Davidoff and Hall (1987); Mason (1994a, 1994b); Maynard (1993).

14 Davidoff and Hall (1987).
15 Stedman Jones (1983).
16 For a survey of these divergent industrial opportunities during the second half of the nineteenth century and their influence on the perceived relative costs of child rearing, see Szreter (1996b), pp. 481–513.
17 The classic study of the mid to late Victorian civic gospel remains Hennock (1973); on municipal socialism in London, see Pennybacker (1995); on municipal trading and finance, see Millward and Sheard (1995); Millward and Bell (1998); Bell and Millward (1998).
18 Marsh (1965), ch. 5, esp. Table 34, p. 118.
19 Feinstein (1995) suggests that nineteenth-century real wages may have risen very little until the 1840s at the earliest; a conclusion also indicated by Horrell and Humphries (1995), with their focus on family household income and the varying contributions of women and children. On the retailing revolution see Jeffreys (1954), Mathias (1967).
20 Mitchell (1988), 'Labour Force', Table 2, p. 104; see also Zimmeck (1986).
21 This figure includes professionals, private means, all commercial and clerical workers, all employers and retailers, and male domestic servants. Calculations from 1911 Census of England and Wales (1915), Vol. X, O*ccupations and Industries*, Table 3.
22 The figures are for both sexes combined.
23 Mitchell (1988), 'Labour Force', Table 2, pp. 103–4.
24 Mitchell (1988), 'Population and Vital Statistics', Table 8, pp. 30–4.
25 That the North and South Wales Divisions' share of the Metal sector was approximately proportionate to their population size was somewhat surprising. The Metal industries were found spread across England and Wales and only the single census division of the West Midlands contained a highly disproportionate number of Metal workers: although it contained 10 per cent of the nation's total population it was home to 17 per cent of those employed in metal working.
26 Szreter and Mooney (1998), Table 6.
27 Szreter and Mooney (1998), Figure 1.
28 Ashby (1922), p. 40.
29 Woods, Watterson and Woodward (1988, 1989).
30 Chapter 4, section 4.11.
31 Fildes (1991).
32 Aaby *et al.* (1984).
33 Bell and Millward (1998); Millward and Bell (1998).
34 Woods (1985).
35 Schofield, R. S. (1985); see also Weir (1984); Goldstone (1986).
36 Schofield, R. S. (1985); Wilson and Woods (1991).
37 Wilson and Woods (1991), p. 403, Fig. 2.
38 Schofield, R. S. (1989). On the agricultural workers in the South see Snell (1985); Sokoll (1993, 1997). On the timing of the difficulties faced by the quarter of a million handloom weaving families see Bythel (1969).
39 Wrigley (1978).
40 Szreter (1996b), pp. 543–5; Szreter (1999).
41 Hollingsworth (1965); Brodsky Elliott (1981), esp. Table II, p. 85.
42 Vann and Eversley (1992), ch. 3, esp. Table 3.8.
43 Hindle (1998).

44 Although plebeian marriage ages subsequently rose again in the 1830s and 1840s to pre–1750 levels, the propertied classes were by then marrying even later. Ansell (1874), p. 45.
45 Banks (1954), chs. 3–6; Banks and Banks (1993), pp. 29–30 and ch. 3.
46 See for instance Jones, G. G. (1993), p. 49.
47 Registrar-General (1856), *Seventeenth Annual Report* pp. ii–iv.
48 Economic historians agree that after the 'hungry forties' the working class subsequently enjoyed a relatively uninterrupted secular trend of rising real wages for three decades; Feinstein (1995, 1998).
49 Szreter (1996b), pp. 335–50, 382–98, 398–439.
50 From 1538 to 1750 pre-nuptial pregnancies accounted for about 15–30 per cent of first births in the Cambridge Group's sample of 26 reconstituted parishes, rising to just over 35 per cent, 1775–1837: Wrigley *et al.* (1997), Table 7.27, p. 421. On illegitimacy in early modern Britain, see Laslett and Oostereven (1973); Laslett *et al.* (1980); Adair (1996).
51 Kussmaul (1981), p. 26.
52 Szreter (1996b), pp. 389–98. The principal evidence supporting the inference that sexual restraint among young adults was deeply institutionalised has been the repeated findings from a number of historians using various sources that illegitimacy rates in England were, comparatively speaking, surprisingly low, and that they fluctuated in sympathy with the marriage rate, rather than as an alternative to it: Laslett and Oostereven (1973); Laslett *et al.* (1980); Adair (1996). For an alternative hypothesis, see Hitchcock (1996, 1997).
53 The original movement, *c.* 1570–1620, was a Reformation phenomenon aimed at the total moral regeneration from all forms of sin in society. The second wave, 1648–60, was part of the official ideology of the Puritan Interregnum. The third wave, 1688–1730, but at its most vigorous in the 1690s, was launched under the new Protestant dynasty of William and Mary, and was much more exclusively focused on sexual morality than the earlier movements, concentrating on the repression of prostitution, venereal disease and illegitimacy. The fourth wave, the post-1780s Evangelical movement may in some senses be said to have continued until the 1960s. On the early modern era see Wrightson and Levine (1995); Ingram (1996). On the late-eighteenth-century and Victorian movements, see, for instance, Quinlan (1941); Brown (1961); Mason (1994a), esp. ch. 2, section 1; and on the latter movement's long-lasting influence, Szreter (1996a).
54 Szreter (1996b), pp. 392–3.
55 Mason (1994a, 1994b). It is of relevance to note that the results of the 1911 census inquiry did indicate moderate restraint of fertility within marriage amongst those surviving from the 1850s marriage cohort both within those social categories representing the upper and middle classes and amongst the plebeian textile workers: *Fertility of Marriage,* Part II (1923), Table XL, p. lxxxvii and Table XLII, p. xcii.
56 The study of the history of sexual attitudes and practices remains a highly conjectural field. The seminal work in this field was, of course, Foucault's; see Foucault (1990). For studies of the history of sexuality which would broadly support the interpretation offered here see Porter (1982); Gillis (1985); Laqueur (1987); McCalman (1988); Barker-Benfield (1992); Mason (1994a, 1994b); Clark (1995); Wahrman (1998). Hitchcock (1996, 1997) offers an alternative, although self-contradictory interpretation.

57 Gillis (1992).
58 Laqueur (1993); Trumbach (1993) and Hitchcock (1996) are amongst those arguing for the primacy of putative changes in sexual beliefs, attitudes and practices as the determinants of the course of demographic change during this period rather than the more socio-economic and broadly cultural explanations of such change usually favoured by demographic and social historians. However, this viewpoint has not found favour in the work of the only scholar who has investigated and presented a wealth of evidence on the diverse social practices of different sections of the population, including the working-classes: Mason (1994a, 1994b).
59 For critique, see Szreter (1993a) and, for a recent proponent, see Chesnais (1992).
60 Williams and Galley (1995), p. 420.
61 On communication communities see chapter 1, note 32.
62 One particular finding in the occupational analysis presented in Szreter (1996b), p. 314, which strongly corroborates this was the unusually high fertility of the occupational grouping of 'Coal mine-owners, agents and managers', despite their allocation to social class I by the Registrar-General. Most mine owners and managers lived in or near the intensely proletarian colliery communities providing their workforce.
63 The memoirs of Robert Roberts' corner-shop family in a poor, Salford working-class neighbourhood gives eloquent and repeated testimony to just such an attitude of superiority: Roberts, R. (1971).

Appendix A

The indirect estimation of infant and child mortality and related applications

This appendix explains the indirect estimation of infant and child mortality using a worked example to illustrate the basic principles of the techniques and to identify some of the important concepts and assumptions involved. The example uses the numbers of children ever born and children who have died by marital duration for the whole of England and Wales given in the published volumes of the 1911 census.

Indirect techniques involve the use of fertility and mortality schedules. Fertility schedules are a series of fertility rates calculated for different age groups or marital duration groups of women, which describe a childbearing pattern among a cross-section of women at a particular time (a period schedule) or among women born in a particular period (a cohort schedule). Similarly, a mortality schedule is a series of mortality rates, or probabilities of dying for different ages, which describe a mortality regime among a cross-section or a cohort. Life tables are the most common form of mortality schedule, providing the probability of surviving from birth to any exact age.[1]

Calculation of the probability of dying

Brass noticed that of the children born to women in a particular five-year marital duration group the proportion who have died corresponds roughly to the probability of dying before a certain exact age. It turns out that the proportion of children who have died among those born to women married less than five years gives an indicator of the probability of dying before the age of 2, and subsequent marital duration groups give probabilities of dying before the ages of 3, 5, 10, 15, 20 and 25. Similarly, the proportion of children who have died among married women aged 15–19 roughly corresponds to the probability of dying before the age of 1, and the proportion who have died among married women aged 20–24 approximates to the probability of dying before the age of 2. Subsequent age groups give rough probabilities of dying before the ages of 3, 5, 10, 15 and 20.

The techniques that Brass developed are available in two variants, one using the women's age groups and the other using women's marital duration groups. In this volume all calculations use the marital duration method because it is subject to significantly less bias than the age group variant. The relative merits and drawbacks of the two variants are discussed after the basic technique has been explained. Proportions of children who have died are often referred to in demographic literature as 'proportions dead' and this convention is followed here.

The number of women in each marital duration group in England and Wales from the 1911 census, the number of children they had given birth to and the number that had died, are given in columns A, B and C of Table A.1.[2] Column D gives the exact age, x, to which estimates of dying refer, and column E gives the proportion of children who have died, D(i) (where i = 1 signifies marital duration group 0–4 (or age group 15–19 when calculations are performed by age group), i = 2 denotes marital duration group 5–9 (age group 20–24), and so on).

The proportion of children dead is only a rough estimate of dying before the exact age given in column D. The correspondence is based upon the assumption that the probability of dying is mainly dependent on age. This leads to two further relationships. First, it entails the basic statistical definition of expected value that the proportion of children of a certain age who have died will be equivalent to the probability of dying before that age. For example, imagine two children born on the same day. If, one year later, one of them has died, then the risk of dying by their first birthday or 'exact age 1' is one in two, or 0.5. Secondly, older children will have been alive for longer, and thus subject to a greater risk of dying. Children of women married for longer durations will, on average, be older, and thus they have been at risk of death for a longer time period. This is why it is necessary to treat each marital duration or age group separately, and why the ages in column D of Table A.1 increase with marital duration. However the same phenomenon occurs *within* marital duration groups. For example, amongst miner's wives, who get married early and have children quickly, those women who have been married for less than five years will have older children than other women married for less than five years but drawn from a later marrying and slower-fertility sub-group, such as lawyers' wives. The same will be true of other, longer marital duration groups. Thus the fertility regime of each sub-group can affect the age to which the chance of dying applies. This age is also affected by the shape of the mortality

Table A.1 *Calculation of proportions of children who have died, for England and Wales, showing transformation of proportions died into probabilities of dying using multipliers*

i	A	B	C	D	E	F	G	H	a	b	c
				x	D(i)	p(i)	k(i)	q(x)			
Marital duration	N of women	N of children	N died	Exact age to which probability of dying refers	Proportion of children who have died (C/B)	Average parity (B/A)	Multiplier	Probability of dying before exact age x (G*E)	Coefficients for multipliers		
0–4	1,112,623	976634	96,033	2	0.0983	0.88	1.1407	0.1122	1.2584	−0.4683	0.1080
5–9	1,072,712	2,310,928	318,972	3	0.1380	2.15	1.0012	0.1382	1.1841	−0.3006	−0.0892
10–14	987,851	3,144,034	542,817	5	0.1726	3.18	1.0093	0.1743	1.2446	0.0131	−0.3555
15–19	775,296	3,156,414	615,352	10	0.1950	4.07	1.0274	0.2003	1.3353	0.1157	−0.5245
20–24	640,254	3,082,870	661,051	15	0.2144	4.82	1.0093	0.2164	1.3875	−0.0193	−0.5472
25–29	482,365	2,598,313	590,661	20	0.2273	5.39	0.9961	0.2264	1.4227	−0.1954	−0.5127

Note:
$k(i) = a(i) + b(i) \times (p(1)/p(2)) + c(i) \times (p(2)/p(3))$
Source: Fertility of marriage, Part I (1917), Tables 23 and 24; United Nations (1983), p. 82.

schedule. Sets of multipliers are used to correct the probabilities of dying up to a certain exact age. Instead of altering the age to which the estimate refers, the corrections apply to the probability of dying. The coefficients used to calculate the multipliers are based on a large number of empirical fertility and mortality schedules, with the average number of children born to each woman in the first three marital duration groups being used as an indicator of the early fertility schedule to determine the exact value of the multipliers.[3]

Calculation of the multipliers is laid out in the remaining columns of Table A.1. Column F shows the average number of children born (parity) to women in each marital duration group, p(i). The first two successive parity ratios p(1)/p(2) and p(2)/p(3) are used as indicators of the shape of the fertility schedule and are combined with coefficients, a, b and c, according to the equation given below the table to produce the multipliers, k(i), given in column G. These coefficients, derived from a large number of empirical fertility and mortality schedules, are based on a particular structure of mortality and can be found in United Nations (1983), *Manual X*.[4] They are also reproduced in columns a, b and c at the right of Table A.1. The values of D(i) from column E are multiplied by the multipliers in column G to obtain estimates of q(x), the probability of dying between birth and exact age x. For example for the first marital duration group (0–4 years) $x=2$, and $q(2)=0.0983 \times 1.1407 = 0.1122$. Similarly for the second marital duration group $q(3)=0.1380 \times 1.0012=0.1382$.

Time trends in mortality

For each marital duration group of women an estimate of the chance of survival to a different exact age is produced. These estimates can be combined to form a period life table if mortality is assumed to have been constant in the few years before the census.[5] Figure A.1 plots the probabilities of dying given by the life table derived from the indirect estimates and by the period life tables for England and Wales 1891–1900, 1901–10 and 1910–12.

If a mortality decline in the two or three decades prior to the census is suspected, as in the case of the first decades of the twentieth century, it is inappropriate to combine the estimates as a life table. Survival to older ages will reflect survival further in the past, when mortality was higher, and survival to younger ages will be better estimates of mortality at times nearer the census, and this can be seen from the estimates of the probability of dying depicted in Figure A.1. Instead of creating a life table, it may be more enlightening to use the estimates to chart trends

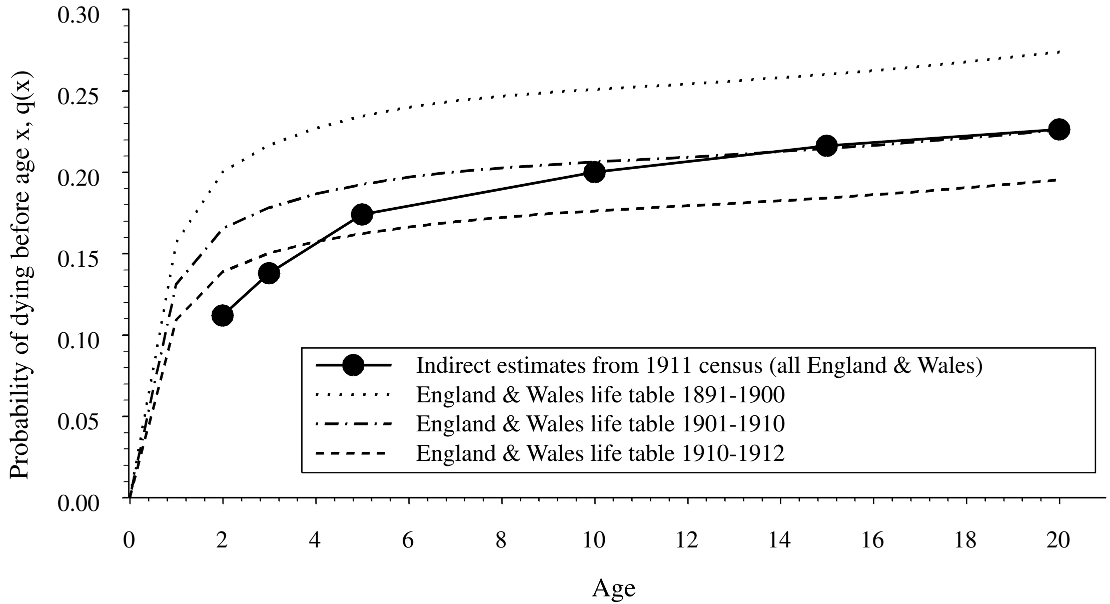


Fig. A.1 Cumulative mortality from indirect estimates and from English and Welsh life tables. *Sources: Fertility of marriage*, Part I (1917), Tables 23 and 24; Registrar-General (1933), Table 9.

in infant and child mortality. This procedure involves the use of 'time-trending' techniques developed by Feeney.[6] Data provided by women with longer marital durations give estimates of survival chances experienced further back in the past than data derived from women married only a short time. Each estimate can be located at a particular point in the past using a further set of multipliers. It is thus possible to say that, in 1896, the probability of dying before the age of 20 lay at 226 per thousand, or that in 1902 the probability of dying before age 10 was 200 per thousand. The multipliers are similar to those used in the mortality estimation, once again being based on a large number of empirical fertility schedules.[7] Table A.2 works through the calculation of the reference period for each estimate. As with the calculation of the previous set of multipliers, the first two successive parity ratios (p(1)/p(2) and p(2)/p(3)) are used as an indicator of the shape of the fertility schedule. These are combined with coefficients in the same manner as before to calculate the number of years before the census to which the estimate refers. This can then be subtracted from the date of the census (taken here to be 1911.25) to give the actual date.

Assessment of trends is not easy if each estimate gives survival to a different age, but comparison can be facilitated by expressing all the estimates in standard terms, for instance as an infant mortality rate, using a model life table or set of life tables.[8] A particular age *structure* of mortality, adequately expressed by the model life table used, must therefore be assumed to have been extant over the period to which the estimates apply, though the *level* of mortality may have varied. The implications of a mis-specified and of a changing age structure of mortality are discussed later.

For this analysis the Brass relational logit life table system has been used with one parameter to change the level of mortality, and the 1910–12 England and Wales life table has been used as a standard to represent the age structure of mortality.[9] A life table for both sexes has been calculated by combining those for males and females 1910–12 under the assumption of a sex ratio of 105 males per 100 females. This life table is shown as l(x) in Table A.3. Logits of both the standard life table, Yl(x), and the estimated probabilities of dying, Y, are shown in the next two columns of the table. The coefficient, a, defining the level of mortality, is calculated by subtracting the logit of the standard life table from the logit of the estimated measure. Finally, the infant mortality rate, q(1) or ${}_1q_0$, is calculated using the logit of the standard IMR and the calculated level, a.

Indirect techniques therefore not only effectively standardise mortality for marital duration and age at childbearing but also enable examination of the behaviour of child mortality over time. It is important,

Table A.2 *Time trending: the calculation of the reference period for each estimate*

i	x	q(x)	p(i)	t(x)		a	b	c
Marital duration	Exact age to which probability of dying refers	Probability of dying before exact age x	Average parity	Years before census	Date	Coefficients for time trending		
0–4	2	0.112	0.88	1.36	1909.89	1.0349	1.3714	−0.3390
5–9	3	0.138	2.15	3.55	1907.70	1.6654	4.5855	0.0233
10–14	5	0.174	3.18	6.05	1905.20	1.2109	3.3291	5.1402
15–19	10	0.200	4.07	8.65	1902.60	−0.5370	−1.7679	14.6370
20–24	15	0.216	4.82	11.57	1899.68	−2.4694	−3.9194	23.0999
25–29	20	0.226	5.39	14.87	1896.38	−2.2107	1.3059	24.4479

Note:
$t(i) = a(i) + b(i) \times (p(1)/p(2)) + c(i) \times (p(2)/p(3))$
Source: Table A.1 and United Nations (1983), p. 83.

Table A.3 *Expressing all the estimates as infant mortality*

i	x	q(x)	l(x)	Yl(x)	Y	a	q(1)
Marital duration	Exact age to which probability of dying refers	Probability of dying before exact age x	English life table 1910–12	Logit of l(x)	Logit of q(x)	Y-Yl(x)	IMR
	1		0.89038	−1.0473			
0–4	2	0.1122	0.86088	−0.9113	−1.0344	−0.1231	0.088
5–9	3	0.1382	0.84944	−0.8651	−0.9152	−0.0501	0.100
10–14	5	0.1743	0.83757	−0.8201	−0.7779	0.0423	0.118
15–19	10	0.2003	0.82361	−0.7705	−0.6922	0.0783	0.126
20–24	15	0.2164	0.81562	−0.7435	−0.6434	0.1001	0.131
25–29	20	0.2264	0.80454	−0.7075	−0.6143	0.0932	0.129

Source: Table A.1 and Registrar-General (1933), Table 9.

however, to bear in mind the fact that no information regarding the ages of the dead children is available. Their ages are estimated purely from the marital duration of their mother and cover a distribution of possible ages of children. Each marital duration group of women is used to estimate the mortality of a different age group of children, although for convenience the estimates may be expressed in terms of infant or childhood mortality. Caution must therefore be used in attributing causes or influences on mortality which may differ according to the average age of the child. In addition estimated time trends in mortality should be interpreted as smoothed measures of mortality and cannot be used to identify short-term variations in levels or trends.

It is important to remember that the results derived from the use of indirect techniques are estimates and that they involve many important assumptions which affect the way results may be interpreted.

Comparison of age and marital duration variants

As mentioned above, indirect techniques can be applied using age groups or using marital duration groups of women, but the latter is preferable since the aggregate results are subject to significantly less bias than the former. For instance, estimates based on age categories of mothers are extremely sensitive to the early age pattern of fertility because they use the parity of the first three age groups to calculate multipliers. Very small numbers of women giving birth in their late teens (and even early twenties) result in a large sampling error for the youngest age groups and notoriously unreliable estimates. Mortality estimates from these age groups are also likely to be inflated by the high proportion of first births which are prone to higher than average mortality.

Married women are more evenly distributed among marital duration groups than they are among age groups so there is less likelihood of parity variations due to small numbers and selection factors. Moreover marital duration is a better predictor of the pattern of childbearing than is age. Sullivan has demonstrated this by showing that the range of successive parity ratios among a set of different fertility schedules was much smaller for marital durations than for age groups.[10]

Marital duration estimates carry the disadvantage that unless a question on duration of marriage is expressly asked in the census or survey more items of data are needed to calculate marital duration than age.[11] More items of data means more opportunity for the introduction of error. However this disadvantage is slight compared to the reliability problems of the estimates based on age groups, and so estimates based on marital duration groups are used in this volume.

Assumptions and violation problems

The use of multipliers based on the structure of fertility and mortality, and the additional use of model mortality schedules, inevitably render the techniques sensitive to a set of assumptions which may invalidate the results if violated. The assumptions relating to the present analysis can be laid out as follows, and are discussed below:

1 The probability of dying depends only on the age of the child.
2 The relationship between the probability of dying (q(x)) and the proportion of children dead (D(i)) is determined by the early pattern of the fertility schedule.
3 The fertility schedule used in the calculation of the multipliers is appropriate for the population under consideration.
4a Fertility is constant in the recent past OR
4b Fertility decline is constant in the recent past.
5a Mortality is constant in the recent past OR
5b The decline in mortality level has been regular and the age pattern of mortality has remained fixed.
6 Reporting errors and selection effects are negligible.

1 The basis of the techniques is that the probability of dying depends only on the age of the child, and is not affected by the age of the mother, birth order, and so on. This assumption is reasonable for most age and marital duration groups of women but is violated at both ends of the age and parity scales. First-born and high-parity children suffer higher risks of death, as do children of very young women, especially those giving birth in their teens.[12] Thus the children of the youngest age group of women (aged 15–19) are more prone to die (not only are they born to very young mothers but they are also more likely to be first births). This would be a significant problem if analysis was being carried out using age groups, but since the first marital duration group contains women of different age groups the problem will not be as great, although there is still likely to be a higher proportion of first births than among other groups.

2 The estimation of the approximate ages of the children who have died relies upon the fertility schedule pertaining for a group of women. If a given pattern of fertility is assumed, then the average age of the children born to women in a particular age or marital duration group can be ascertained. A given pattern of fertility implies that women of each age or marital duration group have children at a particular rate. Thus it is assumed that women married for five to nine years have children at a specified rate during the first five years of their marriage, followed by

more children at another specified rate in the next five years.[13] These rates of childbearing allow the calculation of the overall distribution of children over each age or marital duration group, and thus also the average age of the children born to each group of women. According to assumption 1, the age of the children determines their risks of death. Therefore the relationship between the probability of dying (q(x)) and the proportion of children dead (D(i)) is determined by the early pattern of the fertility schedule. This is a fundamental assumption which, although it may not be strictly accurate in every case, has been proved robust in a large number of model and empirical populations.

3 The techniques have been tried, tested and refined in a variety of contexts, but the sets of multipliers were developed with the particular fertility and mortality regimes of modern day Less Developed Countries (LDCs) in mind. For example, multipliers given in *Manual X*, the indirect estimators' Bible, are based on a model fertility schedule embodying a very early start to childbearing. This is more representative of mid-twentieth-century LDCs than late-nineteenth-century Britain which exhibited much later starting patterns of fertility and nuptiality.[14] The age patterns of fertility in populations where women initiate their fertility early are quite different in shape from those where women initiate it late; the two cannot be matched by simply transposing 1 up or down the age axis. Therefore, when 'later age' patterns of fertility are encountered, the use of multipliers which embody 'early age' patterns of fertility may introduce distortions into estimates of infant and child mortality.

In order to avoid using an inappropriate fertility schedule it is possible to use a variant of the Brass method developed by Preston and Palloni which does not involve the use of model or simulated fertility schedules.[15] The Preston and Palloni method involves 'reverse surviving' the children who have not died and whose ages are known, by possible levels of mortality, until the number projected as born equals the number actually born. This is done by turning the life table survival function round, so that instead of calculating the numbers surviving after a given number of years from the children alive at the beginning of the period, the number surviving at the end is used to obtain the number alive at the beginning under that mortality regime. While bypassing some pitfalls, however, this method is not without disadvantages. To reverse–survive children it is necessary to match children and mothers on the census form, a procedure which may well prove a source of error, especially in the case of the OPCS data where no names were available to aid the matching process. The method also relies on accurate reporting of children's ages. In the OPCS data, the age distributions of surviving children, although reasonably smooth for the earlier marital durations and age groups, become much more prone to heaping on specific ages as marital duration or age of mother increases. In addition, in order to eliminate possible biases arising from the migration of children away from the parental home, it is necessary to restrict analysis to women of less than 15 years marital duration. With the data obtained from women younger than 20 being almost useless owing to small numbers and excess mortality risks, usable data are very much restricted.

The effects of using differing fertility regimes to produce coefficients for the multipliers is explored in Figure A.2. This shows indirect estimates produced using three different techniques: the normal Trussell multipliers, a set of multipliers developed by Jeremiah Sullivan based on empirical populations with later fertility and nuptiality patterns, and the Preston–Palloni surviving children method.[16] The figure shows that all methods yielded very similar results despite the differing assumptions regarding fertility and the problems of matching children to mothers in the surviving children procedure. This finding provides support for Feeney's proposition that the methods are relatively robust to deviations from the fertility assumptions involved.[17] In view of the fact that both the Sullivan and the surviving children estimates were only available for the first three age and marital duration groups, it was decided that the most useful results would be gained from using the Trussell estimates throughout.

4 With indirect techniques successive parity ratios from women in the first three age or marital duration groups, most of whom will have been near the beginning of their childbearing careers at times close to the census, are used to establish a fertility pattern which is assumed to apply to women of all ages or marital durations. In other words, fertility behaviour is assumed to have been constant in the recent past. Although this was not initially a problem in the less developed countries where the indirect techniques are primarily used, it would be rare today to find a situation where it would be reasonable to assume that fertility has not been subject to recent change. England and Wales in the late nineteenth and early twentieth centuries certainly witnessed rapidly declining fertility. This causes a problem in that the ratios between the parities of those in the first group (p 1) and those in the second (p 2), and between those in the second and third groups (p 2/p 3), will describe a fertility schedule which was not actually that experienced in the decades prior to 1911. It follows that if the fertility schedule is inappropriate then the multipliers used to adjust the ratio of

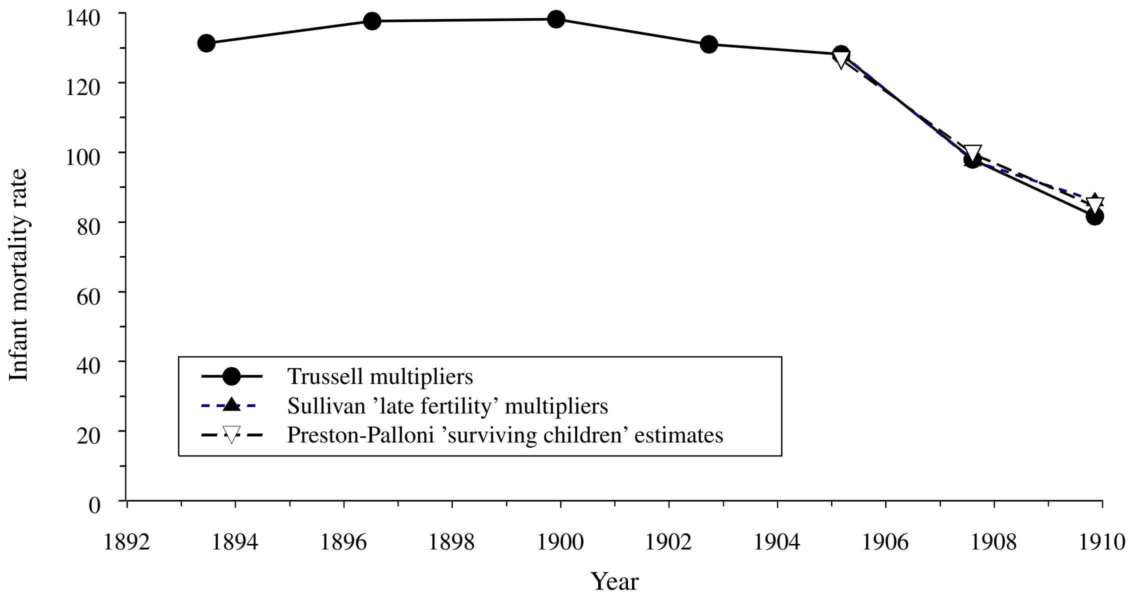


Fig. A.2 Infant mortality estimates from the OPCS dataset calculated using multipliers embodying different fertility assumptions. *Source:* OPCS dataset.

children dead to children ever born and to locate the estimates in time will be inapplicable.

The UN *Manual X* gives an alternative method which overcomes the problem of having to assume constant fertility by suggesting the use of true cohort estimates of fertility calculated from two censuses or surveys five or ten years apart, both containing information on children ever born and surviving.[18] In this case it is only necessary to assume that the fertility change between the censuses has been regular or constant. However, since the 1911 census is the only census with this information for England and Wales, this alternative is unavailable. The surviving children method described earlier also avoids the problem of having to assume constant fertility because it does not rely on a fertility schedule to calculate multipliers. However, the substantial drawbacks of the surviving children method which were outlined earlier render it an unattractive alternative. Given the lack of alternatives, and since Feeney has shown that the errors associated with mis-specification of the fertility schedule in the 'traditional' estimates are negligible, it is felt that traditional marital duration estimates can be safely used.[19]

5 As mentioned earlier, if the estimates are to be combined to create a period life table then it is necessary to assume that mortality is constant in the recent past. If, alternatively, time trending is to be applied, it is only reasonable to compare the mortality estimates from different groups of women if the age pattern of mortality for the whole period is correctly represented by the life table used, even though the level of mortality may change. If the age pattern of mortality has been changing, or is not adequately represented by the life table used, estimates from different marital duration or age groups of women will not be comparable with each other, some being over- or understated. Thus estimated trends will also be unreliable.

The United Nations *Manual X* gives multipliers based on four different age structures of mortality: those represented by the four Coale–Demeny life tables (North, South, East and West). The West pattern, having lower mortality in infancy and childhood in relation to old age, is generally assumed to be the most appropriate for this era in England and Wales, although for earlier periods it has been argued that North, with higher mortality in childhood and early adulthood is more applicable.[20] For indirect estimation, it is the structure of mortality in the early years of life which is important. Thus Figure A.3 provides a graphical representation of the contribution of infant deaths to mortality under 5, as shown by the ratio of infant to child mortality, for various mortality schedules in order to assess which of the four life table families is most suitable for the present analysis.

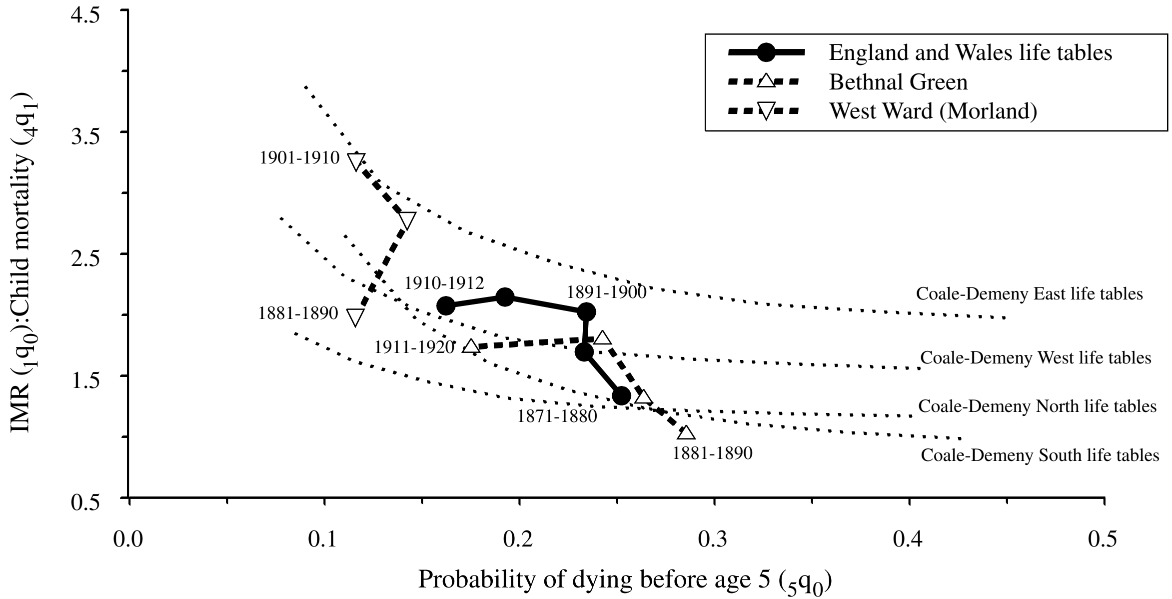


Fig. A.3 The ratio of infant to child mortality at various levels of survival to age 5. *Source:* OPCS dataset; Registrar-General (1933), Table 9; Coale and Demeny (1983).

The risk of dying before the age of five (q(5) or $_5q_0$) has been plotted against ratio of the levels of infant to child mortality (two of the components of $_5q_0$) implied for that level of $_5q_0$ for each mortality regime (i.e. $_5q_0$ has been plotted against $_1q_0$:$_4q_1$, the ratio of the risk of dying before the age of 1 to the risk of dying between the ages of 1 and 5). This has been done for each of the Coale–Demeny families of model life tables implicit in the estimation techniques, and for the Registrar-General's life table schedules for England and Wales for 1871–80, 1881–90, 1891–1900, 1901–10 and 1910–12. Figure A.3 shows that the contribution of infant deaths to mortality under 5 is greatest in the East family and smallest in the North family (with the exception of the South family when the mortality level is high). In all four Coale–Demeny life table families, when the risk of dying before the age of 5 falls, the ratio of infant to child mortality rises. Although improvements in infant mortality are likely to be larger in magnitude, they may be smaller *relative* to improvements in child survival. Thus as mortality improves, that in the first year of life forms a larger proportion of deaths up to the age of 5. Also shown on Figure A.3, stagnant infant mortality rates in England and Wales in the last quarter of the nineteenth century, when child mortality was falling, forced up the ratio of infant to child mortality from a pattern similar to the Coale–Demeny North life table family to one between the West and East families. After the turn of the century, the sudden infant mortality decline stabilised the ratio, so by 1910–12 the mortality pattern was well represented by the Coale–Demeny West life table family. In summary, for England and Wales the implicit change in the age structure of early age mortality as mortality fell is not expressed well by any of the Coale–Demeny life tables which are built into indirect techniques. The West family appears to work very well or reasonably well for most of the time period, however, so the multipliers based on this structure of mortality have been used in this volume.

The problem of using an inappropriate mortality structure may also apply to sub-groups. Although England and Wales as a whole roughly follows a Coale–Demeny West pattern of early age mortality, particular sub-populations may have different mortality structures. Woods has documented a wide range of early age mortality structures among the English and Welsh registration districts in 1861–3. In some places early childhood mortality exceeded infant mortality, and in other places with the same life expectancy at birth, infant mortality was twice as high as mortality in early childhood.[21] Of the 13 registration districts in which the OPCS areas lie, those with the most extreme early age mortality structures are also shown on Figure A.3. Like many urban areas in the nineteenth century, Bethnal Green's high mortality rate contained a relatively low proportion of infant deaths in relation to child deaths.[22] In contrast infant deaths predominated in the rural district of West Ward.[23] The structure of mortality is also likely to have varied among other sub-groups such as between different social classes or occupations. Unfortunately it is impossible to create appropriate life tables for every sub-group for which infant and child mortality is estimated, so the West multipliers have been used throughout. To reduce bias associated with the use of an inappropriate life table, the Registrar–General's life table for England and Wales for 1910–12 was used as a standard.[24]

6 Finally the use of indirect techniques involves assuming that reporting errors (such as age-misreporting and omission) and selection effects (differential mortality to the children of those mothers who died or migrated before the end of the childbearing span, for example) are negligible. Nevertheless, it is likely that some such errors will be present. Some of these – such as age-misreporting – may cancel each other out or be minimised by grouping into five-year age or duration sets. Even so, there is still likely to be a bias caused by the exaggeration of marital duration at the beginning of the childbearing span in order to hide the presence of pre-nuptial births or conceptions.[25]

Other biases or errors, including 'selection effects', will tend to produce underestimates of mortality. For instance it is considered likely that dead children are more likely to be omitted than live, perhaps through unwillingness to admit a dead child or through unconscious suppression of a painful memory.[26] The restriction to, or selection of, currently married women removes many of those, such as unmarried or abandoned mothers, whose children were at higher risk. In addition the children of mothers who had died would themselves have been at higher risk of dying. They may have been the product of a complicated birth, or disadvantaged by lack of care or breast-feeding.

Women who moved away from or into a population may form atypical samples. Unfortunately it is impossible to make generalisations regarding those who migrated away from the areas in the OPCS sample, although we can identify women who were born overseas or in a different part of the country. In the context of 'selection effects' and migration, it is important to bear in mind that time series obtained using indirect estimation are derived *solely* from the population present in 1911. The mortality measures for the 1890s are for the population living in an area in 1911, *wherever* they were living in earlier years. In other words, the '1891' child mortality estimates refer to the mortality experienced *in 1891* by the children of *those women present in 1911*. The measures should not automatically be taken as the mortality of the area in 1891. Generally it may be assumed that any women who died or migrated in or out of a study area acted in relevant respects in exactly the same way as those present in the 1911 population. Occasionally the composition of a population may change over time, affecting this assumption and thus interpretation of any infant and child mortality rates. This can be illustrated by the case of Bethnal Green.

As can be seen from Figure A.4, it is estimated from the 1911 census that in 1891 the infant mortality rate in Bethnal Green lay at about 210 deaths per thousand births. By 1910 this had plummeted to around 100. During the early twentieth century, the East End of London became the home of a massive influx of immigrants from Eastern Europe. The estimated infant mortality rates for the children of women born in the United Kingdom and living in Bethnal Green have been calculated and shown in Figure A.4, as have the rates for the children of those born in Eastern Europe and living in Bethnal Green. These rates indicate that, for the whole 1895–1910 period and particularly for times close to the 1911 census, the children of the immigrants were exposed to lower risks of death than those of the 'native' population. This would not cause a problem for the retrospective estimation of infant and child mortality for Bethnal Green if the proportion of immigrants in the population was the same at each time period, but in fact the proportion of immigrants recorded within the OPCS enumeration districts representing Bethnal Green increased dramatically. In 1891 less than 1 per cent of married women were from Eastern Europe, while in 1911 the proportion was nearly 20 per cent. Using indirect estimation, the immigrant women present in 1911 contribute to mortality estimates for Bethnal Green not only for 1911, but *also for 1891*, even though, for the most part, they must have lived elsewhere. Since in 1891, Bethnal Green's mothers were predominantly born in the UK and presumably subject to higher infant and child mortality, the lower infant mortality experienced by the immigrant women present in 1911 artificially lowers the estimate of overall infant mortality in this particular community for previous years. The extent of this effect may be gauged by weighting the infant mortality rates to compensate for the altering composition of the population. The results of the weighting procedure are also shown in Figure A.4; indicating an infant mortality rate for earlier years very much closer to that for native British mothers. The distortion caused, even by a considerable influx of immigrants, is relatively small, but it is important to bear in mind the possibility of similar, undetected compositional effects in other sections of the OPCS population.

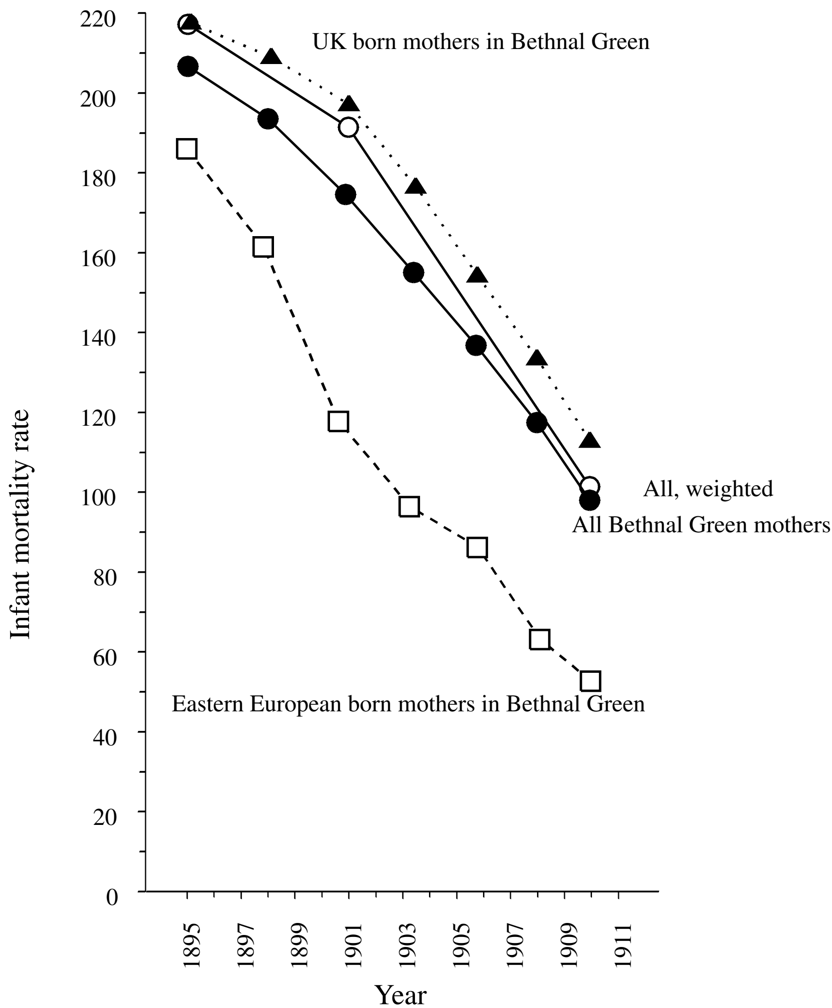


Fig. A.4 Infant mortality estimates for Bethnal Green, by nativity of mother, 1895–1910. *Note:* The weighted figures are a combination of the rates for the UK born mothers and for Eastern European born mothers, weighted by the proportion of mothers in each group in each census year. *Source:* OPCS dataset.

The mortality index

The mortality index, used by Preston and Haines and their associates, is a summary measure of infant mortality. It can be used to facilitate comparisons between groups and as an independent variable in more complicated analysis such as multiple regression.[27] The index takes the form of the ratio of actual deaths to expected deaths for women married for less than 15 years. The number of expected deaths is the product of the number of children a woman or group of women have given birth to, and the proportion of those children who can be expected to have died. The latter is calculated separately for each marital duration group using the multipliers used for the estimation of infant and child mortality in the national population.

Any summary measure must combine the experience of women married for very different lengths of time. As has been pointed out above, the experiences of women in different marital duration groups cannot be directly compared if mortality has been declining: the children of women in longer marital duration groups will have suffered higher mortality than the children of those in more recently married groups not just because they have had a longer time to die (which is taken into account by the use of the indirect technique multipliers in the calculation of the index) but also because they were at their most vulnerable when the risk of death was higher. To minimise the distorting effects of declining mortality, only the first three marital duration groups (women married 0–4, 5–9 and 10–14 years) are used in the calculation of the index.

Table A.4 provides a worked example of the calculation of the mortality index. First of all, the appropriate level of mortality for the national population must be derived. This is done by comparing the ratios of observed to expected deaths using Coale–Demeny life tables levels 14 and 15 to predict the numbers of deaths. Level 14 produces more deaths than actually occurred and level 15 yields fewer. Thus the appropriate level of life table can be ascertained by interpolation. The upper panels of Table A.4 work through this procedure. For each marital duration, the numbers of children ever born and that have died are used, together with the multipliers for indirect estimation, k(i) (based on the successive parity ratios of women in the national population as calculated for the indirect estimation of infant and child mortality), and the probabilities of dying for the relevant levels of the life table. The expected proportion of children dead in each marital duration group, EPD(i), is calculated by rearranging the relationships used in the estimation of infant and child mortality:

$$\text{Proportion of children who have died} = (D(i)/CEB(i)),$$

and

$$q(x) = ((D(i)/CEB(i)) * k(i)),$$

to give

$$EPD(i) = q(x)/k(i).$$

Table A.4 *Calculation of the mortality index*

Panel A: Index based on CD West mortality level 14

i	CEB(i)	D(i)	k(i)	q(x)	EPD(i)	ED(i)	I
Marital duration group	Children ever born	Children died	Multiplier for national population	Probability of dying, based on CD West 14	Expected proportion dead = q(x)/k(i), based on CD West 14	Expected deaths = EPD(i)*CEB(i), based on CD West 14	D(i)/ED(i) based on CD West 14
0–4	976,634	96,033	1.1407	0.1435	0.1258	122,829	0.7818
5–9	2,310,928	318,972	1.0012	0.1556	0.1554	359,130	0.8882
10–14	3,144,034	542,817	1.0093	0.1694	0.1679	527,749	1.0286
0–14	6,431,596	957,822				1,009,708	0.9486

Panel B: Index based on CD West mortality level 15

i	CEB(i)	D(i)	k(i)	q(x)	EPD(i)	ED(i)	I
Marital duration group	Children ever born	Children died	Multiplier for national population	Probability of dying, based on CD West 15	Expected proportion dead 5 q(x)/k(i), based on CD West 15	Expected deaths 5 EPD(i)*CEB(i), based on CD West 15	D(i)/ED(i) based on CD West 15
0–4	976,634	96,033	1.1407	0.1553	0.1361	132,948	0.7223
5–9	2,310,928	318,972	1.0012	0.1372	0.1370	316,613	1.0075
10–14	3,144,034	542,817	1.0093	0.1491	0.1477	464,422	1.1688
0–14	6,431,596	957,822				913,983	1.0480

Table A.4 (*cont.*)

Panel C: Index based on appropriate level of mortality for England and Wales

i Marital duration group	CEB(i) Children ever born	D(i) Children died	k(i) Multiplier for national population	a Interpolation factor between indices for CD 14 & 15	q(x) for E & W based on CD West & interpolation factor	EPD(i) Expected proportion dead q(x)/k(i)	ED(i) Expected deaths EPD(i)* CEB(i)	I D(i)/ED(i)
0–4	976,634	96,033	1.1407		0.1496	0.1311	128,063	0.7499
5–9	2,310,928	318,972	1.0012		0.1461	0.1459	337,139	0.9461
10–14	3,144,034	542,817	1.0093		0.1589	0.1574	494,994	1.0966
0–14	6,431,596	957,822		0.5172			960,197	0.9975

Panel D: Index for sub-groups: social class I, all England and Wales

i Marital duration group	CEB(i) Children ever born	D(i) Children died	EPD(i) Expected proportion dead, based on E & W mortality	ED(i) Expected deaths = EPD(i)*CEB(i)	I D(i)/ED(i)	I* Adjusted index = index / index (nat)
0–4	82,965	4,906	0.1311	10,879	0.4510	
5–9	181,422	15,421	0.1459	26,467	0.5826	
10–14	226,079	26,627	0.1574	35,594	0.7481	
0–14	490,466	46,954		72,940	0.6437	0.6453

Panel E: Index for sub-group: social class V, all England and Wales

i	CEB(i)	D(i)	EPD(i)	ED(i)	I	I*
Marital duration group	Children ever born	Children died	Expected proportion dead, based on E & W mortality	Expected deaths = EPD(i)*CEB(i)	D(i)/ED(i)	Adjusted index = index / index (nat)
0–4	160,030	19,175	0.1311	20,984	0.9138	
5–9	416,510	70,175	0.1459	60,764	1.1549	
10–14	590,689	120,977	0.1574	92,998	1.3009	
0–14	1,167,229	210,327		174,746	1.2036	1.2066

Note:
Because much use of the notation x in the life table formulae, '*' has been substituted for the multiplication sign '×' in the formulae included in this table.
Calculations in this table have used the value of k(i) produced according to Table A1, with more decimal places than shown here. This may result in discrepancies with re-calculations made according to this table.
Source: Table A.1 and Coale *et al.(*1983).

The expected number of deaths for each age group, ED(i), can then be found by multiplying the expected proportion dead by the number of births. The index measures the proportion of actual deaths to expected deaths under the relevant mortality regime. Thus Table A.4 shows that there are fewer deaths than expected under either life table for the youngest marital duration group, and more than expected among those married for between 10 and 14 years. The index for all three marital duration groups combined is calculated by dividing the total number of children that have died by the total number of expected deaths.

When we look at sub-groups, however, we are interested not in comparing mortality to Coale–Demeny level 14 or 15, but in comparing it to the national level in 1911. Thus an approximation of the level of mortality for the whole country is obtained by interpolating between the two mortality indices for the three marital duration groups combined. This is shown in Panel C of Table A.4, and is then used to derive an appropriate level of q(x) for the children of each marital duration group. Finally the index is recalculated for each group and for the three groups combined, yielding an index very close to 1.

Indices calculated for sub-groups may then be compared to the national index. Sub-group indices are calculated by applying the expected proportion dead on the basis of the national mortality level (calculated in Panel C of Table A.4) to the numbers of births and deaths in each marital duration group of the sub-sample. This is illustrated for two sub-groups, social classes I and V, in Panels D and E. The adjusted index simply divides the index by the index for the national population so the sub-group index can be interpreted as a percentage value of the national. The adjusted index for social class I, shown in Panel D, is 0.6453. This indicates that mortality among the children of fathers in class I occupations married for less than 15 years was only 64 per cent of that among those married for less than 15 years in the population as a whole. In contrast, the adjusted index for social class V suggests that their children suffered 20 per cent higher mortality than the national average.

The mortality index combines the mortality experience of the first three marital duration groups into a single indication of mortality, taking account of differences in mortality among children of different ages (represented by different marital duration groups of women). It is, in effect, an 'age-standardised' measure. A single figure naturally cannot shed any light on trends in mortality and effectively ignores the possibly distorting effect of differential mortality decline among sub-groups.

When mortality declines, as it did in Edwardian England and Wales, a summary measure calculated from more than one marital duration group may disguise a wider range of experience. The use of the same life table level throughout to predict the number of expected child deaths leads to an underestimation of the number of expected deaths of children of women in high marital duration groups, and an overestimation of expected deaths to those married for shorter periods. The mortality index will therefore be biased upwards for women who have been married longer and downwards for those married only a short time. This will cause distortion if the numbers of births are not distributed uniformly over marital duration groups and over different groups of women. Preston and Haines maintained that there should be little distortion in cases where mortality decline is gentle, but in England and Wales between 1891 and 1911 expectation of life at birth increased by 7.7 years – an average of just under 3.9 years per decade, and most of this decline was due to the declining infant mortality rate.[28] Nearly half the entire improvement in life expectancy between 1841 and 1921 occurred in the 20-year period between 1891 and 1911.[29] The index can be modified so that the expected numbers of deaths are calculated using an appropriate life table level for each marital duration group. In general, however, there is very little difference between the modified and unmodified indices, except when examining those factors whose distribution over marital duration tends to be highly skewed, such as fertility. Thus the decision was taken to undertake analysis using unmodified versions of the mortality index.

For the regression analyses, the index is calculated for individual women. Each woman's expected number of children dead is found by multiplying the expected proportion dead, EPD(i), for that woman's marital group (based on the mortality of the whole country), by the number of children the woman has had. The index is then the number of her children who have actually died divided by the number expected to have done so.

Notes

1 Life tables are a tool for expressing the mortality regime of a population: see Shryock and Siegel (1976), pp. 249–71. They encapsulate both the level of mortality, and the relationship between mortality at different ages. For a cohort of a thousand births, they provide numbers of survivors at each exact age by single years of age. The life table probability of surviving from birth to any exact age, x, is expressed by l(x), the reciprocal, q(x), being the life table probability of dying. Life tables can be empirical, derived from a census for example, expressing the mortality conditions for a particular place at a

particular point in time. Sets of model life tables have also been developed to approximate the structure of mortality where the exact life table is not known. The Coale–Demeny family of life tables, based on a large number of empirical populations, give different levels of mortality for four different age structures of mortality: see Coale and Demeny (1966), Coale *et al* (1983). The Brass relational life table system, on the other hand, is an algorithm expressing a relationship between mortality at different ages, which can be used, in conjunction with a standard life table, to convert mortality at one age to mortality at another: see Brass (1975).

2 The 1911 census volume only gives figures for the first six marital duration groups, that is for women married for less than 30 years: *Fertility of marriage*, Part I (1917), Tables 23 and 24.

3 If a given pattern of fertility is assumed, then the average age of the children born to women in a particular age or marital duration group can be ascertained. A given pattern of fertility implies that women of each age or marital duration group have children at a particular rate. Thus it is assumed that women married for five to nine years had children at a specified rate during the first five years of their marriage, followed by another specified rate in the next five years. Although data usually come in five-year age groups, the models behind these methods are often specified in single years. These rates of childbearing allow the calculation of the overall distribution of children over each age or marital duration group, and thus also the average age of the children born to each group of women.

4 Brass' original multipliers have since been tested and refined. The ones used here are considered robust. See Sullivan (1972) and Trussell (1975). The coefficients for multipliers given in United Nations (1983), p. 82 are available in four variants, each based on a different mortality structure, one for each Coale–Demeny life table family. Those used here are for Coale–Demeny West.

5 See n.1 above for definition of a life table.

6 Feeney (1980).

7 Multipliers for time trending can be found in United Nations (1983), p. 83.

8 See n.1 above for an explanation of life tables.

9 The logit transformation ($\text{logit}(p)=0.5 \ln((1-p)/p)$) provides a linear correspondence between the logits of two life tables. See Newell (1988), ch. 13 on relational model life tables.

10 Among age-specific fertility schedules, the age at onset of childbearing has a range of several years. In contrast, the marital duration at onset of childbearing varies over a range of less than one year. Sullivan (1972), pp. 87–8. Childbearing is better predicted by marital durations than it is by age groups, so successive parity ratios have a range of 0.13 for duration models but of 0.30 for age group models. Sullivan (1972), p. 91.

11 Both mother's current age and either her age at marriage or the date of that marriage are needed.

12 See, for example, DaVanzo (1984), pp. 313–14; Woodbury (1926), ch.3.

13 Although data usually come in five-year age groups, the models behind these methods are often specified in single years.

14 Multipliers given in *Manual X* were developed by James Trussell, who elsewhere explained the appropriateness of his estimates: 'Since Brass estimates are normally used for developing countries where marriage or entry into

consensual unions takes place early, a better set of estimates...is presented...[where]...a0 [age at first marriage] ranges from 12 to 15.' See Trussell (1975), p. 101.
15 Preston and Palloni (1977).
16 Sullivan multipliers can be found in Sullivan (1972), p. 89.
17 Feeney (1980), p. 119.
18 United Nations (1983), pp. 90–6.
19 Feeney (1980).
20 See Woods and Hinde (1987), p. 39. Multipliers based on the West model were used by Watterson (1987) and Preston and Haines (1991).
21 Woods (1993), pp. 204–6.
22 *Ibid.*, p. 206.
23 The data for Bethnal Green and West Ward are taken from the Registrar-General's Decennial Reports. There are no data available for West Ward beyond 1901–10. The peculiar pattern for this area may be at least partly due to small numbers of deaths.
24 The differences in shape between the early part of the 1910–12 life table for England and Wales and the same part of the 1901–10 life table were minimal, despite the fact that mortality in 1911 was particularly high. This is not surprising as the 1911 life table was calculated from the census data, and the mortality peak in that year was produced by a summer epidemic of diarrhoea which would not have hit by the time of the census. To be logically consistent, as the 1910–12 England and Wales life table is used to convert estimates into infant mortality rates, special multipliers for converting the proportion dead into the probability of dying could have been calculated using the England and Wales life tables. However, it was not considered that the relatively small improvement in estimation from doing so would merit the amount of work it would take.
25 This tendency was noted in the official report on *Fertility of marriage*, Part II (1923), p. x. See also chapter 3, section 3.3 of the present volume.
26 Potter (1977), pp. 335–64.
27 See Preston and Haines (1991). Other studies using the mortality index include Farah and Preston (1982), pp. 365–83 and Trussell and Preston (1982), pp. 1–36.
28 See Preston and Haines (1991), p. 90.
29 Registrar-General, *Statistical Review of England and Wales for the year 1952*, Text Volume (1955), p. 73.

Appendix B

Choice of regression method

The ordinary least squares (OLS) method of multiple regression modelling is used here, although for the statistically minded it is worth noting that the mortality index that we are using as the dependent variable can never be negative, and this may render simple OLS regression unsuitable as dependent variables are assumed to vary between negative and positive infinity. In practice, there may also be a large grouping of values of the mortality index on zero, as a considerable proportion of women will not have experienced any child deaths. This may make a tobit regression more suitable.[1] Trussell and Preston, however, present a thorough comparison of the use of OLS and tobit regressions with reference to infant mortality, using the mortality index as the dependent variable.[2] They conclude that OLS regression produces almost identical results to tobit.

Although tobit regression is probably more statistically valid, it has the crucial disadvantage of being much less straightforward to interpret than OLS. In a comparison using our data, the overall pattern of the magnitudes and signs of the coefficients was the same with both regression procedures, but while the OLS average is constrained to be that of the sample of the whole, this is not true for tobit. It is therefore not possible to interpret the tobit coefficients as having a particular multiplicative effect on mortality. An additional advantage of concentrating on the OLS model is that it enables comparability with the previous work of others, in particular Preston and Haines' analyses.[3]

Although OLS regression stands up well with regard to tobit, in using a dependent variable which is calculated from a number of other elements there is still a possibility that the explanatory variables may be predicting an aspect of the denominator of the ratio which is not directly of interest. In this case, for example, some of the explained variation may be responding to the marital duration term or the number of births.

In order to check that this was not the case, the dependent variable was changed to the simple ratio of deaths to children ever born (calculated for each individual woman and weighted, once again, for the number of children ever born). The dependent variable now varied between zero and one, and so a probit regression was most suitable.[4] The element excluded from the mortality index – the marital duration multiplier – was used to take account of the age of the child, which affects its probability of death. Because mortality was expected to depend on the age of the child this term was included as an independent variable. Two variations of this were performed: one using the expected proportion dead given the marital duration of the woman, and the other using simply her marital duration.

The two probit regressions produced almost identical results. Naturally the coefficients of the differing specifications were not the same, but the difference was only one of magnitude, produced by the very different scales of the two variables used (years married ranged from less than one to 24, being constrained to do so, whereas the expected proportion dead was between 0.1 and 0.2). When the coefficients were compared on suitable scales, the pattern turned out to be identical. Coefficients for the other variables were very similar in magnitude, sign and pattern. Occasionally significance levels differed slightly but on the whole there was agreement regarding the importance of variables.

There was more variation between the probit and OLS regressions than between the two probit ones, but even here they were broadly similar, leading to the same general conclusions. The signs of the coefficients were always the same (except in a very few cases where the coefficient was insignificant and very close to zero) and the patterns of the coefficients were also very similar. The magnitudes varied somewhat more, although in consistent directions, with the absolute values of the coefficients being slightly greater in the OLS case. The major difference emerged in the significance levels of the variables, with the OLS analysis in general indicating higher levels of significance, especially with regard to the final group of variables in the analyses which did not include environment. Overall, however, the exercise produced general agreement with Trussell and Preston, that although a combination of OLS with a more statistically applicable analysis is to be preferred, major misinterpretation will not result from relying on OLS results.[5]

Therefore, although it could be argued that a tobit or probit transformation might be more appropriate than OLS, results using probit emerge as very similar to OLS, so OLS regression has been used for the sake of comparison and for ease of interpretation.

Notes

1 See Kennedy (1992), pp. 228–40 for a description of tobit and probit as opposed to OLS regression.
2 Trussell and Preston (1982), p. 31.
3 Preston and Haines (1991).
4 Kennedy (1992), pp. 239–40.
5 Trussell and Preston (1982), p. 31.

Appendix C

Values of community level variables for each sector

for definition of the variables see Chapter 4.

Place	Sector	Population	Persons per room	Boarders per h'hold	Servants per h'hold	Rooms per h'hold
Abergavenny	1	1,489	0.90	0.15	0.03	4.75
Abergavenny	2	1,796	0.89	0.16	0.13	4.91
Abergavenny	3	491	0.60	0.12	0.26	6.56
Abergavenny	4	1,030	0.79	0.08	0.31	5.61
Abergavenny	5	1,664	1.11	0.17	0.06	4.53
Abergavenny	6	1,699	1.19	0.11	0.05	4.27
Axminster	7	431	0.81	0.12	0.11	5.00
Axminster	8	1,564	0.76	0.09	0.14	5.37
Axminster	9	326	0.75	0.07	0.21	5.44
Axminster	10	1,576	0.56	0.15	0.31	7.23
Axminster	11	1,100	0.73	0.07	0.08	5.02
Banbury	12	4,307	0.73	0.14	0.17	5.98
Banbury	13	3,000	0.81	0.14	0.06	5.10
Banbury	14	364	0.85	0.05	0.10	4.95
Banbury	15	424	0.76	0.12	0.12	5.13
Bethnal Green	16	3,905	1.74	0.09	0.04	2.76
Bethnal Green	17	1,673	1.30	0.03	0.00	3.09
Bethnal Green	18	5,251	1.75	0.09	0.02	2.80
Bolton	19	2,672	1.08	0.13	0.03	4.30
Bolton	20	3,998	1.18	0.18	0.04	3.93
Earsdon	21	3,727	1.44	0.12	0.04	3.31
Earsdon	22	998	1.54	0.10	0.08	3.17
Earsdon	23	811	1.36	0.18	0.05	3.54
Morland	24	1,222	0.73	0.11	0.14	5.54
Morland	25	161	0.92	0.13	0.29	5.65
Morland	26	468	0.75	0.06	0.12	5.44
Morland	27	400	0.67	0.07	0.28	6.50
Morland	28	422	0.62	0.12	0.29	6.97
Morland	29	396	0.68	0.10	0.13	6.36
Morland	30	123	0.58	0.07	0.36	7.54
Morland	31	842	0.76	0.18	0.17	6.22
Pinner	32	1,553	0.72	0.11	0.27	5.56
Pinner	33	4,997	0.63	0.09	0.38	6.76
Saffron Walden	34	487	0.92	0.04	0.07	4.61
Saffron Walden	35	595	0.77	0.05	0.06	5.27
Saffron Walden	36	631	0.80	0.07	0.07	4.91
Saffron Walden	37	380	0.84	0.07	0.15	5.17
Saffron Walden	38	450	0.77	0.10	0.04	5.17
Saffron Walden	39	1,130	0.80	0.08	0.08	4.73
Saffron Walden	40	1,388	0.69	0.07	0.11	5.30
Stoke	41	4,451	1.07	0.18	0.03	4.62
Stoke	42	4,474	1.17	0.15	0.02	4.38
Stoke	43	3,244	1.11	0.15	0.05	4.16
Swansea	44	3,825	1.01	0.13	0.04	4.79
Swansea	45	1,781	0.97	0.21	0.18	5.45
Swansea	46	1,888	1.00	0.16	0.04	4.43
Swansea	47	1,470	0.54	0.06	0.49	7.92
Walthamstow	48	12,268	0.97	0.10	0.05	4.64
York	49	794	0.77	0.19	0.13	5.36
York	50	1,709	0.86	0.09	0.06	4.99
York	51	1,440	0.79	0.12	0.11	5.49
York	52	1,900	0.83	0.12	0.07	5.15
York	53	3,511	0.66	0.12	0.24	6.43

Source: OPCS dataset.

level variables for each sector

Proportion of men unemployed	Proportion of wives working	Proportion of wives born in E. Europe	Proportion of wives b. outside the county	Proportion of employed mothers with care	Proportion of non-employed mothers with care
0.06	0.05	0.00	0.56	0.40	0.16
0.05	0.14	0.00	0.58	0.34	0.25
0.09	0.10	0.00	0.47	0.40	0.27
0.04	0.18	0.00	0.47	0.30	0.37
0.02	0.07	0.00	0.28	0.18	0.11
0.04	0.01	0.00	0.20	0.50	0.32
0.08	0.12	0.00	0.28	0.43	0.23
0.09	0.15	0.00	0.21	0.20	0.23
0.14	0.13	0.00	0.31	0.40	0.31
0.13	0.13	0.00	0.45	0.48	0.37
0.14	0.10	0.00	0.27	0.27	0.17
0.07	0.12	0.00	0.44	0.26	0.25
0.08	0.05	0.00	0.41	0.15	0.17
0.11	0.05	0.00	0.73	0.00	0.24
0.07	0.08	0.00	0.75	0.17	0.16
0.04	0.18	0.29	0.08	0.11	0.12
0.03	0.15	0.00	0.23	0.10	0.02
0.04	0.22	0.14	0.08	0.05	0.09
0.04	0.17	0.00	0.11	0.13	0.08
0.03	0.24	0.00	0.12	0.18	0.08
0.03	0.02	0.00	0.35	0.23	0.25
0.02	0.01	0.00	0.28	0.00	0.43
0.05	0.01	0.00	0.31	0.50	0.35
0.10	0.05	0.00	0.40	0.17	0.24
0.07	0.08	0.00	0.44	0.00	0.28
0.07	0.06	0.00	0.51	0.67	0.22
0.03	0.11	0.00	0.23	0.20	0.47
0.08	0.06	0.00	0.71	0.50	0.27
0.02	0.02	0.00	0.52	0.00	0.23
0.10	0.19	0.00	0.81	0.33	0.30
0.06	0.10	0.00	0.56	0.56	0.29
0.06	0.09	0.00	0.56	0.62	0.46
0.08	0.04	0.00	0.52	0.42	0.51
0.07	0.02	0.00	0.37	0.50	0.22
0.06	0.05	0.00	0.33	0.33	0.28
0.06	0.05	0.00	0.31	0.33	0.21
0.07	0.10	0.00	0.34	0.75	0.40
0.05	0.06	0.00	0.27	0.50	0.17
0.12	0.04	0.00	0.29	0.33	0.19
0.13	0.04	0.00	0.38	0.27	0.23
0.02	0.14	0.00	0.18	0.20	0.15
0.03	0.20	0.00	0.10	0.18	0.11
0.03	0.24	0.00	0.13	0.18	0.16
0.05	0.04	0.00	0.20	0.26	0.28
0.04	0.23	0.00	0.37	0.54	0.25
0.03	0.04	0.00	0.34	0.46	0.30
0.09	0.05	0.00	0.51	0.80	0.72
0.05	0.09	0.00	0.27	0.23	0.17
0.05	0.18	0.00	0.17	0.62	0.30
0.06	0.06	0.00	0.20	0.25	0.20
0.12	0.05	0.00	0.37	0.44	0.20
0.04	0.04	0.00	0.17	0.18	0.19
0.08	0.10	0.00	0.26	0.21	0.35

Appendix D

The percentage of the population of each county living in each type of place, subdivided by environment, England and Wales, 1921

Table D1. *Percentage of the population of each county living in each type of place, subdivided by environment, England and Wales, 1921*

	Type of place													
	Great towns				Other urban					Rural				
County	WC	LI	SI	Total	AG	WC	LI	SI	Total	AG	WC	LI	SI	Total
Anglesey	0.0	0.0	0.0	0.0	0.0	10.3	27.9	0.0	38.2	61.8	0.0	0.0	0.0	61.8
Bedfordshire	0.0	0.0	0.0	0.0	2.6	19.5	38.9	0.0	61.0	39.0	0.0	0.0	0.0	39.0
Buckinghamshire	0.0	0.0	0.0	0.0	0.0	6.4	36.0	0.0	42.5	57.5	0.0	0.0	0.0	57.5
Brecknockshire	0.0	0.0	0.0	0.0	0.0	16.5	0.0	13.2	29.7	42.9	0.0	0.0	27.3	70.3
Berkshire	0.0	31.3	0.0	31.3	0.0	20.4	2.4	0.0	22.9	36.2	9.6	0.0	0.0	45.8
Carnarvonshire	0.0	0.0	0.0	0.0	0.0	45.8	3.2	3.2	52.1	22.9	0.0	25.0	0.0	47.9
Cambridgeshire	0.0	0.0	0.0	0.0	0.0	43.1	0.0	0.0	43.1	56.9	0.0	0.0	0.0	56.9
Isle of Ely	0.0	0.0	0.0	0.0	50.5	0.0	0.0	0.0	50.5	49.5	0.0	0.0	0.0	49.5
Huntingdonshire	0.0	0.0	0.0	0.0	13.1	7.6	22.9	0.0	43.7	56.3	0.0	0.0	0.0	56.3
Cardiganshire	0.0	0.0	0.0	0.0	0.0	29.2	2.1	0.0	31.3	68.7	0.0	0.0	0.0	68.7
Cheshire	8.9	18.2	12.0	39.0	0.2	8.2	18.8	15.0	42.2	15.8	2.4	0.0	0.5	18.7
Carmarthenshire	0.0	0.0	0.0	0.0	0.0	7.4	1.1	33.1	41.6	38.9	0.0	0.0	19.5	58.4
Cornwall	0.0	0.0	0.0	0.0	6.9	19.7	11.4	6.1	44.1	46.2	0.0	0.0	9.6	55.9
Cumberland	0.0	19.3	0.0	19.3	2.0	5.1	3.1	34.2	44.4	29.7	0.0	0.0	6.6	36.3
Derbyshire	0.0	18.2	0.0	18.2	0.4	4.0	1.0	37.0	42.4	7.0	0.6	0.0	31.8	39.4
Denbigh	0.0	0.0	0.0	0.0	0.0	23.9	21.1	0.0	36.0	20.1	0.0	0.0	44.0	64.0
Devon	38.0	0.0	0.0	38.0	1.8	19.7	9.2	0.3	31.0	31.0	0.0	0.0	0.0	31.0
Dorset	0.0	0.0	0.0	0.0	0.0	51.4	0.0	2.6	54.0	46.0	0.0	0.0	0.0	46.0
Durham	0.0	31.7	8.8	40.5	0.0	1.5	0.0	28.4	29.9	1.7	0.0	1.0	26.9	29.6
Essex	13.0	47.7	0.0	60.7	0.5	9.9	9.8	0.5	20.6	15.1	2.0	1.6	0.0	18.6
Flint	0.0	0.0	0.0	0.0	0.0	16.5	0.0	24.1	40.5	36.9	0.0	0.0	22.5	59.5

Table D1. (*cont.*)

	Type of place													
	Great towns				Other urban					Rural				
County	WC	LI	SI	Total	AG	WC	LI	SI	Total	AG	WC	LI	SI	Total
Glamorganshire	0.0	28.6	23.8	52.3	0.0	2.0	3.8	24.1	29.9	1.5	0.0	3.4	12.8	17.7
Gloucestershire	6.4	56.5	0.0	62.9	0.4	1.9	4.0	0.4	6.7	16.5	0.0	7.5	6.3	30.4
Hampshire	37.2	17.7	0.0	54.9	0.0	16.6	3.6	0.0	20.2	24.9	0.0	0.0	0.0	24.9
Isle of Wight	0.0	0.0	0.0	0.0	0.0	51.9	15.5	0.0	67.3	32.7	0.0	0.0	0.0	32.7
Herefordshire	0.0	0.0	0.0	0.0	0.0	35.3	0.0	0.0	35.3	64.7	0.0	0.0	0.0	64.7
Hertfordshire	0.0	0.0	0.0	0.0	4.8	26.4	37.5	0.0	68.7	26.4	4.9	0.0	0.0	31.3
Kent	6.8	0.0	0.0	6.8	1.0	36.7	25.8	1.3	64.9	27.1	1.2	0.0	0.0	28.3
Lancashire	3.6	39.0	22.0	64.6	0.2	3.1	5.3	21.9	30.5	2.3	0.0	0.2	2.3	4.9
Leicestershire	0.0	47.4	0.0	47.4	0.0	0.0	7.4	14.4	21.8	11.2	0.0	11.4	8.1	30.8
Lincolnshire–Holland	0.0	0.0	0.0	0.0	25.4	0.0	18.9	0.0	44.2	55.8	0.0	0.0	0.0	55.8
Lincolnshire–Kesteven	0.0	0.0	0.0	0.0	5.0	6.2	26.6	0.0	37.8	62.2	0.0	0.0	0.0	62.2
Lincolnshire–Lindsey	0.0	20.2	16.2	36.3	1.7	8.4	8.5	11.5	30.1	33.6	0.0	0.0	0.0	33.6
London	42.8	57.2	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middlesex	17.3	35.1	0.0	52.4	0.0	35.1	8.0	0.0	43.1	2.0	1.7	0.8	0.0	4.5
Merioneth	0.0	0.0	0.0	0.0	11.4	15.5	0.0	18.0	44.9	55.1	0.0	0.0	0.0	55.1
Montgomery	0.0	0.0	0.0	0.0	16.0	0.0	19.6	0.0	35.6	64.4	0.0	0.0	0.0	64.4
Monmouthshire	0.0	20.5	0.0	20.5	0.0	2.0	3.1	64.0	69.1	7.9	0.0	2.6	0.0	10.4
Northumberland	0.0	45.4	0.0	45.4	0.0	6.5	3.7	29.5	39.7	11.1	0.0	0.0	3.7	14.9
Norfolk	0.0	36.0	0.0	36.0	2.0	4.2	6.7	0.0	12.9	51.1	0.0	0.0	0.0	51.1
Northamptonshire	0.0	30.1	0.0	30.1	0.0	1.7	30.1	0.0	31.7	34.1	0.0	4.1	0.0	38.2
Soke of Peterborough	0.0	0.0	0.0	0.0	0.0	0.0	75.7	0.0	75.5	24.3	0.0	0.0	0.0	24.3
Nottinghamshire	0.0	41.0	0.0	41.0	0.0	2.1	7.6	28.2	38.0	11.1	0.0	0.0	10.0	21.1
Oxfordshire	30.1	0.0	0.0	30.1	0.5	6.7	9.7	1.8	18.6	51.3	0.0	0.0	0.0	51.3

Pembrokeshire	0.0	0.0	0.0	0.0	8.4	12.8	6.2	16.8	44.2	55.8	0.0	0.0	0.0	55.8
Radnorshire	0.0	0.0	0.0	0.0	5.0	26.8	0.0	0.0	31.8	68.2	0.0	0.0	0.0	68.2
Rutland	0.0	0.0	0.0	0.0	0.0	0.0	18.2	0.0	18.2	81.8	0.0	0.0	0.0	81.8
Shropshire	0.0	0.0	0.0	0.0	0.0	26.6	6.4	13.3	46.3	53.7	0.0	0.0	0.0	53.7
Suffolk East	0.0	0.0	27.3	27.3	0.6	9.7	19.4	1.6	31.3	41.4	0.0	0.0	0.0	41.4
Suffolk West	0.0	0.0	0.0	0.0	4.1	23.6	10.2	0.0	37.9	62.1	0.0	0.0	0.0	62.1
Somerset	14.7	0.0	0.0	14.7	0.0	12.5	19.2	4.9	36.6	46.4	0.0	2.3	0.0	48.7
Surrey	27.1	0.0	0.0	27.1	0.7	50.4	3.8	0.0	54.9	14.3	3.7	0.0	0.0	18.0
Sussex East	50.9	0.0	0.0	50.9	0.5	22.5	1.2	0.0	24.2	24.9	0.0	0.0	0.0	24.9
Sussex West	0.0	0.0	0.0	0.0	0.0	50.3	0.0	0.0	50.3	49.7	0.0	0.0	0.0	49.7
Staffordshire	0.0	10.8	36.5	47.3	0.0	1.0	2.9	32.5	36.5	7.3	0.0	0.0	8.9	16.2
Warwickshire	0.0	66.1	9.2	75.4	0.0	4.4	3.2	3.2	10.8	8.3	0.0	0.0	5.5	13.8
Westmorland	0.0	0.0	0.0	0.0	0.0	20.9	23.0	0.0	43.9	56.1	0.0	0.0	0.0	56.1
Wiltshire	0.0	18.8	0.0	18.8	0.0	14.0	12.8	0.0	26.8	49.2	5.2	0.0	0.0	54.4
Worcestershire	0.0	12.0	13.8	25.8	4.2	5.5	6.8	24.6	41.1	24.8	0.0	0.0	8.3	33.1
Yorkshire, West Riding	0.0	68.1	0.0	68.1	0.9	10.3	2.5	0.0	13.7	18.2	0.0	0.0	0.0	18.2
Yorkshire, North Riding	0.0	28.7	0.0	28.7	1.6	16.8	3.6	18.6	40.6	30.7	0.0	0.0	0.0	30.7
Yorkshire, East Riding	0.0	14.4	38.2	52.6	0.1	2.0	2.9	30.5	35.6	4.1	0.0	0.0	7.8	11.9
England and Wales	10.5	28.8	9.7	49.0	0.7	9.8	6.6	13.2	30.3	14.9	0.5	0.7	4.6	20.7

Note:
Welsh counties are shown in italics.
Source: Derived from 1921 Census of England and Wales (1923–4) *County parts*, Tables 16 and 17; see Note 7, Chapter 6.

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