Demographic Transformation and Socio-Economic Development 5

Christophe Z. Guilmoto
Gavin W. Jones *Editors*

Contemporary Demographic Transformations in China, India and Indonesia

Springer

Demographic Transformation and Socio-Economic Development

Volume 5

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Preface and Acknowledgments

The aim of this volume is to provide a comprehensive account of recent demographic change in Asia's three most populated countries. The idea for this book germinated in 2012 when we realized the wealth of data stemming from the censuses recently conducted in Asia. While we were both individually involved in the analysis of census figures from China, India, or Indonesia, we discovered that there was hardly any comparative work done on demographic trends across these Asian countries beyond the level of national indicators. Yet, these countries whose combined population has now reached 40 % of the world's total are far from homogeneous. In fact, as this volume should make clear, the diversity of demographic trajectories within each of these countries is extreme. Individual provinces, with populations often larger than 50 million, are now going through very distinct stages of the demographic transition – from rapid population growth to ultralow fertility regimes, with formidable migration exchanges often making the analysis of regional situations even more complex. National averages for such large countries are indeed very poor indicators of their actual demographic circumstances and rather incomplete instruments to decipher the dynamics at work.

This realization led us to opt for a more systematic analysis that would recognize both the main demographic components of the recent transformations and their various regional configurations in each country. Such a venture required identification of the best specialists from Asia and elsewhere to carry out this systematic disaggregated analysis and to bring them together for an intensive engagement with their findings. In this, we were fortunate to receive the full support of the National University of Singapore, through its Global Asia Institute. Not only were several authors invited for a stay of several months at the J Y Pillay Comparative Asia Research Centre (directed by the second editor and part of the Global Asia Institute), but we were also able to host a 3-day conference in May 2013 in Singapore ("40 per cent of the World: Population Change, Human Capital and Development in China, India and Indonesia"). This meeting led us also to select the priority entry points to explore the demographics of China, India, and Indonesia that have now become the five main parts of this volume. The book's structure is intentionally analytical, with the key aspects of demographic change – from mortality to changing age structure – in each part and further divided into individual chapters on China, India, and Indonesia followed by a brief synthetic analysis. Each chapter discusses in some depth the lessons of recent trends, but also provides a summary of some of the real estimation issues that demographic analysis faces in countries with no reliable civil registration sources. We believe this should provide readers with easy access to the most informed comparative analysis of these three countries' recent demographic developments.

We are first indebted to our contributors and to other conference participants. They have helped us shape this project and give it its rich substance. Our authors have also patiently borne with the usual delays and contradictory requests that are inevitably associated with a volume of more than 20 chapters. We are also grateful to our colleagues in Singapore who have made it possible. First, Professor Ho Teck Hua, Director of the Global Asia Institute, for his understanding of the importance of the project. Second, Therese M. Chan and Divya S. Ramchand, for their help in organizing the conference in Singapore. Most particularly, we would like to thank Divya Ramchand who has made major contributions to this volume, both substantive and administrative, from birth till completion although she makes only a small appearance in the final product. Finally, we acknowledge the continuous support our book received from Yves Charbit and Ian Pool who welcomed it in their series. The Springer team also deserves our gratitude for their excellent professional assistance. We would also like to extend our special thanks to Ian for the many ways he strived to give more rigor and readability to our manuscript (we believe successfully) during the last stages of the book preparation.

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Abbreviations

AISES	All-India School Education Survey
APCS	Annual population change surveys
ARR	Annual reduction rate
ASDR	Age-specific death rate
ASER	Annual Status of Educational Report
BKKBN	National Population and Family Planning Board (Indonesia)
BKPAI	Building a Knowledge Base on Population Ageing in India
BMJ	British Medical Journal
BPS	Central Statistical Board (Indonesia)
CASS	Chinese Academy of Social Sciences
CBS	Central Statistical Board (Indonesia)
CDI-MOH	Centre for Data and Information and Ministry of Health (Indonesia)
CDR	Crude death rate
CEB	Children ever born
COD	Cause of death
CPR	Contraceptive prevalence rate
DASI	Disability assessment schedule
DHS	Demographic and Health Surveys
DISE	District Information System for Education
DIY	Yogyakarta region
DKI	Jakarta Region
DLHS	District level household survey
DMK	Dravida Munnettra Kazhagam (India)
DMM	Dispersion measures of life expectancy at birth
DSP	Disease Surveillance Points (China)
EAG	Empowered Action Group (India)
EWC	East-west Center
FNPC	Fifth National Population Census (China)
GDP	Gross domestic product
GER	Gross enrolment rate

GHQ	General health questionnaire
GRDP	Gross regional domestic product
HIS	Health information system
ICPD	International Conference on Population and Development
ICPSR	Interuniversity Consortium for Political and Social Research
IDHS	Indonesia Demographic and Health Survey
IGNOPS	Indira Gandhi National Old Age Pension Scheme
IHDS	India Human Development Survey
IIASA	International Institute for Applied Systems Analysis (Austria)
IMR	Infant mortality rate
INPRES	Presidential instructions
IPUMS	Integrated Public Use Microdata Series
IRD/Ceped	Institut de recherche pour le dévelopment-Centre Population Développement
JNU	Jawaharlal Nehru University
LASI	Longitudinal Aging Study in India
LIPI-LEKNAS	National Institute for Sciences (Indonesia)
MAC	Mean age at childbearing
MDG	Millennium Development Goals
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act (India)
MMR	Maternal mortality ratio
MOE	Ministry of Education
MOEC	Ministry of Education and Culture
MOH	Ministry of Health
MOH-VR	Ministry of Health Vital Registration System (China)
MPCE	Monthly per capita consumer expenditure
MPS	Ministry of Public Security (China)
NBS	National Bureau of Statistics
NBS/EWC	National Bureau of Statistics and East-West Center
NCMMSP	National Child and Maternal Mortality Surveillance Points (China)
NER	Net enrolment rate
NFHS	National Fertility and Health Survey
NIHRD	National Institute of Health Research and Development (Indonesia)
NMR	Neonatal mortality rate
NOAPS	National Old-Age Pension Scheme
NOPPSS	National One Percent Population Sampling Survey (China)
NPFPCS	National Population and Family Planning Survey (China)
NRHM	National Rural Health Mission (India)
NSES	National Socio-Economic Survey (Indonesia)
NSS	National Sample Survey
NSSO	National Sample Survey Organization
NTA	National Transfer Accounts
ÖAW/VID WU	Österreichische Akademie der Wissenschaften/Vienna Institute of Demography Wirtschaftsuniversität
OBC	Other backward classes

OECD	Organisation for Economic Co-operation and Development
PAF	Population attributable fraction
PFI-PRB	Population Foundation of India and Population Reference Bureau
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
PMDF	Proportion of maternal deaths of female reproductive age
PNMR	Postneonatal mortality rate
PRB	Population Reference Bureau
RGI	Registrar-General of India
SDKI	Indonesian Demographic Health Survey
SMAM	Singular mean age at marriage
SNPC	Sixth National Population Census
SPH-UQ	School of Population Health, University of Queensland
SRS	Sample Registration System (India)
SSA	Education for All Movement (India)
SUPAS	Intercensal Population Survey (Indonesia)
SUSENAS	National Socio-Economic Survey (Indonesia)
TFR	Total fertility rate
TFRI	Parity-specific TFR
TIMSS	Trends in International Mathematics and Science Study
TPPFR	Total parity progression fertility rate
U5MR	Under-five mortality rate
UN	United Nations
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNMP	United Nations Millennium Program
WHO	World Health Organization
WHODASi	WHO Disability Assessment Schedule
WHOQOL	WHO Quality of Life Assessment
WPP	World Population Prospects
WTO	World Trade Organization
WUP	World Urbanization Prospects
YLL	Years of life lost

Chapter 1
Forty Percent of the World

Christophe Z. Guilmoto and Gavin W. Jones

The twentieth century was a period of extraordinary population growth, in which the world's population more than trebled and its growth rate peaked at 2.1 % per annum in the late 1960s. Even with a slowing down of the growth rate, it is expected that another two and a half billion will be added to the world's 2010 population of 6.9 billion by the middle of the century. The population may well peak at around nine billion in the middle of this century, and then begin a slow decline; or it could go higher, passing ten billion. Coping with the extra two or three billion expected to be added before growth terminates will require all the wisdom and accumulated knowledge that the world can muster.[1]

World population growth in the past century was *sui generis*. No trace of such formidable development exists for a more distant past and never again will population growth of this pace and magnitude occur. But parts of the world are still far from the point at which growth will cease. Planning for the still massive growth expected in these regions requires full utilization of the experience of those countries that are nearing the end of their population growth. Three of these countries – China, India and Indonesia – are the subject of this book. Their populations make up fully 40 % of the world's population. Their experience is important for this reason alone, but also because they have progressed far through the first demographic

[1] Unless indicated, all population estimates, parameters and forecasts used in this chapter derive from the latest set of figures released at the time of our conference by the United Nations' Population Division (UNPD 2013). We use the medium projection set for forecasts beyond 2010. We rely on data from national statistical offices and on original census results only for disaggregated estimates not provided by the United Nations.

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transition, and because of their varied social and political circumstances, their collective experience is likely to be highly relevant for countries that have further to go before their population size stabilizes. As recently as the early 1950s, they were in fact among the poorest places on the globe as many economic, demographic and social indicators clearly attest, but they now rank among middle-income countries and include some of the economically most thriving regions in the world. There is no doubt that their demographic trajectories are of considerable relevance to the less developed nations emulating them as well as to the richest ones they will gradually join.

For demographers, the term "demographic transition" is a shorthand way of characterizing the process whereby countries move from a situation of low population growth resulting from high rates of mortality and fertility, through a period of accelerated growth as mortality declines and fertility decline is delayed, to a point at which both mortality and fertility reach low levels and population eventually stabilizes at low or zero growth rates. Moving through the demographic transition is not an option but an absolute necessity for countries benefiting from the declines in mortality that have been near-universal over the past 60 years. Without a fertility transition, the resulting population growth would be unsustainable over a long period.

Even when substantial fertility declines have brought fertility down to replacement level, population continues to increase for decades, as a result of the population age structure inherited from the period when fertility was high. This is referred to as population momentum. Western countries, East Asian countries, most of Latin America and many countries in other parts of the world have already passed through the demographic transition, though because of population momentum, actual population declines have begun in relatively few countries. As fertility in many cases has continued to decline to levels far below replacement level, substantial and cumulative population declines are likely to set in once population momentum has ceased to exert a major effect. The period when fertility falls well below replacement level, and the behavioural factors lying behind such fertility declines, is often characterized as the "second demographic transition".

Despite the well documented tendency for most countries to move through the demographic transition, demographic conditions around the world remain highly variable. The experience of China, India and Indonesia is highly relevant for countries that remain at an earlier stage of the demographic transition. China is facing the prospect of population decline in the near future, while India and Indonesia face considerable further population growth as long as fertility remains slightly above replacement level; population momentum will carry growth forward for decades.

Parents' prioritizing of quality over quantity of children appears to be a universal trend in countries as they reach higher levels of socio-economic development (Montgomery et al. 2000). So further fertility declines appear inevitable on a world scale. Eventual population decline is the highly likely outcome. As stabilization of population, and arguably, actual population decline, is essential for global survival, the movement towards a decline in China's population can be welcomed, as would further declines in fertility in India and Indonesia. Of course, many issues will be raised by such declines – age structure effects, labour force contraction, population ageing, implications for urbanization and other aspects of population mobility. How such features are managed in populations moving towards population decline will determine whether this phase of demographic transition will be a blessing or a bane for billions of people.

The purpose of this book, then, is to study in detail key aspects of demographic trends in China, India and Indonesia, with the confident expectation that analysis of these trends will have wide relevance. This volume is largely driven by the desire to offer a strong basis for the first comparative study of Asia's three demographic giants. It brings together the state of the art of demographic research on China, India and Indonesia by its most renowned specialists and takes advantage of the latest round of housing and population censuses to share the lessons of their first results, using census reports, provisional tabulations and microdata samples from the three countries. While some statistics are still missing from census reports available today, social scientists working in China, India or Indonesia have already been able to analyze the most important features and components of demographic change in these three countries. Many findings have forced statisticians to revise their estimates and have led demographers to reconsider some of their assumptions about the pace of population change across these three countries.

This chapter will offer more than a brief introduction to the various chapters of this volume. It provides a comparative picture of demographic change in China, India and Indonesia in a broader perspective and focuses on some of the major linkages and singularities across the three countries. It starts with a first section devoted to the state of demographic knowledge and sources in Asia, emphasizing the lead role played by national decennial censuses for monitoring population dynamics. But this part will also stress some remaining issues and most notably the fiasco of the failure to develop a functioning and reliable civil registration system over the last 60 years. Due to this failure to produce exhaustive vital statistics, most fertility and mortality estimates for the three Asian giants are indirect figures derived from secondary information or borrowed from existing demographic models. The chasm is blatant between the regular census operations successfully conducted across some of the most difficult terrains in the world and the incapacity of large bureaucratic organizations to collect and publish local birth and death statistics.

The next section draws a broader picture of demographic growth in China, India and Indonesia and contrasts them with world trends. A series of maps also aims at incorporating in this comparative exercise subnational figures of each of the three countries. It is true that many of their constituent provinces – from Uttar Pradesh to Henan – would rank as some of the world's largest populations if they were treated separately. In this section, we also disaggregate demographic trends into their fertility and mortality components. This analysis better illustrates the timing of the great demographic downturn around 1970 and points to the major difference between the three countries, and in particular to China's unique trajectory. Compared to China, differences in demographic regimes within India and Indonesia appear more pronounced across regions, ranging from low fertility areas to regions closer to some of the least developed countries (Dyson et al. 2005; Hugo et al. 1987). Even if there is a gradual process of demographic convergence under way – with shrinking gaps in fertility levels across regions over the last 20 years – , these internal variations signal the high level of cultural and economic heterogeneity still characterizing these fast-developing countries.

The third part of our chapter covers the profound mechanisms of demographic recomposition induced by population change. This includes the age transition, changes in sex composition, educational expansion as well as population redistribution. Here again, China's experience appears almost unique and its demographic profile will resemble that of more developed, and ageing, countries. Social and regional disaggregation is again crucial for our understanding of trends since the most urbanized parts of China, India and Indonesia tend to concentrate all features of modernity: signs of ultra-low fertility, reduced share of children, favorable dependency ratios, higher education, heavy migratory influx, and record population density. Yet, some of the "bonus" effects – the famous demographic dividends caused by rapid fertility decline and improved health systems – will invariably convert into future demographic liabilities such as the current rapid process of ageing in large parts of our three countries, the increasing economic and social isolation of unattractive backward rural areas, and even the future surplus of men forecast in Northwest India and East China. We end this chapter with a section discussing the role of policies in shaping population change in China, India and Indonesia over the last five decades.

Populations Through the Eye of the Census

As our collection will amply demonstrate, the multifaceted use of census data in demographic research and policy analysis is also fraught with unique methodological challenges. Each country's census tends to have its own statistical blind spots. This is often due to the imperfect format of the colossal census operations when it comes to capturing demographic processes and social characteristics.[2] We will give in this section a few illustrations of the puzzle of census data. Moreover, while new demographic data through surveys and registration systems continuously irrigate demographic research, exhaustive censuses are conducted only every 10 years and their results distilled over the following decade. This creates a long grey period without any statistical update. Why then would we need census data that come only every 10 years and are so costly to assemble, long to process and difficult to interpret? In fact, census operations in industrialized countries are becoming increasingly complex to conduct and are now based on more and more simplified questionnaires when they are not completely abandoned.

[2] The number of census personnel in India in 2011 amounted to more than 2.5 million. China for its part recruited more than six million census-takers in 2010.

Collection and Dissemination

Census-taking has a long history in most regions across Asia, but it is probably in India that the tradition is the strongest. The first population counts were launched by the British during the middle of the nineteenth century, but the modern census started only in 1871–1872 and became the decennial event it has remained ever since. With the exception of the 1941 census affected by wartime budget restrictions, Indian censuses from 1881 to 2011 have provided an unsurpassable mine of social, demographic and economic information. The social history of the census in India is especially rich, as it soon became a key staple for economic monitoring and political debates. Yet the quality of the data collected, including on basic variables such as age and migration, remains at times questionable and its use requires constant statistical vigilance.

The Indonesian census is comparatively much younger. During the colonial period, the Dutch government published yearly data on Java's population based on registers from 1850 onwards, but the first modern census conducted throughout the country dates to 1930. The next count in 1940 was cancelled. But it took no less than 16 years for the government of independent Indonesia to conduct its first census in 1961 at a time when Papuan provinces were still under Dutch control (see Terence Hull chapter). In contrast, China's census history is more recent, yet somewhat chaotic. The new People's Republic of China conducted its first population census in 1953, followed by a census in 1964 which remained unpublished until the 1980s. The next census, taken only in 1982, marked the emergence of a new statistical era and it is often deemed a high-quality operation. Since 1990, the Chinese census has finally become decennial and provides an array of information comparable to that of censuses elsewhere in the world.

Dissemination strategies greatly affect the actual impact of census results beyond academia. Security and marketing issues can play a role in the distribution of census materials and tend often to prevent the rapid diffusion of presumably cost-free and risk-free anonymous census information. In this respect, India offers probably the most impressive case of rapid dissemination. The census operations ended officially on 28 February 2011 after enumerators updated the individual and household information during the month of February. This last day is in fact traditionally devoted to the enumeration of the homeless population. Questionnaires were collated and compiled only after a brief revision round at the beginning of March. But the provisional census results were announced on March 31, less than a month after the end of the field operations. On this date the Census Commissioner released the estimated population by sex for all Indian states, but also the provisional figures for the literate and illiterate population above age 7. In the following months, India's Census Office released provisional totals for India's 640 districts, its towns and cities, as well as for an array of other indicators such as household amenities or occupational categories. As it happens, the provisional total of 1,210.2 million persons was later revised based on a final count, but the new number was different by a mere 0.4 million (a 0.03 % difference). How was this miracle possible, keeping in mind that many other census tabulations in India are usually published many long years after the end of the operations? The explanation lies in one peculiarity of the Indian census: the household schedule listing all individuals contains a brief summary of the household total by sex, literacy status and age (0–6 years and 7+). These numbers (identified as "enumerator's abstracts") are compiled for all enumeration blocks and transmitted. Within 3 weeks, they were consolidated at district and then state level, and then used by the census office to prepare the 180-odd page report published in 1 month's time.

Using a specific form, Indonesia was also able to announce the provisional population total for the country rather quickly: exactly 3 months after the April 2010 census. In comparison, Chinese statisticians appear far more circumspect since it took them almost 7 months from November 2010 to April 2011 to release the official communiqué on the census results. Ironically, India's 2011 census figures were released before China's even though census operations had been conducted in the latter country 4 months earlier.

Yet, velocity does not necessarily rhyme with quantity and quality. Within a few months, China's National Bureau of Statistics shared a much wider choice of indicators than the other two countries, ranging from age and household distributions to detailed educational attainment and basic data on nationalities and migration. One year later, a systematic series of tables at provincial level were published on the NBS website that covered almost all aspects of the 2010 census. These rich regional data incidentally form the backbone of many of the analyses included in this volume such as those by Zhao Litao and Zheng Zhenzhen and Yang Ge.[3] However, it is probably the Indonesian census that turned out to be the most transparent and generous with its data. Detailed tabulations were released on the Central Statistical Board (BPS) website and available for all individual provinces. In addition, the BPS is the only census office to have already released several census monographs on topics such as fertility, ethnicity and education. But the most extraordinary achievement has been the publication of a huge 10 % sample of the Indonesian census through the IPUMS website in no more than 2 years, which has enabled the micro-analysis of educational statistics in the Chapter by Gavin Jones and Devanto Pratomo.

In contrast, China and India are less convinced of the presumed benefits of sharing census samples. China made available to a restricted list of local institutions a rather small sample of 2010 census microdata of limited use to demographers. India has been even less forthcoming and regards the release of census samples with great suspicion to avoid any "leakage of classified information" (Times of India, 4 April 2013). Rather than sharing data files, India's census office has finally opened a census data centre in 2012 giving access to some microdata from the 2001 census. This situation is rather unfortunate in view of the many variables that are not cross-tabulated by the censuses of China and India. In contrast, the mere number of available census variables and units, combined with the growing cost of publications, has encouraged many other statistical offices across the world to release microdata or to

[3] Interestingly, more detailed statistics and maps derived from the 2010 census are now being marketed by a private US company, with prices of datasets running in thousands of dollars.

set-up online tabulators to allow users to perform basic cross-tabulations. It is only through the in-depth analysis of microdata series that statistical issues can be fruitfully resolved and that innovative procedures can shed new light on demographic transformations.

Data Challenges

The modernization of census operations in an environment characterized by rapid economic growth suggests a steady improvement in the quantity and quality of data available on China, India and Indonesia. Some census data are now downloadable in a user-friendly format and reports can be easily read or stored via Internet-based tools. While there is no space for a complete review of all instruments of demographic measurement in the three countries, the census is far from being the only source of population data. Regular surveys in China, India and Indonesia – such as the SRS or the SUSENAS – compensate for the lack of a reliable vital registration system. In addition, more in-depth surveys document specific aspects such as the situation of the elderly or reproductive health. But the unavailability of basic vital statistics prevents each of the three countries from producing reliable estimates of such elementary demographic indicators as death rates by age, birth rates by disaggregated administrative units, or even the sex distribution of births. As a result, census operations that are supposed to provide primarily *stock data*, referring to households and populations at specific dates, are still being used as instruments to measure indirectly *flows* and past events to make up for the lack of civil registration data. Censuses in China, India and Indonesia are employed, as our volume will show, as a source and often the only source to compute fertility and death rates as well as many other indicators on migration and living arrangements for which we have simply no alternative estimates. This predicament forces demographers to resort to indirect methods that require in turn many additional hypotheses and parameters.

The fact that the basic instruments for monitoring population and economic change are still not in place 60 years after independence and that the census remains the most convenient source suggests that regular statistical monitoring via civil registration – developed during the nineteenth century in Europe – remains somewhat of a foreign construct that has failed to grow deep roots in many Asian polities. We have to qualify this sweeping statement by noting that of all demographic instruments introduced in Asia, censuses have performed rather well and that – with the exception of the hesitations in China before 1982 – our three countries have had a solid and long census tradition for the last 50 years. This suggests in turn that census operations – in spite of their tremendous volume and coverage – are more adapted to current administrative capacities of the governments' chain of command than the regular monitoring of demographic events on the ground through voluntary registration. This probably reflects the persisting fault line in demographic data collection between massive top-down statistical interventions organized by governments and the more spontaneous participation by citizens.

Census data are often deemed of uncertain quality. If we focus on some of the more elaborate socioeconomic variables, this situation is understandable. For instance, Indonesia specialists have to cope with a new, open-ended system of ethnic and linguistic self-designation. This has resulted in the apparent proliferation of new ethnic groups or languages. As we write, Aris Ananta and his colleagues are patiently scrutinizing the ethnic data from the 2010 census which are spread into 1331 recoded categories in order to allow for intercensal comparison. Additional linguistic data are of limited assistance to them as no less than 1400 languages were recorded in Indonesia by the latest census (Ananta et al. 2013). If we add to this predicament the issue of linguistic or ethnic migration (when individuals change affiliation during their life time), we get a better sense of the challenges in using some of the more intricate census categories. After years of collection of religious and linguistic data, India in 2011 embarked on a complex series of separate caste and socio-economic regional censuses. It is likely to face serious processing and reclassification issues when processing the data on these thousands of fuzzy caste groups. In fact, the issue of caste measurement may prove politically so volatile that data will not be shared with researchers, in contrast with Indonesia's census data. For its part, China has limited the scope for statistical problems by adopting a more top-down approach to social classification. Since the 1982 census, it has for instance limited the list of ethnic groups to 56 officially designated ethnicities, with all Han Chinese constituting a single group. The Chinese census has also refrained from gathering any type of linguistic or religious information in the course of the census so that the exact size of populations such as Cantonese-speakers or Chinese Muslims remains a matter of guesswork.

Estimation issues, however, do not affect only complex identity-based categories, but also basic demographic staples such as enumeration, age statement, and sex. Enumeration is probably a case in point. Statistical offices routinely conduct post-enumeration surveys after census operations, but they rarely share detailed tabulations of missed populations or double counts with demographers. Findings from these surveys – when available at all – are limited to global indicators of the quality of enumeration, with little by way of age-, sex- or region-specific rates of underenumeration. This is a source of concern to demographers since the quality of enumeration tends to vary widely across groups. A typical case is the avoidance of the census by young unmarried men. This situation may be due to lifestyle, mobility or registration considerations, but the effect can be considerable. China provides a good example of this situation since the overall quality of census enumeration is deemed very good in a country characterized by strong public security institutions. Yet, underenumeration has resulted in the probable invisibility of millions of young men. The sex ratio of the population aged 15–30 years tends to dip suspiciously to values close to 100 – whereas the sex ratio is well above 110 for younger males. The sex ratio rebounds to a level close to 105 for the older population aged 30–60 years, suggesting either male underreporting or female double-counting as the chapter by Zhongwei Zhao and his colleagues suggests. Similar dips in the proportion of men are also detectable among young adults in Indonesia and in India, pointing to the distinct possibility of young men missed during census operations.

In China, the enumeration issue also concerns the child population. In a political context where detection of births "out-of-plan" may result in trouble for parents or local party workers, there is wide suspicion of significant under-reporting of young children during the census. Cohort-based projections from previous censuses indeed demonstrate that many apparently missing tend to resurface after 10 years, resulting in survival rates above one (Cai 2013). The exact fertility level prevailing in China may be affected and it takes a detailed analysis in Zhigang Guo's chapter in this volume to evaluate the impact of enumeration differentials on fertility estimation. This situation is responsible for part of the recurrent debates over the quality of fertility estimates available for China since the 1980s, this in spite of the keen interest of public authorities in monitoring birth rates. While Terence Hull's chapter in this volume also tackles issues of fertility measurement issues for Indonesia, the level of potential discrepancy between fertility estimates from different sources is much smaller, yet the upward trend is unexpected. In contrast, India possesses several reliable sources for estimating its fertility trends in spite of its poor birth registration system. Christophe Guilmoto's chapter shows how census and sample registration data can even produce suggestive data to simulate fertility trends in the future.

A last illustration of the gaps remaining in the census data from China, India and Indonesia relates to the quality of age estimates. Censuses have had little difficulty in estimating age in China thanks to its specific calendar system. Moreover, the introduction of ID cards and the recent system of "real-name registration" have even strengthened the identification of individuals and the knowledge of age in the population. The situation is rather different in the other two countries for a variety of reasons, but India provides the most extreme case. Census commissioners since the nineteenth century have lamented the widespread indifference to numerical age across the population, with only modest changes over the years. The recently released age data from the 2011 census attests, however, to significant improvements over the previous census, which may be partly attributed to the introduction of an additional question on the date of birth in the Indian census schedule. Whipple's index which measures the attraction of ages ending with 0 or 5 has declined from 230 to 171 within 10 years. Yet, the level is still far from the normal value (100),[4] tending to severely disturb detailed demographic estimates.

Population Distribution and Growth at Different Scales

The many challenges in using census statistics have not prevented demographers from analyzing these data as soon as the first census reports were out and our chapters provide a more systematic approach to the main population trends only a few years after the end of census operations. But before discussing the main components

[4] For instance, the number of persons returning round age 60 is 3.3 times higher in India than the average population aged 56–59 and 61–64 years. Such age heaping is more pronounced in rural areas, among women and in poorer regions.

of demographic change, we will start with a brief review of trends in Asia in order to place the three countries in an international perspective and then proceed to a more disaggregated analysis to flesh out regional differentials.

As we write this introduction, exactly four out of ten inhabitants of the planet live in China, India and Indonesia. Their combined share rose regularly in the course of the last century, reaching 39 % after World War II and almost 42 % in 1995. This date marked the peak in their combined demographic weight and ever since, this percentage has been progressively diminishing. Following their successful fertility transition, the populations of Asia's three giants are now increasing at a pace slower than the rest of the world. But individual stories are quite different and China's demographic downturn took place early in the mid-1970s when its growth slid below the world average. As Fig. 1.1 indicates, China's population initially underwent major serious fluctuations during the decade following the foundations of the People's Republic. The impact of the Famine and the formidable ensuing recovery followed by an equally brutal fall in birth rates initiated during the Cultural Revolution give the curve a yo-yo aspect that persists till the late 1980s when the post-famine cohorts reached adulthood. Since the 1990s, the reduction in demographic rates has been impressive (Zhao and Guo 2007). China's growth curve is expected to cross that of the industrialized nations during the next decade and even plunge further into negative rates till 2060 and beyond (Fig. 1.1).

By comparison, growth rates have overall been rather higher and more regular in India and Indonesia than in China since the 1950s. Indonesia witnessed at first a period of record growth till the mid-1970s with its population doubling during the first 25 years. Since then, India and Indonesia have seen a regular decline in their overall population growth and this clearly distinguished them from the set of less

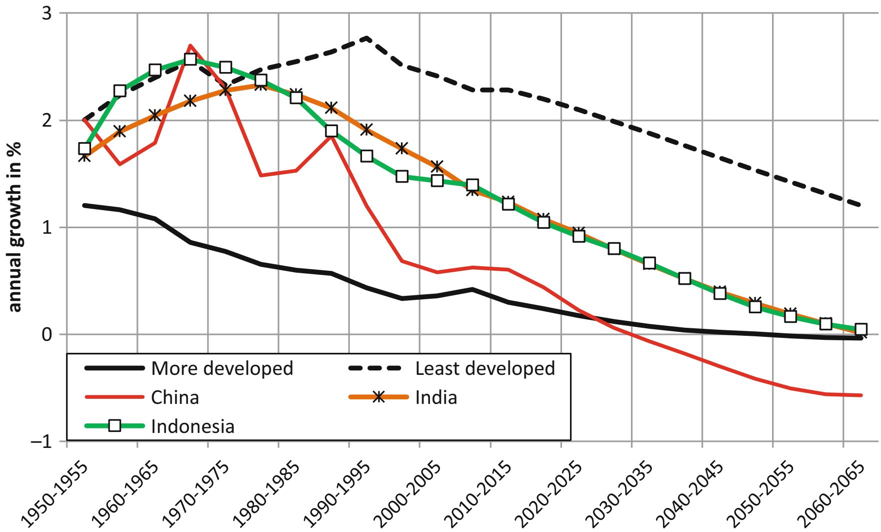

Fig. 1.1 Population growth in China, India, and Indonesia, 1950–2060

developed countries to which they used to belong.[5] This departure from the previous high-growth régime has been less sudden than in China and population growth will indeed remain higher in India and Indonesia than in the world as a whole till 2030. By that time, India's population will have overcome China's as the world's largest population, but Indonesia is in contrast expected to lose its position as the fourth most populated country to Nigeria. Net population decline in these two countries is not forecast before 2060, after India and Indonesia reach their peak populations at 1.6 billion and 326 million respectively. The delay in population stabilization between India and Indonesia, on the one hand, and China on the other hand can be measured as about 20 years, reflecting the similar time gap observed in current fertility decline level (Table 1.1 and Fig. 1.6). Our three countries therefore face a slow but irreversible decline in their relative demographic influence. From 40 % today, their share in the world's total population is predicted to decrease to 35 % in 2049 and 30 % in 2078, with no rebound in view unless fertility unexpectedly bounces back in the future. Their combined population – which had grown from 1 billion in 1950 to 2.8 billion in 2010 – should still grow and reach its peak at 3.3 billion during the 2040s and then start its slow absolute decline.

Comparative analysis has so far been conducted at country level and this no doubt makes sense when we want to cover a large number of countries. Yet, it is partly inappropriate when it comes to China, India and Indonesia, as the scale of comparison for three of the four most populated countries in the world is indeed different. In 2010, China, India and Indonesia had a population of 1360, 1206 and 241 million people respectively. But the 230 other countries for which the United Nations provides demographic estimates have an average population of 18 millions. This corresponds to the size of several metropolitan areas of China, India and Indonesia. Greater Jakarta (Jabodetabek) is for instance credited with more than 25 million inhabitants, while both Delhi and Shanghai conurbations have more than 20 million. The scale factor therefore complicates most comparison across countries since the divergence in terms of demographic size and implications may be simply overwhelming. We have therefore tried a different approach by breaking down our three countries into regions. China, India and Indonesia are respectively subdivided into 33 provinces, 35 states and Union territories, and 33 provinces. These administrative units have an average of 28 million inhabitants in 2010 and they are therefore absolutely in line with other countries in Asia that have almost identical average population size. Some of these units are still mega-regions, competing with the largest countries in the world. The best example is India's state of Uttar Pradesh spread over a surface comparable to that of the United Kingdom or Ghana: with its 200 million inhabitants in 2011, Uttar Pradesh would rank as the world's fifth most populous country, lying behind Indonesia and Brazil. We may also add to this list China's Guangdong, and India's Maharashtra and Bihar which have more than 100 million inhabitants. There are also smaller provinces, yet, only four regions in

[5] We are using United Nations estimates for least developed and more developed countries as two sets of extreme scenarios. The world average figures for most demographic indicators tend to be close to trends for India and Indonesia and they are therefore not shown here.

Table 1.1 Demographic and schooling indicators for China, India and Indonesia, 1950–2090

	1950	1970	1990	2010	2030	2050	2070	2090	2100
Population (in millions)									
China	543.8	814.4	1165.4	1359.8	*1453.3*	*1385.0*	*1240.6*	*1123.5*	*1085.6*
India	376.3	555.2	868.9	1205.6	*1476.4*	*1620.1*	*1640.1*	*1584.2*	*1546.8*
Indonesia	72.6	114.1	178.6	240.7	*293.5*	*321.4*	*326.5*	*321.2*	*315.3*
Density (inhabitants per sq. km)									
China	57	85	121	142	*151*	*144*	*129*	*117*	*113*
India	114	169	264	367	*449*	*493*	*499*	*482*	*471*
Indonesia	38	60	94	126	*154*	*169*	*171*	*169*	*166*
% population aged 65+									
China	4.5	3.9	5.8	8.4	*16.2*	*23.9*	*27*	*28.1*	*28.2*
India	3.1	3.3	3.9	5.1	*8.2*	*12.7*	*18.2*	*22.3*	*23.9*
Indonesia	4	3.3	3.8	5	*9.2*	*15.8*	*20.2*	*24.6*	*26*
Dependency ratio (0–14 and 65+/15–64)									
China	63	79	54	36	*47*	*63*	*71*	*77*	*77*
India	68	80	71	54	*47*	*48*	*55*	*63*	*66*
Indonesia	76	87	67	53	*46*	*53*	*59*	*68*	*72*
Life expectancy at birth (both sexes)									
China	44.6	64.6	70	75.2	*78.1*	*80.5*	*82.7*	*84.8*	
India	36.2	50.6	59.3	66.3	*70.4*	*73.6*	*76.6*	*79.8*	
Indonesia	38.3	54.1	64.5	70.7	*74.4*	*77.8*	*81.1*	*83.8*	
Fertility (children/woman)									
China	6.11	4.77	2.05	1.66	*1.76*	*1.82*	*1.86*	*1.88*	
India	5.9	5.26	3.67	2.5	*2.08*	*1.88*	*1.83*	*1.83*	
Indonesia	5.49	5.3	2.9	2.35	*1.98*	*1.85*	*1.84*	*1.85*	
% urban population									
China	11.8	17.4	26.4	49.2	*68.7*	*77.3*			
India	17.0	19.8	25.5	30.9	*39.8*	*51.7*			
Indonesia	12.4	17.1	30.6	49.9	*63.1*	*72.1*			
% population with no schooling % (aged 15+)									
China	69.8	41.9	22.2	6.5					
India	74.7	66.2	51.6	32.7					
Indonesia	76.2	45.4	43.6	17.3					

Fertility and life expectancy refer to the 5-year period following the reference date. Forecasts are shown in italics

No forecast available for schooling data and for urbanization beyond 2010 and 2030

Sources: UNPD (2011, 2013), and Barro-Lee Educational Attainment Dataset (http://www.barrolee.com/)

China, India and Indonesia – out of a total of 101 subdivisions – have less than one million inhabitants.[6]

[6]These least populated regional units regions are Macau in China, Sikkim in India, and Papua Barat and Maluku Utara in Indonesia.

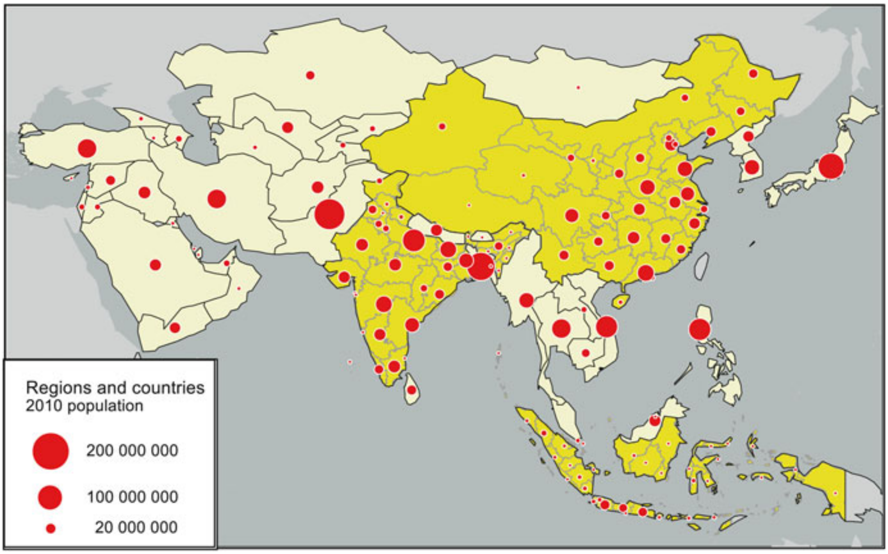

Fig. 1.2 Population distribution in 2010, Asian countries and provinces of China, India, and Indonesia

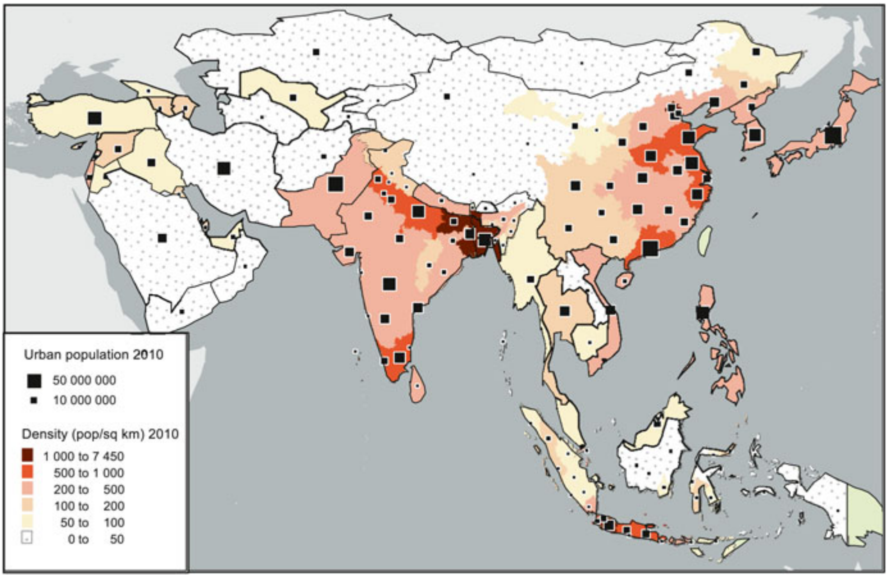

Fig. 1.3 Population Density and Urban population in 2010, Asian countries and provinces of China, India, and Indonesia

This decision to merge national and subnational statistics results in a rather unusual set of maps (Figs. 1.2, 1.3 and 1.4) in which we combine the 101 administrative regions of China, India and Indonesia with the remaining 43 Asian countries

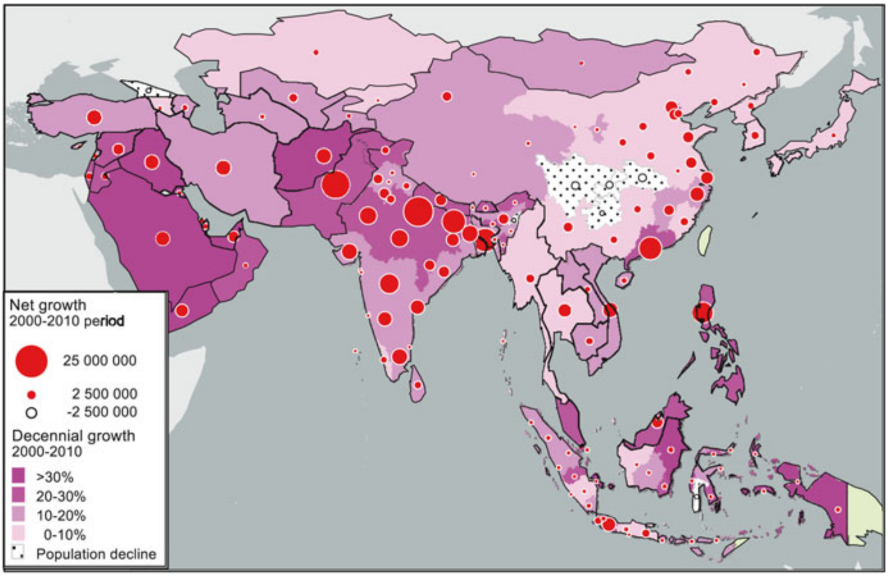

Fig. 1.4 Net population growth and growth rate, 2000–2010, Asian countries and provinces of China, India, and Indonesia

treated as individual units. When the total population of these units in 2010 is compared, it becomes apparent that these sub-regions are on par with the rest of Asian countries. Indian states can clearly compete with neighboring countries, with Uttar Pradesh comparable to Pakistan or Bangladesh or Kerala akin to Sri Lanka. Chinese provinces are also on par with the Koreas to the East and to countries of mainland Southeast Asia like Viet Nam or Thailand. In Indonesia, Java Island stands out as an extremely populated area and five of its six individual provinces are larger than most neighboring nations, including Malaysia. Figures 1.2 and 1.3 also reflect faithfully the distribution of population across the continent and its various density levels. India, along with Eastern China and Java-Bali in Indonesia, are clearly among the most densely populated areas in Asia and in the world. They have inherited from the past dense settlement patterns that follow in particular river basins (Huang He, Ganges, etc.) and the rich volcanic-derived agricultural areas of Java. The impact of demographic modernization remains limited on this population landscape that has long been dominated by the prosperity of agricultural systems and access to irrigation, an advantage reinforced by the progress from the Green Revolution.

Yet, current growth reflects a more complex combination of traditional demographics in less developed areas and unequal economic development over national territories. The next map (Fig. 1.4) summarizes recent demographic trends for the same set of regional units: we use both absolute and relative population growth for the 2000–2010 decade. Interestingly, many parts of China and Indonesia almost disappear from the regional map of demographic growth while India (along with parts of West Asia) takes a central position. Several Indian states still experienced fertility levels above three children per woman during the previous decade. The resulting growth measured in North India and especially in Uttar Pradesh and Bihar is considerable. Fertility remains the primary engine of demographic change and generates formidable growth in some states that may be comparable or higher than observed in other heavyweights such as Afghanistan, Bangladesh and Pakistan.

The picture we get of China and Indonesia is rather different. The distribution of growth rates is more heterogeneous and it ranges across regions from negative levels to rates well above 2 % a year. Most noticeable on Asia's map is the regional cluster in Central China made of provinces recording a net demographic loss. These adjacent provinces of Sichuan, Chongqing, Hubei and Guizhou constitute a gigantic region of 200 million people that mostly coincide with the upper and middle Yangtze River basin. It has long been one of the densest landlocked parts of the world, with density levels higher than in many deltaic regions thanks to the water of the Yangtze and its scores of tributaries. But this immensely rich agricultural region is probably the largest region on earth recording a net population decline.[7] It lost about six million inhabitants during the last 10 years. Population declines elsewhere in Asia – including Georgia and Indonesia's South Sulawesi – have been almost negligible. What is also startling is that this area of demographic decline in central China contrasts with nearby regions along the coast such as Shanghai, Zhejiang, and Guangdong where the population grew by about 20 % during the last intercensal period. In the same manner, low-growth Indonesian provinces in Central and Eastern Java border western provinces such as Banten where the population has increased by more than 30 % in 10 years.

Contrary to the Indian scenario, regional fertility differentials play a minor role in determining these diverging demographic outcomes in China and Indonesia. In fact, variations in fertility levels across regions tend to be more modest in these two countries.[8] They still contain a few provinces with distinctly higher fertility levels such as in West China and in Indonesia's Papuan provinces, but these are sparsely populated areas with minor impact on the overall demography of China and Indonesia. What the growth differentials visible on the map illustrate is in fact the increasing weight of interprovincial migration in setting the pace of population dynamics in these countries. The demography of these high-growth regions is now to a large extent shaped by the volume of internal population redistribution. The fastest growing regions include the most dynamic metropolitan areas around cities like Jakarta, Hangzhou, Shanghai and Guangzhou. In addition, smaller regions of rapid demographic growth fueled by intense in-migration such as Delhi, Tianjin or Beijing may not be visible on the map, but have often recorded a decadal growth above 30 % before the last census.

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[7] The only comparable situation is found in Russia, which lost three million inhabitants during the previous decade.

[8] We have been unable to find a consistent set of fertility and mortality indicators at the subregional level for China, India and Indonesia for preparing similar maps of demographic differentials across Asia. This is mostly due to the paucity of quality demographic estimates for Chinese provinces.

This comparison of growth differentials across China, India and Indonesia emphasizes a major transformation in population dynamics in Asia related to the components of demographic growth. We usually distinguish its three distinct components as total births, total deaths and net migration. But variations in mortality now play almost no role in these growth differentials. In spite of significant mortality differentials across regions, described most notably in chapters by Nandita Saikia on India and by Suharsono Soemantri on Indonesia, longer life expectancies have a limited impact on observed death rates that are already lying within a narrow range of 5–10 per 1000. Moreover, the three studies of recent mortality trends suggest that improvements in survival rates are slowing down. This means that death rates are no longer an important factor in growth differentials. As a matter of fact, regions where higher mortality levels have been identified such as North India and Eastern Indonesia are on the contrary characterized by sustained population growth because of high fertility.

This paradox is also true at national level and Fig. 1.5 details the variations observed across China, India and Indonesia since the 1950s. In spite of the demographic disaster during the Great Famine of 1958–1961, mortality improvements in China are well ahead of other countries. China's lead in life expectancy was already more than 10 years in 1970, and remains wide today, with Chinese living 5 and 10 years longer than Indonesians and Indians respectively. The mediocre progress of India is highlighted by its current mortality level, which corresponds to that of China 30 years ago. Separate estimates of infant mortality (mortality during the first year of life) tell the same story and put India's level in 2010 at that attained by China in 1985 and by Indonesia in 1995. The cumulative effect of India's health backwardness in the future decades is also illustrated by the mortality forecasts that place

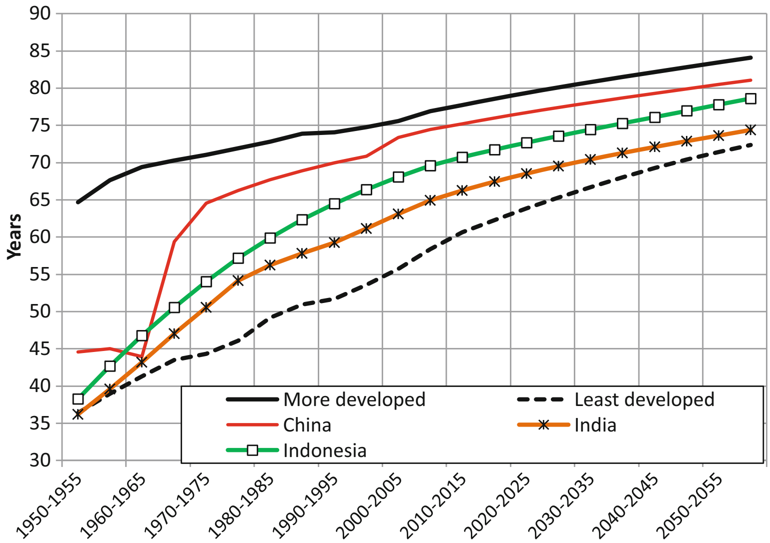

Fig. 1.5 Life expectancy (both sexes) in China, India, and Indonesia, 1950–2060

India's life expectancy well behind that of China and Indonesia for the next 50 years. Yet China's progress in lowering mortality rates has not closed the gap with more developed nations in which life expectancy is still higher. The miracle witnessed in China on the fertility front has not been replicated in its fight against mortality as other countries in Asia such as Singapore or South Korea are well ahead.

The gains in life expectancy recorded by China have, however, not boosted its overall growth rates. This reminds us of the primary role of higher fertility in determining the pace of demographic growth. Figure 1.6 illustrates the success stories of the three Asian giants in lowering their birth rates. Fertility today is close to or below replacement level, while it was almost six children per woman after World War II. China's distinctive demographic history starts around 1970 when the total fertility rates plunged by three children per woman in a single decade. The decline continued over the next decades with the further impact of the drastic family planning measures introduced around 1980. While the exact fertility level is still a matter of dispute, as discussed in detail in Guo Zhigang's chapter, it is undoubtedly well below two children per woman and has probably been roughly identical to rates observed in industrialized countries since 2000. India's very regular decline in fertility levels will lead very soon to less than 2.1 children per woman. Indonesia projects in comparison a somewhat unexpected profile: in spite of a sustained decline since 1970, TFR levels seem to have recently plateaued at a level around 2.5 children. The contribution of Terence Hull to this volume offers a more detailed discussion of the estimation issues involved and the potential factors behind the current stalling. United Nations figures do however predict a similar continuation of fertility decline in both India and Indonesia, with a convergence towards Chinese levels expected before 2050. Christophe Guilmoto's chapter also suggests that the rate of

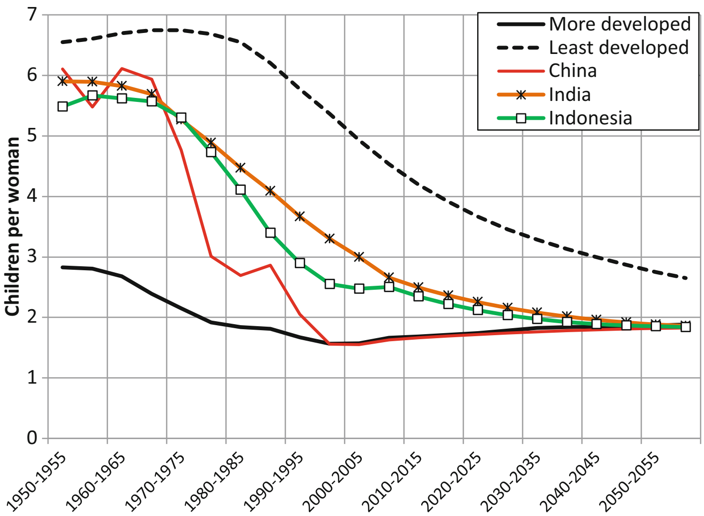

Fig. 1.6 Fertility levels in China, India, and Indonesia, 1950–2060

decline is most probably underestimated for India, with significant implication on its future growth prospects. It may be noted that fertility is one domain in which most of the authors in this volume tend to question the validity of United Nations estimates reproduced in this introduction.

We can draw an overall picture of spatial differentials within these three countries and distinguish fertility- from migration-driven regions. Easily identifiable are the regions where fertility, close to or above three children per woman, remains the major driver of demographic growth in East Indonesia or North China. Yet, the analyses of China, India and Indonesia demonstrate that this pattern of demographic determinism is gradually changing as many regions now have fertility levels close to or below replacement levels. With the advance of contraception, many women in Java or in South India now have fewer than two children and this observation applies as well to rural areas. Fertility in many Chinese provinces is even reaching ultra-low levels. Fertility levels are undoubtedly close to one child per woman in several provinces of China, a feature also observed in Taiwan. Census estimates, to be used with caution, point to fertility levels as low as 0.7 children per woman in Chinese metropolitan regions. India and Indonesia have not followed China's roadmap towards ultra-low fertility. TFR levels in South India have for instance plateaued at around 1.7 children per women over the last 20 years and the same observation can be made about pioneer areas of fertility decline in Indonesia in Central and Eastern Java or in Bali. In the latter country, as discussed in the chapter by Terence Hull, a minor fertility rebound has even been observed and linked to changes in marriage patterns, leading to a slight rise in TFR levels during the previous decade in many provinces across Indonesia.

In many provinces across China, India and Indonesia where fertility is now close to or below replacement level, birth rates are becoming increasingly influenced by the population's age structure. The impact of the demographic bonus, characterized by a historical swelling of the working-age population, tends to inflate the number of annual births in spite of diminishing fertility levels; age structural changes tend to both reduce death rates and raise birth rates independently of long-term improvements in longevity and fertility reduction. This is of course only a passing phase. When analyzing these trends at a regional scale, these structural effects of population composition on vital events get further magnified by the growing impact of migratory moves. This explains in turn why our analysis of growth components is now increasingly moving from a prior focus on fertility trends towards the mounting role of spatial mobility. Although the transmigration program in Indonesia achieved fairly large-scale redistribution of population in certain periods (Hugo et al. 1987, Chapter 6), on the whole in the three countries migration has long played a minor role in population growth and its demographic impact was discernible only at micro regional level.

While net in-migration to urban areas was common, China, India and Indonesia had long been characterized by modest levels or urbanization (Table 1.1). Though the world's urbanization level reached 30 % in the mid-1950s, China and Indonesia attained this level only four decades later during the 1990s and India's average was still below 30 % before the 2011 census. The gap in the proportion living in urban areas is therefore considerable between Asia and the rest of the world, in spite (or because) of Asia's record levels of population density. There are in fact large areas of very dense population concentration that are classified as rural despite sharing many aspects of urbanity (transportation network, access to infrastructure, collective housing, non-agricultural occupation). Many of these "rural" regions in China, India and Indonesia were even specifically identified by the Indonesian label of *desakota* for "rurban areas" (McGee 1991). Yet, what has changed here is that in spite of the continuing progress of urbanization in our three countries, population moves have also affected non-urban areas and sprawled over large regions far beyond official municipal limits. Economic growth long centered on a handful of specific cities has spread through seemingly spatial ripple effects that have affected entire regions. This is for instance illustrated by the growth of Guangdong province in Southeast China, of Northwest Java and of Northwest India where the original urban hubs of Shenzhen, Guangzhou, Delhi and Jakarta have given way to new fast-growing peripheral cities that have developed into new economic poles of their own. The chapter by Tommy Firman provides in particular a very detailed geographical analysis of urbanization processes.

The end result of this gradual transformation of population dynamics is the increasing role played by migration systems. Natural increase – resulting from declining fertility and increasing longevity – is shrinking and approaching zero, and becomes consequently more affected by the structural composition of the population than by actual variations in fertility and mortality levels. But this growing insignificance of the historical determinants of demographic growth is exacerbated by the role of migration that has replaced family-building and survival as core processes of population change. Aforementioned regions in China that have recorded net population decline are not the regions with the lowest fertility levels in the country, but they simply represent regions where the migration drain has been the most considerable (Gu 2014). On the contrary, it is in a few metropolitan areas – where fertility is at ultra-low levels – that unusually rapid demographic growth has been observed thanks to the continuous influx of migrants. Guo Zhigang's chapter demonstrates how the floating population in cities has distinctly higher fertility. This process is of course mainly visible in China, where the natural increase is almost negligible. But it is going to affect many more regions in Indonesia and later in India where growth outcomes will be dictated more by local economic developments and downturns than by the reproductive strategies of households.

Demographic Recomposition

Almost half of the essays in this book are concerned with dimensions of population change that go beyond traditional demographic indicators. As we argued, natural increase per se may even become irrelevant in shaping population growth while aspects related to the population composition acquire a growing importance. Quantity is slowly giving way to quality in the discussion of population change while redistribution processes and heterogeneous regional trajectories become crucial aspects in demographic analysis. Regional economic sustainability – rather than fertility levels – is becoming the key to understanding population dynamics. Even the rural-urban divide is of lesser relevance than spatial gaps in economic development as the fate of the upper Yangtze basin illustrate, where urbanized areas are also losing population to coastal provinces. We will now review other prominent aspects of the changing population composition in China, India and Indonesia.

The Age and Sex Transition

This book documents the changing age composition as a distinct dimension of Asia's emerging demography. The age structure changes that receive the greatest attention in the population and development literature are related to the demographic dividend (always in a positive light) and to ageing (usually in a negative light). The two, of course, are intimately related, and one cannot occur without the other; the ageing process is primarily a delayed spin-off of the earlier faster growth of the working-age population than of the dependant population, resulting from fertility decline. Therefore care should be taken to avoid excessively positive or negative inferences and to ensure that the process of age transition as an important element of the developmental impact of population trends is treated in a holistic manner.

It is in the developed countries of East Asia that these processes have gone furthest, and much academic attention has been given to their experience. In thinking through the implications of age structure changes in China, India and Indonesia, lessons may be drawn from the literature on the developed East Asian countries. A key point is that the rising share of the working age population in the total population has been credited with a significant contribution to the economic growth achieved, though one embedded in a broader context of economic structure and policy measures that have facilitated the remarkable economic successes of these countries. One estimate is that over the 1960–2000 period, the demographic dividend contributed 9 % to China's economic growth, and between 13 and 19 % to that of South Korea, Singapore, Thailand and Taiwan (Mason and Kinugasa 2008: 394). These are substantial contributions, though clearly only one element in the set of determinants of economic growth in these countries.

An important claim with substantial empirical backing is that in addition to the generally acknowledged demographic dividend, there is also a second demographic dividend, resulting from the effect of increased longevity on savings rates. Focusing on consumption and savings over the life cycle, the argument is that increases in longevity lead to increases in the duration of retirement, and recognizing this, individuals increase their savings over their working years so as to finance increased consumption needed during the retirement years. There are also other ways in which changes in mortality may influence savings (Mason and Kinugasa 2008: 395–6), which we will not elaborate on here. Of course, much will depend on the political, economic and social institutions in the countries concerned, in particular the form of support systems for the elderly. However, the second demographic dividend argument may serve to undercut to an important extent the pessimism and indeed alarm permeating much discussion of ageing.

The notion of demographic dividends based on East Asia's experience has now circulated widely (Bloom et al. 2003) and the population bonus is viewed as a crucial demographic asset in China, India and Indonesia. Each country has its own pace, but fertility decline has invariably caused a gradual reduction in the dependency ratios. Dependants, who typically have net income far below their consumption level, had a ratio of about 80 to every 100 working-age population in our three countries by 1970, following a sizeable increase since World War II that was mostly caused by rapidly declining child mortality, exacerbated in China's case by the fertility rebound that accompanied the post-famine recovery during the 1960s.[9]

The three countries had several similar demographic conditions at that time: fertility levels were close to 5 children per women, annual population growth rates were close to 25 per 1000 and each country had an equally small proportion of population aged 65 years and more (around 3.5 % of the population total) (see Table 1.1). Less than 20 % of population was living in urban areas. The only significant variation in demographic parameters was found in human development indicators since China already had a life expectancy higher by 10 years than its Asian rivals and literacy rates were already distinctly better (see Figs. 1.5 and 1.9).

China, India and Indonesia reached a historically high dependency ratio in 1970, with almost one child or old person to every working-age person in the population (Fig. 1.7). In Indonesia and more so in India, where many adult women are not active, the real dependency ratio computed as the ratio of non-workers to workers – rather than by age groups – was no doubt much higher. Interestingly enough, the downturn in dependency ratios occurred in the three countries at exactly the same time in 1970 and at almost the same level (around 80 % for China and India, and 87 % for Indonesia). This evolution sets them clearly apart from the trend observed in poorer countries, where dependency ratios continued to deteriorate till the 1980s and are today significantly higher than in our three Asian countries.

What followed the near simultaneous turnaround in China, India and Indonesia was, however, rather different. As can be guessed from its rapid fertility decline, China took the lead and recorded a dramatic decline in dependency ratios for the next 40 years. These have now leveled off in 2010 at 36 %, a burden of dependency that is more than twice smaller than in 1970. If we convert it into demographic dividends, the number of working-age inhabitants per young and old dependant, China has now 2.7 adults per dependant. This indicator could certainly be adjusted to take into account the increased duration of studies that delay entry into the labor force and the observed participation rates by age and sex that are far from being uniformly 100 % from 15 to 65 years. But such refinements would not change the main message: China's abrupt age transition has brought about a formidable rise in the work-

[9] Dependency ratios used here are the ratio of the population aged 0–14 plus those aged 65+ to the population aged 15–64.

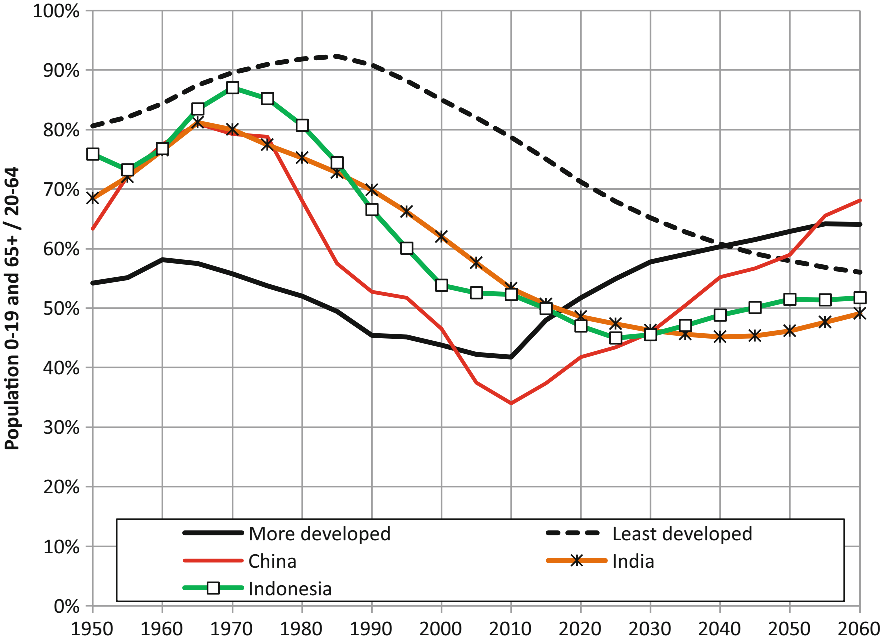

Fig. 1.7 Dependency ratio in China, India, and Indonesia, 1950–2060

ing age population with extensive implications for the country's and its households' wealth, mostly through saving and investments. That this period coincides with the launch of the economic reforms and of the strict family planning policies provides an additional dimension to the singular story of China's recent development.

The respective role of government's initiatives and regulations, reproductive and economic behavior of households, and increasing market forces in this revolution is indeed at the centre of many studies of China, and the respective causality of these intertwined processes of demographic, political and economic change is the subject of much relentless academic debate. Less disputed is the scenario likely to unfold in the coming decades – when below-replacement fertility ceases to have a positive impact on the overall age structure. Ageing will take over as the driving force of China's demographic change. Since the beginning of the century, China had reached a dependency ratio lower than that of rich countries where the impact of shrinking birth rates has started being felt. But the story of the more developed countries is now being replicated in China with a rapid rise in the proportion of elderly in the population. As Fig. 1.8 clearly illustrates, the year 2010 marks a turning point for China as well as for the industrialized world: the proportion aged 65 years and more is now increasing faster than ever, adding about 5 percentage points per decade in China. The acceleration in China means that by 2040 the country will have a larger proportion of its population aged more than 65 years than industrialized countries and the situation will worsen after that unless China's TFR level soon recovers from its present level.

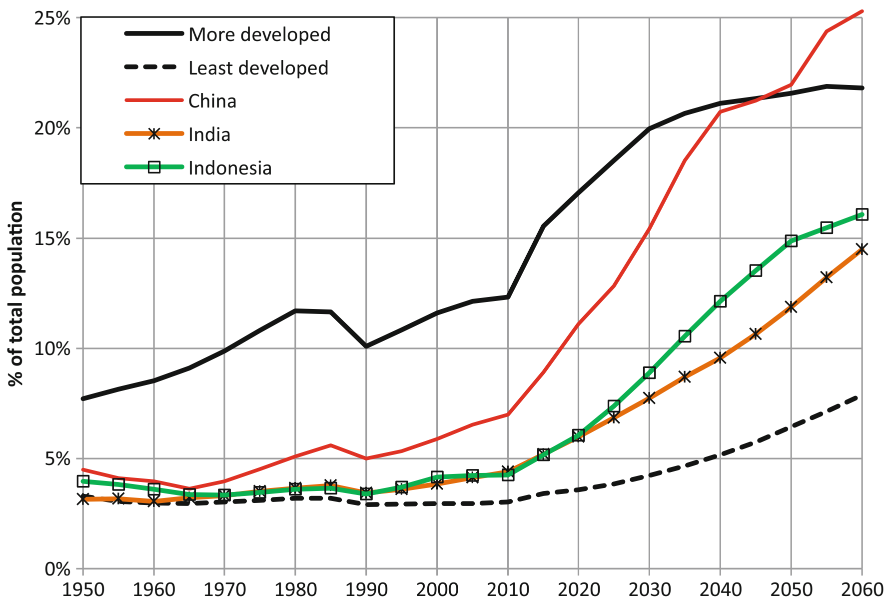

Fig. 1.8 Population above 65 in China, India, and Indonesia, 1950–2060

As Gu Baochang argues in his chapter, ageing in China is in fact a total process affecting the entire population, rather than a development happening at the top of the population pyramid. Indicators of age structural change in China examined over a longer period appear almost symmetrical. According to the United Nations' median scenario, China's population composition will gain during the next 50 years almost the same number of old dependants as it lost child dependants during the previous 40 years. The dependency ratio will rise back to 75 % in 2060 and oscillate around this level till the end of the century. The worker to non-worker ratio will rebound and return to the low level of 1.33 by 2060. Ageing will become the new motto of China's demography.

China's experience in demographic change may be unique for its tempo and its implications on the world's demographic balance, but the patterns are familiar and reproduce what has been observed elsewhere in East Asia. Is China's evolution going to be replicated in India and Indonesia? In these two countries, dependency ratios have also started their descent during the 1970s. Starting from a slightly higher level, Indonesia followed the same route as China till the end of the twentieth century with a gap of about 10 years. But fertility decline in Indonesia was not as swift as China's. Indonesia's decline in dependency ratios did not occur at this pace, was stretched over several decades, and fertility is now stalled above replacement levels in most provinces. As a result, age structural transformations were more gradual than in China. The dependency ratio will reach its nadir only in 2025 according to UN forecasts and this date may even be delayed if the current and unanticipated fertility rebound continues during the present decade. The lowest expected dependency ratio will be 45 % in 2025, a level significantly above that of China today. Yet, as the chapter by Evi Arifin and Aris Ananta demonstrates, Indonesia's age structure differs widely across its regions and some of them have already entered a phase of rapid ageing. The working-age population in Indonesia will represent 2.2 times the dependent population by 2025, a level lower than China's peak. But Indonesia's demographic advantage over China will become apparent later on. The demographic window will last longer and by 2100, indicators of age composition in Indonesia will still be more advantageous then what was observed in 1970. The incredibly rapid ageing process threatening China is already unfolding as India and Indonesia have only started to reap their demographic dividends.

The chapter on fertility trends in Indonesia by Terence Hull suggests that some of basic hypotheses on future demographic change may exaggerate the tempo and extent of fertility decline. While its immediate implications for current population growth may not be favorable, delayed fertility transition will definitely extend the window of opportunity and alleviate the counter-effects of population ageing in the decades to come. No such alternative scenario exists for India, where the analysis of fertility trends in our volume contends on the contrary that all demographic forecasts have been rather pessimistic about India's achievements.

Variations in age structural transition among China, India and Indonesia appear to be in both tempo and quantum. India and Indonesia display a much smoother evolution in view of their slower and later fertility transition, with a longer window of opportunity as a consequence. But the overall cumulative impact of the changes in age structure may be the same. In fact, if we average dependency ratios over the 1970–2100 period, we find almost identical values for the three countries. China's advantage will therefore lie in its capacity to conquer markets earlier through the rapid deployment of its labor force in an increasingly globalized world. India and Indonesia are still coping with a larger child population and have not been able to invest as fast in infrastructure and human capital. But China should also pay the pioneer's price in being forced to develop at accelerated pace a new social insurance system to take care of its rapidly ageing population. India and Indonesia will definitely learn from China's lessons and they will both have additional decades to redesign their social policies in order to accommodate the forthcoming change in their population composition. In view of the vulnerability of social systems in the face of ageing described by Premchand Dommaraju in his chapter, a complete revolution is needed in India to save the future elderly from risks of isolation and destitution.

The same reasoning also applies to regional units within China, India and Indonesia. The forerunners of fertility decline – regions located in South India, Central Java or Eastern China – have benefited earlier from the demographic dividends accruing from the reduction in their dependency ratios. Other regions are in a less favorable position since their age structural transition has been delayed by the slow decline in fertility rates. This is most notably the case of several North Indian states and of more peripheral regions in China and Indonesia. But there is an important demographic caveat to this generalization. Dynamic regions will also profit from constant inflows of adult workers. Their age structure will not simply reflect their past fertility history. On the contrary, regions in relative economic decline such as Central and Northeast China are losing their labor force and are ageing faster than past fertility trends would suggest. There will be clear regional winners and losers. Less developed areas will continue to lose their working age population and their human capital through sustained migration. The fast tempo and magnitude of spatial redistribution within China – unequalled anywhere else in the world – suggests that regional divides will widen and add structural demographic inequalities to existing economic imbalances as the chapter by Zheng Zhenzhen and Yang Ge shows. India and Indonesia have been far less affected by these migratory exchanges so far and gaps in demographic dividends are for the most part linked to differences in the onset of fertility decline. But continuing economic growth and its concentration in a few regions of India and Indonesian is likely in future to generate more migrations.

A rather similar structural change is also affecting Asia in its demographic foundations. The continent has become increasingly masculine under the influence of sex differentials in mortality in the past and the emergence of prenatal sex selection during the last 25 years. Of late, sex selective abortions have emerged as the prime cause for distorted sex ratios at birth that are far above the biological average of 105 male births per 100 female births. Prenatal sex selection results from recent transformations such as fertility decline and the availability of modern sex selection technology (typically prenatal diagnosis followed by abortion), but the root cause is much older. It stems from entrenched son preference within families and communities, leading parents who want to both ensure a male progeny and limit family size to avoid the birth of unnecessary daughters.

In fact, while the world's population should be mostly feminine because of women's mortality advantage, Asia has tipped the scales towards men. The current sex ratio in the world is 102, thanks to the contribution of China and India whose overall sex ratio is close to 107. Recent estimates put at 117 million women the total number of missing women – the difference between the observed female population and the expected female population if sex ratios did not reflect any prenatal and postnatal discrimination (Guilmoto 2012). Most of them are missing from India and China. This phenomenon that has spread to many other countries, including South Korea and Viet Nam, has, however, not affected Indonesia. The reason for this dissimilarity with China and India lies primarily in the relative absence of son preference across Indonesia and ultimately to very different kinship systems. Bilateral kinship systems are dominant in Indonesia – as in many parts of the world – and parents have no reason to discriminate against female children. The absence of prenatal sex selection is also related to the absence of significant excess female mortality at various age groups in Indonesia, whereas chapters on China and India illustrate from various data sources the extent and evolution of excess mortality among girls – including the gradual decline of excess mortality in China described by Zhongwei Zhao and his colleagues.

Yet, population pyramids in China and India will be skewed at the expense of women and imbalances will slowly spread across the age structure till the last birth cohorts affected by sex imbalances die. As the sex ratio at birth is still significantly skewed in China and in many states of India, the overall impact should therefore be felt till the end of the century and the demographic impact of current sex imbalances at birth will be considerable. The future surplus of adult men and its impact on marriage systems – the forthcoming "marriage squeeze" affecting especially men of poorer background – will have consequences on the entire demographic fabric of these two countries. While evidence on affected communities and their capacity to respond to sex imbalances is still limited, there is a growing consensus that almost all aspects of demographic systems will be impacted: reproductive and abortion behavior, nuptiality, internal and international migration, and health.

Education

The most important transformation in population composition in China, India and Indonesia probably does not relate to age and sex structures, but to changes in educational levels. This silent revolution has been at work in China, India and Indonesia over the last 60 years when newly independent governments reshaped their educational policies. Political priorities and efforts, however, varied greatly in each country and resulted in distinct trajectories in each country. A synthetic indicator of educational level is provided here with the average number years of schooling per period as recently estimated by Barro and Lee (2013). Figures shown here relate only to women since their education level has the strongest bearing on demographic trends. They demonstrate the tremendous progress accomplished by China, India and Indonesia since the 1950s when women had on average hardly more than 1 year of formal schooling. China added for instance a year to the educational attainment of its female population every decade. Yet, the gap between China, India and Indonesia has significantly swollen during the last decades as Fig. 1.9 illustrates.

Progress has been particularly slow and disappointing in India where women's average educational attainment is more than 2 years shorter than in China and Indonesia. It continues to have the largest illiterate population in the world. In fact, it remains the only country where educational achievements can still be measured primarily in terms of literacy (Table 1.1). While more than 80 % of the population was unable to read and write at Independence, this percentage has only gradually declined since then and illiteracy still affects more than 25 % of the population, a percentage that rises among women. Huge variations across regions and social groups are indicated by the 2011 census, with peaks of illiteracy observed in states like Bihar or Rajasthan where literates are still in a minority among rural women. The chapter by Bilal Barakat details the superimposed effects of gender, regional underdevelopment, caste and economic status and their links to poor educational outcomes. This development is in stark contrast with China's experience of continuous educational expansion. Illiterates had almost completely disappeared by the mid-1960s. Since then, enrolment at the primary level has been complete and the progress in China has mostly concerned the secondary level, and more particularly

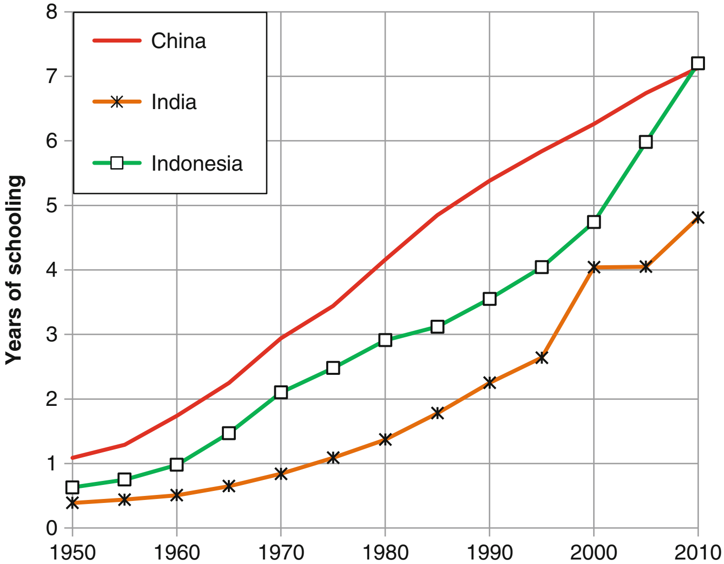

Fig. 1.9 Average number of years of schooling among women, 1950–2010 (Barro and Lee 2013)

the upper secondary level as shown in the chapter by Zhao Litao. The gender gap in education has also vanished, while regional and rural-urban variations persist. Indonesia's educational trajectory is in fact close to China's and far ahead of India's. 2010 census data used by Gavin Jones and Devanto Pratomo allow for a decomposition of correlates of higher enrollment and school achievements, leading to differentials similar to those observed in China: rural-urban gap, regional variations with Eastern Indonesia clearly disadvantaged, and the strong influence of poverty and socioeconomic status.

What two of our chapters also investigate, based on micro-data analysis, is the role of families in educational transmission: school enrolment of the youth emerges as a direct consequence of their parents' education level in India and Indonesia. Along with fertility differentials observed with education across all three countries, this mechanism is at the core of the virtuous spiral of the demographic dividends: parents with higher educational background tend to have fewer children and invest more in their education. Left to itself, such a process intensified by increased intergenerational transfers among prosperous households tends to deepen social and regional divides. In countries such as India where spatial mobility remains low and where illiteracy tends to self-reproduce in the less developed regions, the educational expansion over the last six decades has in fact widened the educational inequality across states. This is also true of Papua in Indonesia, a thinly populated fringe province that remains somewhat insulated from the social and economic dynamics of other islands. The joint processes of accelerated accumulation of human capital and of ageing have yet to spread to all corners of China, India and Indonesia.

The Role of Policy

Urbanization, female education and social composition have been the factors most commonly advanced in this review to account for trends and variations observed in the population dynamics of China, India and Indonesia given the new environment created by sustained mortality decline. There is of course a host of additional factors likely to have influenced the pace of demographic change in given regions and periods and they cannot be adequately summarized here. There are also more complex social mechanisms at work within families and communities to make these transformations in demographic behavior both desirable and sustainable, which are imperfectly captured by demographic studies based on statistical aggregates. But one dimension that deserves special attention is the role of governments in these processes (May 2012; Robinson and Ross 2007). The 1960s are the decisive period in this respect. First, it was the decade when demographic growth was at its highest, with 521 million new births in China, India and Indonesia, and respective governments did not fail to take notice of this spectacular increase. Second, it was at the same time that the concrete idea of reshaping the course of demographic change through policy intervention emerged. Population control became the slogan and subsequently received support from both international donors and national governments. Other efforts at influencing population dynamics received in comparison little support.[10] Finally, we should also note that without the downturn in population growth rates in China, India and Indonesia current world population would be 1.1 billion greater than it is.

While there is a discernible correspondence in the timing of the demographic downturn in China, India and Indonesia, there is far less agreement on the commonalities of their respective population policies. India's was one of the oldest population policies in the world, part of the Nehruvian scheme to modernize Indian society and the idea of government involvement in population control was indeed put forward in the 1950s. But the Indian project to support to family planning clinics was a move of limited consequence and it did not convert into more active and broader birth control initiatives. In fact, till the early 1970s, there was only modest government involvement in population matters in the three countries under study and during the population conferences held in Belgrade in 1965 and Bucharest in 1974 India and China strongly supported the official position endorsing economic development as the main engine of demographic change. Yet, the situation in the ground was far less dogmatic and about to change rapidly. In India, regional governments had already started promoting large-scale campaigns culminating in "vasectomy camps" organized in the early 1970s. In 1975, the Emergency period under Ms. Gandhi's regime gave the central government the capacity to enact coercive fertility regulations and to push for mass sterilizations. This period of forceful intervention did not last long,

[10] We may think here of two other famous demographic initiatives: Indonesia's long-standing transmigration policies promoting population redistribution across its islands or China's restrictive residential regulations aimed at discouraging spontaneous migration towards urban areas.

but ended in a disaster for the family planning administration, which was left paralyzed for the next 10 years. The Indian program remained focused on (female) sterilizations and worked through a vast system of incentives for clients and quotas for family planning workers, which largely remained in place for the next two decades. The resulting outcome was a slow yet unstoppable process of fertility decline throughout India since 1970.

Indonesia launched a national programme of family planning in 1970, mostly confined to Java and Bali, but reinforced and extended to the rest of the country during the rest of the 1970s. Working mainly through local family planning field workers and supported by the entire bureaucratic structure, the Indonesian program managed to increase rapidly the proportion of population using contraceptives during the 1980s. Planners probably learnt from the recent failure of India's efforts at introducing authoritarian measures and relied on reversible methods rather than sterilization (or abortion). But the Indonesian program also benefited from an early integration of health and fertility objectives, years before this approach was officially recognized by the Cairo Conference in 1994. In the 1980s, birth control was firmly part of the larger New Order agenda promoted by the Suharto administration throughout the islands. The family planning program had in particular withstood the objections leveled by some Islamic groups. But after the financial crisis and the fall of the regime in the late 1990s, and a radical decentralization of government functions, the family planning program lost some of its momentum, coinciding with a distinct faltering in the pace of fertility decline during the following decade.

In China, a moderate birth planning policy was inaugurated in the 1970s and chiefly based on supply of birth control methods and recommendations – with "later, longer, and fewer" as the main slogan. Then in 1979, the one-child policy was introduced, ironically when the government was liberalizing its economic policies and after a period of sharp decline in fertility rates during the 1970s. The new policy underwent several amendments during the early 1980s, but kept its strong coercive component. In spite of its name, the one-child policy concerns mainly urban residents and civil servants, among whom it is more systematically enforced. In most Chinese rural communes, parents are allowed a second child following the birth of a daughter, a flexibility reflecting persisting gender bias during a period also marked by sweeping land reforms that benefited male peasants. In minority-populated and under-developed regions, regulations are less rigid and couples may even have a third child. The main characteristic of China's family planning policy was, however, its forceful implementation throughout the country, supported by access to a large range of contraceptive methods and abortion.

This brief summary outlines some of the main characteristics of the population policies of China, India and Indonesia and stresses some obvious differences in their duration, implementation and perhaps overall performance. India's program, the first introduced, was probably the weakest among them and certainly the less vigorously implemented if we except the Emergency episode. China's birth control program was rigorously enforced, leading to human rights abuses, but seems to have been the most effective in reducing fertility rates. In contrast, India's notorious "soft state" was apparently less successful at eroding traditional reproductive norms and bringing down birth rates, just as it failed to rapidly improve health and education conditions. Weak political infrastructures, democratic rule, and a highly diverse population combine to curb public action. Less democratic settings such as socialist China and Suharto's Indonesia are perhaps more favorable to active government involvement in reproductive behavior than India's vibrant political environment, where the opposition to aggressive birth control policies is well established.

It is less clear whether program outreach and performance can be linked mechanically to fertility outcomes and how much of fertility decline should be attributed to the success of family planning programs. This issue has been much debated (e.g. see Pritchett 1994; Bongaarts 1997). It is noteworthy that the decrease in fertility rates was not more rapid in China after 1980 – when the one-child policy was implemented – than in India or Indonesia. Trends shown in Fig. 1.6 indicate that the bulk of the fertility decline was accomplished in China prior to the 1980s and that it proceeded later on at a pace parallel to that observed in the two other countries (Wang et al. 2013). Interestingly, current estimates place India's fertility level (and indeed, that of Myanmar, whose government was long hostile to family planning) below that of Indonesia in spite of the latter's celebrated family planning system. The current stalling in Indonesia may be explained by recent social transformations, calling into question the sustainability of a program-dependent fertility decline. In contrast, India's fertility decline is inscribed in deeper changes of its social institutions and has therefore been somehow immune to changing political and economic circumstances.

Some would argue that while governments still play a crucial role in providing access to contraceptive technologies, they have little sway on the demand factor. Yet others would argue that the small family norm is now socialized in the Chinese and Indonesian populations, in no small part because of the communications efforts of their family planning programs. The lesson from China, India and Indonesia seems to be that it takes a strong government, a well-functioning bureaucracy and a somewhat homogenous population to launch an effective fertility control program. Very few of these conditions are met by the less developed countries where fertility is still very high, starting with Pakistan and Nigeria which are the largest in this category. In any case, the consensus since the ICPD in Cairo is that targets for reduction of fertility should be replaced by reproductive health approaches, so the earlier strategies adopted in China, India and Indonesia are unlikely to be adopted in other countries still facing issues of rapid population growth.

Conclusion

This volume attempts to survey in a very classical sense the main facets of demographic transformations of the three Asian giants in order to highlight some of the major emerging issues and unexpected twists in demographic change. This has led to chapters following a somewhat comparable format revolving around the main staples of demographic analysis from fertility to ageing, leaving aside for reasons of space many other aspects of population dynamics. The exercise is not always easy, for social science research across Asia remains strongly segmented along national lines and tends at times to ignore the lessons to be gained from the experience of their neighbors. Comparing countries of large size as we have done facilitates the development of similar approaches to investigate crucial dimensions of demographic change such as its schedule and pace, its social and regional disparities and potential convergence, and the complex inter-relationships between its different components.

The chain reaction from mortality decline to smaller family size, demographic bonus and looming ageing follows a somewhat familiar and well-documented pattern. Asia since the rise of its four tigers in the 1960s has long provided examples of demographic success stories. But these small countries were hardly comparable with most other Asian countries, mostly because of their size. South Korea was the largest among developing countries in Asia with 32 million inhabitants in 1970. They were also very homogenous in sociological terms. As a consequence, two features essential for understanding China, India and Indonesia are missing from the main demographic narrative of the Asian miracle as seen from the Tigers' experience: the initial conditions of marked diversity – inherited from an extensive geography and various historical trajectories – and the subsequent accelerating role played by population redistribution and interregional migration in demographic change. The detailed analysis of the three countries in our chapters never fails to stress the extent to which social, ethnic or economic differentials have determined distinct demographic pathways. All these factors tend to be cumulative and result in persisting differentials within countries, in which rural women from minority and economically deprived groups may display demographic outcomes akin to what is observed in Sub-Saharan Africa while privileged groups in cities compete with the population of industrialized countries in terms of life expectancy, access to college education, late marriage, low fertility, saving rates and rapid ageing.

Yet, even if the demographic profiles of these various groups and regions appear distinct, our comparisons suggest that their trajectories have by and large run parallel. The main difference in demographic outcomes within respective countries is often primarily an issue of schedule: who started first, who followed next, and who came last? The main factor behind gaps in demographic indicators observed at a particular time tends to be the period in which the process of demographic change started. This is typically the case for mortality and fertility decline, and consequently for aging and demographic dividends. But it appears true also of migration and urbanization processes and possibly of educational trajectories. When trends get closer to their potential threshold – such as below-replacement fertility, near-universal secondary education, or dense urbanization – , the process of parallel change and expansion gives way to a gradual convergence of demographic indicators that will level the demographic playing field. This phenomenon is still rare today and the only obvious illustration relates to fertility stabilization in East China as well as in South India. A gradual slowdown of mortality decline is also perceptible in the more advanced regions of China, India and Indonesia. Even if this new demographic equilibrium is far from achieved – with many tumultuous age waves bound to stir demographic systems during the next decades (Pool 2005) – the overall pattern seems surprisingly linear and provides for reasonably good forecasting of global demographic change.

Our analysis has also stressed the role of migration as a main source of disturbance to this master narrative. During the phases of demographic transition and educational expansion, migration has mostly benefited the most advanced regions, accelerating their successful transformation into prosperous areas and even prolonging their demographic achievements in spite of plunging fertility rates as seen in coastal China. The inverse and more traditional frontier migration model in which populations from the densest areas move towards peripheral regions has had only a moderate impact on the overall demographic dynamics. Migration towards rapidly developing zones may seem a perfectly logical response to economic opportunities and to the prevailing regional inequalities. But China's recent experience suggests that the ultimate result of this migration laissez-faire will be the accelerated demographic and social marginalization of entire regions, where ageing and male surplus will become the main demographic features.

The entrenched inner boundaries that characterize India's cultural and linguistic landscape have so far slowed labor mobility and population redistribution and as Ram Bhagat's chapter reminds us, large-scale migration towards places such as Bangalore and Mumbai has often fueled hostility and regional chauvinism. Instances of open conflict between locals and newcomers have also been observed in Indonesia and China, fueled by ethnic or cultural differences, land disputes and planners' myopia. It is not clear how long the gradual expansion of market mechanisms across these two countries will take to weaken cultural barriers and whether this will herald an era of larger-scale migrations. Trends monitored through most other demographic indicators, from mortality to age composition, seem to be somewhat linear and anticipatable, providing Asia's three demographic giants and their governments a formidable advantage in planning for the future. But the evolution of human mobility in China, India and Indonesia, closely intertwined as it is with changing economic conditions, appears less predictable and ranks high among the major challenges to demographic knowledge in the coming decades.

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Part I
Mortality

Chapter 2
Recent Mortality Trends in China

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Introduction

Analysing and understanding China's demographic patterns and trends must start with an appreciation of its extraordinary mortality changes over the past six decades. This transition can be divided broadly into two stages: very rapid mortality decline from the early 1950s to the late 1970s, and slower but still appreciable improvement in the next three decades. In the first period, China's life expectancy improved at an average speed of 10 years per decade. While China's life expectancy at birth was only around 35 years in the late 1940s, it rose significantly to 50 in 1957, 61 in 1970 and 65 in 1981 (Banister 1987). This change not only brought about a rapid population growth, but also laid foundation for an equally remarkable fertility transition later. This great achievement was directly attributable to a series of socio-economic transformations and public health campaigns and programs, such as nationwide land reform, establishment of government controlled food redistribution, effective control and prevention of infectious disease, rural cooperative medical system and urban free medical care, widespread primary education, and nationwide family planning program. Despite China's relatively low level of economic development at the time and that a large part of the population still lived in poverty, China's

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mortality decline was faster than many countries with similar or markedly higher socio-economic development levels. This together with the successful experience of some other countries, such as Sri Lanka and Costa Rica, were widely regarded as “routes to low mortality in poor countries” (Caldwell 1986). However, it is important to note that China’s mortality improvement was not smooth during this period. It was significantly interrupted between 1958 and 1961 by the famine. This great disaster, which was at least partially attributable to the policy failure and mismanagement by the government, led to a marked increase in mortality and China’s only population decline in the second half of the twentieth century (Zhao and Reimondos 2012).

Since the 1980s, China’s pace of mortality reduction has slowed to a level similar to that observed in the rest of the less developed countries but its life expectancy has been much higher. According to some estimates, China’s life expectancy reached more than 70 years by the end of the twentieth century (Banister and Hill 2004) and is now round 75 years. While the mortality decline in the first 30 years of the People’s Republic of China was highly related to or determined by major social changes and some institutional factors, the slower but still significant mortality improvement in the last three decades has been considerably affected by China’s rapid economic development and related factors. The Chinese government launched economic reform in the late 1970s, which resulted in one of the fastest growing economies in the world in recent history. China’s great social and economic transformation has brought about some negative consequences such as increasing inequality, the collapse of the rural cooperative medical system, and commercialization and marketization of medical services, which in turn led to some unwelcome health outcomes. The Chinese government has made major efforts to address these issues. This is particularly impressive in the areas of improving people’s standards of living, poverty alleviation, further improving education, especially the universal 9-year compulsory education, and establishing a nationwide new rural cooperative health care system. As a result, China’s life expectancy at birth continued to increase. Currently, it is about 9 years higher than the average of other less developed countries and only about 3 years lower than the average of the more developed countries in the world (United Nations 2013).

Following the above brief review, this chapter provides a more detailed examination of mortality changes in China in the first decade of the twenty-first century. In comparison with fertility research, mortality studies have been less developed in China. This is largely due to the fact that for a long time, the research interest of both governments and academics has been focused on fertility changes and China’s family planning program. While China’s mortality changes are also an important topic, research in this area has often been regarded as less urgent. The accessibility of detailed mortality data is a specific issue (Huang 2008). Because of that, it is also difficult to evaluate the quality of China’s mortality data and make required adjustments. In this chapter, we will examine China’s major sources of mortality data and comment on data collected by the 2010 census. Following that, we will examine China’s recent mortality trends and patterns based on officially published data.

China's Mortality Data

Major Sources of Mortality Data

China's mortality data are collected for different purposes by various government agencies, which include Ministry of Health (MOH), National Bureau of Statistics (NBS), Ministry of Public Security, and National Population and Family Planning Commission (Ministry of Health and National Population and Family Planning Commission were merged together and became National Health and Family Planning Commission in the early 2013).

The MOH has made great effort in collecting mortality data. It has organized three national retrospective surveys on causes of death. These surveys, conducted in the mid-1970s, early 1990s and 2006, aimed to review registered deaths and causes of death in China for the periods 1973–1975, 1990–1992, and 2004–2005. They provided very useful information for the study of age-specific mortality, causes of death, and their regional variations over these periods. The 1973–1975 survey covered 98.5 % of counties, which had a total population of 841.7 million people or approximately 93 % of the national population recorded at the end of 1974 (Banister and Preston 1981). The completeness of death registration for the survey was most likely to have fallen within the range of 80–90 %. The life expectancy during these years was within the range 61.7–64.4 years (Banister and Preston 1981; Rong et al. 1981). In the early 1990s and 2006, MOH conducted the second and third national retrospective surveys on causes of death. The two surveys collected information from a national representative sample and recorded deaths which occurred in the study years in approximately 150 counties. Because only limited data have been released for the second national survey, it is difficult to examine the quality of the survey data in detail. As for the third survey, the representativeness of sample areas and completeness of the survey were generally satisfactory, as indicated by the comparison with 2000 census results (Chen 2008).

In addition to the nationwide mortality surveys, the MOH has been collecting cause-of-death data through its Vital Registration (MOH-VR) system and Disease Surveillance Points (DSP) system, and child and maternal mortality data through its National Child and Maternal Mortality Surveillance Points system. The MOH-VR System was established in 1987 and it covered about 8 % (110 million) of the national population (Rao et al. 2005). The DSP system was established in 1990 and had 145 disease surveillance points nationwide. It covered 1 % (around 10 million people) of China's population (Rao et al. 2005; Yang et al. 2008). Death registration recorded through both systems was affected by under-recording (Rao et al. 2005), but the quality of cause-of-death data collected by the DSP is better than that obtained through MOH-VR, as the DSP sample is more representative and more effort has been made in verifying causes of death and in collecting data from a much smaller population.

The Ministry of Health has also been collecting data on child and maternal mortality since the early 1990s. The National Child and Maternal Mortality Surveillance

Points system was established in 1996 by integrating two earlier systems: National Maternal Mortality Surveillance Points and National Child Mortality Surveillance Points systems. The new system initially covered 116 county-level points and a population of 80 million. It further expanded to 336 county-level surveillance points, covering 140 million people in 2006. Generally, the system provides detailed information on under-5 child mortality, maternal mortality by age and the sex of children, and cause of death. The data (including live births, child and maternal deaths) reported by National Child and Maternal Mortality Surveillance Points system are obtained largely from hospitals, although it was claimed that all child and maternal deaths, including those occurring at home, were recorded in the surveillance areas from 1996. It is also worth noting that the surveillance system recorded only the death of children whose guardians lived in surveillance areas for more than 1 year and women who belonged to the surveillance areas according to the household registration.

China's National Bureau of Statistics (NBS) is another government agency that has played a major part in collecting mortality data. Such data were collected through recent population censuses (in 1982, 1990, 2000 and 2010) and 1 % population sample surveys (in 1987, 1995 and 2005), which generally recorded information about the age, sex, education, ethnicity, marital status and in some cases the previous occupation of those who died during the 12 months preceding the enumeration. The quality of death records made by the 1982 and 1990 censuses was high and this was particularly the case for adult mortality (Banister and Hill 2004). In recent years, however, the quality of the data seems to have deteriorated. Underreporting of infant and under-5 mortality was high in recent censuses and population sample surveys (Banister and Hill 2004; Huang 2008). NBS also conducts the Annual Population Change Survey every year, but this survey is less known. As far as mortality is concerned, the survey collects data about the age and sex of the deceased. These data have a good coverage, and the quality of data is relatively high. While the annual population change survey has been conducted from a sample of around one-per-thousand of the national population for the last 20 years, the data gathered by the survey have rarely been used in demographic research, especially the study of mortality changes.

The third government agency that keeps good death records is the Ministry of Public Security. It controls China's household registration system, which was set up nationwide by the household registration legislation passed by the National People's Congress in 1958. According to the legislation, all deaths should be registered within 1 month after the death. However, a large number of deaths are not reported to the local office of public security within the time period required by the legislation. For example, according to the 1982 census, 8 million deaths were not recorded in household registers over the period from 1964 to 1981 (Huang 2008). Despite their potential, detailed household registration data including death registration data have not been released and used in research.

Apart from the data sources discussed above, mortality data collected by other government agencies are also available. For example, detailed death registration including causes of death are made and kept in some large cities. China's National

Population and Family Planning Commission also gathered information on infant and child mortality through several fertility sample surveys. These data also provide very useful information for the study of mortality changes, especially changes in infant and child mortality in recent history, although they will not be detailed here because of space constraints.

Mortality Data Collected by the 2010 Census

Even though the NBS suggested the quality of China's 2010 census was very high and its net under-enumeration rate was only 0.12 %, mortality data recorded by the census were affected by three major problems: under-reporting of infant deaths, over-reporting of young adult deaths and under-reporting of old age deaths. They resulted in an under-reporting of mortality rates at these ages by either deflating the numerator or inflating the denominator.

Under-Reporting of Infant Mortality

Infant mortality rate was considerably under-reported by the 2010 census. It recorded that infant mortality was surprisingly low, at 3.8 deaths per thousand births. In contrast, infant mortality rate obtained from the National Child and Maternal Mortality Surveillance Points was significantly higher, at 13.1 per thousand in 2010. It should be noted that the MOH's surveillance points covered areas with higher levels of economic development and better health care and medical services. Accordingly, even the much higher infant mortality rate observed at the surveillance points was very likely to have been underestimated. When compared with mortality experiences of other countries, the 2010 census recorded an infant mortality rate similar to that observed in Northern and Western European countries where per capita GDP was some 5–6 times higher than China. On the other hand, in countries where the per capita GDP was similar to that in China, the infant mortality rate tended to be much higher. The above comparison of results suggests that China's census-recorded infant mortality rate was too low.

Double Counting of Young Adults

People in their age 20s were over-enumerated by the 2010 census. If we compare the size of the same birth cohort recorded by two successive censuses, for example censuses conducted in 2000 and 2010, survival ratios of all birth cohorts are expected to be lower than 1 at the time when the late census was undertaken. However, according to the 2010 census, survival ratios were greater or considerably greater than 1 in many age groups among those aged 20–40 in 2010. This pattern is particularly notable among female population (see Fig. 2.1). Chinese population has been

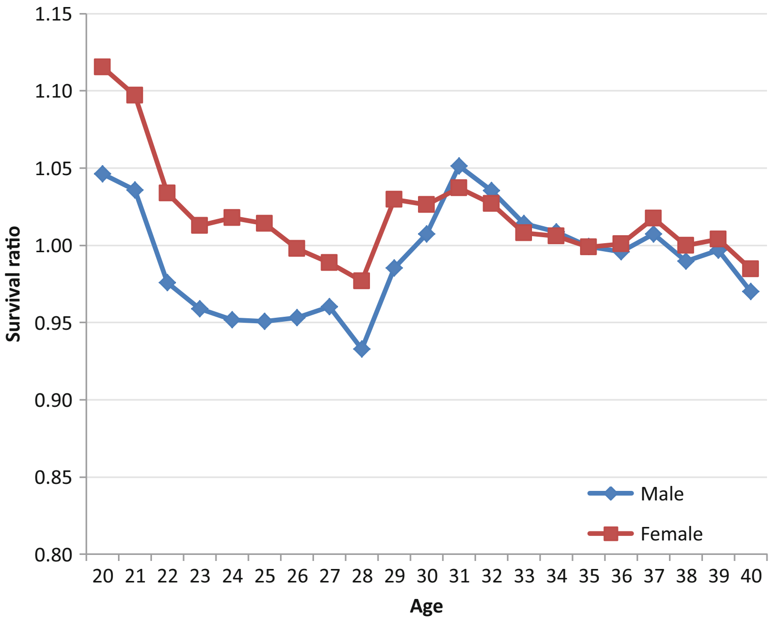

Fig. 2.1 Survival ratios computed over 2000–2010 for those aged 20–40 in 2010, China (Source: NBS (2002, 2012a))

largely a closed one where population changes caused by international migration have been rather small. Under this circumstance, population of the same birth cohorts would become smaller from 2000 to 2010. Survival ratios of larger than 1 were more likely to have caused by the following reasons. There was under-enumeration in 2000 census or over-enumeration in 2010 census, or both. Since under-enumeration of those aged 10 and over was unlikely to have reached a high level in Chinese censuses, the abnormal survival ratios were most likely to have resulted from over-enumeration in the 2010 census. This will be further explained below.

First, in the 2010 census, the authority changed the enumeration rules and registration procedures. In conducting the 2000 census, people were enumerated according to the *de jure* principle. In the 2010 census, both *de jure* and *de facto* methods were used. That is to say, migrants or the floating population were enumerated in both the place of their current residence, and the place where their household registration was held. This practice could effectively lower the impact of under enumeration, but it could increase the chance of double counting although the census authority suggested that the problem of double counting had already been eliminated before the census results were released.

Second, in contemporary Chinese population, infant and child mortality is already fairly low and the difference in its levels between males and females is rather small. Accordingly, changes in the sex ratio of male to female population will be small before people reach age 30 or higher. The 2010 census results showed that sex ratio for those aged 20–24 was 101. This was much lower than the sex ratio at birth of 110 observed in the late 1980s when they were born. This difference cannot be explained by the excessive male mortality. If it was not caused by significant under-enumeration of female children in the 2000 census, then it was more likely to have arisen from the double counting of females, especially female migrants in the 2010 census. Migrants or floating population have often moved away from the place of their household registration. Because of the new enumeration rules used in the census, they could easily be counted twice (Tao and Zhang 2013).

Thirdly, a comparison of census data with those from other sources also indicates that double counting indeed existed among people aged 20 and above as recorded by the 2010 census. Table 2.1 presents population of the same birth cohort recorded by different data sources. It shows that in comparison with the number of births reported by the NBS, the figure recorded by the household registration records, and the 2000 census, the number of people recorded by the 2010 census was notably larger. This may have been caused by the over-enumeration of population of these ages.

Under-Reporting of Deaths at Old Ages

Information recorded in household registers is used extensively in the Chinese censuses. It is common for census enumerators to produce a list of residents and then to interview these residents, as well as other people, and to fill the census form against this list. According to the household registration legislation, when a person dies, his or her household registration should be cancelled within 1 month. However, it is not uncommon that when people pass away, their registration may not be cancelled for a rather long time. The out-of-date information may still be filled in the census form. For a similar reason, people who died before the census may not be recorded by the census enumeration. This could arise from the fact that reporting death itself is a complex procedure. In addition, the family members of the deceased may do this intentionally, because it could bring some benefits to the family (such as continuing to receive the allowance previously given to the deceased). All these lead to an under-reporting of mortality at old ages.

Table 2.1 Population of same birth cohorts from different data Sources (in million)

Data source	Population age 20 in 2010	Population aged 21 in 2010
2010 census data by NBS	28.30	26.71
2000 census data by NBS	26.21	25.14
2010 household registration data by MPS	27.19	25.32
Number of births by NBS in 1989–1990	23.91	24.07

Source: Tao and Zhang (2013)

Because of the above registration problems, it seems important to adjust recorded mortality or to estimate China's recent mortality from different data sources. Despite that, we have decided not to make such adjustments in this chapter. Instead, we will assess the levels and trends of mortality through comparing mortality statistics from different data sources, especially the adjusted mortality data published by NBS. While these results have some limitations, they are sufficient in describing the major trends in China's mortality changes and their main characteristics.

Recent Mortality Changes in China

Changes in Life Expectancy at Birth

As mentioned earlier, China's most rapid mortality decline took place between the early 1950s and late 1970s. There are notable differences in mortality levels estimated by various researchers, but they all indicate that remarkable improvements in population health and mortality were made over this period. This can be easily observed from rapid changes in China's life expectancy at birth. Over the period between 1949 and 1957, life expectancy increased some 15 years. After the great famine, which resulted in a notable increase in mortality from 1958 to 1961, further mortality reduction added another 15 years to China's life expectancy between the early 1960s and early 1980s. During these three decades, except during the famine, China's mortality decline was on average faster than the decline in developing regions and the world average.

According to estimates made by the NBS on the basis of mortality data collected by the last four censuses (Table 2.2), mortality improvement was slow in the period from 1981 to 1990, during which life expectancy at birth rose by only 0.8 years. This was slower than the change in Japan and Taiwan at the points in time when they were at a similar level of life expectancy (Japan in the late 1950s and Taiwan in the early 1970s). In the next two inter-censal periods, China's mortality improvement gained pace. It increased by 2.8 years in the period 1990–2000. This increase, however, was still slower than that in Japan and Taiwan, where the same increase took only 5–7 years to complete. During the period from 2000 to 2010, China's life expectancy increased by 3.4 years, which was as fast as that in Japan and more rapid than that in Taiwan.

Table 2.2 Life expectancy at birth, 1981–2010, China

	Total	Male	Female
1981	67.77	66.28	69.27
1990	68.55	66.84	70.47
2000	71.40	69.63	73.33
2010	74.83	72.38	77.37

Source: NBS (2012b)

Rapid mortality improvement in the last decade has also been indicated by the data from the Annual Population Change Surveys (APCS) conducted by the NBS and those gathered from the Disease Surveillance Points (DSP) by the MOH. The data from these two independent systems show similar levels and trends (see Fig. 2.2) in mortality changes, although they are both affected by under-registration of deaths (Zhao et al. 2014). This is indicated by the markedly higher life expectancies computed directly from these data compared to those adjusted and published by NBS (shown in Table 2.2) and those estimated by the World Bank (plotted in Fig. 2.2).

Improvements in mortality were relatively slow in China in the last two decades of the twentieth century. This was closely related to the socio-economic changes at that time, and some of the negative effects they brought. China has achieved rapid economic growth in recent decades, but this is not without cost. In the 1980s and 1990s, the economic reform led to an increase in unemployment, the old medical care system collapsed in many areas, the commercialization and marketization of

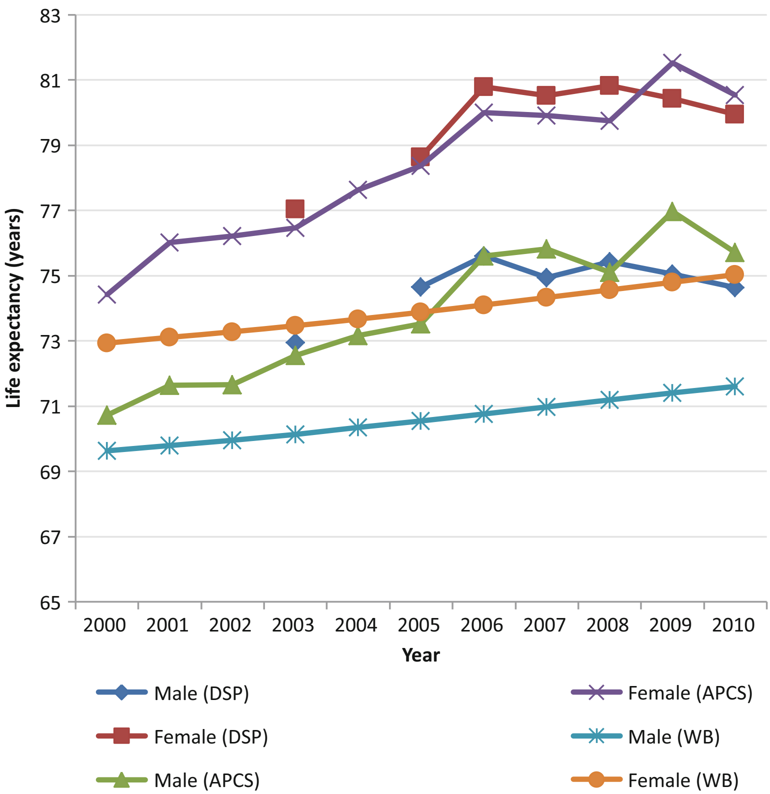

Fig. 2.2 Life expectancy at birth, 2000–2010, China. Note: Life expectancies in this figure are directly derived from various data sources, without any adjustment for any data problems (Source: China Population and Employment Statistical Yearbook, various years from 2001 to 2011; China Health Statistical Yearbook, various years from 2004 to 2011; World Bank data from http://data.worldbank.org/topic/health)

health services greatly increased their cost, and the increasing income inequality made it difficult for poor people to get the needed health care. These changes notably slowed down the mortality decline during that period (Zhao 2006).

The Chinese government realised these problems and took the necessary actions. In addition to the very successful poverty alleviation program, the government has made significant effort in re-establishing the nationwide healthcare system. For example, a medical insurance system for urban workers was implemented in 1998, and the medical insurance system for urban residents (largely the unemployed residents) was enforced in 2007. Furthermore, a new rural cooperative medical care system started in 2003. It now provides health insurance and care to about 95 % of China's rural population. According to China's National Health Service Survey, 70 % of the population was not covered by any health insurance (45 % for urban and 79 % for rural) in 2003. But the proportion without medical insurance fell sharply to 13 % in 2008 (urban 28 % and rural 7.5 %). Similar changes also took place in the share of health expenditures paid by the government, social sector, and individual, which are shown in Fig. 2.3. These changes made a major contribution to the mortality decline in the first decade of the twenty-first century.

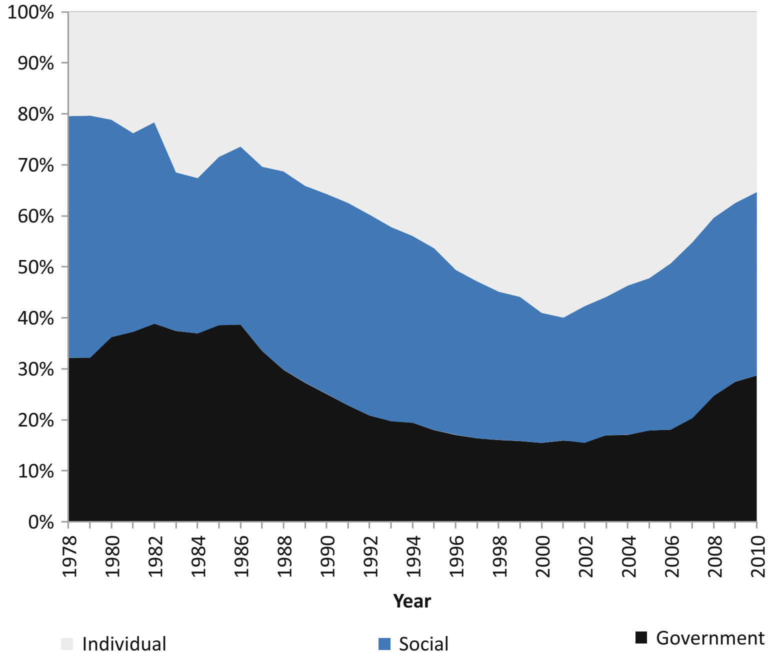

Fig. 2.3 Shares of health expenditures paid by individuals, social and government in China, 1978–2010 (Source: China Health Statistical Yearbook 2011. http://wsb.moh.gov.cn/htmlfiles/zwgkzt/ptjnj/year2011/index2011.html)

Decrease in Infant Mortality

Another important indicator is the level of infant mortality. China's 1988 retrospective fertility survey showed that China's infant mortality rate was over 200 per 1000 at the end of 1940s (Yan and Chen 1991). It fell to 50 per 1000 by 1991 and further declined to 32 in 2000 according to the data from National Child and Maternal Mortality Surveillance Points (NCMMSP) set up by the MOH. Although some differences have been found in estimated infant mortality rates obtained from different sources, they have shown that infant mortality rates declined rapidly in China in the past six decades. This decline has been faster than that in many countries in the world.

Both the APCS and NCMMSP recorded much higher infant mortality for the 1990s compared to that reported by the 1990 and 2000 censuses. For example, infant mortality derived from the 1990 census was 32.9 per 1000, while infant mortality was 40–50 per 1000 in the early 1990s according to both APCS and NCMMSP. Infant mortality rate was 33 per 1000 in 1998 as recorded by both APCS and NCMMSP and 32 per 1000 in 2000 according to NCMMSP, higher than the 27 per 1000 reported by the 2000 census. Until 1998 infant mortality rates obtained from APCS and NCMMSP were much the same. But the gap between them started to increase thereafter. Infant mortality rates reported by the APCS were on average lower than NCMMSP-reported rates by 7 per 1000 points over the period 2000–2010. While NCMMSP data showed smooth and continuous reductions in infant mortality rates, some fluctuations were observed in the infant mortality recorded by the APCS (Fig. 2.4). The 2010 census reported extremely low infant mortality, less than one-third of the figure from the NCMMSP. The estimates released by the World Bank have been largely similar to those observed in the NCMMSP and published by the MOH. They are likely to be closer to China's actual infant mortality than those published by the NBS.

According to the data published by the MOH and World Bank, there has been an appreciable reduction in China's infant mortality in the last decade. Infant mortality rate was around 30 per 1000 in 2000, and fell to about 15 per 1000 in 2010. For the same year, the NBS adjusted infant mortality rate was 13.9 per 1000, very close to those reported by the MOH and World Bank.

Reductions of Age-Specific Mortality Rates and Their Contribution to the Increase of Life Expectancy

The speed of mortality reduction differs considerably across all age groups and thus the age pattern of mortality often changes notably in the process of epidemiologic and mortality transitions. Such transitions typically start with the decline of infant and child mortality. When mortality falls to a lower level, further improvement in life expectancy is largely driven by mortality reduction at older ages. This was also

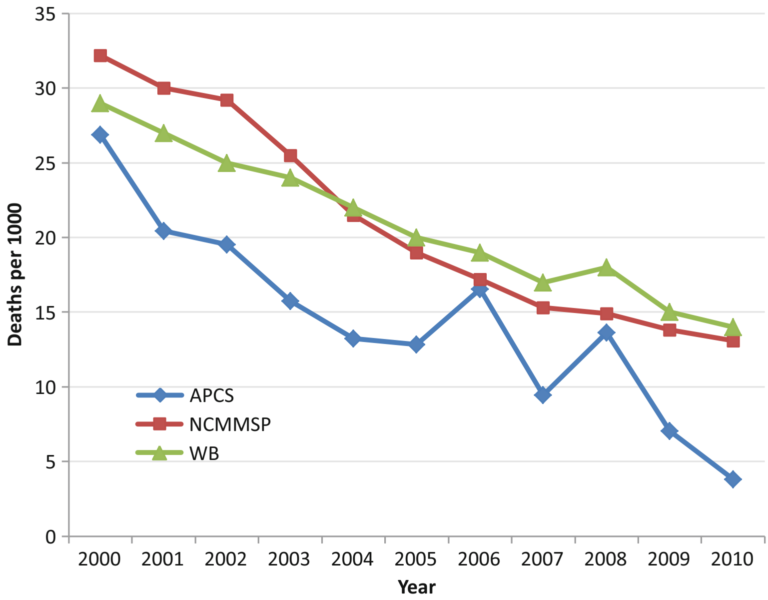

Fig. 2.4 Infant mortality rate, 2000–2010, China. Note: Infant mortality rates in this figure are directly derived from various data sources, without any adjustment for any data problems (Source: China Population and Employment Statistical Yearbook, various years from 2001 to 2011; China Health Statistical Yearbook, various years from 2004 to 2011; World Bank data from http://data.worldbank.org/topic/health)

the case in China, where rapid mortality decline occurred mainly among infants and young children in the early stage of mortality transition. While early life mortality has continued its decline, mortality improvement has become more noticeable among adult and old people in the last 30 years in China. Using data from the Annual Population Surveys and 4-year averages of age-specific mortality rates for periods 2001–2004 and 2006–2009, this sub-section examines changing age patterns of mortality and the relative contribution of mortality decline in different age groups to the overall improvement of life expectancy at birth in the last decade.

China's crude death rate dropped from more than 20 per 1000 in the early 1950s to 7 per 1000 in the late 1970s. During this period, the reduction of age-specific mortality was about 80 % among those aged 0–4 and 5–9, 40–55 % for those aged 10–14 to 55–59, and 20–50 % for those aged 60–64 and over. A similar pattern of decline was observed over the last 30 years. Around a 70 % reduction was recorded in early life mortality, 50–60 % reduction recorded in mortality of young people and mid-aged adults, and 35–50 % reduction witnessed at older ages. Despite that, the crude death rate has been relatively stable, around 6–7 per 1000, for the last 30 years. This was largely caused by changes in the age structure of the population.

Although the relative reduction in age-specific mortality rates was broadly similar in the above two periods (early 1950s – late 1970s and early 1980s – 2010), the absolute level of their decline differed markedly. In the first 30 years, for example, the age-specific mortality rate at ages 0–4 declined by more than 60 per 1000 points, but in the second 30 years the decline was only 9 per 1000 points. As a result, further increase in life expectancy has been increasingly attributable to mortality decline at older ages. Gu et al. (2007) decomposed the contribution to the increase in life expectancy due to the decline of mortality by different age groups. According to their research, mortality decline in the youngest age groups made the greatest contribution to the improvement in life expectancy before 1990. Since then, notable change has taken place. The contribution made by the reduction of old-age mortality has become increasingly important. This trend continued into the first decade of the twenty-first century.

The comparison of age-specific mortality rates between 2001–2004 and 2006–2009 shows that during the last decade, mortality decline continued across all age groups. In the male population, the relative decline was greater among young children and people of old ages. In the female population, percentage decline in mortality among those aged 5–49 was either similar to or greater than that for males. However, in terms of absolute mortality levels, the reduction was greater for males than females at the very young and older ages.

To examine these changes to the increase in life expectancy, we also use Arriaga's method (Arriaga 1984) to decompose their contribution to the recent improvement of longevity. Our results suggest that in both male and female populations, two thirds of the increase in life expectancy was attributable to the mortality decline among people aged 60 and over, 19 % of the increase was attributable to the mortality decline among people aged 15–59, and slightly more than 10 % of the increase was due to the decline of infant mortality. The remaining 3 % of increase in life expectancy was contributed by mortality reduction among those aged 1–14. However, for males this decrease was largely observed among those aged 1–4 years. For females it was almost entirely recorded among those aged 5–14. These patterns are very different from those observed in the early stages of mortality decline.

The analysis presented in this section also indicates that while China has been very successful in lowering infant mortality, its level is still notably higher than that in most of the developed countries. Reductions in infant mortality can still have a non-trivial impact on the increase of life expectancy in China in the next decade.

Increase in Sex Differentials of Mortality

Mortality transition was also accompanied by considerable changes in sex differentials of mortality. In many historical populations where mortality was high, female mortality was close to or even higher than male mortality. During the mortality transition, the mortality decline was generally faster among females than males, and this increased the gender gap in mortality or survival. High female mortality in historical China was strongly affected by the very high female infant mortality and maternal mortality. Since the 1950s, rapid social and economic development and health improvement have greatly lowered mortality in China. According to the

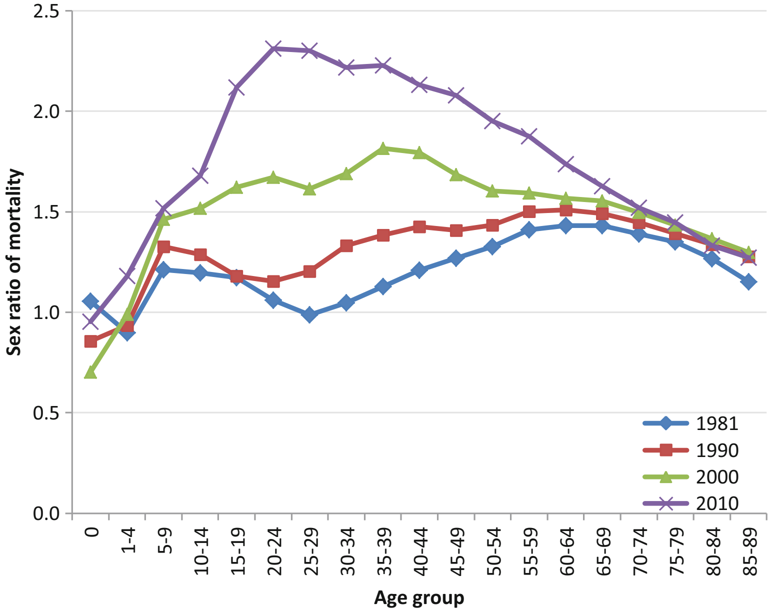

Fig. 2.5 Sex ratios (male/female) of death rates by age groups, 1981–2010, China (Sources: NBS (1985, 1993, 2002, 2012a)

estimates by Yan and Chen (1991) and those by NBS, males and females made similar gains in their life expectancies from the early 1950s to the early 1980s, while the gains have been greater for females than males in the last 30 years. As a result, the gap between female and male life expectancies has doubled, from less than 2.5 years before the mid-1970s to 5.0 years in 2010.

Changes in sex differentials of mortality are not the same across the whole life span. Figure 2.5 plots sex ratios of mortality by age for the last four censuses, which are computed through dividing male death rate by female death rate for each age group. Generally, male mortality is higher than female mortality, and the sex ratios of mortality are greater than 1 at most ages.

In many age groups, sex ratios of mortality have gone through considerable change over the last 30 years. This is particularly notable among people aged 20–44, and the largest increase was among those aged 20–29, an age group among which mortality however remains limited. Sex ratios of death rates in age groups 15–19 and 45–49 were also high in 2010, and were much higher than those calculated from the West Model of Coale-Demeny Model Life Tables. Nonetheless, these patterns are quite normal, and similar high sex ratios of mortality have been observed at these ages in Japan and Taiwan.

In Mainland China, however, a very low sex ratio of mortality was recorded among very young children. For example, sex ratios of infant mortality were all lower than 1 in 1990, 2000 and 2010. The ratio was 0.7 in 2000 and 0.95 in 2010.

While there was a notable reduction in the past decade, female infant mortality was still higher than male infant mortality in 2010. This pattern differs from those observed in most countries, but it has been consistent in recent decades. It is partially related to strong son preference and the resulting neglect of or discrimination against daughters. Such practices have a long history in China, and its effects more noticeable in the presence of low fertility levels attributable to the government-led birth control program (Zhao 2007). This is a major reason for the high sex ratio found among Chinese children. It is also worth mentioning that in China's recent censuses, young children and infant deaths were significantly under-enumerated. If such under-enumerated cases were not randomly distributed among male and female children, and male and female infant deaths, the recorded sex differentials of infant mortality could have been distorted.

Concluding Remarks

China has had an impressive mortality transition in the past six decades. This change was particularly fast in the first 30 years except in the 1958–1961 famine. In the 1980s and 1990s, mortality decline slowed, partly because of the negative impact brought about by some social economic changes at the time. In the last 10 years, China's mortality reduction sped up again. This change was closely related to China's very successful poverty alleviation program, rapid economic development, further progress made in disease prevention and treatment, and the re-establishment of the nationwide medical care system. China's life expectancy at birth is now around 75 years.

Marked mortality decline has been recorded across all age groups in the past 60 years. However, such reduction did not take please simultaneously, and this led to significant changes in the age patterns of mortality. For the same reason, the contribution of declining mortality at different age groups to the increase of life expectancy also varies considerably. In the early stage of mortality transition, prolonged life expectancy was mainly driven by falling mortality among children and young adults, but in recent years, it has been largely attributable to improving survival at older ages.

During the mortality transition, females' survival advantages over their male counterparts have become more apparent. In most age groups, female mortality has been falling faster than male mortality. As a result, the sex ratio of mortality has increased in many age groups, those between 20 and 44 in particular. Gender gap in life expectancy at birth has doubled in the past 35 years and reached 5 years in 2010. This gap however is smaller than that observed in many developed countries when their life expectancy was similar to that recorded in China in 2010. This is related to the relatively high female mortality recorded among young children, which is partly caused by the strong son preference and related to the neglect of female children found in some Chinese populations.

In addition to its age differences and sex differentials, mortality has also shown remarkable variations among populations in different regions, with dissimilar economic conditions, or living in urban and rural areas. Such variations are particularly notable in China and attract considerable attention. While addressing these issues is of great importance in mapping China's mortality changes, it has not been covered in this chapter because of the constraint of space. Relevant discussion of these topics can be found in other recent publications (Banister 2007; Zhao 2006; Zhao et al. 2014).

According to the experience of many developed countries, mortality decline did not stop when life expectancy reached 70 or 80 years. This is by and large similar to what has been observed in China in recent decades. After its relatively slow change in the 1980s and 1990s, China's mortality decline has speeded up in recent years, and this trend is likely to continue in the near future.

China of course also faces some major challenges brought by these changes and the rapid approach of an aging society. Despite the fact that China now has several medical insurance programs which cover almost its entire population, the quality of the care and the level of insurance provided by these programs vary significantly. These and the great inequality in peoples' income levels, living conditions, and huge regional variations in health services are some of the major difficulties that need to be overcome if China wants to further improve the healthy life expectancy and longevity of its citizens.

Finally, it should be pointed out that there are major data and research gaps in the study of mortality in China. Detailed mortality data are difficult to find. Some known or collected data are either not accessible or suffer from under-registration. Partly affected by data restrictions, only a few mortality studies were published in China in the last decade. To improve this unsatisfactory situation and also to improve our understanding of mortality changes and their major determinants, China needs to strengthen its mortality data collection and mortality research.

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Chapter 3
Trends in Mortality Differentials in India

Nandita Saikia

Introduction

India draws global attention when it comes to mortality estimates for two major reasons. First, India's contribution to global preventable deaths is higher than that of any other country. For instance, India accounted for the highest share of global maternal deaths in 2010 (World Health Organization 2012). Despite a significant reduction of deaths of the population under-5 in recent decades, India has the world's largest share of under-5 and neonatal deaths. Secondly, India witnesses large inequalities in mortality by age, sex, regions, and other socio-economic categories. In terms of geographical differences, infant mortality rates (IMR) ranged from a low of 10 infant deaths per thousand live births in urban Goa to a high of 67 in per thousand rural Madhya Pradesh in 2010 (Registrar General, India 2011). The life expectancy at birth for females in rural Kerala was 77.2 years during the period 2006–2010 but was only 62.1 years in rural Assam. Thus, the regional life expectancy gap in India for females stands at about 15 years. And this difference is only at the provincial level, without considering a person's socioeconomic status. If India had adequate data to estimate life expectancy at birth at a district level (an administrative unit smaller than state/province), with the interaction to socioeconomic status, the magnitude of inequality in India might have been found to exceed that observed between countries.

The analysis of mortality trends and patterns since the emergence of the Sample Registration System (SRS), (a relatively reliable source of deaths statistics since the early 1970s), reveals that India's mortality has followed a declining trend over the last few decades with some variation in the pace of decline across decades. Yet

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mortality transition in India can be divided into two stages viz. rapid improvement in life expectancy from 1970 to 1990, and then a relative stagnation from the 1990s to mid-2000s (Chaurasia 2010; Saikia et al. 2011). The improvement and stagnation in life expectancy are largely driven by the reduction and stagnation of under-5 mortality in both stages. With the inauguration of the National Rural Health Mission in the year 2005, the reduction in infant mortality rate (IMR) has accelerated in recent years, leading to a positive impact on life expectancy at birth. Within India, there is a strong regional gradient in mortality measures resulting from differential socio-economic, political, kinship, and health care-related factors. In general, the bigger Indian states can be divided in two categories: *first*, the demographically advanced states with a faster achievement of low fertility and low mortality, and *second*, the demographically backward states with relatively high fertility and mortality rates. In the first category, south Indian states dominate, with an inclusion of a few states from North India, whereas the second category includes the most populous states from the north-central and eastern regions. In recent years, India's mortality at the national level has veered closer to the pattern displayed by the states in the second category. Due to the unavailability of data, mortality trends in the smaller states that account for about 8 % of India's population remain unknown. In addition to regional differences, a considerable rural disadvantage in all mortality indicators are found at both national and sub-national levels.

Although there have been several attempts to analyze mortality trends in India, very few systematic attempts have been made to understand the differential pace of overall mortality reduction across different decades. With the advent of the Demographic Health Survey (known as the National Family Health Survey in India) in the early 1990s, numerous articles have been published on the factors affecting infant and child mortality in India. This literature, however, does not provide a clear picture of the causes of the more rapid mortality decline in the 1970s and 1980s, or of the factors behind the stagnation of mortality reduction observed in the late 1990s.

In this chapter, I first discuss in detail the salient features of mortality trends with respect to sex, age, and the bigger states of India, and provide a description of mortality inequality among the bigger states since the 1970s. This is followed by a comprehensive discussion on factors affecting mortality differentials over time and across geographical regions through a rigorous review of the literature in the past four decades.

Data and Methods

Since the Civil Registration System of India is far from complete, I use data from annual reports and abridged life tables published by the Office of Registrar General, India (RGI), which are based on the SRS. The SRS was introduced in India as a pilot scheme in some selected states in 1964–1965 to meet the demand for reliable estimates of fertility and mortality at the national and state levels. It was converted into a full-scale system during 1969–1970. Based on a dual-record system, it verifies the births and deaths recorded by the local enumerator (continual enumeration) and by a full-time supervisor (in an independent retrospective survey at the end of each 6-month period) in a nationally representative sample of village/urban blocks. Any unmatched or partially matched birth/death in this process is verified in the field, which ensures data quality. The sample includes 7597 sampling units (village/urban blocks), and the population covered under this system is 6,932,000.

A number of attempts were taken to evaluate the quality and completeness of SRS fertility and mortality estimates both by the RGI and other researchers. While many of these studies used analytical methods, some of the evaluations by the RGI were based on an intensive inquiry of a sub-sample. Both direct and indirect estimates showed that the incidence of under-registration of births and deaths were within the tolerable range of up to 10 % (RGI 1982; Bhat et al. 1984; Swamy et al. 1992). Recent studies addressing the quality of SRS data (Bhat 2002; Mahapatra 2010; Saikia et al. 2011) concluded that SRS data was reliable enough for analyzing mortality trends in India and its states. Some studies also concluded that SRS was the only source that facilitates a detailed analysis of the levels and trends in mortality in the country (Roy and Lahiri 1988; Mathers et al. 2005).

This study uses data on life expectancy at birth from periodic life tables provided by the RGI between 1970–1975 and 1996–2000. The SRS-based life tables during 2000–2004 and 2002–2006 showed inconsistent trends in child mortality (age group 1–4) and life expectancy, which was corrected by Saikia et al. (2010). Based on recommendations by Saikia et al. (2010), the Office of Registrar General reconstructed abridged life tables for those periods. Hence, I used the reconstructed life tables by the RGI for the periods 2000–2004, 2002–2006, and 2002–2010. To understand the trend of infant and neonatal mortality, annual SRS reports are used for the period 1970–2010.

To examine the trend in regional inequality in mortality, population-weighted dispersion measures of life expectancy at birth (DMM) and Gini coefficients were computed for the period 1970–2010. The DMM is defined as the average absolute inter-population difference in the life expectancy across all pairs of populations weighted by their population sizes (Moser et al. 2005). A decrease (or increase) in DMM indicates a corresponding decrease (or increase) in absolute inequality in life expectancy among the major states of India. Theoretically, the DMM must be always greater than zero. On the other hand, the Gini coefficient refers to the relative inter-regional inequality, and is equal to the DMM divided by the average life expectancy at birth rate in the population (Shkolnikov et al. 2003). The Gini coefficient varies between zero and one. When multiplied by 100, this coefficient shows the average relative difference as a percentage of the average life expectancy at birth. The formulas for calculating the DMM and Gini coefficients are given in Eqs. (3.1) and (3.2).

$$DMM = \frac{1}{2}\left[\sum_i \sum_j p_i p_j \mid M_i - M_j \mid\right] \tag{3.1}$$

$$Gini = \frac{DMM}{\bar{M}_i} \tag{3.2}$$

Where M_i is the mortality indicator (here it is life expectancy at birth) for population i, and p_i is its population share.

I also computed the population attributable fraction to understand the trend of inequality in adult mortality with respect to the best performing state. The population attributable fraction (PAF) is a proportion of all deaths that could be avoided if all population groups had the same rate of mortality as the best health status group. The formula for calculating the PAF is given in Eq. (3.3).

$$PAF = \frac{\sum_i p_i (RR_i - 1)}{\sum_i p_i RR_i}, \tag{3.3}$$

Where PAF is the population attributable fraction, RR_i is the ratio of mortality rates for the group i to the best performing group, and p_i is population weight of the age group i.

Results

Trends and Geographical Variation in Life Expectancy by Sex

Figure 3.1 shows the trends in life expectancy at birth from 1970–1975 to 2006–2010. Life expectancy increased over this period for both sexes in all states. However, the pace of increase differs across decades. At the national level, the life expectancy gain was highest from the mid-1970s to the mid-1980s. It had been improving until the early 1990s, but there was a slowdown, and even a relative stagnation, during the late 1990s and early 2000s, even in some well-performing states such as Kerala and Punjab. Over the last four decades, the smallest gain in life expectancy was in the early 2000s. Figure 3.1 also shows that the pace of increase in female life expectancy at birth was faster than that of male life expectancy. In the early 1970s, male life expectancy was higher than female life expectancy by about 1.5 years (50.5 years for males, against 49 years for females), whereas female life expectancy at birth became higher than male life expectancy at birth by about 3.1 years during 2006–2010 (64.6 years for males, and 67.7 years for females). Clearly, the range of variation in e_0^0 (life expectancy at birth) among different states was relatively larger for females than for males. Over time, the gap in life expectancy at birth for the best and the worst performing states has decreased and females experienced faster reduction in this gap. For males, the 15.4 years gap between the best and worst performing states in 1970–1975 fell to 10.5 years in 2006–2010, whereas for females it fell from 22.8 years in 1970–1975 to 13.7 years in 2006–2010.

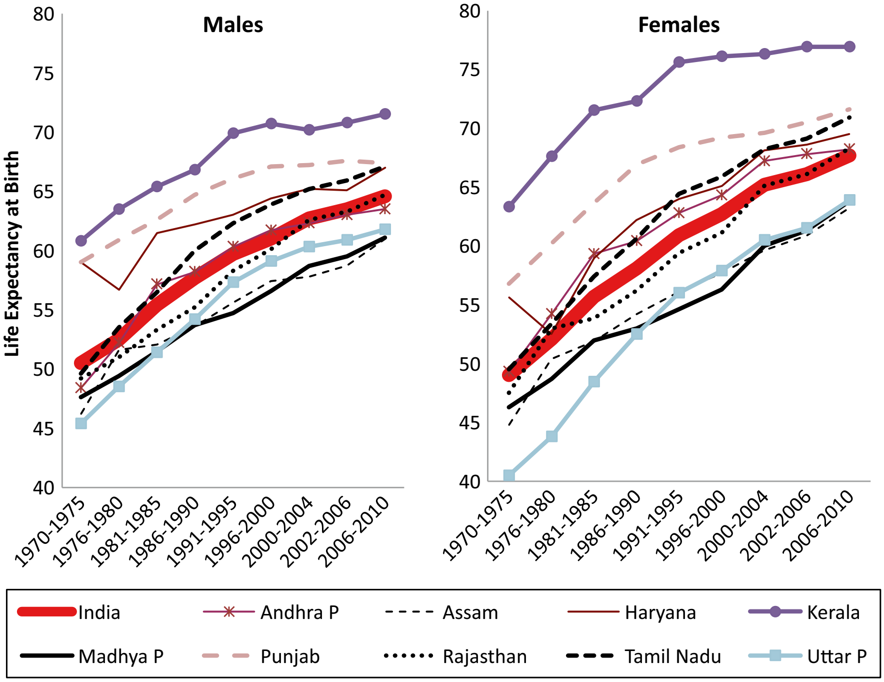

Fig. 3.1 Life expectancy at birth by sex in India and selected states from 1970–1975 to 2006–2010

There exists a distinct regional pattern in life expectancy levels. Most of the southern states enjoy higher life expectancy at birth than the central and eastern states. In particular, the southern state of Kerala stands out as a positive outlier throughout the period. Life expectancy at birth for Punjab, another well-performing state, appeared to be stagnant for the same period, particularly for males. There are two main reasons behind this stagnation. First, neonatal mortality in Punjab either completely stagnated in 1995–2005 or reduced very slowly from 2005 to 2010 (a trend not shown here). The second reason for the stagnation in life expectancy was the increasing burden of non-communicable diseases among adults in Punjab, as reported by Medically Certified Causes of Death Reports. As in Kerala, the state of Punjab also suffered from a high burden of diseases of the circulatory system. As per the Medically Certified Causes of Death Reports, this particular disease alone constituted 23 % of all deaths reported in 2006.

Although life expectancy for the state of Uttar Pradesh was the lowest throughout the period 1970–1990, improvements—especially for females—were much steeper than in another poorly performing state such as Madhya Pradesh. Interestingly, Assam's performance relatively worsened during this period. Assam's life expectancy at birth, especially for females, was higher than Uttar Pradesh at the beginning of the 1970s. However, by 2010, Assam ranked top among the high-mortality states of India.

There was a sudden drop in life expectancy in Haryana between 1970–1975 and 1976–1980 (2.3 years for males, and 3.1 years for females). Questions arose about whether the decline was real, or whether it could be attributed to the quality of the data in the early 1970s. The trends of neonatal and post neonatal mortality in India revealed an unusual pattern: while post neonatal mortality showed a steady downward trend since 1972, neonatal mortality rates sharply increased from 70 to 80 per 1000 between 1973 and 1977, and decreased after 1978. In the absence of any other available data on neonatal deaths in the early 1970s, it is difficult to assess the completeness of analysis of deaths during the neonatal period. Nevertheless, a close look at the regional pattern in the neonatal mortality rate might strengthen our hypothesis that the sudden drop in life expectancy in Haryana might have been a result of improving death coverage. For example, in 1971, the state of Haryana had equal levels of IMR with that of Kerala, one of the best performing states in terms of demographic indicators. This seemed implausible when we observed the trend of Kerala and Haryana during this period. Kerala showed a consistent decline over time, and Haryana showed an increasing trend until 1997, and then started slowing down. Interestingly, the increasing trend of neonatal mortality in the early 1970s was not only in Haryana, but also in other states such as Tamil Nadu, Rajasthan, and Andhra Pradesh. Thus, the drop in e_0^0 in Haryana most likely indicates under registration of deaths during the early years of the SRS.

Figure 3.2 shows life expectancy at birth for males and females for the years 1970–1975 and 2006–2010 for the major regions of India. The regional differential is clear from this map: the most populous north-central and northeastern states had a lower life expectancy at birth than the southern states. However, the extreme northern states (Jammu and Kashmir, Punjab, and Himachal Pradesh) showed a pattern similar to the southern states. The relative position of a few low-performing states (Assam, Orissa, and Uttar Pradesh) remained similar in both 1970–1975 and 2006–2010. The relative position of Madhya Pradesh worsened between the 1970s and 2010s. Andhra Pradesh experienced higher mortality than in other southern states.

Figure 3.3 show the maps of gender gaps in life expectancy (female life expectancy—male life expectancy) for 1970–1975 and 2006–2010. In both maps, states are divided into three categories: those with a maximum female disadvantage in mortality (<–0.5 year), a minimum female disadvantage (–0.5–1.0 year), and a female advantage (>1.0 year). As can be seen in the map of India from 1970 to 1975, there was a strong north-south divide in gaps in life expectancy, with females having a survival advantage in the southern region and a disadvantage in the north. A female advantage in mortality in 1970–1975 was observed only in Kerala and Maharashtra. By 2006–2010, the map looks more homogeneous, with every single state showing longer female longevity than male. Nevertheless, the magnitude of the gender gap in life expectancy in 2006–2010 varies from only 0.7 year in Bihar to 5.4 years in Kerala.

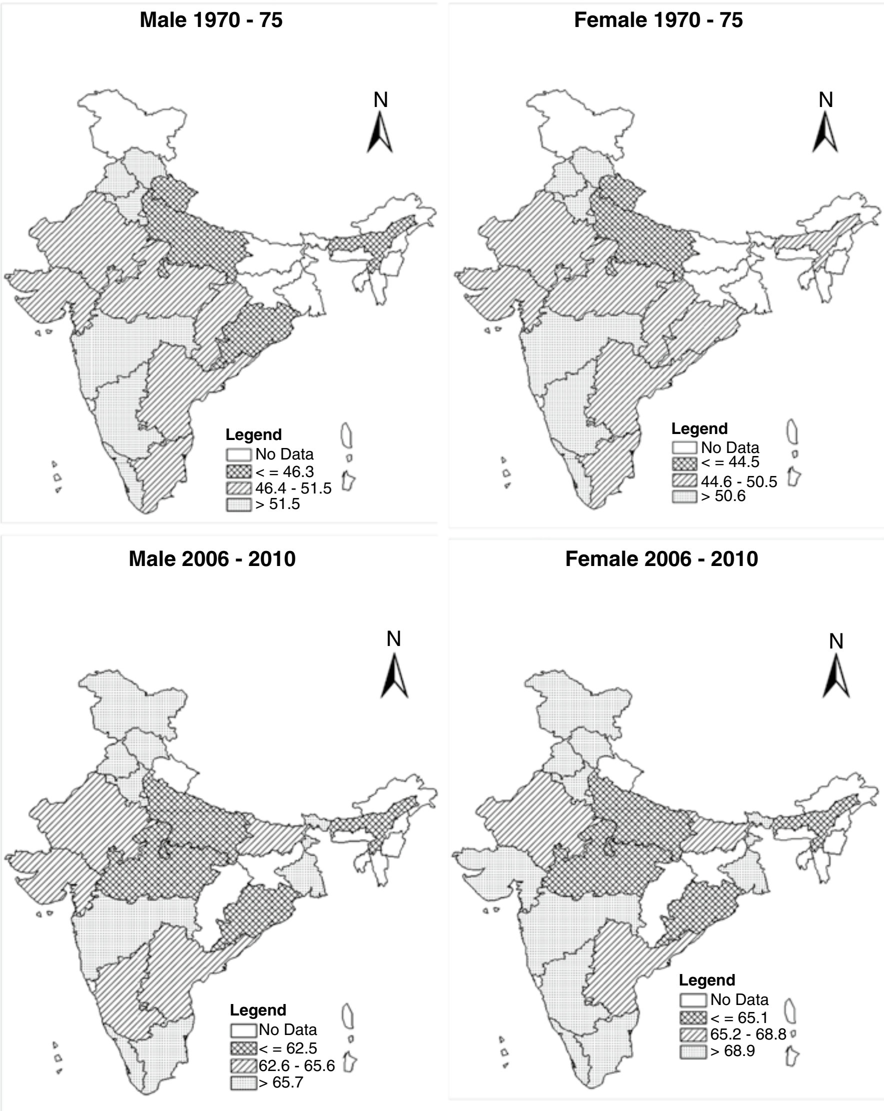

Fig. 3.2 Life expectancy at birth by sex for major states, 1970–1975 and 2006–2010 (Sources: Published life tables by Office of the Registrar General, India for corresponding period)

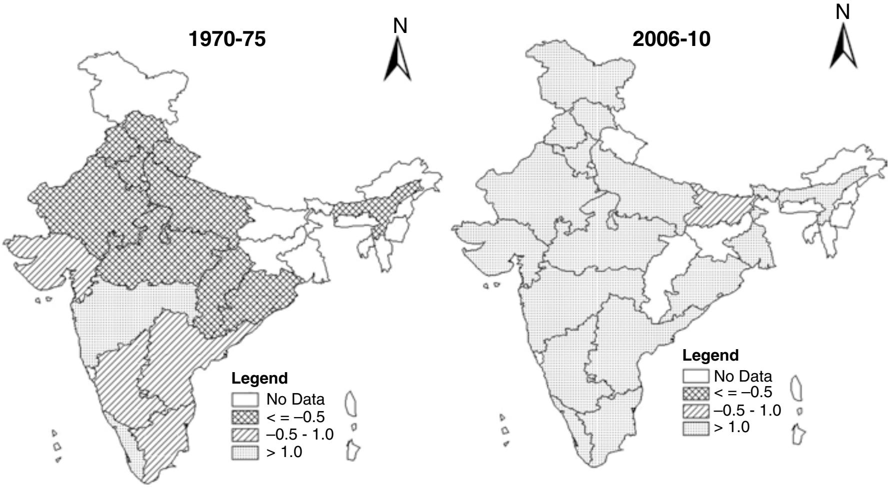

Fig. 3.3 Sex differentials in life expectancy at birth (female life expectancy minus male life expectancy) in 1970–1975 and 2006–2010

Trends in Infant Mortality

Figure 3.4 depicts the trend of infant mortality by rural-urban residence during 1970–2010. The apparent increase in the IMR trend in the early 1970s might be due to increasing coverage of the SRS data at the beginning. Afterwards, the IMR started declining sharply until the 1990s, but the pace of decline slowed down considerably between 1990 and 2010. During 1976–1990, the IMR reduced by an average of 15 points every 5 years, whereas the decline was only 7 points per 5 years after the 1990s. The IMR reduction was highest during 1986–1990 (a reduction of 16 points), and lowest during 1996–2000 (a reduction of 4 points). . This indicates that the substantial increase in life expectancy in the pre-1990s period was largely driven by infant mortality reduction.

Since India's population is mainly rural (approximately 69 % of the population still lives in rural areas, according to the 2011 census), the total infant mortality trend is similar to the rural infant mortality trend. Figure 3.4 shows a persistent but narrowing rural-urban gap in infant mortality over the past four decades. The rural-urban gap in infant mortality is visible in every single state in India, irrespective of its mortality level (figures not shown here). It exists, for example, in demographically advanced states (Kerala, Goa, etc.), as well as in less advanced states (Madhya Pradesh, Assam, and Orissa, etc.). Figure 3.4 also shows the recent stagnation in infant mortality in urban areas.

Figure 3.5 shows infant, postneonatal, and neonatal mortality rates and mortality ratios in India during 1970–2010. In most recent years, the reduction in the infant mortality rate was sharper than the reduction in the neonatal mortality rate, leading to an increase in the contribution of neonatal mortality to overall infant mortality.

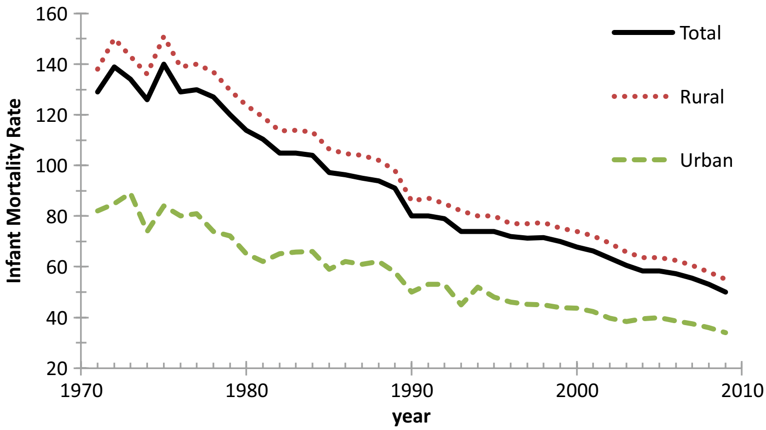

Fig. 3.4 Infant mortality rate by place of residence, 1970–2010 (Source: Published Life tables of Office of Registrar General for corresponding period)

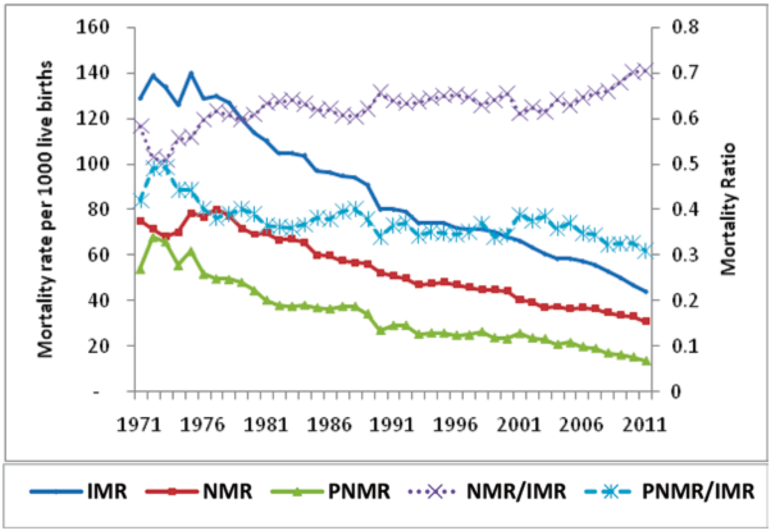

Fig. 3.5 Mortality rates and ratios (neonatal mortality rate/infant mortality rate and post neonatal mortality rate/infant mortality rate) in India during 1971–2010. *IMR* infant mortality rate, *NMR* neonatal mortality infant mortality rate, and *PNMR* postneonatal mortality rate

Trends and Geographical Variations in Adult Mortality

Figure 3.6 depicts the adult mortality trend ($_{45}q_{15}$) in India and major states by sex. Significant variations in levels and trends of adult mortality are found across states. In most recent years, convergence in adult mortality by regions is observed. It is

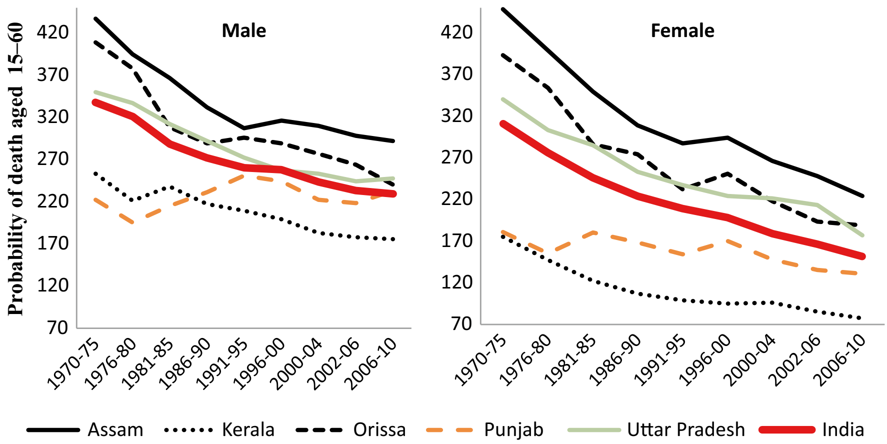

Fig. 3.6 Probability of death (per 1000) for adults aged 15–60 years for India and selected states from 1970–1975 to 2006–2010 (Source: Published Life tables of Office of Registrar General for corresponding period)

interesting to note that the reduction in male adult mortality was very slow in India, and that a few states such as Assam and Punjab experienced stagnation in adult mortality reduction.

Though adult mortality has been declining consistently, the pace of decline differs from one state to another. While Kerala had the lowest probability of death for both sexes, Assam had the highest mortality rates among all states. In particular, both the SRS and the National Family Health Survey (1998–1999) data show that Assam had the highest adult mortality (${}_{45}q_{15}$) among all states of India since the 1970s (Fig. 3.6), and adult male mortality was either marginally increased or remained constant since the mid-1990s. In addition to this, the indirect estimation of adult male mortality applying the Widowhood Method also conveyed similar findings (Saikia and Ram 2010). While Assam had a child mortality rate more or less equal to other poorly performing states (Madhya Pradesh, Orissa, or Uttar Pradesh), it is important to explore why Assam had a relatively high adult mortality. To our knowledge, there is no detailed systematic study examining the high level of mortality observed in Assam or other northeastern states. However the Special Survey of Deaths, 2001–2003 undertaken by the Registrar General of India reported that, along with other Empowered Action Group states,[1] Assam had a significantly higher proportion of deaths due to communicable, maternal, perinatal, and nutritional conditions. Assam is also a high malaria state, and has one of the highest prevalence of tuberculosis among the states of India. High adult mortality in Assam

[1] In India, the eight socioeconomically backward states of Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttaranchal, and Uttar Pradesh are referred to as the Empowered Action Group (EAG) states.

may also be due to the high frequency of deaths related to traffic, insurgency, and natural calamities (flood, erosion, landslide, etc.), all aspects that would need further investigation.

Trend in Mortality Inequality

Table 3.1 shows the trend in the Dispersion Measure of Mortality (DMM) and Gini coefficient in life expectancy at birth among 16 major states of India from 1970–1975 to 2006–2010. These 16 states comprise about 96 % of the total population of India. The average interstate difference expressed in terms of the DMM is more pronounced among females compared to males. The DMM has reduced from 2.49 years to 1.48 years for males, and from 3.47 years to 1.94 years for females. A consistent and impressive reduction in the Gini coefficient in the past five decades was observed during this period. These findings point to a steady convergence in mortality rates across India.

The trend of the PAF in adult mortality in India in the past five decades is shown in Table 3.2. As mentioned earlier, it indicates the proportion of adult deaths (age group 15–60) that could have been avoided if all states had the lowest experienced mortality, as in Kerala. Thus, if all states had the same female adult mortality rate as Kerala in 2010, almost 50 % of the total deaths could have been avoided. In the case

Table 3.1 Dispersion Measure of Mortality (DMM) and Gini coefficient in life expectancy at birth in India, 1970–2010

	Male		Female	
Year	DMM (years)	Gini (%)	DMM (years)	Gini (%)
1970	2.49	4.9	3.47	7.1
1981	2.07	3.7	3.16	5.7
1991	1.80	3.0	2.60	4.3
2001	1.57	2.5	2.21	3.4
2010	1.48	2.3	1.94	2.8

Source: Author's calculation using Sample Registration System data
Note: see text for definition

Table 3.2 Population attributable fraction in adult mortality, in India, 1971–2010

Year	Male (%)	Female (%)
1971	40.90	43.71
1981	26.08	51.24
1991	20.96	52.61
2001	24.26	46.41
2010	23.24	49.49

Source: Author's calculation using Sample Registration System data
Note: see text for definition

Table 3.3 Range of infant mortality rate, neonatal mortality rate and under-5 mortality rates (per thousand live births) in 284 districts of 8 EAG states and Assam, 2010–2011

Indicator	Maximum (district name)	Minimum (district name)	Range = maximum – minimum
Infant mortality rate	103 (Shrawasti in Uttar Pradesh)	19 (Rudraprayag in Uttarakhand)	84
Neonatal mortality rate	75 (Balangir in Orissa)	11 (Rudraprayag in Uttarakhand)	64
Under five mortality rate	145 (Kandhamal in Orissa)	24 (Pithoragarh in Uttarakhand)	121

Source: Annual Health Survey Bulletins by Registrar General of India. Available at: http://censusindia.gov.in/2011-common/AHSurvey.html)

of male mortality, this figure was 23 %, indicating relatively less inequality in mortality among males. Interestingly, the trend in the PAF was not decreasing continuously over time. Thus, mortality inequality among different states has been on average decreasing, whereas mortality inequality with respect to the best performing state has remained very high over time.

While measuring mortality inequality, I considered only state-level inequality, since we have no detailed data below that level. However, there exist tremendous variations across the districts within a state, indicating that there could be districts in more advanced states similar to districts in less developed states in terms of mortality indicators. Since most of the districts have a large population size, mortality differentials within districts across population subgroups might also be significant. In the absence of Sample Registration System data at the district level, the DMM and Gini coefficients could not be computed to capture mortality variations across districts. Nevertheless, recently published district-wise mortality indicators for eight EAG states and Assam by the Registrar General of India give an idea of district level mortality variation in the most recent period. Table 3.3 presents the range of the infant mortality rate, neonatal mortality rate, and under-5 mortality rates per thousand live births in 284 districts of eight EAG states and Assam in 2010–2011. It is clear from the table that infant mortality varied from 19 per thousand live births in the Rudraprayag district of Uttarakhand to 103 in the Shrawasti district of Uttar Pradesh. The case for neonatal or under-5 mortality in the districts of the EAG states and Assam is similar. Therefore, disparities in mortality would appear even more pronounced if we could use district-level mortality indicators for all states.

Discussion

What causes differential mortality decline in India in different decades? To answer this question, a short discussion on causes of death (COD) pattern in India since 1970s is useful. As in many other developing countries, COD data in India suffers from incomplete coverage and another kind of problems. Nevertheless, the two major systems of COD data, the Survey of Causes of Death-rural (1965–1998) and the Medical Certification of Causes of Death (1971–2010), along with some other small field surveys reveal that there has been a structural shift from infectious and parasitic diseases to non-communicable diseases (Yadav and Arokiasamy 2014). Trend analysis of COD shows that there has been a sharp and continuous decline in the share of deaths due to infectious and parasitic diseases until the early 1990s. On the other hand, the share of deaths due to non-communicable and external causes was on the rise since the mid-1980s. The most recent Million Deaths Study (2001–2003) further confirms that death due to non-communicable diseases tops the list of COD in India. This structural change in the COD clearly suggests that the remarkable improvement in life expectancy in the pre-1990s period was largely due to the elimination of infectious diseases, especially among children under age 5. Similarly, the stagnation following the 1990s was due to the emergence of non-communicable diseases among both the young and adult populations. It is worth mentioning that the timing of COD transition varied greatly among states, leading to a significant differential in the mortality decline within India (Saikia 2011). Most southern states experienced this transition earlier than northern and eastern states; some poor performing states such Assam and Madhya Pradesh were double burdened by the emergence of non-communicable diseases even before communicable diseases were eliminated (Saikia 2011).

There have been few systematic attempts to quantify the contribution of socioeconomic and other factors to overall mortality reduction in India, with the exception of factors affecting infant and child mortality. A careful analysis of the existing literature suggests that the rapid mortality reduction in the post-independence period was the result of a complex interaction of social, economic, political, and epidemiological factors (Dyson 2008). The increased control of many infectious and parasitic diseases (e.g. smallpox, malaria, cholera), the spread of immunization coverage (especially with the Expanded Programme of Immunization introduced around 1978), general progress in improving sanitation and water supplies, increased levels of education in the population, and a considerable expansion of health facilities, have all been significant parts of the explanation for the sustained improvement in mortality in India.

What causes regional variation in overall mortality and infant mortality in India? In their pioneering work, Dyson and Moore (1983) hypothesized that differences in kinship structure and female autonomy between north and south India may have influenced the wide north-south divide in mortality. They argued that women living in northern familial institution enjoy lesser autonomy; they may be less prepared and able to innovate, have less access to new information regarding child care, and be more restricted in their ability to utilize health services, either for themselves or for their children. This might have led to a slower reduction of child mortality and hence overall mortality in northern India. On the contrary, southern kinship permits women to exercise greater indulgence toward their children in terms of intra familial food distribution and health care. Dyson and Moore also attributed the northern kinship model as a reason for sex differentials in child mortality in northern India.

Another landmark study by Jain (1985) addressing determinants of regional variations in infant mortality in rural India demonstrated the importance of medical and non-medical factors for explaining the observed regional differences. This study showed that two individual-level factors reflecting medical care at birth and during the post-neo-natal period explained about 64 % of the regional variations in infant mortality. In comparison, 60 % of the variation was explained by the two household-level factors, viz. poverty and adult women's literacy (Jain 1985). With the advent of different rounds of demographic surveys such as the National Family and Health Surveys and the District Level Household Surveys, much more is known about the determinants of the regional diversity in mortality. Many recent studies quantified the relative importance of socio-economic and health care variables in determining regional variation in mortality. It has been shown that southern states performance in mortality reduction was ahead of other states due to the better access to and quality of health services along with higher female literacy.

Findings by Jain (1985) have been supported by more recent studies. For example, many studies discussed the major advances in life expectancy and child mortality in Kerala in detail (Nag 1983; Caldwell 1986; Kumar 1993; Sen 1998). Several authors argued that Kerala's high female literacy, its matrilineal traditions, its political leadership committed to social welfare, and its settlement pattern promoting individualism, communication and greater utilization of social services are probable reasons for the low levels of mortality and fertility in the state. Bhat and Rajan (1990) showed that Kerala historically had substantially lower mortality than India as a whole. Similar to the national level, Kerala's life expectancy at birth also slowed down since the mid-1990s. Kerala witnessed a dramatic decline in communicable diseases in the last century whereas non-communicable diseases, especially circulatory diseases and neoplasm, have increased substantially in both rural and urban areas of this state according to different rounds of the Survey of Causes of Death and Medically Certified Deaths. Since infant and child mortality was already very low and mortality reduction among adults due to degenerative diseases was smaller (Fig. 3.6), life expectancy trends have slowed down during the past two decades in Kerala.

Similar to Kerala, another southern state of Tamil Nadu received global attention in recent years for its success in reducing its already low levels of infant and neonatal mortality (Balabanova et al. 2013). Between 1980 and 2005, infant mortality fell in Tamil Nadu by 60 %, compared to 45 % for India as a whole, with the greatest gains in rural areas. Implementation of large scale multipurpose workers, well-built network of primary health care centers, scaling up of immunization schedules, and a reliable supply of essential drugs underpinned the achievements in Tamil Nadu in most recent years.

How do we account for the slowdown of the infant mortality decline from the mid-1990s to the mid-2000s? This slowdown might be related to an increasing role of neonatal deaths among infant deaths in India. The literature suggests that the reduction of neonatal mortality precisely requires further improvement in medical facilities to address biological complications rather than social or environmental causes, and this is a domain in which India has made little progress (Fig. 3.5). Until the inauguration of the National Rural Health Mission (NRHM) in 2005–a major health reform focused on maternal and child health which covered 70 % of the total population—most public health programs targeted a reduction in infant mortality as a whole, without any special emphasis on neonatal care. The slowdown in the IMR reduction may thus be the result of a lack of policy focus to address the needs of newborns.

The wide rural-urban differential in infant mortality is mainly a reflection of wide socio-economic and health care utilization factors in India. Among socio-economic factors, it is found that the wide gap in maternal education and wealth status of the household by rural-urban residence plays an important role in explaining the persistent rural-urban gap in infant mortality in India (Saikia et al. 2013). Similarly, key maternal and child health utilization variables such as the percent of institutional delivery, percent of fully vaccinated children, percent of women using contraception, etc. are higher in urban areas compared to rural areas. The urban stagnation in infant mortality as observed in Fig. 3.4 may be due to high infant mortality among slum dwellers in urban India, a poor socio-economic subgroup of the urban population.

Unlike under-5 deaths, much less is known about the determinants of adult mortality in India. This is due to the lack of data on adult deaths by socio-economic status. A study discussing the determinants of adult mortality in India revealed that not only the socio-economic status, but also the behavioral pattern of adults lead to mortality differentials among them (Saikia and Ram 2010). More detailed and further investigation is needed to examine differential pattern of adult mortality by states.

India shows an overall converging pattern of mortality trends across states in past four decades. Yet, the mortality inequality at a smaller administrative unit (district) in most recent years remains unacceptable.

Summary and Conclusion

The objective of this article was to analyze mortality trends in India by age, sex, geographical regions, and place of residence (rural-urban) in the past four decades, with a special emphasis on the most recent decade. For this purpose, I used reports and life tables published by the Office of the Registrar General since the 1970s. Various inequality indicators such as the range, dispersion measure of mortality, Gini coefficients, and the PAF were calculated to understand the differential of mortality trends across regions.

My analysis showed that the life expectancy at birth in India substantially increased for both men and women in the past four decades, with significant variations observed from one decade to another. Analysis of mortality trends by broad age groups showed that the substantial increase in life expectancy in recent decades can mainly be attributed to the decline in infant and child mortality. Compared to males, Indian females experienced faster reductions in mortality, with a converging pattern observed across Indian states.

The results also indicated the presence of an extreme level of heterogeneity in mortality indicators across major regions in India. Relative inequality has increased, despite absolute regional convergence in mortality. A north-south gradient in mortality is still observed. Stagnation in life expectancy as a whole and for urban India is a major concern. The rural–urban gap in mortality appears to be constant over time, and the gender gap in mortality has reversed, being now more favorable to females. The age pattern of mortality clearly varies from states to state: while states like Assam are facing a higher burden of adult mortality, states like Madhya Pradesh and Orissa are facing a higher burden of infant mortality. Inequality analysis showed that in spite of a clear mortality convergence pattern over several decades, India still faces an unacceptably high level of mortality disparities at the state and district levels.

The analysis of recent trends in mortality raises several questions. The central question relates to the reasons for the slowing down of the pace of mortality reduction, especially in view of the fact that India is still well below the mortality levels observed in industrialized countries. This question is of major importance, since India has been the major contributor to the world total of deaths since 1970. We need to understand whether this slowdown stems from the growing role of neonatal mortality in infant deaths, an issue which has for a long time not received sufficient attention. We also need to assess whether further medical investments In India will be able to address the sluggish reductions of neonatal mortality in the era of health reforms. In addition, a further question relates to the disease profile of male adults in India that also contributes to the observed stagnation in mortality reduction. Should we postulate that the stagnation in urban mortality reduction is partly caused by the increasing migration of lower socioeconomic groups from rural to urban areas, or should we look for other explanations? These are crucial questions to be addressed in future research on mortality in India. We may also add that, in view of existing mortality variations across regions, evidence-based public health programs should be framed at the district level in relation to the specific needs of these areas. Finally, the data gap remains wide in India, and death statistics are especially limited. The emphasis in the future should be placed on improving death and birth registration in the country, since only vital statistics can provide high quality demographic data at the local level for monitoring trends and differentials.

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Chapter 4
Mortality Trends in Indonesia

Soeharsono Soemantri and Tien Afifa

Introduction

Indonesia's mortality scenario lies midway between China's rapid progresses since the 1960s and India's slow improvements in average life expectancy. Yet, a detailed description of the trends and components of mortality decline is hampered by the relative paucity of reliable statistics on age-specific death rates. In more prosperous countries, births, deaths and marriages are recorded through the government's civil registration system, which creates a permanent record of each event. The records derived from civil registration systems have two main uses: first, they constitute personal legal documents, available to citizens as proof of facts; second, the data derived from these records form the basis of a country's vital statistics system (WHO 2010). Vital statistics are used to derive the fundamental demographic and epidemiological measures that are needed for national planning across multiple sectors such as education, labor and health.

Civil registration records are the best source of vital statistics and vital statistics are in turn the core of a country's health information system (HIS). The availability of measures related to mortality, like the Infant Mortality Rate (IMR), Under-five Mortality Rate (U5MR), adult mortality rate or life expectancy (LE) should ideally be provided by the national civil registration system. The vital statistics based on civil registration are of poor quality and require substantial improvement in all areas (NIHRD 2012). Likewise, the HIS exists in Indonesia but is inadequate for policy

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formulation and allocation purposes (CDI-MOH 2007). Where the civil registration system and HIS are inadequate, it is sometimes necessary, on an interim basis, to use alternative data sources to generate vital statistics. Examples of the latter include population censuses, household sample surveys, demographic surveillance in sentinel sites, and sample registration systems.

Data Sources and Methods for Mortality Estimation in Indonesia

The estimation of mortality measures, derived from surveys and population censuses, can be done by direct or indirect methods[1]. Surveys like the Indonesia Demographic and Health Survey (IDHS), National Socio Economic Survey (NSES also known as SUSENAS), Population Census (PC), and Intercensal Population Survey (known as SUPAS) collected by Badan Pusat Statistik (BPS, Statistics Indonesia), have been used to obtain measures of mortality.

The IDHS has been conducted six times, in 1991 (CBS et al. 1992), 1994 (CBS et al. 1995), 1997 (CBS 1998), 2002/2003 (BPS and ORC Macro 2003), 2007 (CBS and Macro International Inc 2008) and 2012 (Statistics Indonesia et al. 2012). IDHS data have been used by the government of Indonesia to report information on childhood mortality measures, employing both direct and indirect methods. SUSENAS is an annual survey conducted since the 1960s while the Population Census[2] and SUPAS, which also provide childhood mortality rates indirectly, are conducted every 10 years. The recent 2010 Population Census tried to collect information on mortality events in households, thus making it possible to estimate some measures of mortality directly. Table 4.1 shows possible estimation methods by data source for mortality measures in Indonesia.

Mortality measures like Neonatal Mortality Rate (NMR), Post Neonatal Rate (PNR), Infant Mortality Rate (IMR), Under-five Mortality Rate (U5MR), Maternal Mortality Ratio (MMRatio) or Maternal Mortality Rate (MMRate) and Life Expectancy at Birth (E_0) can be estimated by employing both direct and indirect methods. IDHS data provide direct estimates of NMR, PNR, IMR and U5MR by employing the birth history approach.[3] Birth history can be used to compute

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[1] Manual X of United Nations provides guidance in applying indirect method of childhood mortality estimation (Department of International Economic and Social Affairs 1983). Model life tables developed by Coale and Demeny (1983) have been widely used to establish indirect techniques. Indonesia in applying indirect techniques to estimate childhood mortality always adopt the use of West Model of Coale and Demeny Life Tables.

[2] The modern Population Census (PC) after Independence in Indonesia were conducted for the years 1961, 1971, 1980, 1990, 2000 and 2010.

[3] Birth histories, with a mother being asked for information on the date of birth and, if relevant, the age at death of every live-born child she has had, were collected by IDHSs. Information derived from birth histories, were used to calculate directly measures of childhood mortality (including NMR, IMR and U5MR), dividing deaths for given ages and time periods by exposure to risk in terms of person-years of life lived by the reported children.

Table 4.1 Data sources, type of data, estimation method and estimation products

Data sources	Type of data	Estimation method	Mortality measures	Remarks
IDHS (1991–2012)	Birth history of respondents (EMW 15–49)	Direct	NMR, PNR, IMR, U5MR	Prone to give different patterns of intra- vs. inter- survey trends
		Indirect (Brass- type techniques)	IMR, CMR, U5MR, LE	Bias to life table model selection
SUSENAS	Children ever born and surviving	Indirect (Brass- type techniques)	IMR, CMR, U5MR, LE	Limited to ever married women
				Bias to life table model selection
Population census	Children ever born and surviving	Indirect (Brass- type techniques)	IMR, CMR, U5MR, LE	Bias to life table model selection
2010 population census	Deaths reported in the household	Direct	Age Specific Death Rate (ASDR), life table, MMR, MMRatio, proportion of maternal deaths of female reproductive age (PMDF)	Needs correction for incomplete reported deaths

averages of children ever born (CEB) and children surviving (CS) as the basis information to estimate IMR, U5MR and Life Expectancy at birth (e_0) indirectly (Brass-type Techniques). Indirect estimation is widely employed to obtain mortality measures in Indonesia. Brass-type techniques have long been used to estimate childhood mortality rates and life expectancy at birth from various data sources like Population Census, Intercensal Population Survey (SUPAS), National Socio Economic Survey (SUSENAS).

Mortality Estimates and Trends in Indonesia

Direct Estimation

Direct estimates of mortality are available only from IDHS and the 2010 population census. Six waves of IDHS (conducted in 1991, 1994, 1997, 2002/2003, 2007 and 2012) allow direct estimation of childhood mortality rates by employing the birth history approach. The last 2010 Population Census included some questions that made it possible to estimate some measures of mortality directly.[4]

[4] 2010 PC included questions on recent births and deaths since 1 January 2009. Information on deaths and census count of household members by age group can be used to construct a life table and life table-based estimates of IMR, U5MR and E_0 can then be calculated. Although PC does not give sampling error, death events reported by PC may be prone to underestimation.

Childhood Mortality Derived from IDHSs

Direct estimates using different waves of IDHS data give levels and trends of NMR, IMR, and U5MR for the last two decades. Table 4.2 shows direct estimates of NMR, IMR, and U5MR from the six waves of IDHS employing the birth history approach. It also depicts the percentage contribution of NMR to IMR and U5MR.

IDHS provides a set of estimates which refer to three time periods: 0–4 years, 5–9 years and 10–14 years preceding the survey. Comparing the three estimates by IDHS survey dates, there is evidence of different patterns of inter- and intra- survey trends (Table 4.2 and Fig. 4.1). It is suspected that enumerators tend to shift events in the period 0–4 years, to the period 5–9 years, due to enumerator's burden of the survey, which tends to give a lower estimate for the period 0–4 years before survey.

Looking at estimates referring the 0–4 year period preceding the survey, there is a decline in NMR from 32 per 1000 (IDHS 1991) to 19 per 1000 (IDHS 2012), a relative decline of 41 % or an annual reduction rate (ARR) of 2.5 %. Steeper declines are visible in IMR, from 68 per 1000 (IDHS 1991) to 32 per 1000 (IDHS 2012), a relative decline of 53 % or an ARR of 3.6 %. As for U5MR, it fell from 98 per 1000 (IDHS 1991) to 40 per 1000 (IDHS 2012), a relative decline of 59 % or an ARR of

Table 4.2 Direct estimates of childhood mortality and percentage contribution of NMR to IMR and U5MR, IDHS 1991–2012

Year of IDHS	Years preceding survey	Time reference	Direct estimates of childhood mortality (per 1000 live births)			% contribution of NMR to	
			NMR	IMR	U5MR	IMR	U5MR
1991	0–4	1988	32	68	97	46.8	32.5
	5–9	1983	36	80	116	44.5	30.7
	10–14	1978	41	82	123	50.4	33.6
1994	0–4	1991	30	57	81	53.3	37.4
	5–9	1986	34	75	103	45.8	33.3
	10–14	1981	37	75	110	49.5	33.9
1997	0–4	1994	22	46	58	47.7	37.5
	5–9	1989	28	59	83	48.4	34.3
	10–14	1984	28	65	95	43.4	30.0
2002/2003	0–4	1999	20	35	46	57.1	43.5
	5–9	1994	26	51	63	51.0	41.3
	10–14	1989	29	59	79	49.2	36.7
2007	0–4	2004	19	34	44	55.9	43.2
	5–9	1999	23	44	58	52.3	39.7
	10–14	1994	28	53	69	52.8	40.6
2012	0–4	2009	19	32	40	59.4	47.5
	5–9	2004	20	35	45	57.1	44.4
	10–14	1999	23	45	58	51.1	39.7

Source: IDHS (1991, 1994, 1997, 2002/2003, 2007, 2012)

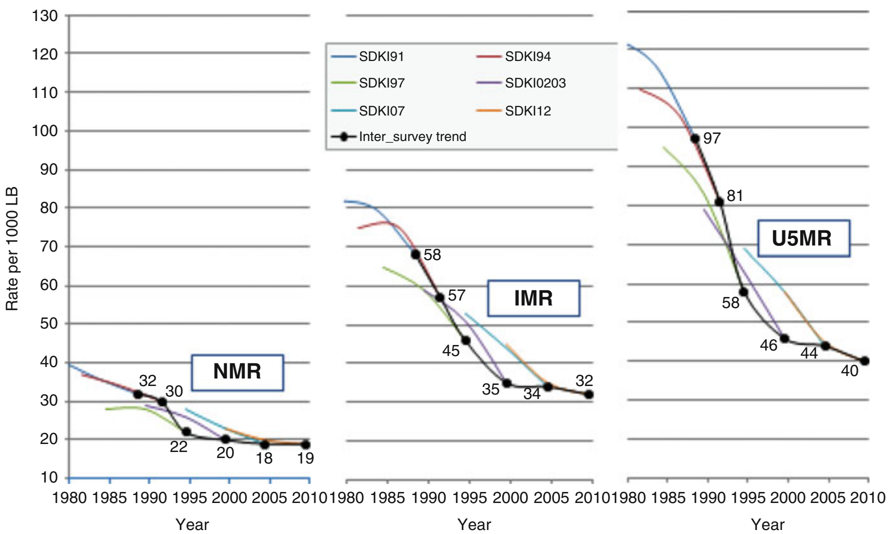

Fig. 4.1 Patterns of inter and intra survey trend of NMR, IMR and U5MR, IDHS 1991–2012 (Source: IDHS data. Note: SDKI in the legend stands for Survei Demografi Kesehatan Indonesia, also known as the Indonesian Demographic Health Survey (IDHS))

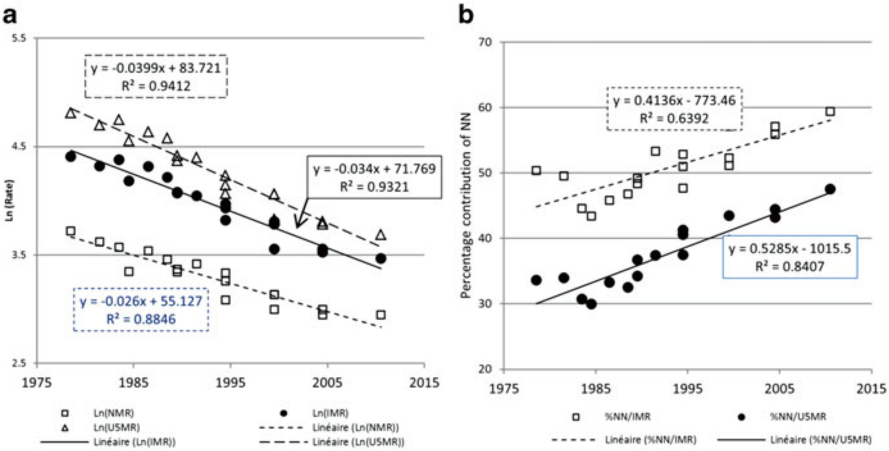

Fig. 4.2 (**a**) Direct estimates of NMR, IMR and U5MR by IDHSs 1991–2012. (**b**) Percentage contribution of neonatal deaths to infant and underfive deaths

4.6 %. Aggregating all the IDHS estimates, we get an ARR of IMR of 3.4 % and an ARR of U5MR of 4.0 % (see Fig. 4.2a), lower than the calculation based on only the 0–4 year period estimate (which yields an ARR of 3.6 % for IMR and an ARR of 4.6 % for U5MR).

The data also showed that during the last two decades, lowering NMR was more difficult than lowering IMR or U5MR. This is a common feature of mortality decline at young ages. The difficulty in lowering NMR is reflected by the increase in percentage contribution of NMR to IMR, from 47 % (IDHS 1991) to 59 % (IDHS 2012) and the increase in percentage contribution of NMR to U5MR, from 32 % (IDHS 1991) to 47 % (IDHS 2012). Overall increases in percentage contribution of NMR to IMR or U5MR are also shown by the coefficient of the regression line of the percentage contribution (see Fig. 4.2b).

Childhood Mortality Derived from 2010 Population Census

The recent 2010 population census also collected information on deaths in the household between January 2009 and the census date (May 2010). The estimated 1 year deaths by age group can be obtained, and together with population counts by age group, it is possible to calculate the Crude Death Rate (CDR) and Age Specific Death Rate (ASDR) as the basis for constructing a life table. Direct estimates of IMR, U5MR and E_0 from 2010 population census (Life Table based) are shown in Table 4.3.

Direct measures of mortality from the 2010 population census are dependant on data quality. Without correcting for the completeness of reported deaths, 2010 population census gives direct estimates of IMR (17 per 1000), U5MR (23 per 1000) and E_0 (82 years) that are unlikely to represent the recent conditions of the country. After correction for the completeness of reported deaths, if we apply overall completeness of 41.4 % (Brass Growth Balance Method), 2010 population census gives a much higher IMR (40 per 1000) and U5MR (54 per 1000) and a lower E_0 (64 years). If we apply different completeness by age groups, 40 % for 0–49 years, and 64 % for 50 years + (based on Dual System Approach, Chandrasekaran Deming Method)[5], 2010 population census gives similar IMR (41 per 1000) and U5MR (55 per 1000), but a slightly higher E_0 (68 years).

Table 4.3 Direct estimates of IMR, U5MR and life expectancy at birth (both sexes) from 2010 population census

Data sources/method	IMR [q(0)]	U5MR [q(5)]	$E_{(0)}$	Ref year
2010 PC: Direct (LT based, without correction)	17	23	81.9	2009
2010 PC: Direct (LT based, corrected for overall completeness 41,4 %)	40	54	63.9	2009
2010 PC: Direct (LT based, corrected for completeness (dual system) of 40 % (0–49 years) and of 60 % (50 year+)	41	55	68.3	2009

[5] Dual systems approach to estimate incompleteness of birth and death events follow the concept developed by Chandrasekaran and Deming as cited in Shryock and Siegel (1982).

Indirect Estimation

Table 4.4 shows indirect estimates of IMR employing the Trussell Technique – West Model from information of children ever born and surviving derived from Population Census, SUPAS and SUSENAS, and compares it with direct IMR estimation using the birth history approach from IDHS data (estimate based on 0–4 years and 5–9 years period before survey).

Population census (PC) combined with SUPAS gives a steeper decline of IMR compared to indirect estimates from SUSENAS or direct estimates from IDHS. A very high estimate of IMR in 2002 is given by 2006 SUSENAS, and the data point has been removed. Figure 4.3a compares trends of IMR based on indirect estimates from PC/SUPAS and SUSENAS versus direct estimates from IDHS. Figure 4.3b compares the trend of IMR from three data sources: PC/SUPAS (which gives an annual reduction rate of 4.5 %), SUSENAS (which gives an ARR of 3.4 %), and IDHS (which gives an ARR of 3.9 %).

From Table 4.4, we see a wide difference between indirect estimates of IMR for the same time reference (2006): the 2010 population census estimate of IMR was 26 per 1000 while the 2010 SUSENAS estimate of IMR was 33 per 1000. With the large sample size of about 300,000 households in 2010 SUSENAS, we do not expect the indirect estimate of IMR to differ widely from the estimate using the 2010 population census. The large difference between the two indirect estimates (7 points), would need to be explained by other factors as well as sampling error of

Table 4.4 Indirect estimates of IMR (national) by PC, SUPAS, and SUSENAS (Trussell Method – West Model) vs direct estimates of IMR by IDHS

Indirect estimation[a]					Direct estimation[b]	
Ref year	PC	SUPAS	Ref year	SUSENAS	Ref year	IDHS
1967	142		1992	60	1984	80
1976	112		1995	49	1987	75
1986	70		1996	42	1989	68
1991		51	1997	52	1990	59
1996	47		1998	44	1992	57
2001		32	1999	41	1995	46
2006	26		2000	34	1995	51
			2001	34	2000	35
			2002	57	2000	44
			2003	40	2005	34
			2004	39	2005	35
			2005	38	2010	32
			2006	33		

Note: [a]Indirect estimates derived from population census: 1971, 1980, 1990, 2000, 2010; SUPAS: 1995, 2005; and SUSENAS: 1996, 1999–2010
[b]Direct estimates refer to 0–4 and 5–9 years before survey date, derived from IDHS: 1991, 1994, 1997, 2002–2003, 2007, and 2012

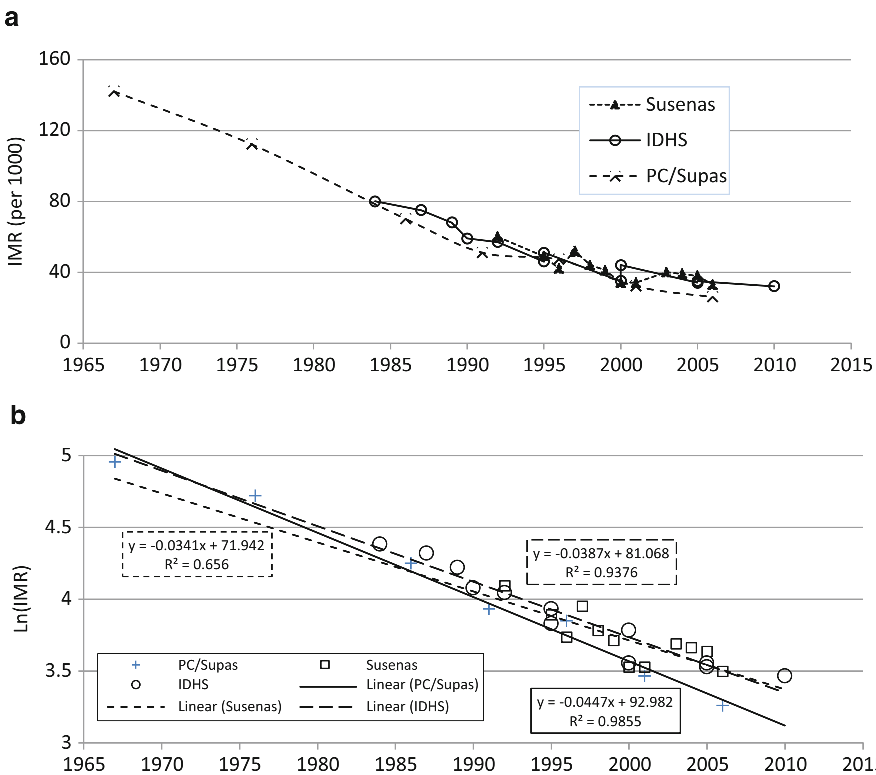

Fig. 4.3 (**a**) Indirect estimates of IMR from PC/Supas and Susenas versus direct estimates from IDHS, Indonesia. (**b**) Trend and ARR of IMR based on indirect estimates of PC/Supas, Susenas and direct estimates of IDHS

SUSENAS. The quality of information on CEB and CS as the basis for indirect estimation may be better using SUSENAS than Population Census data as SUSENAS utilizes data collectors who are better qualified, better trained and have better field implementation skills. Figure 4.4 compares CEB, CS and proportion of child deaths [$D_{(x)}$], and derives the IMR and E_0. The 2010 population census, compared to the 2010 SUSENAS, gives lower average number of CEB and CS, and lower $D_{(x)}$ by age of mother. The information also indicates that PC, compared to SUSENAS, tends to undercount number of CEB and CS which implies a lower estimate of childhood mortality and a higher LE.

Variation of Childhood Mortality

Figure 4.5 shows the variation in direct estimates of IMR and U5MR by province (for the 10 year period prior to the survey date) based on 2007 and 2012 IDHS. Both the 2007 and 2012 IDHS give a very wide range of IMR and U5MR. The lowest

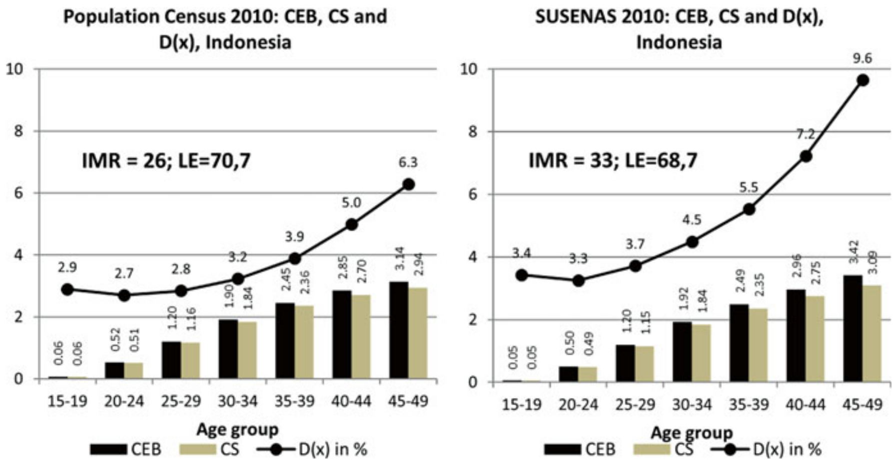

Fig. 4.4 CEB, CS, D(x) as reported by 2010 population census and 2010 SUSENAS and their indirect estimates of IMR and life expectancy at birth (Trussell, West Model)

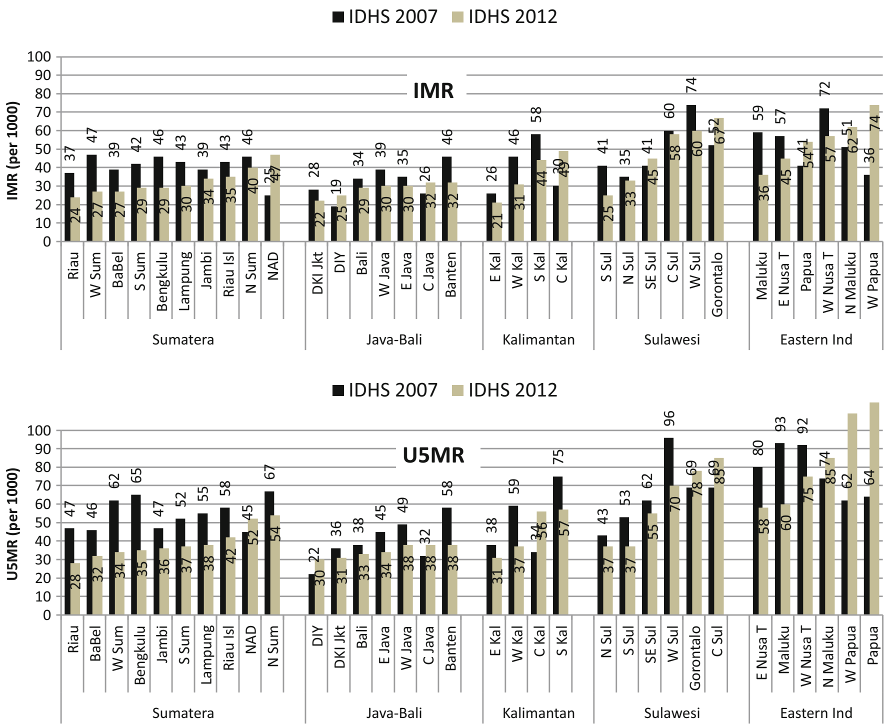

Fig. 4.5 Infant mortality and under-five mortality (IMR and U5MR) during the 10 years preceding the surveys, Indonesian provinces, 2007 IDHS and 2012 IDHS

IMR in the 2007 IDHS is in Yogyakarta (19 per 1000) and the highest IMR is in West Sulawesi (74 per 1000). The lowest and highest U5MR also occur in Yogyakarta (22 per 1000) and West Sulawesi (96 per 1000). Based on 2012 IDHS, the lowest and highest IMR occur in East Kalimantan (21 per 1000) and West Papua (74 per 1000) respectively, while the lowest and highest U5MR occur in Riau (22 per 1000) and Papua (115 per 1000) respectively.

Comparing the 2007 and 2012 IDHS, IMR declined in 24 provinces and increased in 9 provinces; U5MR declined in 26 provinces and increased in 7 provinces. However, changes in IMR and U5MR by province from 2007 IDHS to 2012 IDHS should be interpreted with caution. Almost all IMR and U5MR by province estimated by 2012 IDHS are within the range of IMR or U5MR ± 2 standard error given by 2007 IDHS. Even the decline in national IMR from 39 per 1000 (2007 IDHS) to 34 per 1000 (2012 IDHS), or an ARR of about 2.7 %, is not a statistically significant change. Sample sizes of 2007 IDHS (about 41,000 households) and 2012 IDHS (about 46,000 households) are not able to detect changes of IMR either nationally or provincially.

Figure 4.6 depicts indirect estimates of IMR and U5MR by province and their annual reduction rates between 1996 (2000 PC) and 2006 (2010 PC). Nationally, ARR between two PCs for IMR is 6.9 % and for U5MR is 6.8 %. ARR by province

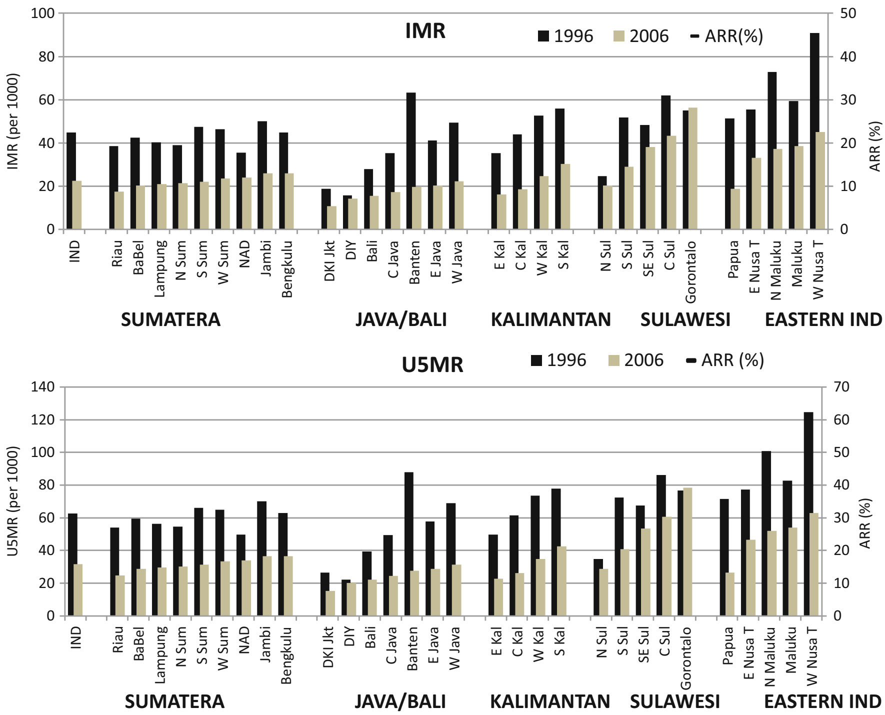

Fig. 4.6 Indirect IMR and U5MR by province, 2000 and 2010 population census

shows large variation, from a negative ARR in Gorontalo to a very high ARR in Banten (more than 11 %). Most provinces have reached an ARR greater than 4.4 %,[6] except NAD (Aceh) in the Sumatera region, DIY (Special Region of Yogyakarta) in the Java-Bali region, and 4 provinces: North Sulawesi, Central Sulawesi, SE Sulawesi and Gorontalo in the Sulawesi Region.

Both direct estimation (IDHS) and indirect estimation (2000 and 2010 PC) show similar variation of childhood mortality by region: high mortality mostly in Eastern Indonesia and Sulawesi, and low mortality in Java/Bali (Figs. 4.5 and 4.6).

Indonesia and Model Life Tables

Our analysis allows us to explore a more technical issue related to mortality patterns observed in Indonesia. A life table, constructed from the reported deaths in the household from the 2010 population census after correction for its completeness, is used here for comparison with selected life table model used for indirect estimation. Indonesia has, for a long time, employed the West Regional Model Life Table. Figure 4.7 contrasts pattern of $_nm_x$ and $_nq_x$ (log scale) between the West Regional Model Life Table and the 2010 population census-based Life Table for the same level of mortality (level 21 or E_0 of 68 years) for both sexes. The two life tables give quite different patterns of $_nm_x$ and $_nq_x$, with the census giving higher levels of $_nm_x$ and $_nq_x$ for younger age groups. This may explain the higher estimates of IMR (41 per 1000) and U5MR (55 per 1000) from direct life table-based estimation using 2010

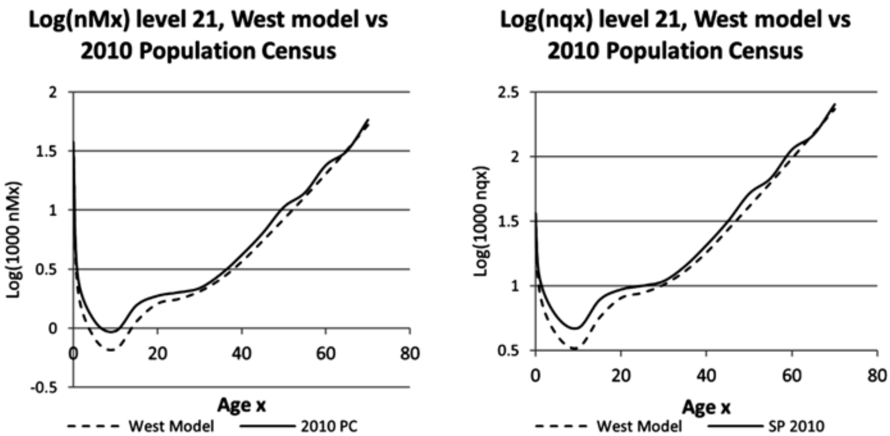

Fig. 4.7 Relative difference of $_nm_x$ and $_nq_x$, West Model Life Table vs Indonesia 2010 Population Census for both sexes, mortality level 21 ($e_0 = 68$ years) (Source: Soemantri 2012)

[6] ARR needed to meet MDG-4 target achievement.

population census data (see Table 4.3) compared to indirect estimation from 2010 SUSENAS (IMR = 33 per 1000 and U5MR = 41 per 1000).

Changes of Trends of NMR, IMR and U5MR by Time Period

Indirect mortality estimates from 2000 to 2010 censuses depict a steep decline in national mortality with an ARR of more than 6.5 % for both IMR and U5MR between 1996 and 2006. In contrast, direct mortality estimates from 2007 IDHS to 2012 IDHS (estimate for the 5 year period preceding the survey) provide a lower ARR of 1.2 % for IMR (from 34 per 1000 to 32 per 1000 within the 5 year period from 2004 to 2009) and an ARR of 1.9 % for U5MR (from 44 per 1000 to 40 per 1000). Different ARR for childhood mortality based on indirect versus direct estimation may relate to changes in the trend overtime, with direct ARR referring to more recent time periods than indirect ARR. The difference may also be due to different approaches applied. Therefore, changes of trend should be assessed by using the same approach (direct or indirect).

Evidence of declining ARR using the indirect method can be assessed by comparing ARR from indirect estimates from PC/SUPAS against ARR of indirect estimates from SUSENAS. IMR estimates from PC/SUSENAS data from 1967 to 2006 gives an ARR of 4.5 % compared with an ARR of 3.4 % for the period from 1992 to 2006 based on SUSENAS (Fig. 4.3b and Table 4.4).

Changes in the trend of childhood mortality for the more recent period are shown by the 1991–2012 IDHS data. Figure 4.8 depicts changes in the trend of NMR, IMR and U5MR by contrasting their ARRs before 1990 versus after (and including) 1990; and before 1999 versus after (and including) 1999. ARR of NMR declined from 2.9 % in the period before 1990, to 2.4 % thereafter, and declined from 2.8 % before 1999, to 1.5 % thereafter. ARR of IMR has increased from 2.7 % in the period before 1990, to 3.2 % in the period ≥1990, but it decreased from 3.3 % in the period before 1999 to 2.5 % thereafter. ARR of U5MR did not change in the period before and after 1990 (3.4–3.5 %), but it declined from 4.3 % in the period before 1999 to 2.8 % thereafter. Changes of trend of NMR, IMR and U5MR have been depicted by the variation of ARR, but variation of ARR should be interpreted with caution due to sampling error. Generally, both indirect and direct estimation of childhood mortality nationwide have indicated that reducing child mortality has become increasingly difficult.

Concluding Remarks

Indonesia relies on survey-based data to obtain official measures of mortality, but these data sources yield a wide range of estimates. Different approaches to measuring the mortality rate give different results and different assessments of the progress made. The difficulties faced in providing a single set of mortality estimates for

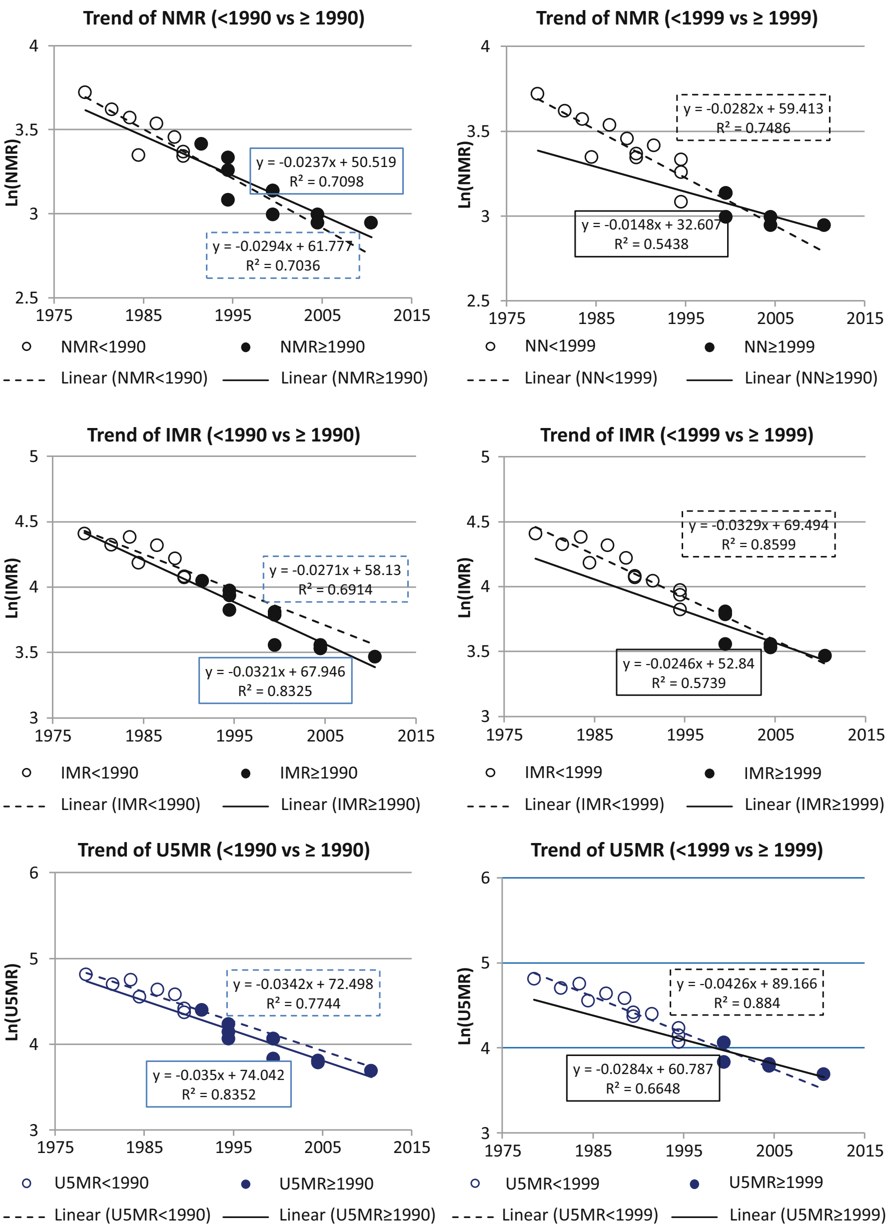

Fig. 4.8 Change of trends of NMR, IMR and U5MR by time period, IDHS 1991–2012

assessing recent trends and the range of regional differentials illustrate the fragility of the mortality statistics. Since evidence-based planning requires reliable and timely information, a reliable registration system is urgently needed to provide a stronger statistics and health information system in the country. In the course of our estimation procedures, we also observed that applying a standard population model to measure childhood mortality may not be appropriate for the conditions in Indonesia and this would require further exploration.

The IDHS, which provides direct estimates of the NMR, IMR, and U5MR, could be better interpreted as the lowest limit of the measures. In spite of sustained decline observed over the last decade, trends in childhood mortality rates over time also indicate that it is becoming increasingly difficult to further reduce these measures, and that lowering the NMR is less easy than lowering the IMR and U5MR. The challenge in further reducing childhood mortality is also underscored by the annual reduction rates obtained through indirect estimates from PC/SUPAS and SUSENAS data.

Apart from the downward trends of mortality in Indonesia, our estimates also document the persistence of considerable variations in survival across the country. Using for instance census figures on mortality below 5, estimates range from 15 per 1000 in Jakarta region to 78 per 1000 in the recently created Gorontalo province of Sulawesi. In view of Papua's overall degree of underdevelopment, its mortality figures appear rather low in comparison with other eastern provinces or the rest of the country. In addition, disaggregated estimates show that there are also sizeable variations between provinces within the same islands, with mortality twice higher in the less advanced areas of Java, Kalimantan or Sulawesi. While gaps across provinces appear to have shrunk since the 1990s, inequity among the regions of Indonesia as revealed by comparisons of the childhood mortality rates remains a crucial issue to be taken into consideration in developing health policies.

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Chapter 5
Mortality in China, India and Indonesia: an Overview

Christophe Z. Guilmoto

The overall reduction of mortality in Asia is a central dimension of the global demographic change over the last century and the three chapters of Part One provide an in-depth account of more recent developments in China, India and Indonesia. Mortality decline in many parts of Asia predates the post-WW2 period – usually taken as the benchmark of demographic modernity – and started in several areas after the 1918 influenza epidemic. Mortality decline in India can for instance be dated back in 1920s. However, mortality trend during the interwar period is hard to determine for China or Indonesia. The available data related to Java do not point to a tangible improvement of survival in Indonesia. Population growth as estimated during this period appears to have been relatively sustained till the brutal trend reversal caused by the Japanese occupation of 1942–1945 and the ensuing war of independence (Williams and Guest 2012). China's mortality trajectory and the precise date of the inception of a sustained reduction in death rates are not accurately known due to lack of regular census before 1950 and the analysis is complicated by the successive disasters that China encountered after 1930 (civil war, Japanese occupation, famine etc.). The decline in mortality in China is commonly associated to public health improvements introduced in the beginning of the twentieth century, even though mortality decline clearly accelerated during the 1950s when the first national census was held and reliable statistics became available (Lee and Feng 2001).

Figure 5.1 is based on more solid demographic reconstruction, and gives details on mortality trends observed across China, India and Indonesia since the 1950s. It portrays an almost linear and uninterrupted progression in longevity in the three countries, with the exception of the crisis in China at the end of the 1950s. Life expectancy recorded an exceptional progress of about 30 over 60 years, with an average gain of 5 years per decade in China, India and Indonesia from 1950 to 2010.

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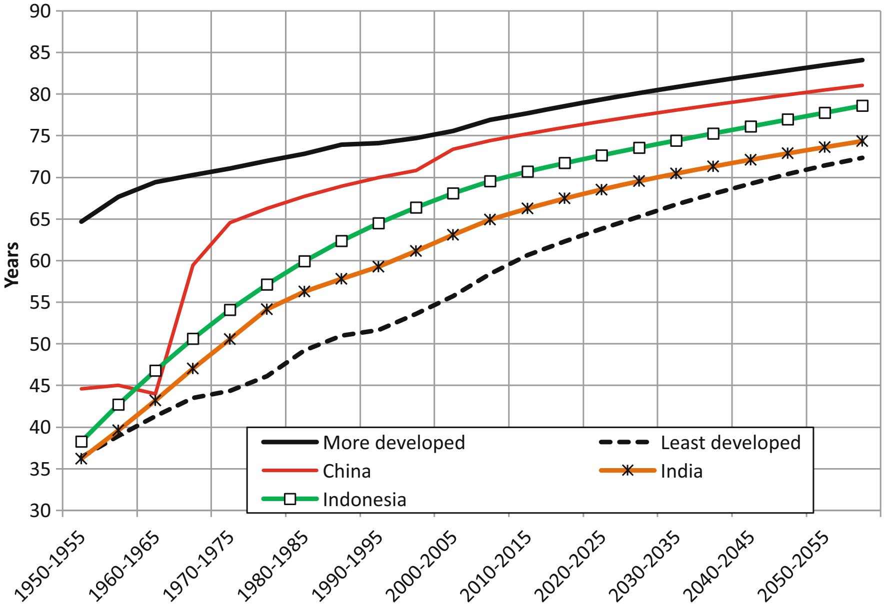

Fig. 5.1 Life expectancy (both sexes) in China, India, Indonesia, and comparison with more and least developed countries, 1950–2060

During most of this period, the progression proved more rapid in these three countries than in industrialized countries and in less developed countries. A similar picture could be drawn from a comparison of infant mortality rates during the same period. For instance, Indonesia's decline was remarkable when its infant mortality rate fell from 188 to 26 per 1000 births while mortality in the less developed countries decreased only from 199 to 63 per 1000. Information is derived from United Nations figures (UNPD 2013), but the chapters on mortality in China and Indonesia in this volume underscore the persisting shortcomings of mortality estimates in Asia.

The comparison of mortality improvements in China, India and Indonesia may give rise to several additional comments. First, when the trends are examined more closely they tend be more curved than simply linear. While clearly positive, annual gains in life expectancy in China, India and Indonesia have diminished over the years and are currently lower than any time in the recent past. In fact, the pace of mortality reduction in the three Asian countries is now slower than currently observed in less developed countries. The chapter on Indonesia provides a fine statistical analysis of this deceleration. This reversal, well described in the three chapters of our volume, is of course related to the new challenges faced by health authorities once the first phase of the epidemiological transition is over. With transmissible diseases increasingly under check in China, India and Indonesia, future mortality advances will depend on the fight against cardiovascular and other degenerative diseases. The public health costs involved in the reduction of chronic diseases have invariably slowed down the overall progress in longevity.

We also observe from the curvilinear trends observed during the last two decades that the progress is not necessarily faster in Asia than in developed countries where life expectancy is already higher. Of late, China's progress has been in particular slower than in industrialized countries. This is in contrast with the 1950–1980 period that witnessed what has been described as "the most rapid sustained increase in life expectancy of any population in documented global history" (Babiarz et al. 2014). This may be related to the fact that market reforms of the 1980s have caused a gradual reduction in the universal access to health care that characterized the first decades of the People's Republic. Indeed, its pace of mortality improvement has been relatively slow according to the analysis by Zhao, Chen and Jin in this volume, in spite of its outstanding economic growth. The miracle witnessed in China on the fertility front has not been replicated to the same extent in its fight against mortality and other countries in Asia such as Singapore or South Korea are well ahead of China.

Second, mortality trajectories show that these improvements appear to have proceeded at an almost parallel pace during the last six decades in China, India and Indonesia. As a result, differentials between the three countries are today almost identical to what they used to be in 1950. China is well ahead of the other two Asian giants and it was already so in the early 1950s. Barring for the famine period, the gap in life expectancy between China and India has remained almost the same over these 60 years. Today, Chinese live on average 5 and 10 years longer than Indonesians and Indians respectively. Again, there is little convergence in mortality level across the three countries. India and Indonesia do not seem to be catching up with China. What may indeed be noticed is the mediocre progress of India highlighted by its current mortality level corresponding to that of China 30 years ago. The cumulative effect of India's health backwardness will be felt in the future decades and represent a major weakness in the development of its human capital.

Finally, these curves of life expectancy since the 1950s are inevitably a rapid summary of more complex local transformations. Within each country, there are significant variations in terms of mortality levels and trends as documented notably by the chapters on India and Indonesia. Ideally, we would have plotted on a single map comparable mortality indicator at subnational level for China, India and Indonesia as was done for density or population growth in the introduction to this volume. But sources proved too disparate for a systematic and reliable comparison. Using available materials, we may however attempt a regional disaggregation for China, India and Indonesia.

According to Chinese official estimates, province-level life expectancies in 2008 ranged from 67 to 68 in Gansu, Guizhou, Tibet and Yunnan to 81 years in Shanghai (Li 2012). Southwestern provinces suffer distinctly more adverse mortality levels, with almost a 10-year gap in life expectancy between adjacent Guizhou (67.3) and Chongqing (76.1). This geographical pattern is roughly similar to what was estimated in the 2000 period (Congdon 2007). It may be argued that many Chinese provinces are huge demographic entities with more than 50 million inhabitants and are therefore unlikely to be homogenous with respect to mortality. Cai (2005) shows that life expectancies had in 2000 a range of 14 years at regional level, but of

23 years at prefectural level.[1] In Indonesia, census-based estimates put the extent of regional variations in life expectancy at 11 years. The lowest value is observed in the new province of Gorontalo (63.1 years), with several other eastern provinces such as Maluku, West Sulawesi, and West Nusa Tenggara close to 65 years. Unsurprisingly, the metropolitan provinces of Jakarta and Yogyakarta top the list with life expectancies above 74 years (BKKNB 2013).[2] The dispersion observed is slightly smaller than in China. In India, life expectancies are shorter than in China and Indonesia, according to SRS regional life tables for 2009–2013, the range between states is 12 years and of same order as in the two preceding cases. The lowest values are observed in Assam (63 years) and Madhya Pradesh (64), while Kerala unsurprisingly takes the lead position with a life expectancy of 75 years. What is more unexpected is that the division of Indian states into urban and rural areas hardly increases the dispersion in life expectancy – from 62 years in rural Assam to 76 in urban Himachal Pradesh. No figures exist for lower administrative units, but indirect evidence based on infant and child mortality at district level suggests the presence of greater mortality variations when estimates are provided at a more disaggregated level.[3]

What this brief comparative review suggests is that subnational heterogeneity remains pronounced in China, India and Indonesia. When set against each other, regional estimates in these countries tend to blur inter-country variations as they often overlap. In China, India and Indonesia, the least advanced regions have for instance a life expectancy close to 65 years around in 2010. At the opposite of the spectrum, estimates close to or above 75 years are also found in China, India and Indonesia. When compared to the rest of the world, the most advanced areas in China, India and Indonesia enjoy mortality conditions that are not very different from the United States (78 years in 2010) or Poland (75). The least advanced regions have on the contrary a life expectancy similar to what is observed in Haiti, Sudan (61) or Ghana (63). This demonstrates that the range of health situations prevailing within the three demographic giants is extreme, but that it tends to be concealed by the comparison of national averages.

Mortality trends in China, India and Indonesia have in turn several implications. Some are firstly epidemiological, since they imply a deep change in the distribution of deaths by cause over the years. Recent estimates for the Global Burden of Disease Study 2013 provide a graphic picture of the current situation and the variations within Asia (GBD 2015). When compared in terms of life lost (YLL), India is still affected by causes such as pneumonia, tuberculosis, diarrhea and various neonatal ailments while they are receding or almost absent elsewhere. While Indonesia is in

[1] In 2000, there were 345 prefectures in China with an average population of 3.7 million.

[2] Papua reports a suspiciously high level of longevity with a life expectancy estimated at 73 years. The computations of under 5 mortality by Soemantri and Afifa in this volume lead to a somewhat less optimistic view of the mortality situation in the Papuan provinces.

[3] Infant mortality estimates ranged in 2001 from 18 to 94 per 1000 at state level, but from 13 to 121 at district level (Rajan et al. 2008). India's 593 districts had an average population of 1.8 million in 2001.

a somewhat intermediary position between India and China – with many deaths still due to neonatal and respiratory diseases, China presents today an epidemiological profile closer to that of richer countries: the stroke is the first cause of years of life lost as it is in Japan and South Korea, and road accidents and cancer mortality have also emerged in China among the ten leading causes. The forthcoming challenges for health infrastructures are therefore varied across China, India and Indonesia. In spite of rise of the private healthcare system in Asia, the role of public sector will remain crucial for communication, prevention and screening activities.

Other immediate implications of the progress of life expectancy are mainly demographic since changes in longevity will have a direct bearing on age structures and especially on ageing processes. These issues are explored at greater length in the last part of this volume. It may also be useful to stress again that the large extent of geographical differentials in mortality reduction highlighted in the previous paragraph will generate extremely various situations. India, obviously the laggard in terms of health improvements, will pay a price in the forthcoming decades of demographic dividends since the health profile of its working-age population will continue to be less favorable than in China and Indonesia.

If we ignore for simplicity's sake the additional impact of migration and fertility, the consequences of mortality decline on ageing will be first felt in the few advanced regions of China, India and Indonesia identified here – from Shanghai to Jakarta and Kerala. Less advanced regions with a life expectancy 10–15 years shorter will be affected much later. On one side, we have regions in China, India and Indonesia where the focus of public health intervention will be on addressing non-communicable diseases while the social challenge of ageing will revolve around setting up a sustainable pension system as is being done these days in China. But on the other side, we have regions in the same countries suffering from very serious shortcomings in their health infrastructures. These regions have been deprived from the benefits of universal inoculation and access to health facilities enjoyed elsewhere in China, India and Indonesia. With mortality conditions akin to those prevailing in many sub-Saharan African countries, these regions need direct intervention from national governments. The mere effect of the booming private health sector has been obviously insufficient to reduce regional inequalities. If we look at the pace of progress in survival portrayed by the 1950–2010 trends, these underprivileged regions are more than 20 years behind the more prosperous regions and huge resource mobilization will be required to bridge this gap.

Our analysis suggests that regional differentials are shrinking slowly and India, as studied notably by Nandita Saikia in this volume, provides a good illustration of the modest progress towards regional equality. Large countries with high life expectancy have managed to reduce interregional variations in life expectancy, which is down to 6 years in the United States. In more homogenous Japan, the interregional range is even smaller with a gap of less than 2 years in female life expectancy between prefectures in spite of sizeable regional differentials in income. Regional inequality in healthy living and longevity are distinct dimensions of uneven social development of China, India and Indonesia. They tend to be seen today as a source rather than simply an outcome of the overall process of economic development. The long-term implications of current poor health conditions on the regional accumulation of human capital are therefore considerable and will reinforce regional imbalances in the future. Based on our analysis, there are reasons to believe that mortality variations within and between countries may still be visible in 20 years and will impact future birth cohorts, with out-migration as the main outlet to reduce inequalities.

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Part II
Fertility

Chapter 6
Understanding Fertility Trends in China

Zhigang Guo

Background and Purpose

Along with the radical family planning campaign launched by the Chinese government over the decades, China has experienced an unprecedented fertility decline since the 1970s. In the early 1990s, its Total Fertility Rate (TFR) fell below replacement fertility and continued its decline. Ever since, there has been strong suspicion whether the record low TFR may largely be the result of under-registration of births. The Fifth National Population Census (FNPC) of China in 2000 reported a shocking TFR of 1.23, which was widely considered "too low to be acceptable". Subsequently, the National One Percent Population Sampling Survey (NOPPSS) in 2005 reported a TFR of 1.35, slightly higher than in 2000 but still very low. In fact, most nationwide population surveys since 1995 have reported TFR in the range of 1.3–1.5.

Figure 6.1 provides a comparison of total fertility rates obtained from various sources, including national surveys conducted by the National Population and Family Planning Commission (NPFPC). It can be seen that most total fertility rates have remained below 1.5 since 1995, in some years substantially lower. The only exception was the nationwide population and family planning survey in 2006. The upward trajectory seen in the 2006 survey shocked both the government and the public and was interpreted as "rebounding fertility posing severe problem", when it was in fact due to a biased sample employed in the survey (Guo 2009).

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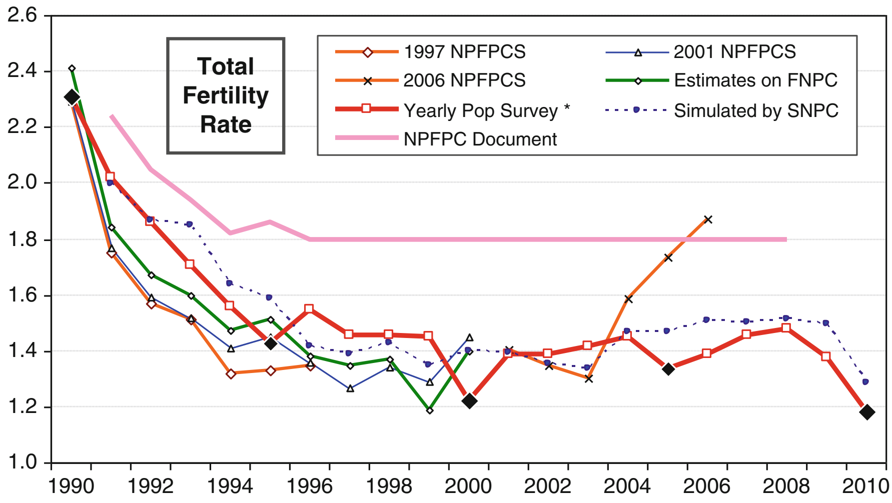

Fig. 6.1 Total fertility rates in China, 1990–2010

Data Sources and Explanations

(i) 1997 NPFPCS: Calculated by Guo (2000) on the basis of the data from the nationwide population and reproductive health survey in 1997 conducted by NPFPC.

(ii) 2001 NPFPCS: Calculations made by Ding Junfeng (2003) based on data from the national population and reproductive health survey in 2001 conducted by NPFPC.

(iii) 2006 NPFPCS: From *Tabulations of the 2006 National Population and Family Planning Survey*, China Population Publishing House, 2008.

(iv) Estimates on FNPC: Estimations by NBS/EWC (2007) based on data from the fifth national population census in 2000.

(v) Annual Population Change Surveys *: Published by the National Bureau of Statistics (NBS 1991–2010), including the results from the national population censuses and 1 % population sampling.

(vi) Simulated based on the 2010 census: Results obtained by Guo (2011) through simulating the SNPC population structure based on data from the Sixth National Population Census.

(vii) NPFPC documented: Data published by the National Population and Family Planning Commission of People's Republic of China, from *Handbook on Frequently-Used Data about Population and Family Planning in China* (*2008*), China Population Publishing House, 2009.

The Sixth National Population Census (SNPC) of China in 2010 reported a record low TFR of 1.18, far below replacement fertility. Should we believe it or not? As before, such a low TFR level was seriously questioned. However, simulation results of population processes based on the age-specific population of the SNPC showed it to be consistent with the very low fertility rates found in the nationwide surveys in the past. The census results suggest that a TFR of 1.8 in 2010 – which government departments insisted was the actual TFR – is a serious departure from reality. Furthermore, the reported TFR is even lower than 1.47, the average fertility level required by various fertility policies implemented in the national family planning campaign (Gu et al. 2007).

In this chapter, I analyze 2010 fertility data to decipher new trends in fertility in China and shed light on possible causes of the recent further drop in Chinese fertility. First, I will analyze the trend of TFR by birth order. Then, I will find the locations and the subpopulations which experienced further TFR decline in recent years. I will also point out what demographic factors may have been relevant to the fertility decline. Finally, I will discuss whether the fertility decline found in the 2010 census should be regarded as evidence of under-registration of births in the census.

Comparison of Total Fertility Rate by Birth Parity: Nationwide

In this chapter, we decompose the total fertility rates into parity specific TFR. Starting from births by age and birth order, we compute age-order specific fertility rates as the number of births of a given parity per woman of a given age group. We obtain the total fertility rates by parity by summing of these fertility rates for all groups from 15–19 to 45–49. For instance, the TFR for first births – noted TFR_1 – is simply the sum of age-specific first birth rates. The same method is followed for higher-order births up to parity 3+. The TFR_1 corresponds therefore to the average number of first births women would have by age 50 if they were to follow the age-specific rates observed during a given period. By definition, the sum of all TFR_i equals the TFR. The advantage of this measurement is precisely in the decomposition of the TFR as the sum of parity specific fertility (Bongaarts and Feeney 1998). Further below, we also compute the mean age at childbearing (MAC) by parity.

Table 6.1 provides the parity specific TFR_i in 2010 and the corresponding statistics in FNPC in 2000 and the National One-Percent Population Sample Survey (NOPPSS) of 2005. The TFR_i from the one per thousand sample data of the 2010 census are also provided in the table. There are only small differences between the two sets of results from the 2010 census.

Table 6.1 Comparison of total fertility rate by birth parity: nationwide

Source	TFR_1	TFR_2	TFR_{3+}	TFR
FNPC in 2000	0.867	0.288	0.066	1.221
NOPPSS in 2005	0.891	0.384	0.063	1.338
SNPC in 2010	0.728	0.381	0.079	1.188
SNPC 1‰ sample	0.729	0.379	0.082	1.190

There was a significant drop in TFR_1 from SNPC compared with past corresponding statistics: from 0.87 in 2000 to 0.73 in 2010. However, TFR_2 in 2010 did not change much compared to 2005, and TFR_{3+} even increased. Evidently, the fertility decline in recent years in fact took place mainly among first births. Such changes in TFR by birth order appear less likely to be attributable to birth under-count since they are well within what is permitted by the fertility policy.

While a small portion of young couples in a few metropolitan cities of China does not wish to have children, there has been no evidence to suggest that this is becoming a popular practice among young couples nationwide. Is it possible, then, for the TFR_1 to be at such a low level? The answer is yes. Many demographic studies have shown that the period effect of change in the schedule of childbearing may result in a change in TFR. In particular, Bongaarts and Feeney (1998) proposed an approach to estimate this kind of period tempo effect using mean age at childbearing (MAC) as an index to measure the tempo effect in childbearing, and they suggested this approach should be applied to each birth order separately. Using the measures of MAC_i with TFR_i, a tempo-adjusted total fertility rate can be calculated. Their empirical analysis showed that delays in MAC_i in certain birth orders may significantly reduce the TFR_i. Recently, Bongaarts and Sobotka (2012) proposed a refined indicator of tempo- and parity-adjusted total fertility rate, in which the MAC_i is also used to measure tempo change.

Table 6.2 provides the statistics of MAC_i based on various data sources. MAC_i values are getting considerably higher in the last 10 years, and the difference in MAC between the 2010 census results and the one per-thousand sample statistics are relatively small compared to the change over time.

MAC_1 in 2010 rose to above 26 years of age, from 24.5 in 2000, an increment of about 2 years. Most of the increase took place during the 2005–2010 period. Thus, we find that the downtrend in TFR_1 is closely associated with the uptrend in MAC_1.

By the above examination, we now know that the very low TFR level of SNPC resulted from the further drop in TFR_1, which is associated with a significant rise in MAC_1. However, one question remains: why did the rise in MAC_2 and MAC_{3+} not lead to a decline in TFR_2 and TFR_{3+}? I will first attempt to locate which parts of the population experienced the largest decline in fertility levels, and deal with this question later.

Table 6.2 Mean age at child-bearing (MAC) by birth order: nationwide

Source	MAC_1	MAC_2	MAC_{3+}
FNPC in 2000	24.5	28.8	31.1
NOPPSS in 2005	24.6	29.8	31.6
SNPC in 2010	26.7	30.8	33.4
SNPC 1‰ sample	26.3	30.4	33.2

Following the approach proposed by Bongaarts and Feeney (1998), MAC_i is calculated with age-specific fertility rate as weight

Comparison of Total Fertility Rate by Birth Parity: Urban/Rural Residence

China is a dual society, in which urban areas have higher levels of development than rural areas. The Chinese population census provides statistics by type of residence, namely city, township, and village. In the following part, counts from cities and townships are combined and classified as urban, while counts from village are classified as rural.

Table 6.3 presents the TFR_i by urban and rural residence. During the period 2000–2005, TFR levels rose for both urban and rural segments in all birth orders, in particular rural TFR_2 which rose the most by 0.17.

Moving on to the period 2005–2010, we find that TFR declined for both rural and urban residents, especially among the rural segment where TFR fell by more than 0.2. It is worthy to note that the pattern of fertility decline differed by area type. In rural areas, TFR_1 fell sharply by 0.22, TFR_2 fell slightly by 0.02, while TFR_{3+} increased marginally by 0.03. In urban areas, TFR_1 dropped by 0.11, while both TFR_2 and TFR_{3+} increased a little.

We now know that in recent years, the rural TFR experienced the largest reduction because of the large decline in TFR_1.

Table 6.4 provides the corresponding MAC_i by residence based on different population censuses of China. We find that the values of MAC_2 and MAC_{3+} for both urban and rural populations have been rising over the decade. But changes in MAC_1 by residence are different in the first half and second half of the decade: in the first half of the decade, MAC_1 for both urban and rural showed virtually no change at all,

Table 6.3 Comparison of total fertility rate by birth order: urban and rural

Source	Residence	TFR_1	TFR_2	TFR_{3+}	TFR
FNPC, 2000	Urban	0.774	0.141	0.022	0.937
	Rural	0.947	0.392	0.095	1.434
NPOPSS, 2005	Urban	0.797	0.221	0.023	1.042
	Rural	0.990	0.560	0.104	1.654
SNPC, 2010:	Urban	0.686	0.257	0.037	0.979
	Rural	0.771	0.542	0.131	1.444

Table 6.4 Mean age at childbearing (MAC) by birth order: urban and rural

Source	Area	MAC_1	MAC_2	MAC_{3+}
FNPC, 2000	Urban	25.52	29.85	31.57
	Rural	23.88	28.47	30.92
NOPPSS, 2005	Urban	25.45	30.41	31.99
	Rural	23.87	29.47	31.32
SNPC, 2010	Urban	27.90	31.67	34.14
	Rural	25.33	30.30	33.01

and even fell slightly, while in the second half of the decade, MAC_1 for both urban and rural increased by about 2.5 and 1.5 years respectively. In fact, the change in TFR_1 for urban and rural populations was inversely related to the change in MAC_1. During the period 2000–2010, TFR_1 comprised a major share of TFR (70 % for urban and 53 % for rural), thus a change in TFR_1 would have a major impact on the overall level of fertility.

Comparison of Total Fertility Rate by Birth Parity: by Registration Type

Another relevant classification for population in China is by type of household registration, or *hukou*: agricultural and non-agricultural. This is relevant because the fertility policies are, to a large extent, implemented according to people's *hukou* status (Gu et al. 2007). For example, the one child policy is generally applied to the people with non-agricultural *hukou*, however a variety of policies are applied to people with agricultural *hukou* according to the local situation. Following earlier economic reforms, large flows of people moved from the countryside to cities and townships, becoming urban residents, while their agricultural *hukou* status remained unchanged. They are called the "floating population", who are still subject to the fertility policy of their original home area (which allows higher fertility) even though they are actually living in urban areas. The tremendous numbers of young floating migrants coming to urban areas may have raised urban fertility, especially the levels of TFR_2 and TFR_{3+}. This may go some way in explaining the increasing trend in urban TFR_2 and TFR_{3+} shown in Table 6.3. Therefore, investigation of TFR change by *hukou* type may provide information concerning the population group which experienced the largest fertility decline in the past decade.

Table 6.5 presents the TFR_i statistics by *hukou* which are calculated using micro-sample data because statistics by *hukou* type are not a common classification in the published statistics. As expected, in the 2010 population census, TFR_2 and TFR_{3+} for non-agricultural *hukou* are indeed visibly lower than those for urban residents in Table 6.3. However, TFR_1 for non-agricultural population is 0.703, slightly higher than urban TFR_1 of 0.686, which may imply that the floaters living in urban areas have not increased the urban TFR_1 level, but rather pushed it downward.

All the TFR_i for agricultural *hukou* population in Table 6.5 are lower than those for rural residents in Table 6.3. In fact, the rural residents at present are those who hold an agricultural *hukou* and still reside in rural areas. This could be either because the movement of the original farmers into urban areas depressed the fertility among the floaters or because the floaters are a selective group of people who are more likely to have higher education and aspirations for career development rather than childbearing, which may have pushed fertility downward.

Table 6.5 Comparison of total fertility rate by birth order: *Hukou* type

Source	*Hukou* type	TFR_1	TFR_2	TFR_{3+}	TFR
NOPPSS, 2005, 2‰ sample	Non-agricultural	0.792	0.092	0.008	0.892
	Agricultural	0.964	0.492	0.080	1.537
SNPC, 2010, 1‰ sample	Non-agricultural	0.703	0.132	0.015	0.851
	Agricultural	0.712	0.487	0.111	1.310

More importantly, for our purpose of examining the fertility trend by *hukou* type, Table 6.5 shows that people with agricultural *hukou* experienced a greater fertility decline in recent years. Their TFR dropped to 1.31 in 2010 from 1.54 in 2005, a reduction of 0.23, mostly due to a reduction in TFR_1 by 0.25 (from 0.964 in 2005 to 0.712 in 2010). As for the holders of non-agricultural *hukou*, though TFR_1 also declined, the change was much smaller, so its effect was almost balanced by the increase in TFR_2 and TFR_{3+}. As a result, TFR for non-agricultural *hukou* fell only slightly.

In short, we find in Table 6.5 that fertility declined among people with agricultural *hukou* and this mostly happened with respect to first births.

Comparison of Total Fertility Rate by Birth Parity: by Floating Status

Studies in China on the floating population (Duan et al. 2008, 2009) suggest that in recent years, a majority of rural to urban migrant laborers are in their young working ages, which is also the most active age for reproduction. In the past, these young migrant workers were called ‘guerillas’ for moving away from their resident areas in order to have more children than was allowed by their region’s fertility policy, for under-reporting their real levels of fertility, and for avoiding surveys. This group was also cited as a major reason for the very low fertility levels reported in population censuses and surveys.

However, many careful studies (Chen and Wu 2006; Guo 2010) argued against this accusation by showing that the floating population tends to marry and have children at later ages and thus have lower fertility than the non-floating people, who remain at the place of their household registration. In fact, the floating people tend to be more educated among the originally rural population and are motivated to earn higher incomes and pursue a new life style. Even though this may have created some difficulties for the family planning administration, it does not mean that the floating people are inclined to move just to have more children.

Table 6.6 presents the TFR_i statistics by floating status, which are calculated using the micro-sample data. We may first observe that TFR is lower among the floating population, especially for higher parities as if migration interrupts family formation. It can also be seen that TFR of non-floating women dropped from 1.43 in 2005 to 1.21 in 2010. In particular, their TFR_1 fell from 0.96 to 0.72 in 5 years. On

Table 6.6 Comparison of total fertility rate by birth order: floating status

Source	Floating status	TFR_1	TFR_2	TFR_{3+}	TFR
NPOPSS, 2005, 2‰ sample	Floater	0.838	0.262	0.037	1.137
	Non-floater	0.964	0.400	0.064	1.427
SNPC, 2010, 1‰ sample	Floater	0.770	0.316	0.058	1.143
	Non-floater	0.718	0.400	0.089	1.206

the contrary, the TFR for floating women stayed at 1.14 during this period. Their TFR_1 fell to 0.77 in 2010 from 0.84 in 2005, though it was balanced by the rise in their TFR_2 and TFR_{3+}. Therefore, the drop in TFR for the country as whole in the recent 5 years cannot be simply attributed to the possibility of under-reporting of births among the floating population.

Floater women had lower fertility rates than their non-floater counterparts, both in the 2010 census and the 2005 sample survey. It is worth noting that the difference in TFR between the two categories became narrower in the 2010 census than in the 2005 data, mainly due to the significant drop in TFR among non-floaters rather than the rise in TFR for the floaters. Therefore, it once again confirms that the biggest decline in TFR occurred among non-floating rural resident population.

Comparison of Total Fertility Rate by Birth Parity: by Registration Type and Floating Status

This section will examine which part of the population experienced the biggest fertility decline in the recent 5 years by comparing among the combinations of *hukou* type and floating status. Table 6.7 presents TFR_i statistics for these combinations.

From Table 6.7, we see that the total TFR did not change much for all other combinations except for the population with agricultural *hukou* who were non-floaters, whose TFR dropped by 0.27, from 1.64 in 2005 to 1.37 in 2010. This mainly took place in TFR_1, which fell by 0.315, from 1.012 in 2005 to 0.697 in 2010. In fact, TFR_1 in 2005 showed some evidence of “birth heaping”, (TFR_1 value is greater than 1), and subsequently dropped to a rather low level in 2010.

TFR_2 and TFR_{3+} increased for all the four combinations. In the case of agricultural *hukou* floaters and non-agricultural *hukou* non-floaters, even their TFR_1 fell, but the reduction was relatively small. As a result, their overall TFR did not change much.

It is also interesting to see that the fertility differences between floaters and non-floaters are in an opposite direction for different *hukou* types. Specifically, among those with agricultural *hukou*, the floaters had a lower fertility level, while among the non-agricultural *hukou*, the floaters had a higher fertility level.

Table 6.7 Comparison of total fertility rate by birth order: different registration type and floating status combinations

Source	Cross types	TFR_1	TFR_2	TFR_{3+}	TFR
NPOPSS, 2005, 2‰ sample	Agri. *hukou* – floater	0.839	0.304	0.045	1.188
	Agri. *hukou* – non-floater	1.012	0.535	0.088	1.635
	Non-Agri. *hukou* – floater	0.797	0.126	0.011	0.934
	Non-Agri. *hukou* – non-floater	0.798	0.090	0.008	0.895
SNPC, 2010, 1‰ sample	Agri. *hukou* – floater	0.760	0.348	0.063	1.172
	Agri. *hukou* – non-floater	0.697	0.540	0.129	1.366
	Non-Agri. *hukou* – floater	0.814	0.174	0.030	1.018
	Non-Agri. *hukou* – non-floater	0.692	0.130	0.015	0.837

The Effects of Delayed Age at Marriage and Childbearing

By analyzing the data, we have found that the decline in TFR in SNPC was mainly due to a decline in TFR_1, which was closely related to a delay in mean age of childbearing, especially for rural resident women, in particular during the period 2005–2010.

Traditionally, Chinese women had their first child roughly 1 year after getting married. Since the family planning campaign started in the early 1970s, women's age at marriage and childbearing increased, but these changes occurred much earlier in time and more rapidly in urban areas than in rural areas. Now we examine whether the reduction in TFR_1 and the postponement in MAC_1 are closely related to the delay in marriage for rural resident women.

Figure 6.2 presents the proportions of the never-married women by age among rural resident women in recent years. The proportion of the never-married have increased remarkably, especially in the most fertile ages from 20 to 30 and this took place mainly in the years from 2005 to 2010. Taking aggregate statistics for example, in the 20–24 age group, the proportion of the never-married has increased from 47.6 % in 2005 to 58.5 % in 2010, and for the 25–29 age group, from 8.2 % in 2005 to 16.7 % in 2010. Alternatively, using a standardized comparison, the proportion of never-married among rural resident women in the age range 20–34 would be 7.9 percentage points lower than the SNPC figure of 30.1 %, if the age-specific proportions were unchanged since 2005. Such a change in structure of marital status would have exerted a great impact on the TFR_1 level.

In fact, the proportions of never-married by age for urban resident women have also increased in the past decade, though the change occurred more steadily over time. This raises the question of why TFR_1, and consequently TFR, did not decline as significantly for urban residents as that for rural residents.

This can be explained by the following facts. First, postponement of childbearing does not mean giving up having a child, as the delayed birth may be recuperated at later ages. Usually the delay in age at marriage and childbearing was more pronounced in the urban areas, resulting in the present situation in which the younger cohorts are postponing their marriage and childbearing while the older

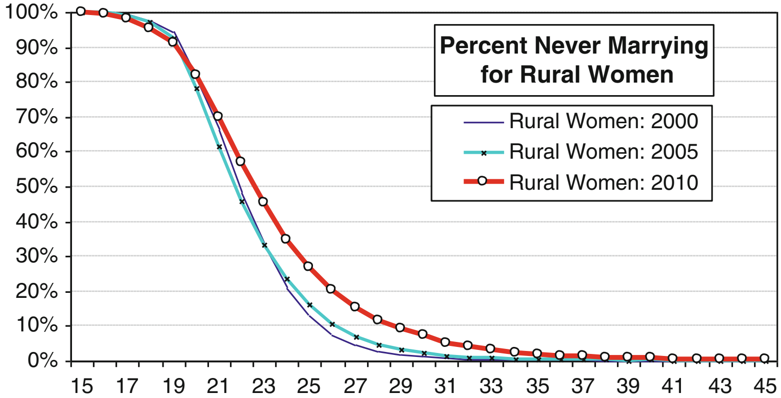

Fig. 6.2 Proportion never marrying by age for rural resident women

cohorts are recuperating their delayed births, so the postponement effects are to a large extent balanced by the recuperation effects. The postponement of marriage and childbearing has become significant among rural residents only in recent years, though the offsetting effect is less visible among this group. Secondly, the large number of rural residents moving to urban areas, who are subject to more relaxed fertility policies of their home *hukou*, may have raised urban TFR, as seen in urban TFR_2 and TFR_{3+} continuing to rise in the last decade.

Low Fertility Rates Should Not Be Seen as Solely Due to Under-Count of Births

All the results above are calculated directly from the released SNPC statistics or its sample data with no adjustment. Though the under-count of births in the SNPC enumeration would admittedly have an impact, I believe that the results reflect a fundamental change in the underlying population situation and cannot be solely attributed to false data as some have claimed.

SNPC was conducted with a new method for enumeration: the people present in a household and the people with *hukou* registered in the household were both enumerated, and then the 'usual residents' were selected according to a designed criteria and used as the statistical base. This new method takes the decision about whether a person should be enumerated in a household away from the interviewer. This amendment was designed in order to prevent under-enumeration in general. Moreover, the presented fertility statistics shown above are based mainly on reports of women aged 15–49 concerning their own childbearing.

First, the low fertility rate of SNPC was the result of a decline in TFR_1 despite increases in TFR_2 and TFR_{3+}. It is known that for both urban and rural residents, the current fertility policy does not restrict the first birth, and there is therefore no need for women to disguise their first births. The family planning workers check only for the second and higher birth orders, yet TFR_2 and TFR_{3+} of SNPC either remained constant or rose slightly, just the opposite of what would be expected if undercount was becoming more serious. Hence it is difficult to explain such changes of fertility levels by birth order due to under-reporting of women's childbearing in the last 5–10 years.

Second, our comparisons suggest that the fertility decline shown in SNPC is closely related to prevailing trends of postponement of marriage and childbearing, indicated by rapidly rising MAC_i, especially for MAC_1, particularly in rural areas. This is associated with an increasing proportion of never-married among young women. On one hand, MAC_i are calculated based on reported births, and it is unlikely that a women who already reported her childbearing would misreport her own age; on the other hand, there is hardly any reason for a married woman to give false information about her marital status.

Third, it is unlikely that the low fertility rate reported in 2010 is due to under-reporting of births among the floating population. Although some people still assert that floating couples tend to have more babies and hide them, there has been a lot of statistical evidence that floating population tend to get married later and have lower fertility. More importantly, the above evidence suggests that the TFR decline in recent years is attributable to the non-floating population rather than the floating population.

In summary, the prevalence of delayed marriage and childbearing has been the driving force behind lower fertility rates in China in recent years, similar to what is already observed in other low fertility countries. Therefore, the very low TFR in 2010 cannot simply be attributed to false statistics.

Comparison of Total Parity Progression Fertility Rate: Nationwide

In addition, as an alternative to the period fertility level, Total Parity Progression Fertility Rate (TPPFR) based on a series of age-specific parity progression ratios needs to be examined. This approach was proposed by a group of Chinese scholars (Ma et al. 1986) and used as an official measure of period fertility rate by the National Family Planning Commission. This measure is good at monitoring the period fertility level because it controls not only for the age structure effect but also for the parity structure effect for women in childbearing ages. Therefore, this measurement can provide a more comparable fertility rate when parity structures vary across regions or change over time. So the $TPPFR_i$ by parity and total TPPFR are calculated for the population census to further examine the changes in China's period fertility level.

The TPPFR statistics presented in Table 6.8 which control for parity structural effects, give a different picture of China's fertility level in the last decade. The value

Table 6.8 Comparison of total parity progression fertility rate: nationwide

Source	$TPPFR_1$	$TPPFR_2$	$TPPFR_{3+}$	TPPFR
FNPC in 2000	0.974	0.338	0.029	1.342
NOPPSS in 2005	0.976	0.409	0.039	1.424
SNPC in 2010	0.979	0.368	0.045	1.392

of TPPFR is higher and more stable than that of the corresponding TFR, because $TPPFR_1$ was almost unchanged while $TPPFR_2$ and $TPPFR_{3+}$ showed some change. These TPPFR results suggest that the fertility level stayed steady at a very low level, verifying the lower levels and the bigger changes shown by TFR, especially for TFR_1 which resulted from tempo and structural effects. Additionally, the $TPPFR_1$ value close to 1 confirms that most women had at least one child, unlike the image given by the much lower level of TFR_1.

Comparison of Life-Time Fertility Rate and Period Fertility Rate

Although TFR and TPPFR are measures of period fertility level, they are commonly interpreted as indices of life-time fertility level based on the assumption of synthetic cohort. This interpretation can be confusing, since period rates can deviate significantly from life-time rates. The mean number of children ever born (CEB) per woman by age 50 is often used as the measure of life-time fertility level. In this chapter, mean number of CEB per woman in age group 35–39 is used as a proxy for the cohort fertility measure, because women in this age group have almost completed their childbearing, and more importantly, because this measure is restricted to a shorter period of experience for each cohort of women, namely the previous two decades before the census, thus enabling us to estimate cohort fertility with a shorter time lag. Figure 6.3 presents the mean number of CEB per woman in age group 35–39, and the corresponding TFR statistics from various population censuses over time.

First, the mean number of CEB dropped from 3.80 in 1982 (corresponding to women born roughly around 1943–1947) to 1.52 in 2010 (corresponding to women born roughly around 1971–1975), indicating that life-time fertility level has declined rapidly for sequential cohorts ever since China carried out its family planning campaign. In fact, the mean number of CEB in the latest census reached a very low level, quite close to the current fertility policy CEB target of 1.47 (Gu et al. 2007).

Second, the mean number of CEB was much higher than the corresponding TFR values as shown in Fig. 6.3, creating a difference between the life-time fertility level and the period fertility level.

Only in the 1990 population census did these two indices show values relatively close to each other. Some researchers and government agencies believed that China's real level of TFR in 2000 could be estimated using the mean number of CEB from

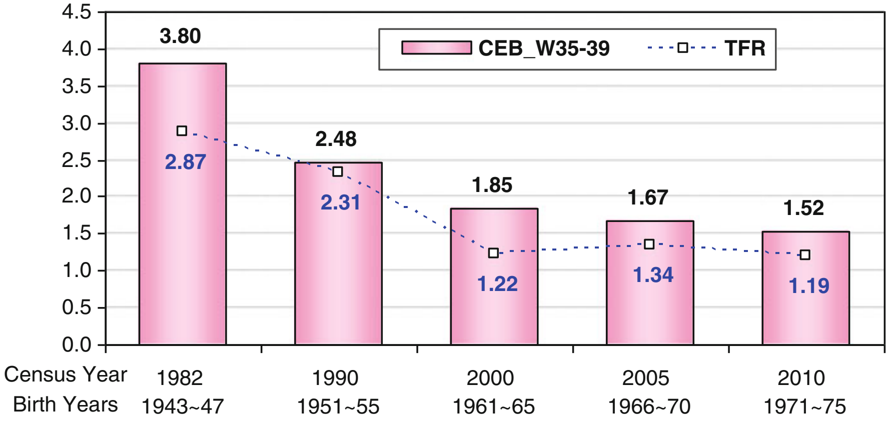

Fig. 6.3 Mean number of children ever born for women in age group 35–39 and TFR

the same census because they thought the TFR value in the 2000 population census was too low. They believed that the real TFR ought to be around 1.8, and concluded that the very low TFR level reported was mostly due to severe under-reporting of births. But this kind of perception was obviously a misunderstanding (Guo 2004a, b, 2008). The government's assumption of TFR at 1.8 has been repeatedly disproved by the empirical evidence, given that the mean number of CEB declined from 1.67 in the 2005 population survey to 1.52 in the 2010 population census.

Both life-time fertility and period fertility from the population census are based on women's self-reports of their own CEB and childbearing in the last year, and so the statistics are inevitably affected to some extent by under-reporting and concealment. However, both the life-time fertility and period fertility shown in Fig. 6.3 show somewhat consistent downward trends. As for the higher value of mean number of CEB than TFR, this is because life-time fertility is a lagged reflection of one cohort's experience over decades, whereas TFR is a cross-sectional reflection of the previous year's experience for a synthetic cohort during fertility transition. In addition, TFR is quite likely to be pulled downwards by period effects of delayed tempo and change in parity structure for women during a period of fertility transition. Therefore, the life-fertility is always much higher in value than period fertility during the transition phase of fertility decline, which is what China is experiencing at present.

Recently, some Chinese demographers have asserted that TFR of 1.18 from SNPC is unbelievable, and that the true value of TFR is unlikely to be lower than the policy fertility rate (1.47) since there are numerous out-of-plan births. However, their reasoning is problematical because it mixes up life-time fertility and period fertility, and neglects period effects. The so-called policy fertility rate by the government is in fact an average requirement of life-time fertility for the couples nationwide. When life-time fertility declines to the lower level, strong period effects, such as postponement of marriage and childbearing, can pull down the TFR to a level which is lower than the policy fertility level, and this statistical phenomenon may last for many years. This situation has been confirmed repeatedly by many prior population censuses and surveys, but various authoritative demographers and relevant government agencies have denied the very low fertility levels, attributing it to the result of under-reporting. This presents a real barrier to understanding the changing situation of China's population.

Concluding Remarks

The major purpose of this study was to examine period fertility statistics from the sixth national population census of China conducted in 2010. To do that, we disaggregated TFR indicators by birth order to provide a finer depiction of the ongoing fertility dynamics. We also provided a detailed analysis of fertility by *hukou* status and this illustrates the complex interaction between fertility and migratory behavior among the population. For lack of space, we didn't examine regional differentials in TFR across the country (see however the Fertility overview below). Finally, we explore the potential role of tempo vs. quantum effects by using indicators of age at childbearing and parity progression. This leads to a qualified analysis of recent fertility trends in China that we will summarize in the next paragraphs.

Compared to previous population censuses and surveys, China's fertility level declined further, and the fertility pattern changed simultaneously. TFR_1 dropped significantly, which is closely related to the delay in marriage and postponement of childbearing, especially for rural resident women. However, levels of TFR_2 and TFR_3 have risen somewhat. After careful examination, it can be concluded that the fertility decline shown in the latest census is largely attributable to intrinsic demographic changes in marriage and migration. By controlling the tempo effects and parity structure changes, the total parity progression fertility rate suggests a smaller decline and stability at a very low fertility level in recent years. In addition, the lifetime fertility levels shown in the series of population censuses also confirm that China's fertility level is already far below replacement fertility. Therefore, the very low fertility level cannot simply be attributed to false statistics, and it does reflect the real population situation of China even after discounting for underreporting.

While there are some demographers who emphasize the problem of underreporting in 2010 and estimate the real TFR level to be 1.65 or even higher, their judgments rely on old approaches, which yield greatly biased estimates. Chinese government agencies as well as the United Nations agencies lowered their original TFR estimates around the year 2010 from nearly 1.8 to about 1.65 after SNPC (UN 2013). However, I think their modified estimates are still too high. Based on the analysis in this chapter which utilizes data from SNPC, I believe the real TFR of China in 2010 should be no more than 1.5, and the average TFR in the decade from 2000 to 2010 should be even lower. The Chinese government should urgently recognize the reality of the situation and take action to change its strict one-child policy. Otherwise, the fertility level will slip further downwards.

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Chapter 7
The Past and Future of Fertility Change in India

Christophe Z. Guilmoto

Introduction

The importance of Indian fertility to current world population trends can hardly be underestimated.[1] According to United Nations figures for 2010–2015, India accounts today for 55 % of all Asian births and for exactly one fifth of the world's total. Since the mid-1970s – when fertility levels plummeted in China – India has been the major contributor to the world birth rates, with about 27 million births per year today, at a pace close to a birth per second. According to United Nations forecasts, it will remain by far the leading country in the number of annual births till the end of their projection period in 2100.

Yet, this story is far from static. India's share of world births, which had been increasing since the 1950s, is now on the decline. It peaked at the turn of the century at 20.6 % of all births and is now heading for a regular decrease over the next decades, expected to reach 18 % by 2035, 16 % by 2050 and less than 14 % from 2075 onwards.[2] This slow trend may be compared with the more dramatic change observed in China, which accounted for 25 % of the births in the world during the early 1950s but saw its relative share of the world's births shrink to 20 % by 1980, 15 % by 1997 and 10 % after 2020. The actual number of births in India started to plateau after 1995 and today it is fast declining in absolute numbers. Nevertheless, India's decline in the annual volume of births is proceeding at a slower pace than China's, where the number of births has been decreasing more by than 12 % per decade over the last 40 years. Comparing India with China over the last 50 years

[1] This chapter benefited from comments by an anonymous referee and by colleagues on an earlier version presented at meetings in Singapore and Busan.

[2] Figures derived from the United Nations estimates for 1950–2100 (UNPD 2013).

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leads inevitably to a contrast between China's especially eventful demographic history, full of peaks and troughs, and the sluggish but serene pace of demographic change in India. Ours main objective is to highlight India's singular trends till today and to chart the future course of fertility.[3]

To describe and explore the puzzle of India's slow fertility transition, we will examine fertility decline as it unfolded in India over the last six decades and compare it with the scenarios observed elsewhere in Asia. We will then repeat this analysis at state and district level in order to identify areas characterized by especially rapid or slow fertility change. This analysis will lead to a discussion of the determinants of fertility decline based on existing research. Our search for a theory of fertility change applicable to India is somewhat unsuccessful and we end up using to a purely data-driven model to predict the future course of fertility decline in the country. The conclusion discusses the way in which fertility decline in India can be interpreted and argues that endogenous factors of change may be more relevant to understanding India's pathway to fertility transition than the application of standard models relating reproductive change to transformations in the economic and social structures.

Sixty Years of Fertility Change in an International Perspective

Available estimates shown in Table 7.1 indicate that fertility remained at a plateau from 1950 to 1970, with only a marginal reduction observed during the 1960s. The story is probably far more complicated than that because of the complex impact of the traumatic 1940s (Bengal Famine and the partition of the subcontinent) and the demographic recovery and modernization that followed. Yet, it remains reasonable to argue that the average fertility level in India was close to six children per woman during this pretransitional period, as suggested by Mari Bhat's estimates (1989). A sustained reduction in fertility rates at the national level emerges only from the late 1960s and has continued ever since without interruption. This momentum brought down the family size from a plateau at 5.9 children per women to 2.7 by 2005, crossing the thresholds of 5, 4 and 3 children respectively in 1976, 1989 and 2002

Table 7.1 Total fertility rates in India, 1950–2010

	1950–1955	1955–1960	1960–1965	1965–1970	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000	2000–2005	2005–2010
India	5.90	5.90	5.82	5.69	5.26	4.89	4.47	4.09	3.67	3.30	3.00	2.66

Source: World Population Prospects 2012 (UNPD 2013)

[3] For lack of space, we will not discuss several demographic issues of fertility decline such as age-specific fertility rates and changes in marital status described by NFHS survey waves. Most recent statistics on age, regional and marital fertility differentials can be found in SRS (2013).

(United Nations estimates). The impact has been considerable in terms of averted births, since fertility has been divided by more than 2 during the last 40 years.

Yet, it remains difficult to assess the tempo and quantum of India's fertility trends without resorting to a broader comparison. India's profile looks indeed more singular when confronted to fertility trends observed in other Asian countries during the same period. We limit here our exercise to the 15 largest Asian countries with a population above ten million.[4] This comparison shows that during the first 5-year period (1950–1955), India was among the countries with the lowest fertility levels (5.9 children per woman), with only Indonesia (5.7) and Sri Lanka (5.8) reporting slightly lower total fertility rates (TFR).[5] Yet 55 years later, in the 2005–2010 period, fertility in India became the fifth highest in Asia, and trends suggest it may soon be passed by Cambodia and Nepal – where fertility is expected according to the UN figures to be lower than India's before 2015. In other words, India's fertility has shifted from one of the lowest to one of the highest in Asia, in spite of a sustained decline for almost 50 years.

A more detailed analysis is needed to understand whether this gap between India and the rest of Asia can be explained by the timing of this decline or by its pace over time. To do this, I have first reclassified Asian countries by the period of the inception of the fertility decline and then standardized the pace of subsequent decrease in fertility rates. The inception period is taken here as the first 5-year period when fertility decreased by more than 5 % over the previous period. This period ranges from 1960 (South Korea and Sri Lanka) to 1990 (Pakistan and Nepal), with 1974 as the average starting year over our 16-country sample. India's birth rates started diminishing 5 years earlier than the regional average, so that the tempo factor itself cannot account for the smaller decline in fertility in India over the last 50 years. The explanation for this modest fertility decrease therefore lies in the quantum factor.

To compare fertility decline in these different countries, I have plotted the net extent of fertility decline against the number of years since the onset of fertility decline (Fig. 7.1). All curves therefore start at zero (pretransitional fertility level) and decrease thereafter. Iran and China display the fastest decline, since fertility had already shrunk by almost 3 children during within the initial 10 years. The decrease is also impressive in five more countries – Viet Nam, Thailand, South Korea, Bangladesh and Cambodia – where the average family fell by at least three children in the course of the first 20 years of decreasing TFRs.

India, on the other hand, emerges as the nation with the slowest rate of decline in Asia. During the 15 years following the inception of the decline, India was on a par with the decrements observed in Nepal, but over a longer period, the gap between

[4] The countries selected for comparison are the following: Bangladesh, Cambodia, China, Indonesia, Iran, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, South Korea, Thailand, Uzbekistan, and Viet Nam. Afghanistan and Japan have been excluded respectively for their delayed and early fertility transition.

[5] We exclude here South Korea because of the impact of the Korean war of 1950–1953. Fertility rebounded to 6.3 children per woman after 1955, which suggests it must have been close to 6 during pretransitional years.

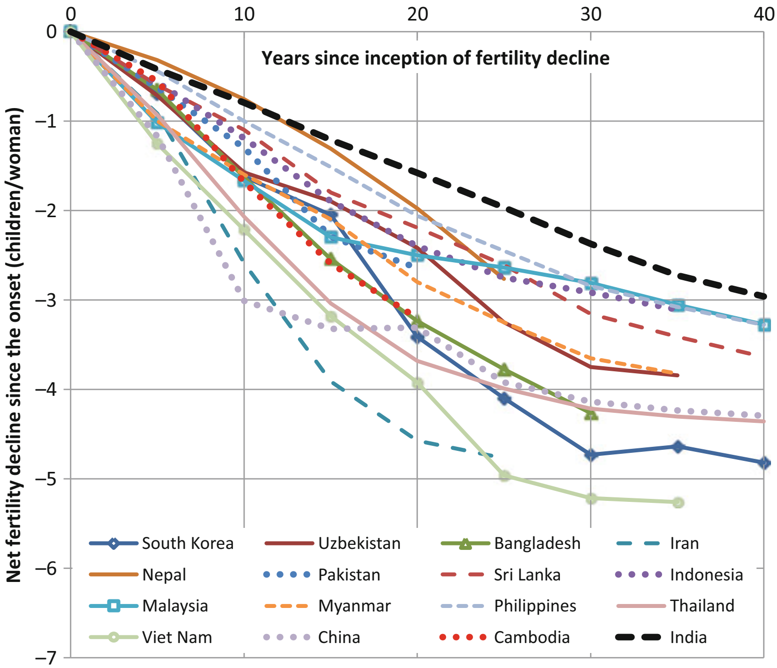

Fig. 7.1 Net fertility decline in selected Asian countries since its inception, 1960–2010 computed from UNPD (2013)

India and other Asian countries widened. India achieved a three-child fertility decline in no less than 40 years, as against 35 years for the other two laggards (Philippines and Malaysia). Incidentally, this slow fertility reduction in the latter two countries can be partly explained by a very restrained family planning program. While the diffusion of modern contraception has been hampered in the Philippines by the strong influence of the Catholic Church, Malaysia has even introduced over the last two decades pronatalist measures with a view to slowing down fertility decline among the Malay community. It is ironic that India, whose official family planning policy is held to be one of the oldest in the world, finds itself in the company of two countries where birth control may be among the government's weakest priorities.

India's net fertility decline was of −0.74 children per decade as against −1.2 children in our entire sample. It may be noted that the decline in South Asian countries may have been overall slower than in East or Southeast Asia. Yet, India's specificity does not appear to be a mere regional idiosyncrasy since India's rate of decline has been significantly slower than that of its neighbors – including "late decliners" such as Pakistan and Nepal where TFRs started falling more than 15 years after India (see also Fig. 7.2). Thus, the four other South Asian countries included in our sample saw their fertility contract by 2.5 children within the first two decades of fertility decline, while the decrease in India was only of 1.6 children during the

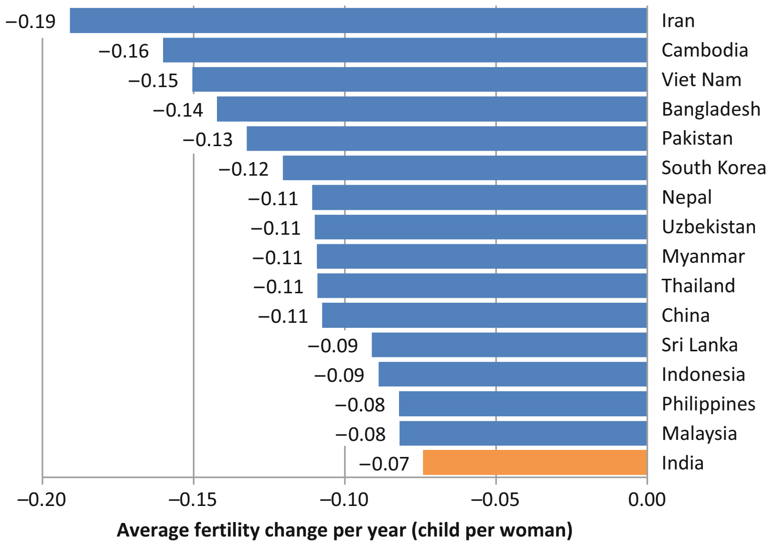

Fig. 7.2 Annual TFR decline in selected Asian countries, 1960–2010 (Source: computed from UNPD (2013))

same interval. India can therefore be seen as an outlier even with respect to other South Asian countries that share most of its cultural and social traits such as mediocre progresses in health and education, low urbanization and migration rates and low female labor force participation rates.

It may also be observed that most fertility declines tended to have an inverted S-shape: the decline was slow at the beginning, accelerated later on and finally slowed down at low-fertility levels. This curvilinear pattern resembles that of a logistic curve typical of the progress of an innovation, here fertility control and the small-family norm. This is true for countries such as Iran, China and South Korea where the average number is today well below 2, but it is also visible for more sluggish fertility trajectories such as Uzbekistan's and Malaysia's – where fertility decline has decelerated at a level significantly above the replacement threshold.

India's decline turns out to be, on the contrary, almost perfectly linear.[6] The rate of decline is almost constant over the period. Even if the quinquennial United Nations estimation format tends to smooth out annual variations and to conceal in particular the fluctuations observed in the 1970s (see further below for more detail), the apparent regularity of the decrease over 40 years is striking when compared with fertility series from other countries. We have examined the fertility decrease for all countries and 5-yearly periods and computed its variability across periods, which reflect the ups and downs of fertility decline during the transitional period in each of

[6] This corresponds to an accelerating decline in relative levels. Note that this acceleration stopped after 20 years in most other Asian countries while the simulation exercise carried on further below suggests that the rate of decline may not slow down before 2020 in India (see Figure).

these countries. India's figures are characterized by the smallest standard deviation (.06) of our sample. All other countries have on the contrary experienced sizeable oscillations in their pace of fertility decline and the average standard deviation is almost five times larger than that observed for India.[7]

At this point, we may wonder whether this unique feature of India's fertility transition is real. Do United Nations fertility estimates provide a true picture of the real pathway of fertility decline in India? If the answer is yes, we should try to understand whether this slow decline is caused by structural and compositional factors or by some historical accident. Furthermore, does India possess specific characteristics that could explain the reason for this slow path towards replacement level? Or is this phenomenon simply due to India's extremely heterogeneous social and economic structure? I will explore some of these hypotheses in the rest of the chapter.

Fertility Decline in India: Trends and Annual Variations

Since the 1970s, there are annual fertility estimate series for India and its states based on the estimates of the Sample Registration System. When they are plotted against the 5-year estimates of United Nations (Claeson et al. 2000), the parallelism of these two series appears striking. The annual figures from the Sample Registration System (SRS), which provides the best estimates of vital rates in India, are rarely lower or greater by more than .5 children compared to the United Nations figures. The series are almost identical for the last 15 years, which is not entirely surprising since the United Nations rely partly on SRS figures to estimate the evolution in Indian fertility rates.

In terms of overall trend, the SRS data mirror the United Nations trends since they lead to a rate of fertility decline of −.69 child per decade in 1971–2010 as against −.73 according to the United Nations from 1970–1975 to 2005–2010. Even this slightly lower fertility decrement may be explained by the initial underestimation of TFR by the SRS when the original sample system was set up in 1970. This gap is in fact corroborated by the other fertility estimates which both placed TFR at 5.4 children during the early 1970s – a figure indeed higher than the first SRS estimate close to 5 children, but almost identical to the United Nations figures of 5.3.[8]

Since SRS estimates are available for individual years, I can further examine the trend in fertility decline over the period under study. An important episode of India's fertility history is of course the Emergency period, during which the government took new initiatives to accelerate the adoption of family planning. This brief period extended from June 1975 to March 1977. It was associated with many excesses and forced sterilizations and it saw a sudden surge in the number of (male) sterilizations

[7] The highest standard deviation (above .50) is observed for Iran and China where fertility decline was once the steepest and has now virtually ended.

[8] See Rele (1987) and Jain and Adlakha (1982).

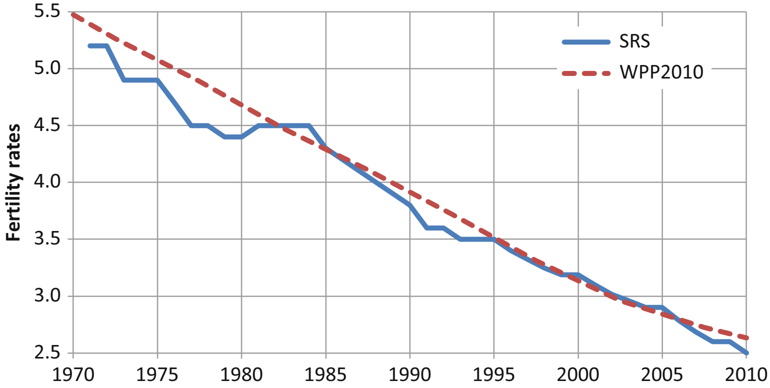

Fig. 7.3 Total fertility rates according to two sources, India, 1970–2010

performed in India. The Emergency period abruptly ended with the fall of Indira Gandhi's government during the 1977 elections. The impact of the emergency is obvious on our series with a sudden fall in TFR by .4 children from 1975 to 1977. Following the Emergency and the fall of the government, the new authorities cancelled all controversial aspects of the family planning campaigns and never tried again to forcefully intervene in birth planning as in 1975. What followed was a 7-year long stalling of fertility rates at 4.5 children per woman. In 1985, fertility decline resumed in India and proceeded uninterrupted till today (Fig. 7.3).

The picture of India's linear fertility decline can therefore be slightly amended thanks to these annual data and their correspondence with some major events in India's population policy development. For a very long period, starting with 1971–1975 and continuing during 1984–2010, fertility decline has indeed been almost linear. Yet, I can also identify the complex 1975 episode that played out in two parts. It started with a sudden drop in TFR level in 1975–1977 during the Emergency when new family planning regulations were drastically enforced and the number of sterilizations shot up. It was followed by a long stagnation till 1984, a period during which different successive governments renounced any forceful and undemocratic involvement in fertility reduction. The effect of this sudden turnaround in fertility trends was a dramatic reduction in the overall trend down to −.44 during the decade 1975–1985.[9]

While it may appear that this entire episode of the Emergency cost India several years on its path to replacement fertility, I may also notice that fertility proceeded at an unusually faster rate of −1 child per decade during the 10 years that followed 1984. Thus, the delay caused by the Emergency and its impact on fertility decline dynamics were largely offset by the prompt recovery that followed in 1984. This can be confirmed by state-level figures examined in the section below and the specific cases of Tamil Nadu and Kerala. These two states remained almost unaffected

[9] For a strictly statistical approach to these critical years as trend discontinuity, see Goli and Arokiasamy (2013).

by the Emergency turmoil, most probably because of the weaker influence of the Congress Party – which introduced the drastic population policies in 1975 – in these two states then ruled respectively by the nationalist DMK (Dravida Munnettra Kazhagam) and communist parties. In spite of the near-absence of Emergency effects (jump during 1975–1977 and subsequent stagnation till 1984) in these two states, their overall rate of fertility decline over 40 years turns out to be slower than in the rest of India.

Disaggregation of Fertility Trends Within India

The fact that the decrease in fertility levels was almost linear over the last 40 years in India could also be due to compositional effects since India's overall trends are nothing but the composite picture of different schedules of fertility decline observed across India, where urban areas or southern states have for instance experienced earlier changes than the rest of the country. Yet, the disaggregation of fertility decline by rural and urban areas (not shown here) fails to highlight any different trends. According to SRS figures, urban fertility was already lower by 1.3 children than rural fertility at the beginning of our study period. This urban-rural gap has narrowed only recently as fertility rates in urban areas crossed the replacement level in 2004. The average downwards trends in both rural and urban remain linear and almost parallel across the 1971–2010 period and I cannot attribute the slow fertility trend to the composite effects of tends in urban and rural areas.

Looking at state-level trends may better underscore the heterogeneity of demographic change across the country. Our analysis is restricted to the largest 15 states for which annual TFR estimates from the SRS are available. A great deal of research on fertility decline over the last 20 years has indeed focused on India's demographic diversity, with on the one hand pioneer states such as Kerala (often compared to China *sans* coercive family planning) and on the other northern and central states (somewhat closer to countries in sub-Saharan Africa). It is indeed a well-established fact that the onset of fertility decline did not occur simultaneously across India (Guilmoto and Rajan 2001). This historical process of demographic change will probably stretch over a total of more than 70 years, having started in the early 1960s in the pioneer areas in South India and being likely to end after 2030. India's slow fertility decline could thus be simply the result of the complex combination of diverging regional schedules.

To explore this hypothesis, I computed the overall rate of fertility decline for each of these 15 states and compared it with India (−.69 child per decade). The results of this analysis are shown on Fig. 7.4. They indicate that excluding Haryana (see below), the variations in the pace of fertility decline across states were of a limited extent. Decennial fertility declines lie between −.87 (Punjab) and −.56 (Tamil Nadu). The slow rates in Tamil Nadu during the last 40 years are also observed in Kerala and Karnataka, regions where fertility tends now to level off

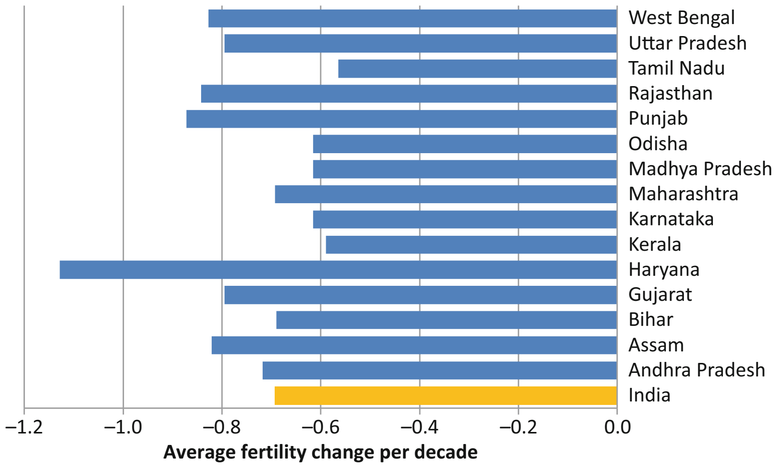

Fig. 7.4 Average TFR decline per decade, largest Indian states, 1971–2010 (SRS estimates)

below two children per woman. In fact, TFRs have remained more or less stable in Kerala at a level close to 1.7 children per woman since the mid-1990s. In these states, the pre-1970 decline and the recent stabilization of fertility levels are therefore responsible for the apparently slower fertility decline observed during the last four decades.

The only apparent outlier among the largest Indian states is therefore Haryana. In this state adjacent to Delhi, fertility is reputed to have declined from 6.7 in 1971 to 2.3 in 2010, at an average decadal rate of −1.13 children. The drop in Haryana's fertility rates is the fastest observed across India since 1971 and comparable to declines observed elsewhere in Asia (see Fig. 7.2). It may even be added that this state was directly affected by the post-Emergency stalling, with flat TFR levels from 1977 till 1984. Moreover, we notice that even if the initial decline in fertility from 1971 to 1978 indeed appears vertiginous (−2 children per woman), the SRS figures used here are compatible overall with TFR estimates for Haryana derived from other sources (Rele 1987). Moreover, Haryana is not entirely isolated, since it is surrounded by other states and territories such as Punjab, Delhi and Chandigarh where decline in fertility rates has been on the whole slightly faster than average during the last four decades. Yet, Haryana represents less than 3 % of India's population. In spite of its intriguing fertility trends, Haryana had no impact on the national trend and remains till now an unexplained outlier vis-à-vis the rest of India.

As a conclusion, regional fertility levels observed in 1971 in each state appear to be the best predictors of the TFR observed 40 years later since the regional differentials have been modest during this period. This analysis shows that the overall national trend cannot be accounted for by the variations in the schedule of fertility decline at state level.

Understanding India's Future Fertility Decline

Projecting India's future fertility trajectory would ideally require some strong theory based on the exogenous factors of changes in reproductive behaviour. Yet, the experience of the previous decades suggests we have none at present. A brief review of fertility analysis in India may start with the famous paper by Dyson and Moore (1983) stressing the existence of various demographic regimes within India, drawing in particular a boundary between the North and the South of the country based on a fine anthropological and historical reading of the country's diversity. Once the fertility decline had become substantial in many parts of India, the literature underlined its specific geography by focusing on the pioneer role of Kerala in the process (and ignoring Tamil Nadu's early decline). After studies on the "Kerala model", other states were gradually added to this examination and the list of regional success stories and accompanying narratives quickly grew, with themes such as the role of local government in Tamil Nadu, the impact of economic growth in Punjab, the social development factor in Andhra Pradesh (etc.). At the same time, delayed and slower fertility decline elsewhere was attributed to the poor condition of the so-called "Bimaru" states in terms of human development and gender equity. But in truth, all these ex-post explanations had little predictive value, being only ad hoc interpretations of what recent demographic estimates had just unearthed. Incidentally, they took individual states as units of analysis ("Kerala model", etc.) when maps clearly show that administrative regions have played no major role in the spread of low fertility across the country (Guilmoto and Rajan 2001). The current geography of fertility differentials in India still fails to follow these administrative boundaries and it rather points to larger cultural regions (Fig. 7.5).

Increasingly detailed district-level datasets have in fact led to the identification of the many factors associated to lower fertility in India (child mortality, literacy levels, religious composition, urbanization, female participation rates etc.), that tend to cut across state boundaries.[10] Yet, what these models fail to capture is the process of fertility *decline* over time since they focused on the interpretation of fertility *differentials* in a given period. In other words, these models remain strictly synchronic (cross-sectional) and have avoided taking a diachronic (historical) perspective, mostly because social and economic variables accounting for fertility variations fail to explain the pace of fertility decline over time.

We may take the literacy-fertility explanation as an illustration of the limitations of the cross-sectional models. The link between low fertility and better schooling is well-established in India, with Kerala as the best example of high literacy and low fertility region. Yet, fertility decline has proceeded faster than what the mere effect of slow educational expansion would suggest. We may further wonder how this relationship explains changes in the reproductive behaviour among the least educated women in India. As a matter of fact, the average fertility of illiterate women

[10] We are referring here to the statistical analysis of census data found in Malhotra et al. (1995), Murthi et al. (1995), Bhat (1996), Drèze and Murthi (2001), Guilmoto (2005) and Bhattacharya (2006).

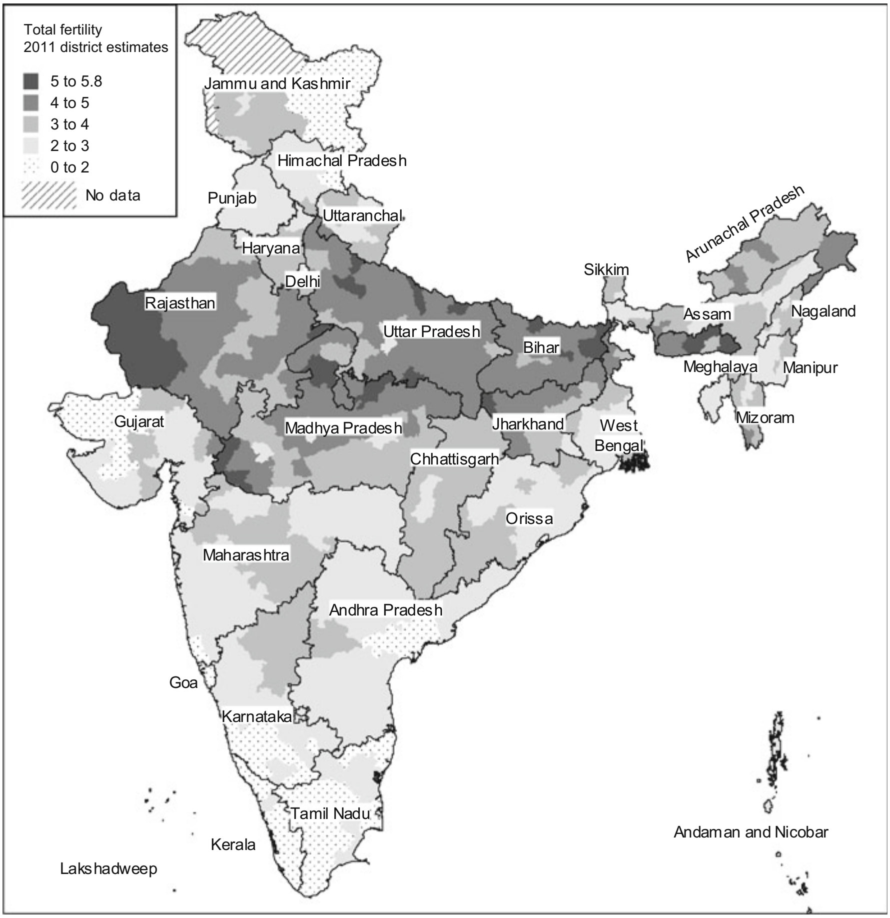

Fig. 7.5 District-level fertility estimates for India, 2004–2011, based on Guilmoto and Rajan (2013)

has regularly decreased over the years (Bhat 2002). According to the latest National family and Health Survey (NFHS), it was down to 3.5 children per woman in 2006–2007, and as low as 2.4 children in Tamil Nadu or 2.1 in Andhra Pradesh.[11] Such fertility levels in illiterate women in South India are significantly lower than TFRs in say urban Uttar Pradesh or Madhya Pradesh. It is not clear whether educational change *per se* has had any structural impact on the reproductive behavior of women with no education at all. McNay et al. (2003) contends that the increased use of contraception by uneducated women in India should rather be explained by diffusion mechanisms related to rapid changes in local norms governing reproduction.

[11] The most recent SRS data confirm that women with education below primary in Kerala and Tamil Nadu had lower fertility in 2012 than graduates from Madhya Pradesh or Uttar Pradesh (SRS 2013).

While the low fertility observed among illiterate women in South India tends indeed to reduce the explanatory power of education as the main factor for fertility decline, the rapid economic progresses observed since the economic reforms of the 1990s have had no visible effect on the downward fertility trend which remained linear over the entire period (see also Fig. 7.3). There is no tangible turnaround during the early 1990s at the time of the onset of India's remarkable economic surge. There is also no specific acceleration of the fertility decline in the urban areas that have most benefited from the emerging economic opportunities. Even before that period, Drèze and Murthi (2001) had stressed the absence of tangible links between low fertility and economic achievements.

More recently, Dharmalingam et al. (2014) have developed a model of fertility differentials, but without educational and economic variables. I need not to repeat here these analyses to stress the apparently limited impact of social and economic development on TFR trends. The same argument could be extended to other variables such as age at marriage, urbanization, child mortality or female participation rates which are usually related to fertility differentials across regions or social groups. Research has only agreed on the fixed effect of son preference or religious affiliation on fertility (Bhat et Zavier 2003; Dharmalingam and Morgan 2004), while more regional studies has unearthed local cultural factors and diffusion as explanations for singular fertility trajectories (Guilmoto 2005; Basu and Amin 2000).

Structural changes during the recent decades in social and economic conditions commonly associated with low fertility have therefore had a modest role in the rate of TFR change in India. Fertility has declined everywhere, including in rural areas, among the disenfranchised groups, among religious minorities, among the peasantry, among women marrying early, etc. In fact, the only truly longitudinal analysis of fertility change resorted to the use of a strictly spatial modeling with little role attributed to social or economic variables (Balabdaoui et al. 2001). This spatial analysis merely describes the way fertility decline progresses over time across localities. It does not say why fertility decline started in the first place in some areas of South India and subsequently of Northwest and East India. The only lesson from statistical models of fertility decline is probably to explain why the onset of fertility decline took place later in some backward regions of North Karnataka or East Uttar Pradesh. But we do not learn why it started in a few pockets of South India rather than in the more advanced metropolitan regions of Mumbai or in Delhi.

An Unorthodox Attempt at Simulating Future Fertility Change

As we have seen, the few variables linked to fertility are mostly endogenous cultural features and rather impervious to the pace of social transformations. We do not have any predictive theory based on identified exogenous determinants of fertility decline that could help chart the future of Indian fertility. We are in fact left with no better alternative than to use a path-dependence explanation to account for the course of fertility change. This corresponds to opting for a "chartist" approach against a more theory-based framework.[12] Geography plays a central role in view of the regular diffusion of fertility decline across Indian regions. Such a purely demographic perspective involves the forecasting of future trends based on documented past trends rather than on exogenous variables. In demography, the most sophisticated version of such stochastic logic is the probabilistic model in which future fertility decrements are estimated based on the historical experience of other cases of fertility decline elsewhere in the world (Alkema et al. 2011). This is how the United Nations Population Division projects the future course of fertility in India, adding confidence intervals to their estimates based on Bayesian modeling.[13]

I will use here a simpler version of this methodology by looking at past TFR decrements. The main characteristic of our approach is that I use only Indian data, rather than historical series derived from other countries in the world. District-level estimates available over 1961–2011 provide a large dataset for studying decadal fertility decrements, as fertility estimates are available for most districts for two consecutive census years. I can therefore use both fertility levels and subsequent fertility decline for a large sample of 2,818 decennial intervals.[14] Fertility decrements have then been regrouped by TFR classes ranging from 1.8 to 6 children per woman.

The results for these 23 TFR classes are shown in Table 7.2. They indicate that fertility decline is not uniform at all TFR levels. We observe in particular that fertility decline proceeds faster when TFRs are in the range of 3–4 children per woman–with a reduction of about .8 per decade. A TFR decrement of .2 from 3.6 to 3.4 children per woman therefore takes only 2.3 years as shown in column 4. Decrements tend to be lower for both higher and lower fertility levels. As was already observed, fertility decline slows down significantly when TFR crosses the 2.1 replacement level. It is at its slowest for the lowest TFR class (below 1.8 children), which mostly corresponds to the recent experience of districts located in Tamil Nadu and Kerala. It may be hazardous to compute the pace of fertility decline for lower TFR levels such as 1.6 children in view of the small number of districts involved.

These data are then used to reconstruct the overall path of fertility decline in India. To do this, I use 2000 as a pivot year, with a TFR level of 3.19 children per woman given by the SRS (the United Nations estimate for 2000 is almost identical at 3.14). Starting from this TFR level in 2000, we can estimate backwards the TFR during the four previous decades by using the number of years per fertility decrement (column 4) at various TFR levels (column 1) as computed in Table 7.2. Similarly, we can simulate TFR in the future by using the fertility decrements shown in our table.

[12] For want of adequate theory, finance economics often resort to a chartist approach in which forecasts are derived solely from past behavior of indicators.

[13] For a more severe evaluation of probabilistic methods, see Lesthaeghe (2012).

[14] Fertility estimates are missing for several districts for specific years in states such as Assam and Jammu and Kashmir. See the appendix for detail of this dataset.

Table 7.2 Fertility decrement at different TFR and fertility simulations based on district trends, 1961–2011

TFR class	Sample size	Average TFR decrement per decade	Years per TFR decrement of .2	Simulated scenario	
				Year	TFR
(1)	(2)	(3)	(4)	(5)	(6)
<1.8	37	−0.25	−8.0	2023.1	1.8
1.8–2.0	41	−0.45	−4.5	2018.6	2.0
2.0–2.2	60	−0.50	−4.0	2014.6	2.2
2.2–2.4	75	−0.56	−3.6	2011.0	2.4
2.4–2.6	73	−0.61	−3.3	2007.7	2.6
2.6–2.8	65	−0.73	−2.7	2005.0	2.8
2.8–3.0	103	−0.77	−2.6	2002.4	3.0
3.0–3.2	99	−0.83	−2.4	2000	3.2
3.2–3.4	84	−0.78	−2.6	1997.4	3.4
3.4–3.6	121	−0.86	−2.3	1995.1	3.6
3.6–3.8	124	−0.83	−2.4	1992.7	3.8
3.8–4.0	129	−0.84	−2.4	1990.3	4.0
4.0–4.2	156	−0.78	−2.6	1987.8	4.2
4.2–4.4	151	−0.67	−3.0	1984.8	4.4
4.4–4.6	169	−0.63	−3.2	1981.6	4.6
4.6–4.8	171	−0.56	−3.6	1978.0	4.8
4.8–5.0	192	−0.58	−3.4	1974.6	5.0
5.0–5.2	192	−0.65	−3.1	1971.5	5.2
5.2–5.4	190	−0.57	−3.5	1968.0	5.4
5.4–5.6	174	−0.45	−4.4	1963.6	5.6
5.6–5.8	162	−0.46	−4.4	1959.2	5.8
5.8–6.0	135	−0.45	−4.5	1954.8	6.0
6.0<	115	−0.50	−4.0	1950.7	6.2

Sample size: number of districts in each TFR (total fertility rates) class with estimates of net fertility decline
Years per TFR decrement of .2: number of years required for a decrement of .2 according to the TFR decrement rate per decade
Simulated scenario: using 2000 as pivot with TFR = 3.2 children (SRS figure), I compute the year corresponding to the upper TFR class limit by using the average number of years per fertility decrement

The results of this simulation are plotted on Fig. 7.6 against SRS and United Nations estimates. As the comparison of the different curves demonstrates, the simulated course of fertility based on the experience of fertility decline in Indian districts is very close to the two other series of TFR estimates for the 1960–2000 period. This is not surprising since observed fertility decrements at district level during the second half of the twentieth century resulted in the overall fertility decline in India captured by SRS and other series. The only significant difference is that the TFR simulation has entirely smoothed out the short-term episodes such as the Emergency and its aftermath.

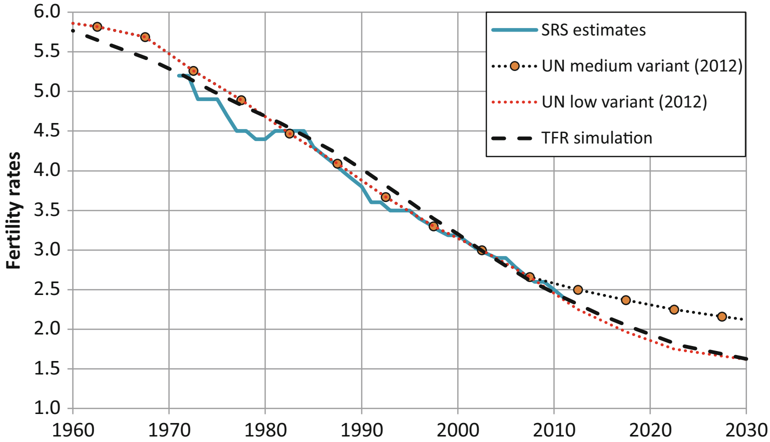

Fig. 7.6 Simulated course of fertility decline in India and other TFR estimates for India, 1960–2030

What may be more interesting is the forecasting of TFR change beyond 2000 onwards. As Fig. 7.6 shows, the forecast is very close if not identical to the SRS series available till 2011.[15] This again is not entirely surprising in view of the close agreement between district series (Guilmoto and Rajan 2002, 2013) and SRS figures. Yet, our method also allows for the forecasting of fertility change beyond the 2011 census. After 2011, the TFR continues to decrease at a sustained pace according to our simulation, even if the rate of fertility tends to gradually slow down. This leveling off reproduces the stabilization of fertility rates observed in below-replacement states since the 1990s. India's fertility is expected to reach 1.8 children in 2023 and 1.6 in 2030.[16]

What is surprising is that this simulation exercise points to a much faster fertility decline than suggested by other source. The gap between our simulated TFR curve and the United Nations trend line tends to widen over the years, reaching 0.35 children in 2020 and 0.45 in 2030.[17] Our forecast suggests for instance that TFR in India will reach replacement level in 2016, whereas the recently revised 2015 United Nations medium variant puts the date of this event at 2030, a considerable 14-year difference.

This view of India's current pace of fertility decline goes indeed against all recently expert opinions on the subject. Only a few ago, a study on the future of fertility in India by Carl Haub was published by the United Nations Population

[15] See also Navaneetham and Dharmalingam (2011) for a discussion of trends.

[16] Our forecast is probably less reliable for this lowest level due to the limited number of Indian districts (37) that had recorded fertility below 1.8 before 2011.

[17] Our forecast of fertility decline departs even more from the somewhat alarming PFI-PRB set of projections– according to which India will not reach replacement level before 2040 or even 2060 as per its two variants.

Division. It documents all recent fertility projections and lists in particular the years at which TFR is expected to reach a replacement level of 2.1 according to six different projection sets (Haub 2011). They range from 2021 for the Registrar General Office to 2034 for the US Census Bureau and even 2056–2061 for the overtly pessimistic scenario drawn by the Population Foundation of India and the Population reference Bureau (PFI-PRB). Carl Haub participated himself in the study of 2007 conducted by the Population Foundation of India and Population Reference Bureau, whose most optimistic scenario had Indian fertility rates reaching 2.1 children by 2036–2041, i.e. at least 20 years behind the date estimated here (PFI-PRB 2007). The only recent estimate similar to ours comes from Tim Dyson (2009), who estimated in 2002 that TFR would reach 2.1 children in 2016 only if we take the "low floor" (lower bound) of fertility rates in Indian states as 1.5 children per woman.[18] In fact, our forecast can also be compared to the low-fertility variant of the United Nations (or to the lowest 95 % interval of the probabilistic model), but this is a rather extreme scenario that is rarely used for forecasting purposes.

I should add that the difference between our estimate and the medium-fertility variant of the United Nations is by no means negligible, since it translates into a reduction by about 230 million births in India from 2010 to 2050. Compared to the standard United Nations forecast, our scenario also delays by 5 years the date when India is expected to overcome China as the world's most populated country (from 2020 to 2025).[19]

While 2016 may indeed sound a very early date for reaching replacement level in India, it appears rather plausible. After all, the latest TFR estimate is already 2.3 children per women for 2013. With the pace of fertility decline for the previous 10 years at −.06 per year according to the SRS estimates and to our district dataset, the TFR may very well cross the replacement level by 2016. Many states already reached 2.1 children per woman by 2013 according to the SRS, including all the four southern states, Delhi, Himachal Pradesh, Jammu and Kashmir, Maharashtra, Odisha, Punjab and West Bengal while Haryana and Gujarat are soon going to follow suit.[20]

Discussion

Our chapter has shown that the pace of fertility decline has been very slow in India vis-à-vis other Asian countries. In addition, fertility decline has been almost linear in India over the last 50 years, with the exception of the troubled Emergency period.

[18] The date at which TFR reaches 2.1 is respectively 2021 and 2026 with higher floors of 1.8 and 2.1 (Dyson 2009). As it happens, recent estimates from low-fertility states suggest that the current floor level is in the range of 1.7–1.8 children per woman.

[19] Computations based here on the difference between the medium-fertility and low-fertility variants of the 2012 United Nations prospects.

[20] Dharmalingam et al. (2014) argues on the contrary against rapid regional convergence.

The disaggregation by state level shows that contrary to the impression given by the pronounced regional variations in fertility levels within India, most states have followed an almost parallel course of fertility decline and that consequently, India's regional heterogeneity does not account for this singularly slow pace of fertility decline. The primary source of variations in regional fertility levels observed today are linked to the initial pretransitional fertility level and to the date of the onset of the decline rather than to the subsequent pace of the decline itself.

There is no good explanation for such a slow fertility decline in India. India does not stand out as being particularly laggard with respect to factors usually held to be prime determinants of decreasing birth rates. In fact, modern family planning methods, educational expansion and economic progress over the last 50 years have been in line with what has been observed elsewhere. India has definitely lagged behind several other Asian countries in terms of infant mortality (Claeson et al. 2000), but the profile of mortality decline in India is almost identical to the Asian average. India's fertility reduction appears to some extent to be self-sustained, lending credence to the view of the decline as a diffusion process. Such a perspective suggests that fertility transition responds less to exogenous structural factors–such as reduction in child mortality or educational expansion–than to local processes of social change affecting in particular collective norms about desired family size or contraceptive use.[21] Interestingly, this contagion-like effect is not centered on the hotspots of socioeconomic change that industrial districts or metropolitan areas are supposed to be. The most visible core areas of fertility decline in South India from the 1960s onward (i.e. South Kerala and West Tamil Nadu) were not very advanced regions in this respect (Guilmoto 2005).

This analysis militates for a somewhat theory-free perspective on fertility decline in India in which local institutions in specific areas and social groups initiated an endogenous revolution in reproductive behaviour 50 years ago, which gradually spilled over neighboring areas. It may be argued that the hypothesis of diffusion is a theory in itself (Casterline 2001), but what I stressed here is merely that the fertility decline observed in a few pioneer areas across India–such as Western Tamil Nadu–has spread to adjacent regions over the years. It is beyond the scope of this chapter to examine the mechanisms accounting for this apparent spatial diffusion of Malthusian behavior. Yet, the resulting geographical processes are obvious and it looks "as if" lower fertility levels in a given district had an inevitable impact on bordering areas 10 years later. The sluggish fertility decline observed since the 1960s led us to talk earlier of a specific "Hindu rate of fertility decline" (Guilmoto and Rajan 2013)–a nickname referring to the slow but regular rate of economic development observed in India before 1990 and dubbed the "Hindu rate of growth". While this notion of slow economic growth has now become obsolete in view of India's rapid progresses over the last two decades, the pace of fertility decline has for its part never really changed over the last 50 years. Countries in South Asia such as Nepal, Bangladesh or Pakistan where changes in the fertility regime took place

[21] See, however, the obvious limitations of the diffusion model expressed by Säävälä (2010) in her description of the spectacular fertility decrease observed in Andhra Pradesh.

much later than in India have witnessed a more rapid decline. Yet, like the tortoise in the famous fable, India's fertility decline has proceeded uninterruptedly and seems bound to continue further in the next two decades. Contrary to pessimistic narratives and more sophisticated forecasting models, our data-driven simulation of fertility change suggests that India will cross replacement level 15 years before the date projected by the United Nations. Trends observed in South India also reveal that fertility seldom falls to ultra-low levels as observed elsewhere in East Asia. It tends to stabilize at levels close to 1.6 children and cases of districts with fertility levels falling below 1.5 are mostly limited to metropolitan areas such as Kolkata or Chennai. Moderation and irresistibility are probably the key words to comprehend the process of fertility decline in India.

Appendix: District-Level Fertility Estimates

Several sets of estimates are available for each date from various sources such as Guilmoto and Rajan (2001, 2002, 2013), Bhat (1996), (Registrar General of India 1997). Yet, several issues arise due to regular changes in district boundaries, which prevent the longitudinal analysis of fertility series over the years. The number of districts in India has regularly increasing over the years, starting from 310 districts in 1956 to 640 districts in 2011.

In order to prepare a consistent set of estimates for the largest number of districts, I combined the 1956–1991 series and the 2001–2011 estimates by Guilmoto and Rajan. Bhat's estimates were only used to check the quality of our TFR estimates for 1981 and 1991. The resulting dataset was converted into surface maps of fertility in India for each census years by kriging. I then applied 2011 census boundaries to these maps of fertility to derive fertility estimates from 1961 to 2011.

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Chapter 8
Indonesia's Fertility Levels, Trends and Determinants: Dilemmas of Analysis

Terence H. Hull

Innovations and Ambitions

While the history of population counts in Indonesia goes back centuries to the feudal assessments of tribute and colonial accounting for corvée labour, the first modern census with attempts to record the age groups, sex and household structure of the full population took place in 1930. The statisticians responsible for that massive undertaking achieved a remarkable feat in pre-electric calculator times by collecting, collating, analysing and publishing the final preliminary results within months, and the final reports for the entire nation within 3 years. Of course the tables they produced were confined to a limited number of variables, and the analysts lacked the ability to rapidly retabulate or cross-tabulate their results following the insights gained from the first tables. Each table was labour intensive, and government budgets at the start of the great depression limited elaboration or experimentation with the huge data set. Moreover the great shortcoming of the count was that exact age was only asked of European, Chinese, and a small number of indigenous groups, with the bulk of the population being assumed to be ignorant of their own or family members' ages, and thus only recorded in very broad age groupings. After the Second World War, when the scheduled 1940 Census had been cancelled, and the attainment of Independence after the revolution of 1945–1950, when no plans were even made for a 1950 census, the first Population Census of the new Republic took place in 1961. Growing political conflict and social unrest disrupted tabulations of that enumeration. In the end only limited preliminary national counts and the full detailed tabulations of Jakarta, Yogyakarta and East Java were saved from destruction – the rest of the census documentation being lost as the vast bulk of the paper forms were sold off by desperate, underpaid government officials.

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The turbulent history of the first three decades of independence meant that the Indonesian government had only the sketchiest evidence of the levels, trends and differentials of fertility rates for the huge, rapidly growing and highly diverse population. Discussions of agricultural, educational and health policies were extremely limited by a lack of confidence in the population estimates and projections needed for national planning. The first thorough accounting of childbearing came with the 1971 Census, which was both the first computerized count, and the beneficiary of demographic innovations of indirect techniques to estimate vital rates using deficient data sources developed by William Brass and colleagues (see Brass 1975). Indonesia could not rely on the direct registration systems used in more developed countries due to the weakness of local administrations and the fragility of reporting between the local and central governments. Instead the Central Bureau of Statistics carried out a full household and head count using a very short, simple questionnaire, accompanied by a longer questionnaire with detailed personal information from a randomly selected sample of census blocks. The use of samples for the decennial census detailed information continued through the 1990 count.

Between the 1961 and 1971 censuses government and international donors had become alarmed by the record high rates of population growth and the high fertility fuelling what they called a demographic explosion. In March 1967 a military takeover put General Suharto in the presidency, a position he was to hold for over 31 years. One of his early policies, promoted by the economic technocrats he placed in key positions, was the establishment of a program of population control, relying on the decades old policy of Transmigration to promote the resettlement of people from Java and Bali to less dense areas of the country, but now supplemented by an innovative program of family planning to bring down fertility rates. This focus on population numbers gave great support to the 1971 Census, but also fostered a series of large-scale surveys to monitor trends on a routine basis. The Central Bureau of Statistics (now Statistics Indonesia or BPS) had initiated annual Social and Economic Surveys (SUSENAS) in 1963 with samples representative at provincial level, but with the growing concerns about population the SUSENAS designers increasingly made efforts to sharpen the local area estimates of demographic variables. Over the years these included an array of modules with detailed questions relevant to marriage, fertility, health and mortality estimation.

The Demographic Institute of the University of Indonesia carried out a nationally representative Fertility-Mortality Survey in 1972–1973. The National Institute for Sciences (LIPI-LEKNAS) implemented national Migration Surveys. In 1976 a three-tiered survey of national demographic conditions was carried out, including the Indonesian implementation of the World Fertility Survey questionnaire in the densely populated islands of Java and Bali. By the time of the 1980 Population Census the country had accumulated a large array of baseline data on fertility, and with the encouragement of donors, had pressed to innovate with more detailed questions on surveys and new methods of indirectly estimating fertility trends. The 1980 Census long form sample questionnaire even included questions on the timing of women's latest births, and their current use of contraception, a very ambitious undertaking that provoked controversy when the results did not match other government estimates of use of birth control devices (Hull 1987). The accumulation of data and the growing cadres of trained analysts meant that by 1995 people were confident that fertility rates were dropping, and proud that the government programs had brought down family sizes to less than half the levels of the 1950s. The prospect of reaching the stated target of replacement level fertility (TFR = 2.1) by 2010 seemed quite realistic.

The 1998 transition from Suharto's New Order to a democratic Reform Era had important impacts on the nation's population census operations. These were born in a time of international economic crisis that robbed the government of legitimacy and support. While not a revolutionary transformation of ideology, the fall of Suharto gave his successors the opportunity to institute long desired changes in governance. After three decades of tightly controlled authoritarian rule under the one president, in the first decade of the new millennium the nation took on two radical changes: first the implementation of more direct multi-party democracy including popular elections of the president, members of the legislature, and leaders all the way down to the village level and second, the decentralization of government spending powers from the central to district governments. Both changes required better information about population numbers and personal characteristics of citizens living in around 500 districts and thus the need for a new approach to census collections.

As early as 1995 senior officials of the central government had called for more detailed data on villages and sub-districts to help them with planning and monitoring educational and health initiatives. While governments in Europe and North America were moving away from reliance on large scale census activities, Indonesian politicians were demanding ever more detail on economic and cultural variations in the ethnic mosaic that makes up the nation, and in the absence of good registration systems, they relied heavily on whole count population censuses. The hope was that the 2000 count would confirm a developmental success story. Instead, unexpectedly, the collapse of a series of Asian currencies in late 1998 forced major cuts to the Indonesian budget as they struggled with a financial crisis. Carefully planned activities including census staff training and supervision were cut back in the fiscal year 1999–2000 and at the last minute in April 2000, as the country entered a new fiscal year, a cut to wages of the census interviewers was announced. Unfortunately, as successive presidential administrations struggled to save the economy in 1998–2001, across the board budget cuts undermined the administration of the innovative 2000 Population Census program.

Needless to say the quality of data collection suffered, and by all measures the coverage of the enumeration suffered. Simultaneously the designers of decentralized budgets turned to the statisticians for information to enact a fair distribution of regional budgets. The census results were critical to the assessment of payments to newly empowered districts, so senior officials had a strong incentive to avoid criticizing the resulting census numbers for fear that any hint of under enumeration would provoke district heads to demand the population estimates for their districts be adjusted upwards. Census 2000 based estimates of fertility and mortality were lower than previous enumerations, so the central government departments were pleased to claim a steady continuation of trends in line with targets.

It is only from the perspective of an additional decade of accumulated contradictory data that the shortcomings of the 2000 count have become clear. Not only was the total population undercounted, it also seems likely that indirect estimates of fertility and mortality rates were below reality. Yet in 2014 the distance of time means few policymakers are interested in revisiting the 2000 census numbers to consider what those undercounts imply for our understanding of population trends which were likely underestimated for 1990–2000 but overestimated for 2000–2010. Without a reassessment of successive census and survey undercounts the narrative about population growth rates in Indonesia is necessarily flawed, and the assessment of any "true" level and trend of population numbers will be equally problematic.

Population numbers are not the only issue with national data collections. By and large national departments and local governments rely heavily on socio-economic sample surveys for most of the detailed data used for policy design and program assessment. Sampling frames for national surveys carried out after each census have the errors of the enumeration embedded in the plans used to select sample households. After the 2000 Census the sample frames for the SUSENAS and DHS (Demographic and Health Survey) were likely to have been biased as undercounts differed according to geographic area, economic class, and a number of demographic characteristics. Sample biases would obviously have led to biases in the estimates for demographic and economic indicators produced by those surveys.

Despite these problems the decade from 2000 to 2010 probably marked a steady improvement of the quality of demographic date coming out of newly renamed Statistics Indonesia (still referred to as BPS in Indonesian publications). The return to economic growth led to rising budgets, and Statistics Indonesia remained a centralized, hierarchical agency at a time when other national departments had lost their local office structure. Hence the ability of the organization to collect and process standardized data. This reflected the realization that statistics, unlike health and education services, could not be autonomously managed across hundreds of government units without endangering the basic validity and reliability of the information. Statistical integrity found strong champions among central planners, finance officers and even legislators representing the provinces and districts that were now struggling to demonstrate the value of local autonomy. Such actors looked to Statistics Indonesia for data that would prove their performance against Indonesian and international demographic, social and economic indicators, and even to provide benchmarks against which the performance might be gauged over time.

Policy-makers consideration of fertility trends focussed on questions about assumptions for population projections, and hence the annual determination of local budgets. The total fertility rate was also the key metric to judge the success of a now decentralized family planning program. Thus when the international standard Indonesian Demographic and Health Surveys carried out in 2002–2003 and 2007 produced national total fertility rates stuck at an average of 2.6 children, policy makers were quick to attribute this to the failure of decentralized family planning.

Careful reassessment of the results showed that the surveys had encountered an unexpected failure of the sample selection to capture all the single women in the population, hence giving incorrect denominators for the fertility rates. Once adjustments were made to the samples, the estimated TFRs fell to 2.5 and 2.3 respectively, indicating a continuing, albeit slow fertility decline (Hull and Hartanto 2009). Because the earlier results published in the final reports of the two DHS were never officially corrected, policy makers constantly talked about "population explosion" and "baby boom" during the 2008–2010 period, and attributed the failure to achieve replacement target of TFR to equal 2.1 in 2010 to the inadequacies of the National Population and Family Planning Board (BKKBN).

That period also coincided with the detailed planning for the 2010 Population Census. Committees working on the questionnaire came under great pressure to add new questions on childbearing, including direct statements about events in the year before the census, including births, reports of all deaths in the household including maternal and infant deaths, and the total numbers of live born children residing with mothers, and those living elsewhere.

The local demands for population data reinforced international demands for innovative collections of fertility and mortality information related to the indicators used to monitor the Millennium Development Goals. In turn the pressure to add questions joined with the ambition to repeat the 2000 Census ambition of a single, full coverage questionnaire including all households across the country. What emerged was the most complex total coverage population census in Indonesian history. While unquestionably of great value, the enumeration posed many challenges for analysts.

Recent Challenges of Fertility Estimation

In all Indonesian censuses since 1971 the key method for estimating age specific and total fertility rates has been the Own-Child Method developed by Grabill, Cho, and colleagues. It relies on the household listing of all people according to age and sex and assessment of their relationship to the named head of household. Sometimes an additional question is asked with regard to each child in the household list to determine if its birth mother lives in the house, and if so to link her household listing number with that of the child. The heart of the method is the matching of mothers and their own children. By making a large matrix with the ages of children from birth to 14 years across the top, and the mothers in rows by age from 15 to 49, it is possible to fill in the cells with numbers of linked pairs of mothers and "own" children, leaving one row of children who are not matched with their birth mothers. The unmatched children are distributed across the matrix in proportion to the ages of mothers who have matched children. With these detailed calculations the analyst can add across rows and columns to work out the numbers of births that actually occurred in each of the years over the 15 years prior to the enumeration, and compare these with the estimates of the women according to their age group in each successive year. This allows the calculation of age specific rates by 5-year age groups of the women, and consequently the total fertility rate that would be expected if women in future bore children over their entire reproductive life at the current age specific rates. Hull and Dasvarma (1986), Hull (2003, 2007, 2009 and 2012).

The Own Child estimates in Table 8.1 show the decline in fertility as measured in the three censuses between 1990 and 2010, for the nation and for individual provinces. The calculations drop the information from infants (the 0 year-olds) and take the average fertility rates based on 1, 2, and 3; 4, 5 and 6; and 7, 8, and 9 year olds, to cover successive 3-year periods prior to the enumeration. In the table the TFRs used are for the most recent period. Thus in the case of 2010, the reference period for the calculation would be May 2007 through May 2009, the period for the births of the 1, 2 and 3 year olds. The midpoint in this period would be November 2008.

Indirect estimates of TFR can also be made using regressions developed by Rele and elaborated by Palmore. The basic data needed for the calculation of the original Rele approach are the number of children recorded in the census from birth through complete age 5 (the 0–4 age group), and the total number of women aged 15–49 (the childbearing ages) to produce a ratio of young children to reproductive aged women. Most manuals indicate that the reference year of the TFR estimate produced this way is the average of 5 years prior to the enumeration, meaning around mid-2007 for calculations from the 2010 Census.

The Palmore method uses estimates of life expectancy to generate the Gross Reproduction Rate and the Total Fertility Rate, based on the experiences of countries with reliable data. The regressions were originally developed in the 1970s and 1980s, and thus reflect experience around that time. According to the online manual of the EASWESPOP programs, the Palmore method uses different inputs but a similar regression technique to estimate the TFR:

> This method computes estimated Total Fertility Rates and Age-Specific Fertility Rates using age-sex distributions. The method also uses Proportions of Ever Married Women and Infant Mortality Rate. The estimations are based on regression equations developed from reliable data around 1970. Estimated fertility is supposed to be for the census year, but when fertility has been changing rapidly, the estimates are closer to an average for the preceding five years.

For further information on the method see: (http://www.eastwestcenter.org/fileadmin/resources/research/PDFs/manual_fertility_estimate.pdf).

At the provincial level both the Rele and the Palmore fertility estimates can be biased as a result of out or in migration by women of childbearing age, separating them from the households where their children reside (e.g. overseas migrant workers and rural women working as servants or factory workers in urban agglomerations). Table 8.1 giving the Rele and Palmore results for the 1990, 2000, and 2010 Censuses provides evidence of the contradictory differences that can result when applying the two regression methods to the same data sources. While it might have been expected that the two estimates would be equal, Rele is usually higher and sometimes lower than the Palmore estimate.

Ultimately the three methods use the household listings of women and children to derive indirect estimates, and if the methods and the input data were perfect we

Table 8.1 Total fertility rate indirect estimates for Indonesia by Province, Censuses of 1990–2010

Region	Own child technique			Rele regression			Palmore regression		
Census year	1990	2000	2010	1990	2000	2010	1990	2000	2010
Reference year	1987–1989	1997–1999	2007–2009	1986–1990	1996–2000	2006–2010	1986–1990	1996–2000	2006–2010
Indonesia	3.3	2.3	2.4	3.4	2.6	2.4	3.6	2.6	2.3
Aceh	4.4	2.8	2.8	4.1	2.8	2.8	4.3	2.7	2.7
Sumatera Utara	4.3	3.1	3.0	4.2	3.0	2.9	4.4	3.0	2.8
Sumatera Barat	3.9	3.1	2.9	3.8	3.1	2.8	4.1	3.1	2.8
Riau	4.1	2.8	2.8	4.3	3.1	(3.0)	4.5	3.0	2.6
Jambi	3.8	2.7	2.5	3.9	2.8	2.6	4.1	2.7	2.4
Sumatera Selatan	4.2	2.9	2.6	4.3	2.8	2.6	4.5	2.9	2.4
Bengkulu	4.0	2.7	2.5	4.2	2.9	2.6	4.4	2.9	2.4
Lampung	4.1	2.6	2.5	4.1	2.7	2.5	4.3	2.7	2.3
Bangka Belitung	[a]	2.6	2.5	4.0	2.4	2.7	4.3	2.4	2.4
Kepulauan Riau	[a]	[a]	2.4	3.4	2.3	(2.8)	3.6	2.0	2.3
DKI Jakarta	2.3	1.6	1.8	2.4	1.8	1.9	2.3	1.5	1.6
Jawa Barat	3.5	2.5	2.4	3.5	2.8	2.5	3.8	2.8	2.4
Jawa Tengah	3.0	2.1	2.2	3.2	2.4	2.2	3.4	2.3	2.0
DI Yogyakarta	2.1	1.4	1.9	2.1	1.8	1.9	2.3	1.7	1.8
Jawa Timur	2.5	1.7	2.0	2.6	2.1	2.0	2.7	2.0	1.8
Banten	[a]	2.7	2.3	4.4	3.0	2.4	4.7	3.1	2.2
Bali	2.3	1.9	2.1	2.4	2.2	2.2	2.4	2.1	2.0
Nusatenggara Barat	5.0	2.9	2.6	4.6	3.1	2.7	5.4	3.5	2.9
Nusatenggara Timur	4.6	3.4	3.8	4.4	3.8	3.7	4.7	3.8	3.8
Kalimantan Barat	4.4	3.0	2.6	4.3	3.0	2.7	4.6	3.2	2.6
Kalimantan Tengah	4.0	2.7	2.6	4.1	2.9	2.7	4.2	2.9	2.5

(continued)

Table 8.1 (continued)

Region	Own child technique			Rele regression			Palmore regression		
Census year	1990	2000	2010	1990	2000	2010	1990	2000	2010
Reference year	1987–1989	1997–1999	2007–2009	1986–1990	1996–2000	2006–2010	1986–1990	1996–2000	2006–2010
Indonesia	3.3	2.3	2.4	3.4	2.6	2.4	3.6	2.6	2.3
Kalimantan Selatan	3.2	2.3	2.3	3.3	2.6	2.4	3.6	2.9	2.5
Kalimantan Timur	3.3	2.5	2.6	3.5	2.8	2.8	3.6	2.7	2.6
Sulawesi Utara	2.7	2.1	2.4	2.7	2.4	2.4	2.9	2.2	2.2
Sulawesi Tengah	3.9	2.7	2.9	4.3	3.2	3.0	4.7	3.4	3.0
Sulawesi Selatan	3.5	2.6	2.6	3.3	2.8	2.5	3.5	2.8	2.4
Sulawesi Tenggara	4.9	3.3	3.2	4.8	3.5	3.2	5.1	3.6	3.2
Gorontalo	[a]	2.7	2.8	3.2	3.0	2.7	3.3	3.1	2.8
Sulawesi Barat	[a]	[a]	3.3	3.9	2.1	3.3	4.1	2.2	3.3
Maluku	4.6	3.4	3.6	4.4	3.8	3.4	4.7	3.9	3.3
Maluku Utara	[a]	3.2	3.3	4.8	3.7	3.4	5.1	4.0	3.4
Papua Barat	[a]	[a]	3.2	4.9	3.3	3.3	5.0	3.4	3.1
Papua	4.7	3.3	2.9	4.7	3.5	2.8	4.8	3.6	2.6

Note: [a]Provinces created between 1990 and 2010 are not included in the Own-Child estimates due to lack of tabulations for the geographic units used to create the new provincial units (Source: Rele and Palmore: BPS Population Census Team calculations 2010. Published Own Child Estimates: BPS 2011) would expect no difference in output estimates. The differences we obtain, both in direction and magnitude, imply that there are imperfections somewhere, though the scale of the differences tends to be only 0.1 or 0.2 of a child on average which is small. While it would be tempting to blame the methods for differences, experience over time points to errors in data as the more likely source of bias. As mentioned above, the matched mothers and children will be more accurately linked with the correct fertility rates if the age statements for both children and mothers are accurate, data on young children co-residing with their birth mothers are consistent, and few mothers live away from their children for study or work. The fertility levels calculated for Papua and Papua Barat were unexpected, and will require more detailed analysis to determine the degree to which these numbers are valid and reliable. Observers think the cultures and logistic difficulties of these two provinces would have led to higher fertility rates.

Measurement of fertility from the 2010 Census is complicated by the multiple methodologies used to estimate the total fertility rate. When different levels of fertility are produced from the same data source (albeit from different variables) many users will complain that the results are wrong, when in fact they are merely reflecting differences in method. Given the apparent biases, analysts looking for data to shape the assumptions needed for population projections should avoid using the statistics directly, but instead make assessments about the degree to which the results are likely to be over or undercounting current fertility for the period 2010–2015. It is important for researchers to consider the determinants of fertility as measured through the changing patterns of marriage and changes in marital fertility.

The 2010 Census was the first to ask a question of all ever-married women about any births they experienced in the preceding year, in this case between 1 January 2009 and the date of the interview falling between March and July 2010 (generally taking place in the month of May and early June). The total numbers of births in households in calendar year 2009 could then be compared with the numbers of women of all marital statuses in households according to their age in 2009, to produce an estimate of age specific fertility rates. When such calculations were made, they showed obvious underestimates and were regarded as being unsuitable for any serious estimates of levels or trends.

Faced with the questions about both the indirect regression methods and the direct reports of births since 2009, analysts at Statistics Indonesia have fallen back on what are deemed to be the two more reliable sources of fertility estimation: the Survey or Census based Own-Child estimates and the DHS pregnancy history calculation of retrospective estimates of TFR, as shown in Fig. 8.1.

These two sources are not without confusion. The Own-Child estimates from successive censuses and inter-censal surveys are shown as blue dots linked by dashed lines. In fact, while the graph links points along the time dimension, the data are actually averages over periods of time of 3–5 years in duration. Linking the mean values is undertaken simply as a simple way of showing the trends. The blue line traverses a "ski-jump" course from above 4 children per woman in the early 1980s, to a minimum level approaching 2.2 in 2002, and then ramping back up to 2.4 in 2008, this latter point being based on the reports of women visited in the 2010 Census.

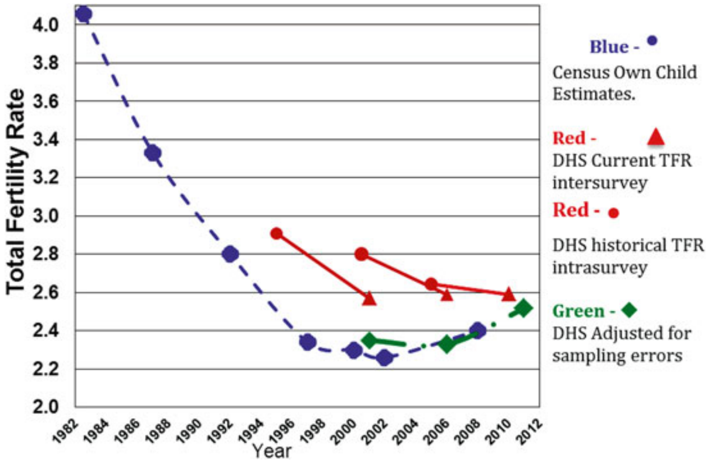

Fig. 8.1 Comparison of census and DHS estimates of fertility

The DHS pregnancy histories provide two perspectives on fertility estimation. First, the comparison of 'current' fertility between the successive survey dates, and second, the intrasurvey trends calculated from the historical reports of births occurring in the decade prior to the survey date. On the chart these are shown in the three red lines with circles at the top left and triangles on the bottom right. The triangles, reading from left to right, refer to 'current' fertility average number of children born in the 1–4 year period prior to the survey. The circles are for the period 5–9 years before the survey and are based on the children in the household who are currently 5–9 years old. The red lines show that the intra-survey estimates for each survey and reveal downward trends in fertility. The inter-survey estimates of 'current' fertility are shown by a comparison of the three triangles and reveal a flat trend of three successive estimates of 2.6 births per woman.

The inconsistency between the inter-survey and intra-survey estimates revealed by the DHS is very disturbing because the standardized questionnaire and high quality of interviewer training should have produced very reliable and consistent statements of fertility both within and between the surveys. Instead they indicate that women's reported histories consistently show fertility declining, while the successive surveys show no decline of current fertility.

These are all valid concerns. However, as Hull and Hartanto (2009) demonstrated in a detailed review of the 2002/2003 and 2007 DHS, there can be a problem with a sample survey aimed at interviewing ever-married women as the main respondents. Other household members may slip through the net of household listings, either because they are not regularly at home, or because they live in 'special' households like dormitories, barracks, boarding houses and informal accommodations. In Indonesia, with rapidly rising enrollments in tertiary education, participation in the formal workforce, and increasing mobility, surveys have found it difficult to design samples that captured young adults between the ages of 20 and 34. In the case of the DHS the result was a large number of missing single women. Since their numbers are needed in the denominator when calculating the rate of births per all women, for the Total Fertility Rate, their loss in the sample had a serious impact on the validity of the calculation. By estimating the number of missing women in each survey it is possible to adjust the TFR to obtain a more realistic estimate of fertility. In Fig. 8.1 the adjusted figures are shown in the dashed green line linking the diamond points for current fertility. The adjustment is very serious for 2007, but is smaller for 2012. The DHS in that year included all women for detailed questioning survey rather than just ever-married women. The fact that the latest DHS is subject to such a small adjustment gives confidence in the belief that fertility has been rising in recent years.

The revised picture of fertility is of great concern because the census and the adjusted DHS traverse a ski-jump shape with the decline being reversed around 2002 at a rate of 2.2 and climbing since then to reach 2.5 in the year 2011. This recent increase poses two distinct questions. First, how reliable are the various methods of estimating fertility rates in Indonesia? Second, if they are to be believed, is the recent apparent increase in fertility a sign of failing family planning services? On the first question we can be fairly confident that the Census and adjusted DHS estimates are reliable, given their evident consistency and the strength of the logic underlying the trend shown in Fig. 8.1. Thus attention must be directed to the major determinants of fertility: the current use of effective contraception and the proportion of women who are in regular sexual unions, either through marriage or cohabitation.

Control of Fertility Within Marriage

One of the major political narratives related to Indonesian fertility is the argument that decentralization of government function in 2001 led to the collapse of a highly successful centralized family planning program. As indicated above this appears to have empirical support related to the record of a reversal of fertility trends between the decennial censuses of 2000 and 2010, and the results of three DHS between 2002/2003 and 2012. However, it is dangerous to jump to conclusions as to the cause of fertility changes since the concept of proximate determinants implies that the level of fertility is a function of the interaction of a limited number of variables related to conception, gestation and parturition. As John Bongaarts (1978) has reminded us in his elaboration of the conceptual framework of Davis and Blake (1956), fertility change is largely limited to only three pliable variables, the use and effectiveness of contraception, the accessibility and utilization of options for the termination of pregnancy and the establishment of regular reproductive unions, most specifically reflected in the institutions of marriage.

In Figs. 8.2 and 8.3 there are two perspectives on the measurement of birth control, the contraceptive prevalence rate (CPR) and the method mix of modern and traditional forms of contraception. Prevalence is measured by asking if cur-

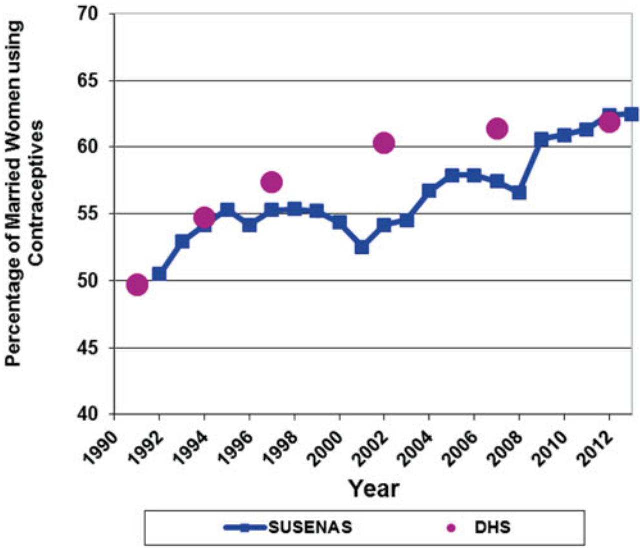

Fig. 8.2 Contraceptive prevalence recorded in SUSENAS and DHS, Indonesia 1991–2013

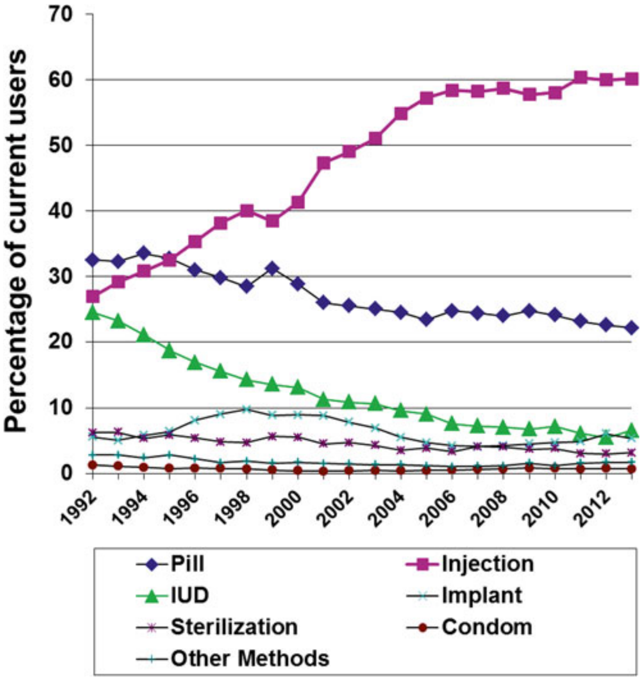

Fig. 8.3 Dynamics of contraceptive method mix, SUSENAS 1992–2012

rently married women are currently using family planning. For some surveys, like the SUSENAS, the question is very straightforward and can be answered with a simple yes or no. For others like the DHS the respondent is asked in detail about a range of devices, medications or behaviours designed to prevent conception. In Fig. 8.2 it is clear that the DHS question records a higher prevalence than the SUSENAS. In part this may be due to the detailed nature of the question, but more likely it is a side effect of the way the respondent is selected for each survey. SUSENAS interviewers seek out any responsible adult in the household, and in addition to the contraceptive behaviour of household members will also ask about a detailed set of social and economic variables. Very often the respondent will be a male head of household and the woman whose contraceptive use is being determined could be a his daughter-in-law, granddaughter, or even a non-relative like a servant. By contrast the DHS interviewer has to ask each woman about her personal experience. This makes the DHS result more reliable, but as Fig. 8.2 shows, both surveys indicate relatively steady results around the level of 60 % current use of contraception (based on the analysis of Hull and Mosley, 2009).

Even though the current level of use has remained high, there is always the possibility that the effectiveness of contraception may have fallen if women had switched to less reliable methods of fertility control, like withdrawal, rhythm or other traditional methods. Figure 8.3 reveals that there has indeed been a major change in the mix of contraceptives used in Indonesia, with a huge increase in use of injectables and steady decline in almost every other method, especially IUDs. But injectables offer more assured control of fertility than the pills and IUDs that they replaced, and most of the other methods accounted for less than one in ten of contraceptors throughout the two decades covered in the figure. Thus both in terms of current use and effective use, contraception does not contribute much to the explanation of fertility increase.

Reversal in Trends of Mean Age at Marriage

Lacking comprehensive information on the age at first marriage using civil registration or detailed sample survey data, Indonesia has long relied on the synthetic measure of the Singulate Mean Age at Marriage (SMAM) to track changes in matrimony by province and at the national level. The marital status results from censuses and Intercensal Surveys (Table 8.2) show that the national female SMAM rose between 1990 and 2005. It then fell between 2005 and 2010 returning to the 2000 level.

A more detailed record of annual SMAM is available from the SUSENAS series of surveys (Fig. 8.4). These show that the SMAM for rural women and men rose each year from 2000 to 2005, and then fell in most years between 2006 and 2011. The grey bars on the chart indicate the years in which the rolling sampling frames for the SUSENAS were recalibrated to reflect the revised baseline from the decennial census. Following the 2000 Census the SUSENAS sample was reset in 2001.

Table 8.2 Female Singulate Mean Age at Marriage for Census and Intercensal Survey (SUPAS) data, by Province, 1990–2010

Province	1990	1995	2000	2005	2010
Indonesia	21.6	22.2	22.3	23.4	22.3
Nangroe Aceh Darussalam	22.6	23.5	23.2	na	23.1
North Sumatera	23.3	24.0	24.0	24.9	21.8
West Sumatera	22.8	23.5	23.1	24.4	22.9
Riau	22.0	22.7	22.5	23.7	22.5
Jambi	20.8	21.4	21.5	22.3	21.2
South Sumatera	21.7	22.1	22.9	23.7	22.2
Bengkulu	21.0	21.2	21.6	23.0	22.2
Lampung	20.8	21.4	21.7	22.9	22.0
Bangka Belitung	–	–	22.2	22.0	21.2
Riau Archipelago	–	–	–	24.6	24.4
DKI Jakarta	23.9	25.4	24.5	26.4	23.5
West Java	20.2	21.3	21.5	22.9	22.2
Central Java	21.3	22.1	22.5	23.4	22.1
DI Yogyakarta	24.1	24.1	23.5	25.9	24.3
East Java	21.0	21.2	21.8	22.7	22.0
Banten		–	21.5	22.9	21.5
Bali	22.7	22.7	22.8	23.2	22.4
West Nusa Tenggara	21.0	21.0	21.8	22.4	22.1
East Nusa Tenggara	23.8	23.5	23.8	24.0	23.5
West Kalimantan	21.4	21.9	22.1	23.7	22.1
Central Kalimantan	20.8	21.8	20.7	22.0	21.0
South Kalimantan	21.5	21.6	21.6	22.2	21.2
East Kalimantan	21.6	22.1	22.0	23.4	22.2
North Sulawesi	22.4	22.4	22.4	23.9	22.5
Central Sulawesi	21.3	21.3	21.3	22.4	21.8
South Sulawesi	23.6	24.0	23.7	24.4	23.2
Southeast Sulawesi	21.5	21.5	21.8	23.2	22.3
Gorontalo	–	–	21.4	21.9	21.6
West Sulawesi	–	–	–	–	22.0
Maluku	22.4	22.3	22.9	23.7	23.6
North Maluku	–	–	22.0	23.2	22.8
West Papua	–	–	–	–	23.0
Papua	20.4	20.7	20.8	21.9	22.3

Note: 1990, 2000 and 2010 data from decennial Population Census; 1995 and 2005 data from Intercensal Surveys (See also data in Annex)

SMAM estimates dipped sharply and then continued a steady rise till about 2006, after which point they reversed and started a steady decline up to and beyond the readjustment of sample in 2010. Because the SUSENAS is a sample survey subject to standard deviations that would make the year on year differences statistically suspect it is premature to jump to conclusions about the nature of the recorded

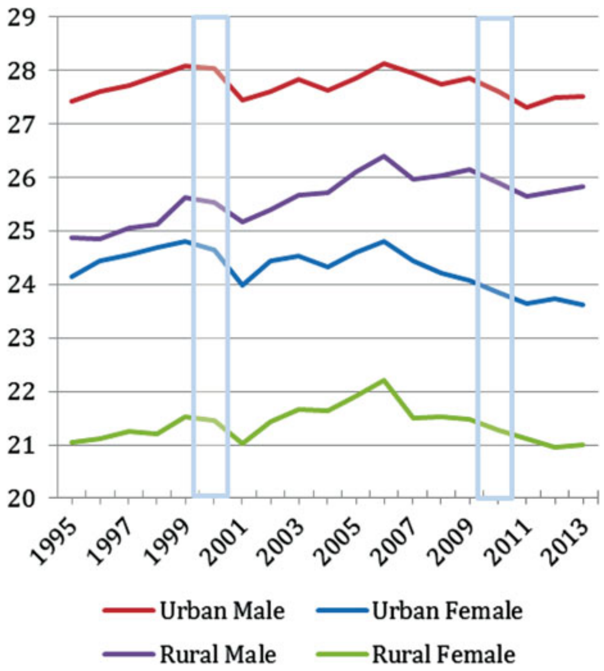

Fig. 8.4 Reversal of trends in annual mean age at first marriage, SUSENAS, Indonesia 1995–2013 (Source: Calculated from the SUSENAS, Annual Social and Economic Survey files held in the Australian Data Archives-International. http://ada.anu.edu.au/international/data-archives)

changes. Nonetheless the trends are suggestive that there has been an important social change at work in the last decade that is encouraging young people to marry earlier than was the case for their older siblings.

One prominent hypothesis that has been put forward to explain the change is the idea that young adults' evident growing participation in a variety of religion based social groups is providing institutional fostering of early marriage. A common phrase that has crept into the public discourse is "it is better to be married than sinful" – *lebih baik kawin daripada dosa* – reflecting anxiety that single adults will be tempted into premarital relationships. Religious leaders and teachers thus encourage them to seek out matches with co-religionists. Young people who hesitate with excuses that they have not saved enough money to afford an expensive wedding are encouraged to have simple ceremonies (Jones et al. 2011).

Lack of publicly available data of religious affiliation in most large-scale surveys makes it difficult to explore that hypothesis on a national scale. Statistics Indonesia does not publish data on religion from the annual SUSENAS or regular DHS due to concerns about sampling error. The larger samples from the 1990 Census and the 1995 Intercensal Survey (SUPAS) were regarded as being sufficiently robust to allow release of the data, but the 2005 SUPAS religion variable has been withheld, despite the survey having a larger sample than earlier enumerations. Both the 2000

Census and the 2010 Census attempted full coverage of the entire population, so they are not subject to sampling errors. However, in a country where local inter-religious conflict is growing, and where religion is increasingly a symbolic marker of social and political identity, even the Census numbers can provoke controversy.

Figure 8.5 shows the very sketchy data on SMAM according to the reported religious affiliation of women. The embargo on the 2005 data prevents us from seeing the degree to which apparent rises in age at marriage overall between 2000 and 2005 were reflected in the religious affiliation differences. Also, the relatively small populations affiliated with Buddhism and Hinduism cause two problems. First, the comparison of sample enumerations in 1990 and 1995 means that the smaller groups are subject to large sampling errors, particularly since the samples were based on clusters that would magnify errors where religious groups are not randomly distributed across the population. Second, the change of religious categories in the last three enumerations has meant that some of the smaller groups have been subject to switching categories. For instance in 2000 some families who had previously been officially listed as Buddhist were enumerated in the newly recognized group of Confucianist. Similarly in 2010 the Census allowed many local animist or other theist groups to be recorded according to their faiths, and thus reduced the numbers in previous categories in which they had been recorded. This especially seems to have been the case for people in some regions of Kalimantan who had previously been coded as Buddhist. In Fig. 8.5 these coding issues could be part of the explanation for unstable estimates of SMAM for the smaller religion groups.

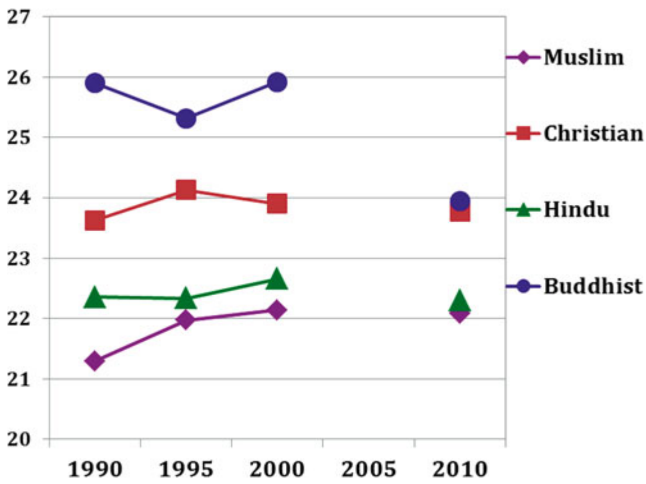

Fig. 8.5 Female SMAM according to Religion, 1990–2010 (Note: Christian combines the codes for Roman Catholic and Protestant congregations. Muslim includes all sects of Islamic faiths including Sunni and Shiite and smaller Muslim groups. Source: Calculated from data sets held in the Australian Data Archives)

Most importantly the misfortune of 2005 SUPAS data restrictions leaves us unable to show how different religious groups experienced changes in marriage over the years between 2000 and 2012. The indications of continuing increase in CPR in the last decade, combined with the presumption that there has been no decline in contraceptive effectiveness and no evidence of reduction in the rate of abortion, leaves little doubt that the very recent fertility increase is a "period effect" resulting from earlier age at marriage and first birth. Demographically tempo effects are usually short term and self-limiting. There is little likelihood that the mean age at marriage will continue to decline, and every possibility that it might begin to climb again if female enrolments in school and participation in the workforce continue to increase. Should that occur the TFR would head toward replacement level again, and if Indonesia follows the same trend as many other Asian countries, the TFR is likely to continue down through to sub-replacement levels of less than two births per couple. The wide range of social and cultural forces that are at play in shaping the proximate determinants of fertility make for some serious challenges requiring careful policy and planning responses. Demographically, the single most serious challenge may be the shortage of detailed, reliable data allowing analysis at the sub-national level.

Conclusion

It will take some time, and a great deal of detailed research, to confirm the exact nature of Indonesia's recent fertility changes and to tease out the implications for family planning, health and education policies. The next major data collection using a large sample designed for analysis at the provincial level will be the 2015 SUPAS, and results from that cannot be expected before late 2016 or early 2017. This is the data set that will provide the final assessment of MDG (Millennium Development Goals) indicators for the target year of 2015. The fertility measures it produces will refer to women's experiences in the years 2011–2014, in other words they will record behaviour over a time before any policy changes made today could possibly be implemented. This is the dilemma of measurement facing policy-makers, politicians and planners if they look to the TFR to guide family planning and population control policies.

The government will need to shift directions in the collection of fertility data to inform policy improvements. They will still need to monitor SUSENAS trends and increase investments in routine DHS to collect more reliable data on components of fertility such as contraceptive practice and marriage patterns. However there needs to be a sharper awareness of the fragility of all estimates. In this chapter we have seen how inconsistent fertility estimates can be when using different methodologies and different data sets. Selection of one set over another is not easy since every method and every data set has strengths and weaknesses. Because Indonesia is a huge, heterogeneous country with a decentralized system of administrative management there will always be a premium placed on whole of population based data systems.

In recent years policy-makers have called for more effective national registration of vital events. These calls are not new. In fact government registration of births and deaths goes back a century and more. As with many political calls the challenge is not in the adopting the idea, but rather in the implementation and maintenance of concrete changes. If anything the result of recent calls has been retrograde competition among central government ministries, each claiming authority to administer birth and death records. Currently there are multiple systems to record births but the institutions responsible palpably lack the expertise or discipline to achieve full coverage, and none of them publish the incomplete data to allow assessment of shortfalls that could allow design for improvements. Instead they restrict access to the data. This is the dilemma for Indonesian demographers seeking to improve the evidence base for planning.

Annex

Singulate mean age at marriage among rural and urban Indonesians 1993–2013

	Urban		Rural		Total	
Year	Female	Male	Female	Male	Female	Male
1992	24.0	27.2	20.9	24.9	22.0	25.8
1993	23.9	27.4	20.8	24.8	22.3	26.0
1994	24.4	25.9	21.2	23.0	22.5	24.1
1995	24.1	27.4	21.0	24.9	22.3	25.9
1996	24.4	27.6	21.1	24.9	22.5	26.0
1997	24.6	27.7	21.2	25.1	22.6	26.2
1998	24.7	27.9	21.2	25.1	22.7	26.3
1999	24.8	28.1	21.5	25.6	23.0	26.7
2000	24.6	28.0	21.5	25.5	22.9	26.7
2001	24.0	27.4	21.0	25.2	22.4	26.2
2002	24.4	27.6	21.4	25.4	22.9	26.5
2003	24.5	27.8	21.7	25.7	23.0	26.7
2004	24.3	27.6	21.6	25.7	22.9	26.6
2005	24.6	27.9	21.9	26.1	23.2	26.9
2006	24.8	28.1	22.2	26.4	23.4	27.2
2007	24.4	27.9	21.5	26.0	22.9	26.9
2008	24.2	27.7	21.5	26.0	22.9	26.9
2009	24.1	27.9	21.5	26.1	22.8	27.0
2010	23.8	27.6	21.3	25.9	22.7	26.8
2011	23.7	27.3	21.1	25.7	22.4	26.5
2012	23.7	27.5	21.0	25.7	22.4	26.7
2013	23.6	27.5	21.0	25.8	22.4	26.7

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Chapter 9
Fertility Decline in China, India and Indonesia: an Overview

Christophe Z. Guilmoto

Simply put, fertility decline in Asia is a story that has changed the world's demography. After all, the beginning and the acceleration of the fertility decline in these three countries have changed our perspective on long-term population prospects, consigning the Population Bomb scare of the 1960s to oblivion. During the 1950s, fertility levels were indeed quite high and the contribution of China, India and Indonesia to the overall population growth was preeminent since they accounted for 45 % of the total number of births in the world. This proportion remained the same till the mid-1970s. But the inception of fertility decline after 1970 caused it to decline and births in the three Asian countries amount nowadays only for 35 % of the world total. The proportion is predicted to continue to decline till the end of the century. Had the share of births in China, India and Indonesia remained the same today as it was before 1975, we would have recorded in 2015 about 25 million more births in them than estimated today by the United Nations. This reduction in family size is indeed the major driver of the historical downturn in demographic growth rates recorded at the end of the twentieth century.

In spite of their common feature, the three previous chapters have examined the fertility trajectories of China, India and Indonesia in relative isolation. For China and Indonesia, the reason for this is rather clear. Measurement issues are perplexing in these two countries and require the systematic confrontation of existing census, registration or survey sources. In China, the political context is largely responsible for the delay in setting up a more robust monitoring system and it leads to an array of fertility estimates. Strategic underenumeration of births and of the child population by parents and local officials is an additional source of uncertainty. In the case of Indonesia, it is rather the possibility of an unexpected fertility rebound during the last decade that is at the core of measurement issues. Most estimation procedures

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are based on several birth cohorts in order to smooth out annual fluctuations and such methods work fine as long fertility rates follow a relatively linear trend. In case of a potential turnaround hypothesized in Indonesia, fertility rates need to be further decomposed by year and birth cohort, a requirement that less robust data sources such as Indonesia's various fertility estimates cannot easily cope with. In comparison, India's fertility estimates drawn from the annual SRS figures seem to be somewhat more reliable and allow for a systematic comparison with other Asian countries.

Using the United Nations figures (UNPD 2013), we can contrast the fertility decline in China, India and Indonesia over a century with trends observed in the richest and poorest parts of the world. Figure 9.1 primarily illustrates the success story of the three Asian giants in lowering their birth rates. Fertility today is close to replacement level, while it was almost six children per woman after World War II. The three Asian countries have seen their fertility curves shift from the highest level represented by the least developed countries before 1970 to the lowest level of the industrialized countries today.

When examined more closely, individual fertility trajectories and their social and political contexts are, however, far from identical in the three countries under study, in spite of the broad parallelism of TFR curves plotted in Fig. 9.1. China's historical fertility profile during the first two decades after 1950 is complicated by the famine crisis and its aftermath. Its distinctive contribution to the global population downturn starts around 1970 when the total fertility rates plunged by three children per woman in a single decade. It is not easy to clearly identify what set in motion this sudden fall in fertility rates. TFR levels that exceeded six children per woman in the

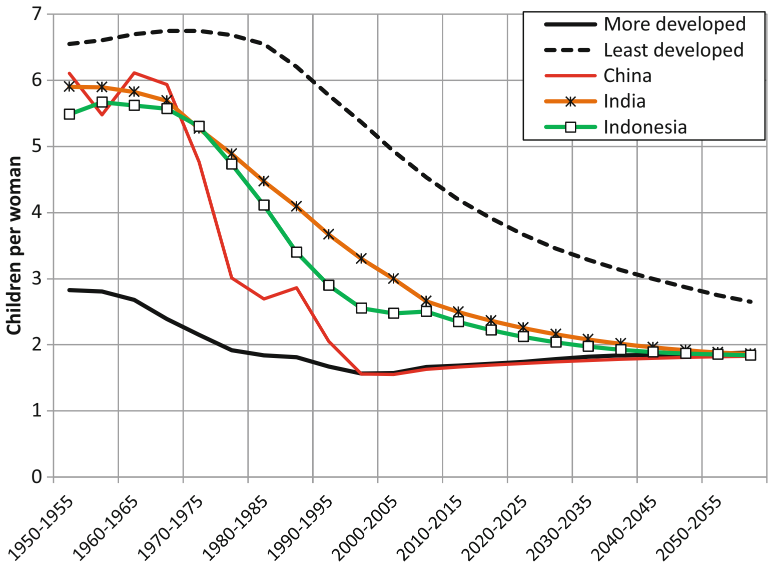

Fig. 9.1 Fertility levels in China, India, and Indonesia, 1950–2060

early 1960s were artificially high because of the post-famine recovery mechanisms and bound to diminish afterwards. The steep decline that followed reflected at the same time a spontaneous reaction to the unrest of the Cultural Revolution, a deeper process of social change, and a response to a changing policy environment inaugurated by the introduction during the 1970s of the first birth control campaigns. The decline continued over the next decades with the further impact of the drastic family planning measures introduced around 1980. The exact fertility level is still a matter of dispute – as discussed in detail in Guo Zhigang's chapter – , but it is undoubtedly well below two children per woman and similar to rates observed in many industrialized countries since 2000. While fertility decline has been swifter in other countries such as Iran, the decrease in China has been the most important ever in terms of reduction in the absolute number of births.

In contrast, India's fertility decline presents a slower but less chaotic profile than China's. The comparison between the three countries is made easier by the fact that they all had an identical fertility level of 5.5 in 1970, a level close to their maximal level reached a few years earlier. The 1970 figure can thus serve as a benchmark for their fertility levels at the very beginning of their historical decline. This also suggests that China, India and Indonesia had perhaps a similar fertility regime in the past, in spite of obvious differences in their marriage systems such as age at marriage, divorce, and remarriage. India's fertility decline is slow because it took India 13 years longer than China to reach four children per woman. While fertility will soon reach replacement level in India, this will be after a delay greater than 20 years compared to China. But the decline was also surprisingly regular as highlighted in Christophe Guilmoto's chapter. Traces of the drive for forced sterilizations during the 1975 Emergency are hardly visible and the impact of the recent economic acceleration is undetectable as well. The decrease seems to have proceeded irrespective of the changes in the political and economic context affecting India since 1970. It further reflects more a global change in reproductive strategy – fueled by structural factors such as educational expansion, reduction in child mortality and changing family norms – than the consequence of exogenous factors such as political mobilization or poverty reduction.

Indonesia projects in comparison a somewhat unexpected profile. The phase part of the fertility transition corresponds to a sustained decline since 1970, at a pace significantly faster than in India. Fertility reached three children in the early 1990s and 2.5 a few years later. This period closely corresponds to the Suharto administration, which ended precisely when fertility started to plateau at 2.5 children per woman. The contribution of Terence Hull to this volume offers an in-depth discussion of the estimation issues involved in the understanding of sudden interruption of Indonesia's 30-year old fertility decline. It also details the potential factors behind the current stalling. This discussion is important because it forces demographers to reconsider the comfy theory of inexorable fertility decline and to examine the role played for instance by religious mobilization or economic downturn. It also offers us the opportunity to think again about the long-term fertility equilibrium that may characterize a post-transition demographic system. The case of Malaysia – where fertility stalled during the 1990s, only to resume its decline during the next decade –

suggests that the stabilization observed in Indonesia may be just a temporary adjustment to a new social and economic context. But it also appears that Indonesia is not following Thailand's model where fertility has now reached an ultra-low level and that its fertility may be more like Malaysia's.

United Nations figures predict a similar continuation of fertility decline in both India and Indonesia and a gradual convergence with China before 2050. India's fertility level is most probably exaggerated by the United Nations estimates. The actual TFR level is in fact already below Indonesia's level – rather than above – , if we follow the latest estimates by the SRS for India and by Susenas for Indonesia. The implications in terms of population growth are considerable since this faster fertility decline observed in India means in particular slower growth and a few additional years before India overcomes China as the most populated country. It may in fact be noted that fertility is one domain in which most of the authors in this volume tend to question the validity of United Nations estimates used here.

As was the case for mortality, it turned out to be unfeasible to plot on the same map fertility estimates at subnational level for China, India and Indonesia. This is mostly for lack of recent reliable fertility figures for Chinese provinces.[1] This is especially regrettable because China has experienced a rapid regional convergence in fertility levels, illustrated notably by the fall of birthrates in Xinjiang and Tibet. This trend differs from what can be seen in other large developing countries such as Brazil or India where regional heterogeneity in fertility remains pronounced. There are, however, reliable fertility estimates for India and Indonesia that allow us to investigate in more detail the current geography of fertility in these countries. India's diversity remains a textbook case of fertility variations as the map in Guilmoto's chapter illustrates: many areas record below-replacement fertility, especially in the South of the country. At the same time, women in many other high-density areas in the North still have more than four children on average, which corresponds to fertility levels higher than currently observed in Kenya or Ghana. Fertility variations are less extreme in Indonesia. A few smaller eastern provinces have TFR levels close to or above 3.5 children per woman in 2012. On the contrary, provinces with the lowest TFR levels – Jakarta, Bali and Yogyakarta – have not witnessed a further decline and 2012 estimates put on the contrary their average fertility above replacement level. The fertility variations between Indonesian provinces have in fact reduced rapidly since 2000.

The implications of fertility trajectories in China, India and Indonesia are primarily related to population growth and its components, while regional disparities may be corrected by heightened spatial mobility as China has already exemplified over the last 20 years. In addition, the link between fertility reduction and the bonus effect of rising working-age population is at the core of the analysis of the demographic impact of current population trends in China, India and Indonesia. All these topics are explored in detail in two separate parts of our volume. But an equally interesting lesson of this comparative analysis of the three Asian demographic giants relates to the future trajectory of fertility. We may want to examine whether

[1] See, however, estimates provided in Peng (2011).

these three countries offer a unitary scenario and where fertility levels may be heading in the next decades.

China's experience suggests a decline well below replacement level. Fertility levels estimated from the 2010 census – probably unreliable because of frequent underreporting – place metropolitan provinces such as Beijing, Tianjin or Shanghai at levels around one child per woman. The chapter by Guo argues that fertility is significantly lower than the standard 1.6 estimate. This suggests that a large part of China has already reached an ultra-low fertility level. Very low levels observed in Hong-Kong, Macao, Singapore and Taiwan point to where Chinese fertility may be heading. We can also turn to Japan and South Korea in East Asia for other illustrations of ultra-low fertility regions that China may soon resemble. In all these countries and territories, fertility lies today between 1 and 1.4 children per woman. Current fertility estimates by the United Nations and the World Bank are probably significantly above the real fertility trajectory of China. The future fertility scenario may even be closer to the low variant of the United Nations in which fertility is allowed to decline to 1.25 children per woman in the next 20 years. Compared with the medium variant of the United Nations, the low-fertility scenario translates into a deficit of 176 million inhabitants by 2050 and an inception of an absolute decline of China's population in 2020 rather than in 2030. This shows that the fertility estimation in China is not simply a matter of decimal point accuracy. Yet, in view of these estimation uncertainties, it is too early to ponder whether China will be caught in a low-fertility trap as described for part of Europe (Lutz et al. 2006) or whether there may be any rebound effect once the drastic family planning regulations are dismantled.

The comparison with Indonesia is made difficult by the interpretation of the recent stalling of fertility. Cases of long-term stabilization above replacement level are not frequent, although Sri Lanka's fertility has remained close to 2.3 children for almost 20 years. However, Indonesia's situation may be simply a temporary stage consecutive to the change in government mobilization and population policy pressure. Fertility in Indonesia could be going through a transitional phase before a further decline, as was indeed observed earlier in Malaysia. We also ignore the level at which Indonesian fertility may plateau, given that the experience of non-Muslim countries such as Sri Lanka, Thailand or Viet Nam may not be applicable.

In comparison, we have a better picture of India in spite of its demographic diversity. India's course of fertility decline stands indeed in marked contrast with China's. The decrease has long been far more moderate and somewhat immune to government pressure to accelerate its pace. Now that fertility is nearing replacement level, we may wonder how far this will take India and whether ultra-low fertility is a plausible scenario. South India provides an interesting example because of its pioneering position in India's history of fertility decline. The states of Andhra Pradesh, Kerala and Tamil Nadu, which have been over the last 20 years at the forefront of fertility decline, have witnessed a stabilization of their TFR at a level close 1.7–1.8 children per woman. In the North, Punjab provides a similar picture of fertility stabilization in-between replacement and ultra-low level. Simulations in the chapter on India's fertility suggest that fertility may plateau in India significantly above 1.5 children. A long-term fertility level lying between 1.6 and 1.9 children may in fact be a quite plausible scenario, not only for India but also for other countries where fertility decline has declined more slowly.

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Part III
Education

Chapter 10
Educational Expansion in China: Evidence from the 2010 Census

Litao Zhao

Introduction

China's educational landscape has changed profoundly since the late 1970s. Enrollment expansion has occurred at all levels, more so for higher levels. A major theme, based on various data sources up to the early 2000s, is the unequal access to education across urban-rural, regional and socio-economic lines.

The earlier data, whether from sampled surveys or government statistics, do not fully capture a number of important policy changes that may have affected educational provision and access in ways different from before. One change is the rapid expansion of tertiary enrollment between 1999 and 2006. Another change is a much larger role of the central government in financing rural education in the less developed central and western regions. These changes should have important implications on the pattern of educational expansion and access.

The 2010 Census Data as released in the aggregated form do not allow for a deeper analysis that takes family, school, community and regional factors into account. Nonetheless, it has clear advantages over earlier data in that it captures important changes in the 2000s. Covering the entire population, it can provide baseline findings to assess the quality of other sample surveys, which may not be truly nationally representative due to difficulties in sampling certain social groups (such as migrant workers) or certain geographical areas (such as remote, mountainous areas).

In this chapter, I use China 2010 aggregated Census Data to show the changing pace of expansion for different levels of education, and the pattern of educational attainment by gender and residence (across urban, town and rural areas). A central question is whether the large, growing disparity in education by gender and residence observed in the 1980s and 1990s remained the case in the 2000s.

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Factors Shaping Educational Provision and Access

The literature has suggested a wide range of factors shaping educational provision and access. They affect the supply and demand of education in complicated ways. The state is a key variable in education. In China as elsewhere, the state determines how education is structured, governed, financed and delivered. In developing countries, state capacity has important bearings on educational development (Buchmann and Hannum 2001).

As a transitional economy, the market effect has been strongly felt in China. Arguments about the market effect, however, go both ways. On one hand, in the 1980s there were serious concerns about the market competing with schools for teenagers. The spread of local non-farm jobs and the relaxed control on rural-urban migration raised the opportunity costs of education (Entwisle et al. 1995), which reduced the demand for education for some rural families. On the other hand, the transition from a planned economy to a market economy raised the returns to education in China (Bian and Logan 1996; Xie and Hannum 1996; Zhao and Zhou 2002), which increased the demand for education as a result.

In sociology, class or social structure is another key variable. New insights have been gained by bringing class into the debate on whether education expansion reduces inequality in education. The Maximally Maintained Inequality thesis argues that only after a saturation point is reached can further expansion reduce inequality (Raftery and Hout 1993). By comparison, the Effectively Maintained Inequality thesis argues that when a saturation point is reached, inequality will shift from quantity of education to quality of education (Lucas 2001). Horizontal stratification will replace vertical stratification as the main concern.

Other factors at the community and family level also affect the supply and demand of education. Numerous studies have shown that resource endowments, cultural beliefs and family structure and size can affect family decisions on educational attainment. In China, family structure and size have changed dramatically, notably because of the so-called “one-child policy” and the sustained economic growth over recent decades. This in turn transformed the traditional male preference and the gender gap in education likely changed as a result.

What is the net effect of the combination of state policies, local conditions and family changes on educational access? Studies using the 1990 Census Data found a large rural-urban gap in the attainment of basic education, as well as large gender inequalities and regional disparities (Connelly and Zheng 2007a; Hannum 1999; Tsui 1997). A lot of changes occurred in the 1990s with the determined drive to universalize 9-year education nationwide. Using the 2000 Census Data, some studies show substantial progress in the reduction of disparities along rural-urban, regional and gender lines (Connelly and Zheng 2007b).

Substantial inequalities, however, continued to exist in other dimensions. Regional disparities in per student expenditure remained large (Tsang and Ding 2005; Zhao 2009). This raised concerns about disparities in education quality. Meanwhile, as 9-year education was becoming universal nationwide, the equity concern shifted to higher levels of education. Analyses based on the 2000 Census Data found a widening rural-urban gap in access to upper secondary education, as the increase in attendance in urban areas outpaced that in rural areas (Connelly and Zheng 2007b). Echoing such concerns, in reviewing country-specific gains in human development between 1970 and 2010, the 2010 UNDP Report concluded that China was one of ten countries to make the largest progress in Human Development Index, which is a composite measure of education, health and income. However, unlike the other nine that improved their standing through achievement in education and health, China is the only one that made it to the "Top 10" list "due solely to income performance".[1]

Two important changes occurred in the 2000s, which are likely to have important implications for the pattern of educational expansion and access. One change is the central government's decision to expand higher education in the wake of the 1997 Asian financial crisis. Due to sluggish demand, China's economy slowed down since the second half of 1997. The situation did not improve in 1998 despite the government's pro-active fiscal policy. The ongoing economic crisis further aggravated the problem of rising urban unemployment, caused by massive layoffs from state-owned enterprises prior to China's accession to the World Trade Organization in 2001. Against this backdrop, rapid expansion of tertiary enrollment began in 1999. The trend continued in subsequent years until 2006, when the negative consequences of the explosive expansion forced the government to slow down the pace (see Fig. 10.1). The number of new intakes annually did not reach one million until 1997; by 2006, it had increased to 5.4 million. The annual growth rate was 22.2 % during the 1998–2006 period, compared to 4.4 % between 1985 and 1998 (Zhao and Sheng 2008).

Another major change occurred in 2006. To establish an expense guarantee system for rural education, the central government moved beyond fixed-term projects and ad-hoc financial transfers to a more institutionalized form of help to poor areas. For the first time, the central government specified the financial responsibility between the central government and lower tier governments. In particular, the central government was willing to play a much larger role in helping the central and western regions. For capital spending such as the construction and renovation of rural schools, the central government would share the cost with lower tier governments in the central and western regions on a 50–50 basis, while local governments in coastal regions would have to rely on themselves. For recurrent non-personnel expenditures, the central government would share the cost on an 80:20 basis with the western region, on a 60:40 basis with the central region, and work out a share with each province in the coastal region. The 2006 reform substantially increased the share of central government expenditure in total government budgetary expenditure on education from 7.6 % in 2005 to 19.5 % in 2011 (Zhao and Qian 2013).

[1] See UNDP (2010), "40-year Trends Analysis Shows Poor Countries Making Faster Development Gains", http://hdr.undp.org/en/reports/global/hdr2010/news/title,21577,en.html, accessed 9 May 2013.

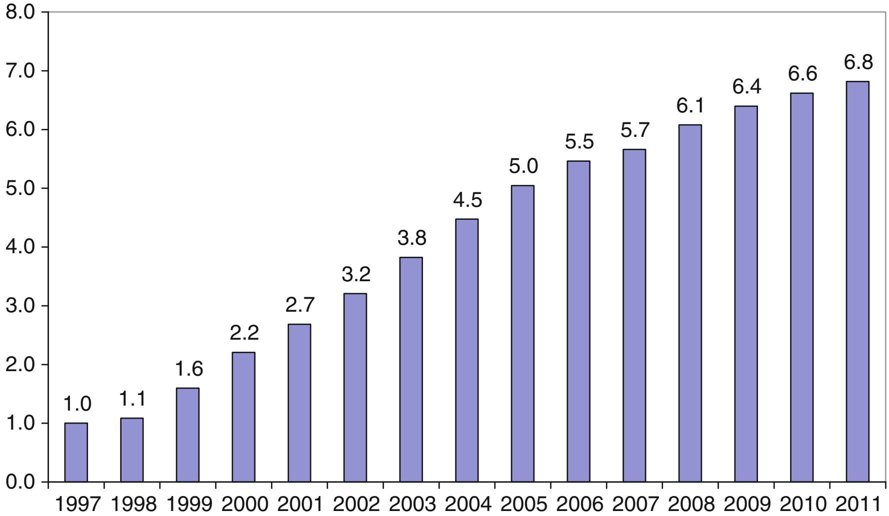

Fig. 10.1 Number of new tertiary enrollment in China (million): 1997–2011 (Source: *Statistical Yearbook of China 2012*)

Due to the rapid expansion of higher education and the expense guarantee system for rural education, the patterns of educational provision and access may have changed in the 2000s, compared to the 1980s and the 1990s. The 2010 Census Data can provide an updated analysis regarding the pace of educational expansion, and the extent of unequal access by gender and region.

The 2010 Census Data

China's National Bureau of Statistics has released the 2010 Census Data in the form of tabulations. Insofar as education is concerned, there are three sets of tabulations from the census data. The first set is the number of people by level of education and gender for each birth cohort[2] aged 6 and above. In ascending order, the seven levels of education are no education, primary education, lower secondary education, upper secondary education, junior college education (*daxue zhuanke*), undergraduate education (*daxue benke*), and post-graduate education (*yanjiusheng*).

The second set is the number of people who are illiterate by gender for each cohort aged 15 and above. The third set is a further breakdown of illiteracy into no formal education and some primary education. For each set, there are four tables, one for the entire population, and one each for urban, town and rural populations. Urban population covers those living in city districts or city proper (without districts), regardless of household registration status. In other words, rural migrants living in

[2] Henceforth the term 'cohort' will be used.

cities are counted as urban population. Town population covers those living in county seats and towns (outside of city districts). Rural population includes all the rest.

This chapter also uses the 2000 Census Data when analyzing the trend of higher education expansion in the 2000s. Figure 10.1 clearly shows the pace and scale of the expansion using data from the Statistical Yearbook of China. However, such a "great leap forward" in higher education is not reflected in the 2010 Census Data. The differences across cohorts in the percentage of each cohort receiving higher education are much smaller than what the government enrollment data shows. The reason is that the benefits of higher education expansion extended to earlier cohorts, who might have missed out on college education when they were at the right age, but made up for it later due to the expanded opportunity. Therefore a comparison across cohorts using the 2010 Census Data cannot reliably tell how much higher education opportunities have expanded in the 2000s, but a comparison between the 2010 and 2000 Census Data can provide a more reliable estimate. For the same cohort, for instance the cohort of 1980, there is a discrepancy in the percentage receiving higher education between the two censuses. This discrepancy is expected for reasons described above.

A number of data limitations should be noted. There are no measures of education quality. Information on family background is also lacking, making it impossible to analyze education inequality by class. In terms of the regional inequality, the tables released by the National Bureau of Statistics break down the educational attainment data by urban, town and rural residence, not by eastern, central and western region. As a result, it is not possible to compare the three regions. Moreover, the census data are based on current residence, not *hukou* or household registration status. As one would move from the countryside to the city if he/she passes the college entrance examination to enroll in a college/university, there is no way to use the education attainment data based on current residence to gauge the disadvantage of being a rural student in accessing higher education. In other words, the urban-town-rural differences reflect the spatial distribution of human resources rather than the urban-town-rural gap in access to higher education.

Patterns of Educational Expansion

To provide an overall picture of educational development over time, Fig. 10.2 shows the distribution of highest level of education attained for each cohort from 1930 to 1990. Those born after 1990 are not shown because many of them are not at the age to receive higher education yet. The long-term trend of educational expansion is very clear, evidenced in the shrinking size of those who received lower levels of education and the growing size of those who received higher levels of education.

For the convenience of historical and international comparison, we can define the first stage of educational development as one in which the majority received no formal education, the second stage as one in which the highest level of education attained by the majority is primary education, the third stage lower secondary education, the fourth stage upper secondary education, and the fifth stage tertiary education. Figure 10.2 shows that prior to 1930, China was in the first stage of educational development. China then moved into the second stage, which encompassed birth cohorts 1930–1956. Starting with birth cohort 1957, China entered the third stage of education development, where the highest level of education attained by the majority was lower secondary education. China remained at this stage for cohort 1990. For this cohort, 0.5 % received no formal education, 6.6 % had primary schooling as the highest level of education, and 42.3 % stopped at lower secondary education. The remaining half went on to pursue upper secondary and tertiary education. Interestingly, while 23.5 % attained upper secondary education as their highest level of education, more – 27.2 % – moved on to access tertiary education. This has a lot to do with the unprecedented expansion of higher education since 1999. An intriguing question is whether China will bypass the fourth stage to move directly into the fifth stage, where tertiary education is the highest level of education attained by the majority.

Figure 10.3 shows the net enrollment rate for each level of education by cohort. For primary education, China had achieved a high enrollment rate in the Mao era through the mass education program. Over time, there was steady progress towards the universalization of primary education without any disruption from major events. By the 1950 cohort, primary enrollment rate 90.4 %; the 1958 cohort exceeded 95 %; and the 1979 cohort, for the first time, reached 99 %. The net enrollment rate for the post-1990 generation hovered around 99.5 %.

For lower secondary education, previous research found two episodes which disrupted the long-term trend of expansion (Hannum 1999; Tsui 1997). One was linked to the Great Famine (1959–1961), and the second was the post-Mao restructuring of

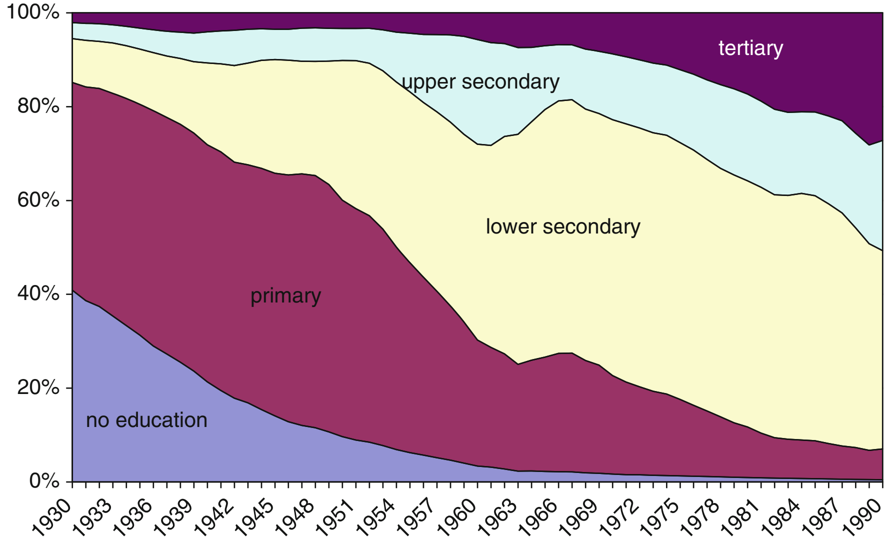

Fig. 10.2 Distribution of highest level of education attained by cohort (Data source: China 2010 Census Data)

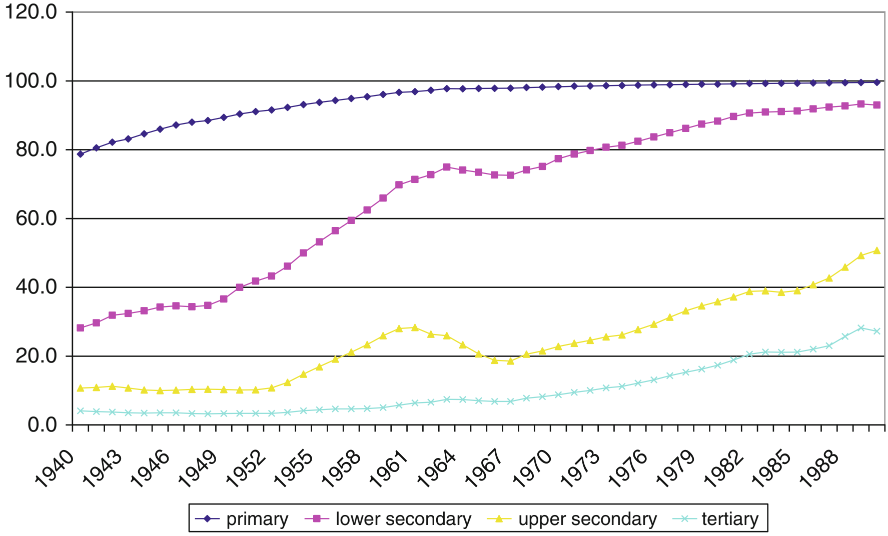

Fig. 10.3 Net enrollment rate for different levels of education by cohort (Data source: China 2010 Census Data)

the education system. In the Mao era, the mass education program was effective in extending education to the rural population. After an initial period of stagnation in the late 1960s due to the Cultural Revolution, the number of schools, teachers and students all increased during the 1970s, especially at junior and senior high levels. The expansion was particularly rapid in rural areas. As a result, China achieved a much higher level of educational attainment than most other countries at a similar level of economic development. An overhaul of the educational system occurred after the Cultural Revolution (Pepper 1980). Many low-quality schools were shut down or converted into vocational and technical schools. Examination was reinstated to replace political recommendation as the primary means of determining progression through the educational system. Key-point schools[3] enjoying funding priority were reestablished, mostly in urban areas. This change was part of the larger shift to focus on economic development as China's priority. The educational system was seen as unfit for the new agenda. Its quality was poor, vocational and technical training was insufficient, and there was a need for less rigid administration of education (Lewin et al. 1994). Against this background, total enrollment decreased substantially throughout the 1980s, and net enrollment decreased in the early 1980s, according to government statistics (Hannum 1999).

For the second episode, there has been a debate about whether the effect was a more serious contraction or a less serious slow-down. The 2010 Census Data clearly captures the two episodes of disruption. There was little growth in enrollment rate

[3] Key-point schools are those which receive extra funding from the government, and attract the best students and teachers.

for the three cohorts of 1946, 1947 and 1948, which were most likely to be affected by the Great Famine. In fact, there was a slight contraction for the cohort of 1947. The second episode negatively affected a total of four cohorts from 1964 to 1967. Their enrollment rates were lower than subsequent and preceding cohorts. Figure 10.3 clearly shows that the post-Mao restructuring of the educational system led to a contraction rather than a slow-down of educational expansion.

In contrast to earlier analyses which described the 1980s as a period of stagnation or even contraction, the 2010 Census Data shows steady progress in the expansion of lower secondary education, at a faster pace than the 1990s. If we assume that the cohort of 1967 began to enter lower secondary schools around 1980, and the cohort of 1977 around 1990, the 2010 Census Data shows that the net enrollment rate increased from 72.5 to 84.9 %, a growth of 12.4 %. In comparison, the difference between the cohorts of 1987 and 1977 was 7.4 %, suggesting a slower pace of expansion between 1990 and 2000. The slower pace of course does not mean smaller efforts on the part of government. Nevertheless, Fig. 10.3 shows the 1980s to be a period of remarkable expansion of lower secondary education.

To consolidate the achievement in universalizing 9-year education nationwide, China set a new target in 2001: in the next 5 years, the enrollment rate target was 90 % for lower secondary education and 60 % for upper secondary education. The challenge came from the fact that most of the 522 county-level jurisdictions that had fallen short of universalizing 9-year education by 2000 were poor areas in the western region. It is particularly difficult to provide education in sparsely populated mountainous areas. Local governments built boarding schools and provided boarding subsidies and free textbooks to keep children in school. Despite all the efforts, the enrollment rate for cohorts from 1989 to 1994 hovered around 93 %, suggesting that the expansion of lower secondary education had reached a limit due to a combination of supply and demand factors in the 2000s.

Upper secondary education followed a similar trajectory of expansion to that of lower secondary education, except that the starting point was much lower, the contraction was considerably deeper and longer, and the stage of expansion came considerably later. In particular, the post-Mao restructuring of the education system had a much larger disruptive effect on upper secondary education than lower secondary education. There was a contraction in the enrollment rate for six cohorts from 1962 to 1967, and steady recovery thereafter. However, the lower secondary enrollment rate of the cohort of 1975 was still below that of the 1961 cohort (27.7 % versus 28.3 %). Therefore, the 1980s was a period of contraction and stagnation for upper secondary education more so than lower secondary education. In contrast, there was substantial expansion of upper secondary education in the 1990s and 2000s (from cohort 1975 onwards).

Compared to lower levels of education, Fig. 10.3 is not suitable for showing the varying pace of higher education expansion. Since there was no strict age limit on when one could receive higher education, earlier cohorts negatively affected by an unfavorable political or policy change could make up later if a favorable change occurred. This explains why Fig. 10.3 shows no disruptive effect of the Cultural Revolution, which is historically not true. Those negatively affected had a chance to go to college after the Cultural Revolution. The disruptive effect was therefore smoothed out across cohorts. For the same reason, Fig. 10.3 does not show the effect of rapid higher education expansion since 1999 which is more visible in Fig. 10.1. Nevertheless, the long term trend of higher education expansion is clear: it took only 10 cohorts (from 1978 to 1988) to increase the net enrollment rate by 10 %, from 15 to 25 %, while it took nearly 20 cohorts (from 1959 to 1978) to increase the net enrollment rate from 5 to 15 %. So far, the 1989 cohort, who most likely entered a college/university in 2007 or 2008, had the highest enrollment rate at 28.2 %.

A better way to track the progress in the 2000s is to compare the 2010 and 2000 Census Data and see the differences in the rate of enrollment in higher education for the same age cohort. Table 10.1 compares age cohorts 20–30. Note that the rapid expansion of higher education enrollment began in 1999, therefore cohorts sampled in the 2000 Census had not yet benefited from it. In contrast, the 2010 Census captures the rapid expansion and comparing data from the two censuses reveal the big difference which occurred during the 2000s. For the cohort aged 20 in 2000, 9.9 % had access to higher education. By comparison, for the cohort aged 20 in 2010, 27.2 % had access to higher education – triple the proportion compared to 10 years prior. The percentage difference becomes smaller for older cohorts, but is still large. Note that the cohort aged 20 in 2000 is the same cohort aged 30 in 2010. According to the 2000 Census, 9.9 % of this group had access to higher education; however, according to the 2010 Census, 17.3 % received higher education. This discrepancy suggests that after 2000, another 7.4 % went on to receive higher education. In short, China remained at the stage of elite higher education in 2000. In the decade after 2000, China moved to the stage of mass higher education, defined as 15 % of college-age population having access to higher education. The 2010 Census Data shows that the highest cohort reached 28.2 %.

Table 10.2 summarizes the pattern of expansion for different levels of education. If we focus on the period between 2000 and 2010, there was little growth of lower secondary education as it was approaching the "saturation point". In contrast, upper secondary education experienced faster growth than earlier periods. The most rapid expansion occurred in higher education.

Table 10.1 Rate of access to higher education for age cohorts 19–35 in 2010 and 2000 China census data

Age	2010 census data	2000 census data	Percentage point change, 2000–2010
20	27.2	9.9	17.3
21	28.2	9.6	18.6
22	25.7	8.4	17.3
23	23.0	7.7	15.3
24	22.0	7.3	14.7
25	21.2	7.2	14.0
26	21.1	6.9	14.2
27	21.2	6.8	14.4
28	20.6	6.5	14.1
29	18.8	6.2	12.6
30	17.3	5.8	11.5

Data Source: 2000 China Census Data and 2010 China Census Data

Table 10.2 The pattern of educational expansion in China

	1980s	1990s	2000s	Highest % attained this level
Lower secondary	Back on growth track following contraction in the late 1970s	Steady growth towards universalization	Slow expansion (due to coming of "saturation point"	Around 93 %, (cohorts 1989–1994)
Upper secondary	Deeper contraction and slow recovery	Steady growth	Faster growth	54.4 %, (cohort 1993)
Tertiary	Slow expansion	Slow expansion	Rapid expansion	28.2 %, (cohort 1989)

Based on findings from the 2010 China Census Data

Educational Access: The Gender Dimension

Gender has always been an important dimension in the analysis of educational access. Figure 10.4 shows gender differences in access to lower secondary, upper secondary and tertiary education by cohort. The gender pattern is very clear. The gender gap is larger in earlier cohorts, and relatively more so for higher levels of education. Over time, however, there has been a convergence.

Earlier studies using the 1990 Census Data still found a substantial gender gap (Connelly and Zheng 2007a). The gap became much smaller in the 1990s as rural girls caught up. With the universalization of 9-year education nearly achieved nationwide by 2000, the concern was whether the gender gap would shift to higher levels of education. Figure 10.4 shows it did not. For upper secondary education, girls overtook boys in the 2000s, starting with the 1991 cohort, who most likely began their upper secondary education around 2006. The rate of access for girls was 52.8 %, compared to 52.0 % for boys. More interesting is the changing gender gap in tertiary education. Starting with the 1987 cohort, the gender gap disappeared as the rate of access for both genders was tied at 23 %. Starting with the 1989 cohort, females overtook males with 28.6 % access rate versus 27.7 % for males. The Chinese experience clearly shows that a country may achieve gender equality before educational levels reach a plateau.

Gender differences can manifest in more subtle forms. One possibility is that it still takes the form of vertical stratification, with females going to lower-tier universities. The 2010 Census Data further breaks down tertiary education into junior college education (*daxue zhuanke*) and 4-year university education (*daxue benke*). A years after females first outnumbered males in junior college education, they also overtook males in 4-year university education. One can go further to ask whether females are less represented in elite universities. The 2010 Census Data does not provide information for more analysis along this line. Another possibility is that the gender difference can take the form of horizontal stratification, with females concentrated in certain fields of study that lead to lower-paying jobs. Such fields, which expanded faster than "hard sciences", may draw more female students than male students. Government statistics and the 2010 Census Data do not have information on the distribution of male and female students across fields of study. More research

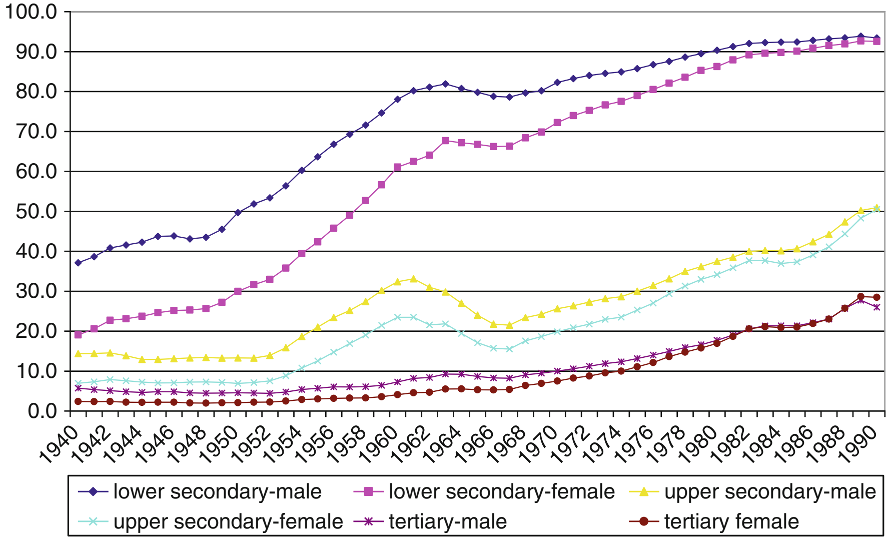

Fig. 10.4 Gender difference in access to lower secondary, upper secondary and tertiary education by cohort (Data source: China 2010 Census Data)

is needed in the analysis of gender-based horizontal stratification. Nonetheless, China had made tremendous progress towards gender equality in educational access.

Distribution of Human Resources across Urban, Town and Rural Areas

The rural-urban gap in educational access has also attracted a great deal of attention. It is becoming even more salient with the declining significance of gender in education. However, the 2010 Census Data is not suitable for analyzing the rural-urban gap in *access* to education. Rural-to-urban migration is a serious distorting factor. For instance, if rural students passed the national college entrance examination, they would go to cities for higher education. Unless they returned to home villages at the time of the census survey, they would be treated as urbanites, leading to an inflation of urban advantages in access to higher education. Instead, what the Census Data captures is the *distribution* of human resources across urban and rural areas.

The 2010 Census defines population by current residence rather than household registration or *hukou*. Urban population includes those living in city districts or city proper (without districts), thus counting migrants living in cities as urban population. Town population includes those living in county seats and towns (outside of city districts). Rural population includes all the rest.

Figure 10.5 shows the distribution of the highest level of education in urban areas by cohort. The trend is clear: towards the younger cohorts, the percentage receiving higher education has increased rapidly. Although China overall is still in the third

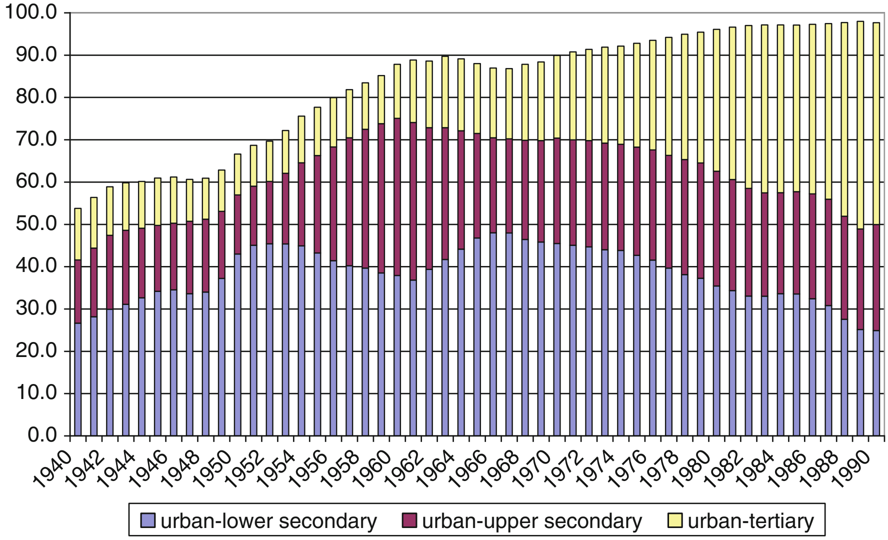

Fig. 10.5 Distribution of lower secondary, upper secondary and tertiary education by cohort in urban areas (Data source: China 2010 Census Data)

stage of educational development where the highest level of education for the majority is lower secondary education, urban China is now in the fifth stage of educational development where the majority of the young cohorts have received higher education. For the cohort of 1990, about 48 % had access to higher education, much higher than the proportion whose highest level of education is upper secondary education (25 %), or lower secondary education (25 %).

Figure 10.6 shows the distribution for town areas. Like urban areas, the percentage of college/university educated has increased towards younger cohorts. However, there are differences. In town areas, the share of those whose highest level of education is upper secondary or tertiary has been increasing, while in urban areas, the share of those whose highest level of education is upper secondary education has been declining due to the expansion of higher education. Town China is still in the third stage of educational development where the highest level of education for the majority is lower secondary education. For instance, about 40 % of the 1990 cohort had lower secondary education as their highest level of education, compared with 29 % for upper secondary education and 26 % for higher education.

Figure 10.7 shows the distribution for rural areas. In terms of the trend, similar to town areas, the share of those whose highest level of education is upper secondary or tertiary education has been increasing. Rural China is also in the third stage of educational development. One remarkable development in rural China is that the college educated among older cohorts rarely stay in rural areas, but the situation has begun to change for younger cohorts, suggesting substantial improvement in human resources in rural China. Among the 1990 cohort, 58 % had lower secondary education as their highest level of education, 20 % upper secondary education and 11 % higher education.

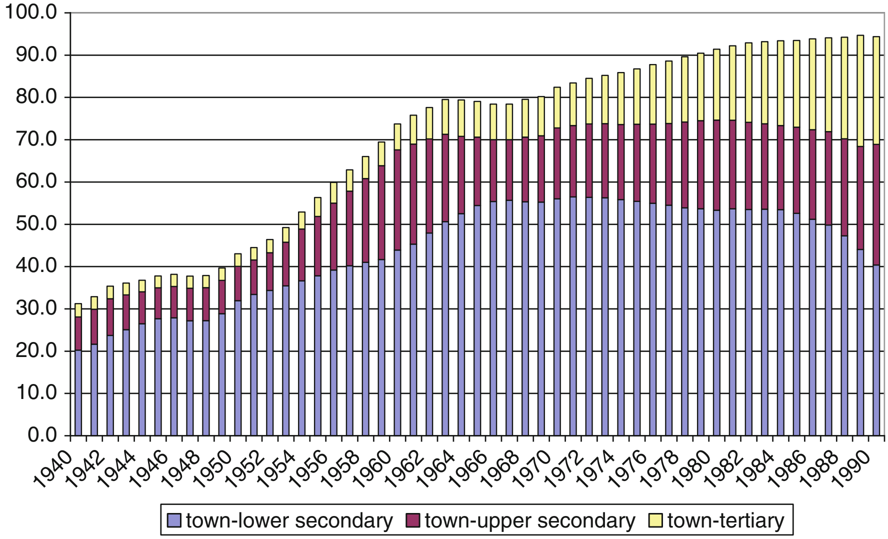

Fig. 10.6 Distribution of lower secondary, upper secondary and tertiary education by cohort in town areas (Data source: China 2010 Census Data)

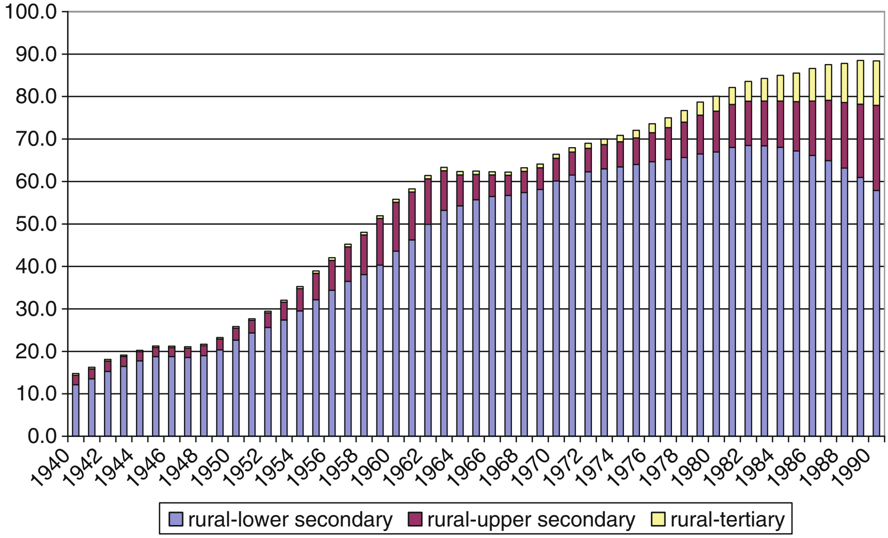

Fig. 10.7 Distribution of lower secondary, upper secondary and tertiary education by cohort in rural areas (Data source: China 2010 Census Data)

Findings from Fig. 10.7 raise an important question of whether the "brain drain" problem has started to reverse rural areas. Based on 2010 Census Data, Table 10.3 shows the distribution of the college/university educated by residence for young cohorts aged 29, 27, 25 and 23 respectively. Indeed, there is an interesting pattern.

Table 10.3 Distribution of the College/University Educated by current residence for young cohorts

Age in 2010	Urban	Town	Rural
29	72.4	18.7	8.9
27	71.6	17.8	10.6
25	67.0	18.7	14.2
23	65.6	18.0	16.5

Data source: China 2010 Census Data

While the town share remains constant across cohorts, the urban share declines, whereas the rural share increases towards younger cohorts. More research is needed to find out what has driven the turnaround of the "brain drain" problem or whether it is a consequence of the introduction of de facto registration in the 2010 census. Nonetheless, it is a remarkable development and we need to know how far rural areas are becoming more attractive to the college/university educated.

In short, all the three areas have benefitted tremendously from higher education expansion in the 2000s. In absolute terms – percentage of residents with higher education – urban areas gained the most, followed by town areas, and rural areas. However, in relative terms, rural areas have gained the most. The younger cohorts of the college/university educated are much more likely to reside in rural areas than the older cohorts.

Discussions and Conclusions

China's drive towards the universalization of 9-year education by 2000 set the stage for educational expansion at the upper secondary and tertiary levels. Using the 2010 Census Data, this chapter finds that (1) China's upper secondary and tertiary education have experienced faster expansion in the 2000s than in earlier periods, (2) at a lower enrollment rate, tertiary education expanded even faster than upper secondary education, and (3) the expansion had some equalizing effect along gender and rural-urban lines. Due to data limitations, this chapter cannot tell whether the same is true for other dimensions of inequality in education, such as family background, differential access across the eastern, central and western regions, or the quality of education.

The 2010 Census Data can help shed light on the development of upper secondary education in China. In the 2000s, China has been actively expanding its upper secondary education. One major policy is to eventually provide free vocational education to all at the upper secondary level starting from 2009. There are a number of motives behind this initiative. One is to use free education to increase demand for upper secondary education; the second is to optimize the structure between academic and vocational education; and the third is to provide skilled labor for industrial upgrading. According to the government's plan, the optimal structure should be roughly 50–50 between the academic track and the vocational track. Some scholars have begun to question the policy of providing free upper secondary vocational education for all. Their argument is that the low demand for upper secondary vocational education is not because it is unaffordable, but because it is of low quality (Wang 2012).

Findings from the 2010 Census Data provide further evidence to challenge the 50–50 ratio between the academic track and the vocational track. Figure 10.2 suggests a trend where more students prefer the path of academic upper secondary → tertiary education, over the path of vocational upper secondary education → the labor market. With expanded educational opportunities, the demand factor becomes increasingly salient. Unless the quality of vocational secondary education improves, the government policy of attracting half of the students to the vocational track through free education would not work. The administratively set 50–50 ratio seems arbitrary.

China's 2010 Census Data can also shed some light on its new strategy of using urbanization and "townization" to promote economic growth and social transformation. Townization is seen as a good way to minimize the problem of over-urbanization on one hand and the decline of rural communities on the other. Past studies have found that when return migration did happen from time to time, returnees preferred to settle down in nearby towns, rather than in their home villages (Murphy 2002). But according to Table 10.3 in this chapter, towns are not particularly attractive to the young college-educated. How to attract them to towns is a question for China's new strategy of urbanization and townization.

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Chapter 11
Education Trends in India: Recent Census Results in Context

Bilal Barakat

Introduction

The development of schooling in India over the last few decades has been a decidedly mixed success. This is true in absolute terms, in comparison to other countries, and relative to both government and popular expectations. Immense population size leverages India's educational challenges onto a global scale. India is home not only to the largest number of illiterates in the world (and has been for a long time (Cárceles 1990)), but also the single largest population of out-of-school children. Educational growth in China, which faced challenges on a similar scale, has far outpaced that of India in their history as independent modern nation-states. In India, ever since independence, achieving universal and free basic education has not only been an explicit policy aim, but even a constitutional directive. Consistent failure to achieve this aim has been characterised "as the most conspicuous failure of India during 50 years of independence" (Tilak 1997, 2241).

This failure has implications beyond the strictly educational domain. Of particular importance in the Indian context, where social discrimination has historically centred on identities, is the fact that "education is a particularly attractive development idea because it offers marginalised groups a model of achieved status distinct from ascribed definitions of respect" (Jeffrey et al. 2004, 975). Moreover, sluggish educational expansion has important knock-on effects for general development efforts. Arguably, it contributed to calling into question the feasibility of "soft" approaches to family planning, for example. The slow pace of educational expansion alone made it all too easy to get impatient with its fertility-depressing effect, even

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for those who did not doubt the potential contribution of women's education to fertility decline in principle, or its presumed operation through enhancing female autonomy in particular (Drèze and Murthi 2001).

Education also provides an important escape route from the poverty trap (Tsujita 2012). Indeed, the continued relevance of this aspect, despite sustained economic growth at the national level, is highlighted by the fact that a change in the definition of the poverty threshold since the 2001 census has shown poverty to be even more widespread than previous estimates, namely almost 42 % in rural areas in 2004–2005 (Tsujita 2012, 35). Not only is education part of poverty alleviation, it has become part of the definition of poverty itself: "[A] lack of education is often one form of deprivation in the basic needs approach, the participatory approach and the capability approach" (Tsujita 2012, 38). Those with fewer than 4 years of schooling are now generally considered "educationally poor", and recognised as a distinct category by the United Nations.

Indeed, this stance echoes that of India's Supreme Court, which argued in 1993 that other unconditional Fundamental Rights enshrined in the constitution, such as the rights to personal liberty, and to life, can only fully be realised with access to basic education. Until then, the original constitution text had been interpreted as making education up to the age of 14 a non-justiciable right. The 1993 ruling gave it the status of an unconditional Fundamental Right, and a conditional one even above the age of 14. A constitutional amendment in 2002 and the 2009 Right To Education Act were to implement these changes in law. Critics, however, have argued that these effectively *undermine* the court directive (Sadgopal 2010). The act is criticised for granting too much discretion to state legislators, and for failing to guarantee the key notion of *free and compulsory* education for all, which has been a nominal constitutional goal since the very beginning, but has never been effectively the case (Tilak 2004a).

Not just the legal framework, but also India's education system itself, including its governance structure, is highly complex, even in comparison with other federal systems internationally (Tilak 1989, 450–1). Educational policy in India filters down through at least four layers of bureaucracy, namely at the Central, State, District Panchayat, and finally Village Panchayat levels (Dyer 1994). Education became a "concurrent" shared responsibility between the central government and the states in 1976. However, it has been argued that this was merely the *de jure* recognition of the *de facto* concurrency that had already been in place before independence (Tilak 1989, 458). Part of the ensuing complexity is the need to weigh up changes at different governance levels against each other. For example, the increase in central government education spending as a share of the federal budget was partly offset by declining state budget allocations during the 1980s and early 1990s (Shariff and Ghosh 2000).

Assessing complex systems and their dynamics calls for high-quality and comprehensive data. The results of the Indian census are therefore eagerly awaited every round and the 2011 was no exception. But while the census results are crucial for assessing long-term trends in literacy, the available census data are not sufficiently rich to allow for meaningful interpretation on their own. Accordingly, I attempt here to place them in the context of a number of other sources of educational and socio-economic data. In doing so, choices must inevitably be made. For instance, I will neglect the issue of Early Childhood Care and Education (ECCE) here, which is not, however, to deny its importance!

The chapter is structured as follows. Additional data sources that are used in the subsequent analysis are presented. The recent census results for literacy at the state level are then discussed alongside previous measurements of literacy. These other sources also provide information on educational attainment that allow for a more nuanced discussion than literacy alone. By any measure, be it literacy or attainment, universal participation is still found to be some way off. The subsequent section aims at identifying the specific sub-populations making up these gaps, followed by the final discussion and conclusion.

Data Sources

Unfortunately, the Indian census is a relatively limited and restricted source of education data. While it is standard for census questionnaires to query only the simplest educational characteristics (literacy, attainment, current enrolment or attendance), valuable insights can still be gained if these characteristics can be related to socio-economic or spatial covariates in a finely-grained manner. However, in the case of India, access to micro-data census samples is extremely restricted, not just for "public use", but also for research. This is all the more regrettable as it should in principle be *easier* than in many other countries to provide useful research samples without compromising confidentiality. After all, the statistical value of micro-data samples is largely a function of absolute sample size (*sine qua non* properties such as reasonable accuracy being taken as given), while confidentiality is a function of relative sample size. Incidentally, India is also one of the few countries that do not grant access to micro-data from UNICEF's Multiple Indicator Cluster Survey (MICS). In any case, the census does not include some variables of particular interest in the study of Indian education, foremost that of caste membership. Nor does it offer a meaningful measure of income or poverty.

It is therefore necessary to complement census data with a variety of other sources. Researchers of education have demonstrated some ingenuity in this respect; even the National Election Study has been used for educational sociology research (Vaid 2004). The present study is more conservative and mostly uses fairly standard sources of data, even if some of them are relatively underutilized and this is the first time, to my best knowledge, that they have been analysed jointly.

Limited as it is, the 2011 Census results are one source of the most up-to-date literacy data available, albeit only in aggregate tabulated form.

In lieu of census microdata, individual and household level samples are available from the National Sample Survey (NSS), extracted from the international Integrated Public Use Microdata Series (IPUMS) repository. The present study makes use of all five available rounds, spanning the years 1983–2004.

A staple in demographic research are the Demographic and Health Surveys (DHS), some of which contain useful education data. In the case of India, these coincide with the National Family Health Survey (NFHS). One limitation arising from this is that the sample is restricted to (ever) married women. This is not true of the most recent available round with literacy information, namely the 2005–2006 survey. The age restriction of 15–49 remains in place, however.

Similar in scope is the nationally representative Indian Human Development Survey (IHDS), the first round of which was conducted in 2005. While lacking the international comparability of the DHS, it captures a richer set of education-related characteristics. Unfortunately, while the second round was completed in 2011–2012, the micro-data have not been made available at the time of writing. Nevertheless, for present purposes the IHDS serves to replace many more geographically limited household surveys that have been collected and analysed in specific Indian states or districts over the years.

The various kinds of household data above can be complemented by administrative data for the school system. Two sources are used in the present study. The first is figures from various rounds of the All-India School Education Survey (AISES). These were conducted at irregular intervals beginning in 1965, with the most recent one in 2009. Unfortunately, the published tabulations of data collected are not standardised across survey rounds. Here, they are principally used to examine the growth in private schooling, for which the published results of the most recent round are not useful. More recently, school statistics are collected in an ongoing manner, through the District Information System for Education (DISE), which publishes key tables annually.

Official enrolment data based on school registers have, of course, been subjected to sometimes drastic criticism that they "are not worth the paper they are printed on" (India and Economics 1999, 92), because of, for example, incentives to report inflated enrolments. In addition to questions of accuracy, indicators derived from aggregate enrolments suffer from some distortions that survey-based individual level estimates do not, for example when it comes to drop-out rates. When calculated as Grade V enrolment over Grade I enrolment, as is commonly done, the official figures for drop-out rates are actually overly pessimistic (Jayachandran 2007). In *combination* with survey-based indicators, however, the administrative data can provide useful contextual information.

Finally, in the absence of consistent official time series of educational attainment, the study makes use of a dataset of population reconstructions based on the 2001 census (Lutz et al. 2007) to provide a sense of historical trajectories.

Educational Outcomes and Trends Over Time

At low levels of educational development, literacy is the most basic educational variable calling for scrutiny. Literacy rates[1] by state, as captured by the 2011 census, are shown in Fig. 11.1. As is evident, there is large variation between states,

[1] Literacy by itself is a highly limited measure (Ramachandran 2006); this is all the more true of "census literacy" which is literacy of household members as reported by the household head. In

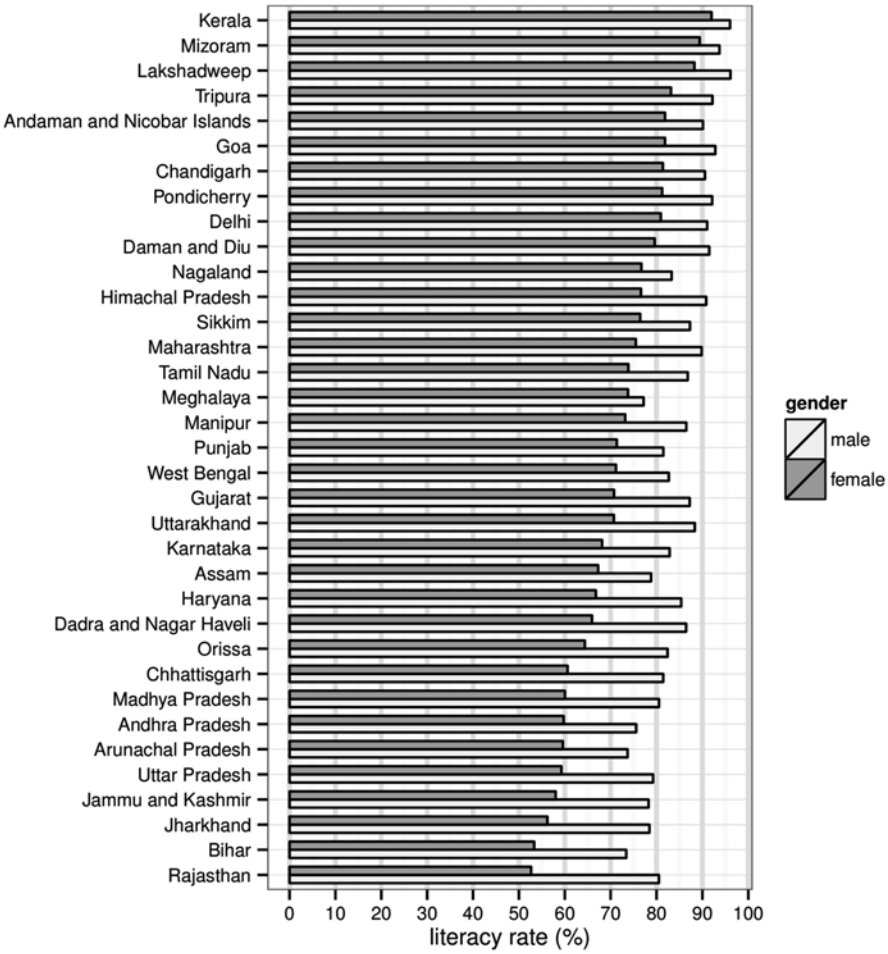


Fig. 11.1 Overall literacy rate (ages 7+) by state, in decreasing order of female literacy (Source: Census 2011)

theory, interviewers are instructed to test actual literacy if in doubt, but there exists no data on how often this is actually done in practice. Indeed, an ancillary analysis shows that reported literacy correlates almost perfectly with whether the individual has ever attended school. This may suggest that respondents view "is literate" and "has attended school" as virtually synonymous, even though in reality, both acquiring literacy as an adult and attending school without learning to read or write is both possible and—in the latter case—unfortunately not uncommon. Moreover, even having attended school and acquired minimal literacy, it is possible to lapse back into effective illiteracy if the skill is not maintained through active use. However, the implications for data quality may be overestimated. The IHDS figures do differ from the NSS estimates at the level of individual states, but considering the variation across states as a whole, they are remarkably consistent. This is despite the fact that the IHDS in theory consistently applied the "read a sentence" test for literacy, and does not rely on self-reports. The same is true of the DHS, if partial literacy is included. This means that, even though the ability to read parts of a sentence is a very narrow understanding of "literacy", at least it appears to be fairly reliably self-reported.

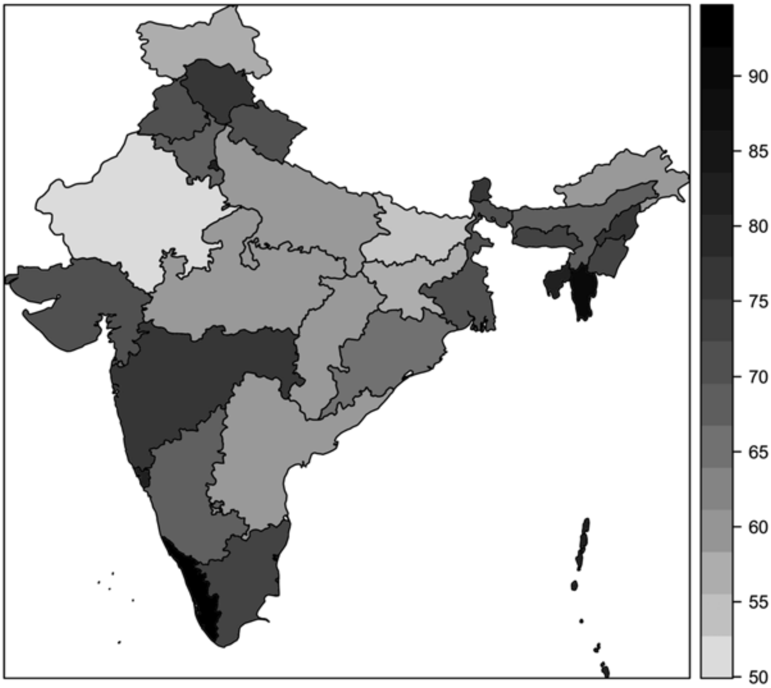
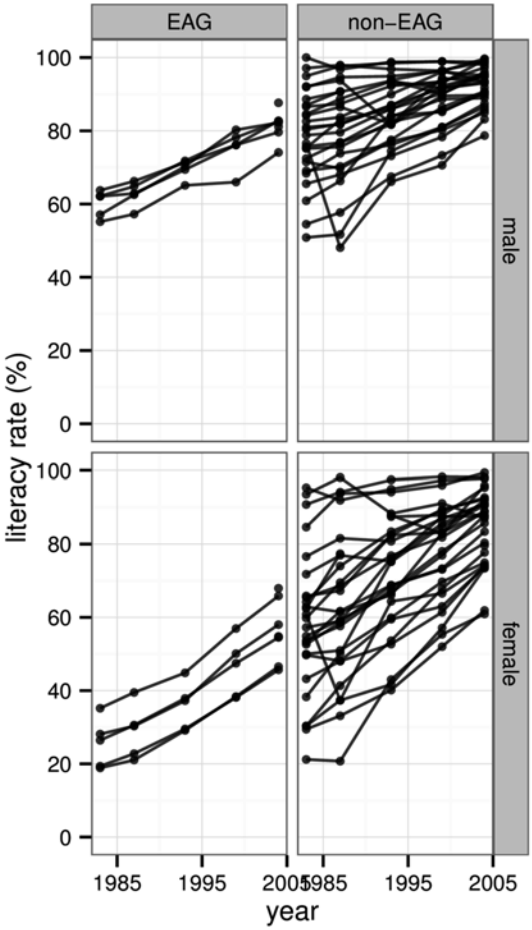


Fig. 11.2 Female literacy rate (%) (ages 7+) (Source: Census 2011)

especially with respect to female literacy. In geographic terms, this variation displays the expected pattern corresponding to overall development level of different parts of the country (c.f., Fig. 11.2). Female literacy is lower than male literacy in all states, the difference exceeding 20 percentage points in some cases. While the leading states boast near universal literacy among their population, the share of literates among females in Rajasthan barely exceeds that of illiterates. Considering past estimates from different sources, the literacy rates reported by the 2011 census are in line with what might be expected based on the consistent past trend and levels reported around 2005. In the case of males, the stagnation among the worst-performing states is disappointing. By contrast, for females the improvements at the low end are higher compared to the leading states. This is encouraging, given that the previous census showed only small gains in the lowest-performing states (Economic and Political Weekly 2004). Unfortunately, more detailed disaggregated literacy data from the 2011 census were not available at the time of writing.

To elaborate on the spatial differences in literacy achievement, Fig. 11.3 separates out the Empowered Action Group (EAG) of states. This group is used to identify the less developed Indian states for purposes of targeted government and international agency support, and for research purposes in order to be able to talk about development challenges such as low school enrolment and high fertility that are not shared across all of India. The EAG currently comprises Bihar, Jharkhand, Madhya

Fig. 11.3 Young adult (ages 15–29) literacy by residence in Empowered Action Group (EAG) states (Source: NSS)



Pradesh, Chhattisgarh, Rajasthan, Orissa, Uttar Pradesh and Uttarakhand, and is therefore more inclusive than the "Bimaru" (literally = "sick") group (Bihar, Madhya Pradesh, Rajasthan, UP) that was previously used for this purpose. As can be seen, the long-term literacy expansion in the EAG has occurred at more or less the same pace as in other states. While this means that they have not fallen further behind, there is also no evidence of a catch-up effect or convergence. In absolute terms, the gains in female literacy especially, which was at extremely low levels even as late as the mid-1980s, have nevertheless been large. As it happens, the alignment of the EAG and non-EAG subgraphs suggests that the EAG states may be said to be lagging approximately 20 years behind. A similar lag can be observed between rural and urban areas (not shown).

Slow progress in the overall literacy rate is natural. Even if young adults are mostly literate, the overall literacy rate is also determined by the existing stock of illiterate older adults. In principle it may be possible to reduce this stock through adult literacy efforts, but in practice this has not occurred. In fact, an analysis of the pseudo-cohort of birth years 1960–1964 across the NSS samples shows that their literacy rate has shown no noticeable improvement in their adult years, despite the fact that these cohorts were in the target age range for ambitious literacy campaigns in the late twentieth century. This is unsurprising given that such campaigns have tended to fall short from the start in terms of their resourcing compared to their stated targets (Ramabrahmam 1989). A case in point is the National Adult Education Programme of 1978, which had aimed to make the 15–35 year-old population completely literate within 5 years, and the critical 1980 Kothari Committee evaluation thereof. As a result, improvements in the adult literacy rate are constrained by the slow process of cohort replacement, and it will be decades before it becomes uniformly high.

The stagnating pace of improvement at the relatively higher end is also consistent with findings in the literature. In the context of early 1990s mass literacy campaigns, lower literacy gains were observed among residual illiterates in high literacy environments than in medium-literacy ones. This is explained in terms of dispersion and marginalization of residual illiterates in urban areas and their access to literate proxies in the form of other household members or neighbours who can read written information for them. By contrast, "[i]n regions of medium literacy and in the rural areas […] the illiterate population constitutes a majority. Mobilisation processes are facilitated by this mass base and the campaign has a greater potential of becoming a movement in favour of the majority" (Nambissan 1996, 2031). The question of access to literacy among those illiterate themselves has led to the notion of "proximate literacy" defined as the presence of a literate adult in the household (Reddy and Rao 2003), which is investigated further below.

The literacy of younger cohorts specifically has improved greatly, and much faster than the overall adult literacy rate. Indeed, considering the apparent trends in school attendance by age shown in Fig. 11.4, claims that attendance in the age group 6–11 is now approaching universality are credible, subject to the caveat that in many cases this may be attendance at an unrecognised school of unknown quality.

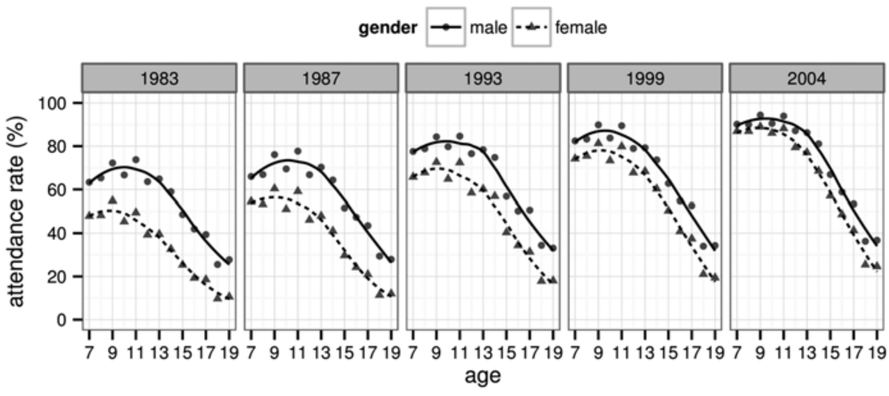


Fig. 11.4 School attendance by age (smoothed) (Source: NSS)

What is also evident is that the gender gap in attendance has consistently diminished over time, although it had not yet disappeared even at primary level by 2004. It is significant in this context that the remaining gender gap does not appear to widen systematically at higher ages (or, therefore, at higher grades). This could not necessarily have been expected a priori, since some obstacles to female school participation are heightened after menarche. However, participation at higher ages has increased much less than at primary school age 6–11. Indeed, the slope of attendance decline has remained essentially stable (if not steepened), and the slide begins already at age 12.

In addition, the improvements at lower levels of schooling have been too slow to fundamentally shift the profile of the working age population as a whole (Fig. 11.5). Those with no schooling or at most incomplete primary schooling continue to constitute the majority of those aged 15–65, both among men and women. The share of the working age population with tertiary attainment is still marginal.

Examining the experiences of successive cohorts by focusing on the narrower age group 30–34 that has essentially completed its formal schooling, provides an alternative perspective. Figure 11.6 displays the continuation ratios at different levels of schooling, conditional on having reached the level below. In terms of participation among the relevant age group, the pace of higher education expansion may be viewed critically relative to the slow elimination of illiteracy or relative to the growth in secondary attainment, i.e. the pool of candidates eligible for tertiary entry. As Fig. 11.6 shows, until the early 1980s, the chance of a girl to enter primary school in the first instance was lower than that of continuing on with gaining a tertiary degree among those who graduated from upper secondary school. However, criticism of higher education expansion has instead frequently been voiced with respect to its absolute size. This contrasts with the fact that analysts taking an internationally comparative perspective have noted that the relative tertiary participation

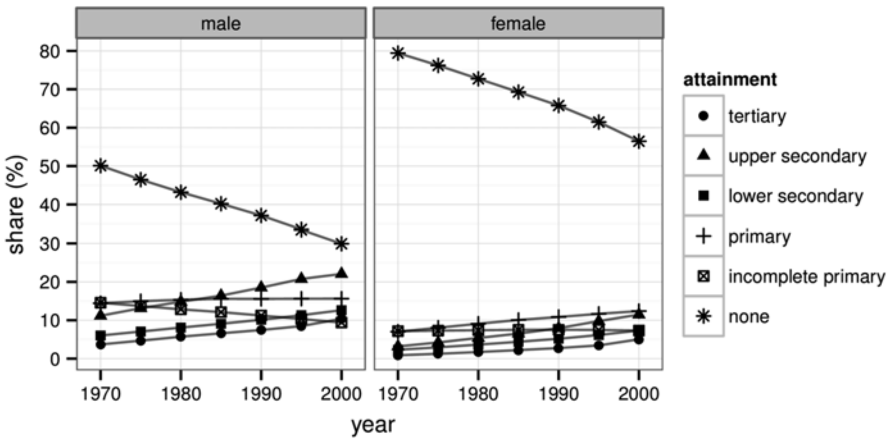


Fig. 11.5 Attainment profile of the working age population (ages 15–65) (Source: IIASA education reconstruction)

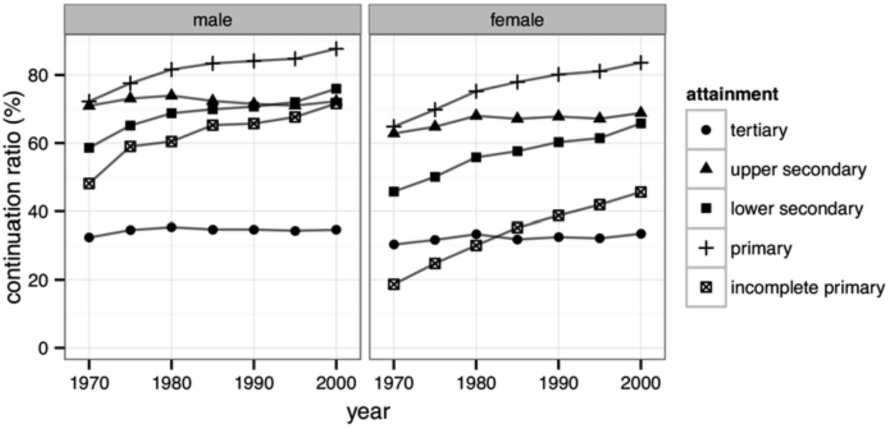


Fig. 11.6 Attainment continuation ratios of the population aged 30–34 (Source: IIASA education reconstruction)

is only about half of that observed in China and other countries in Asia (as noted some time ago by Chitnis 1993, but essentially still true).

On the whole, these data show that expansion at lower levels has not created new bottlenecks (at all levels continuation ratios were increasing almost monotonically). However, initial entry into school continues to remain the greatest obstacle, greater than the challenge of progressing once in school. As a matter of fact, with universal entry the subsequent continuation ratios would result in an attainment profile not dissimilar to that of many countries with higher incomes.

Inequalities and Intergenerational Mobility

Sources of inequality in educational outcomes are legion in India. No attempt will be made here to provide a comprehensive or systematic overview of the many ways in which gender, caste, religion, location, and socio-economic disadvantages interact in shaping educational inequities in India.

Some disadvantages clearly act in a compounding fashion. Few would doubt that a low caste poor woman in a rural area in an EAG state is particularly disadvantaged. But equally few would seriously suggest that being female has in any sense "proportional" implications in urban Kerala and rural Bihar, or deny that urban experiences of poverty are distinct from rural poverty. Yet taking all possible interactions into account quickly becomes unwieldy in a regression framework. Instead, I examine classification trees applied to select educational outcome measures captured in the IHDS.

The way to read these classification trees is as follows. Each horizontal line leads to the vertical split of the subpopulation on its left, with the labels above and below it indicating the splitting criterion. The area of each point is proportional to

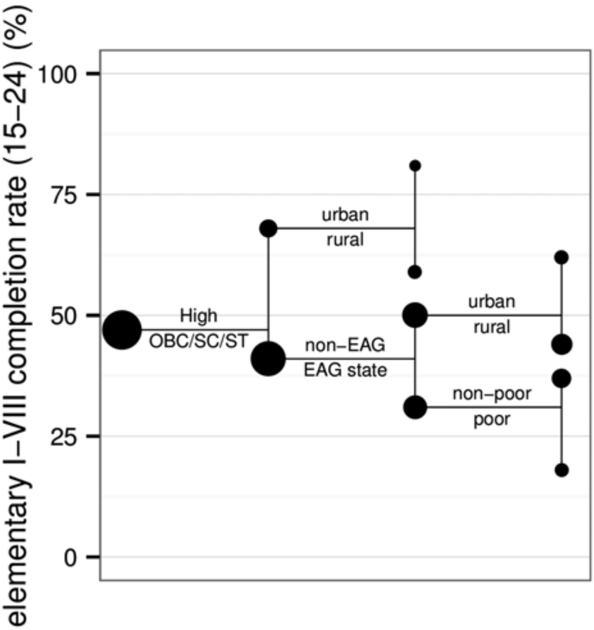


Fig. 11.7 Inequalities in Grade VIII completion (Data: IHDS)

the subpopulation it represents. Vertical position corresponds to the average indicator value in the subpopulation in question. Note that this is not simply a graphical representation of a contingency table, because the splits at the same depth, but in different branches, can follow different criteria. The splits maximise the intra-group difference and minimise the intra-group variation between the subgroups.[2]

Using Fig. 11.7 as an example, the overall completion rate of Grade VIII (far left) is just below 50 %. The single strongest discriminating factor is caste membership. For members of higher castes, the completion rate is closer to 70 %, and the only meaningful distinction among them is according to urban or rural residence. For the larger group of Scheduled Castes (SC), Scheduled Tribes (ST), and Other Backward Classes (OBC) (and for present purposes this category also includes Muslims), the major distinction is between those groups in EAG or other states. Within EAG states, their Grade VIII completion differs mostly by poverty, whereas in non-EAG states residency in an urban or rural area involves a greater separation. Even the

[2] Specifically, the split at each node is chosen statistically to maximise a deviation-based discrimination criterion. Unless otherwise stated, the potential classification criteria included poverty (specifically the dichotomous household poverty indicator calculated by IHDS based on monthly per-capita consumption and the official Planning Commission poverty line that varies by state and urban/rural residence), caste, urban/rural current residence, EAG state, gender, caste, and literacy of the household head. The robustness of the estimated trees was assessed by comparing the trees generated on 100 weighted bootstrap samples of the original data. All results shown or mentioned below were highly robust in terms of their agreement with the modal tree structure across samples.

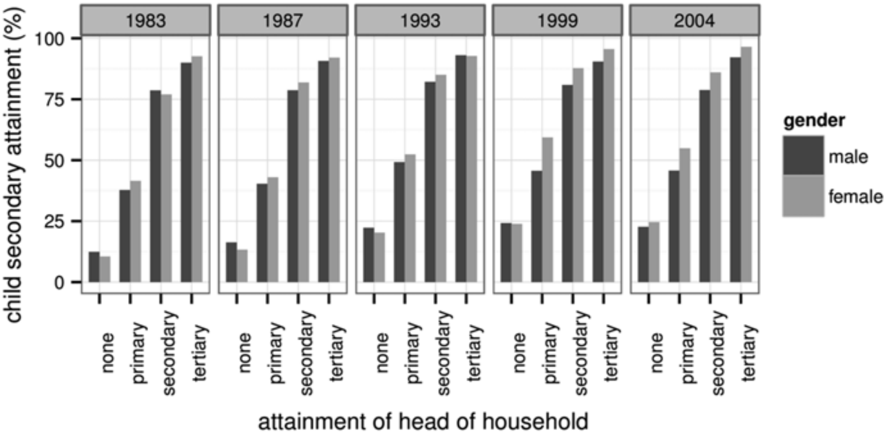


Fig. 11.8 Intergenerational educational mobility at secondary level (Source: NSS)

most advantaged members of lower castes, specifically those living in urban areas outside the EAG states, reach a Grade VIII completion rate that is only slightly higher than that of rural members of the higher castes.

The above classification deliberately excluded the education of the household head as a potential classification variable. The interesting feature is that location in the state and caste hierarchy is displaced as a criterion when literacy of the household head is included. One implication is that caste disadvantage, at least with respect to this particular outcome and disregarding quality and other factors, may largely be a legacy of past educational disadvantage.

The strong intergenerational transmission extends to the secondary level. Figure 11.8 displays the probability of completed secondary attainment among young people aged 20–24, conditional on the educational attainment of the head of household, if this was either their mother or father.

A number of observations can be made with respect to this figure. Clearly the chances of completing secondary school differ strongly between less and more educated households. Moreover, while the overall level of secondary participation has increased slightly over time, the gap by parental education has narrowed only marginally. Interestingly, the gap is qualitatively similar for both male and female children. In particular, a noticeable gender gap remains even among the most educated households.

Recalling the notion of "proximate literacy" in opposition to "isolated illiteracy", where the latter means having no literate adult in the same household, I also examine the different patterns of inequality with respect to literacy and proximate literacy. The inequalities characterising literacy are quite regular, with little interaction, and are not plotted here. The largest difference is with respect to gender, and for both genders the urban/rural differential is next, where the rural population is also highly stratified by caste in terms of their literacy. By contrast, with respect to proximate literacy, shown in Fig. 11.9, the gender differential essentially disappears. Given that males and females share households, this makes sense, since proximate literacy

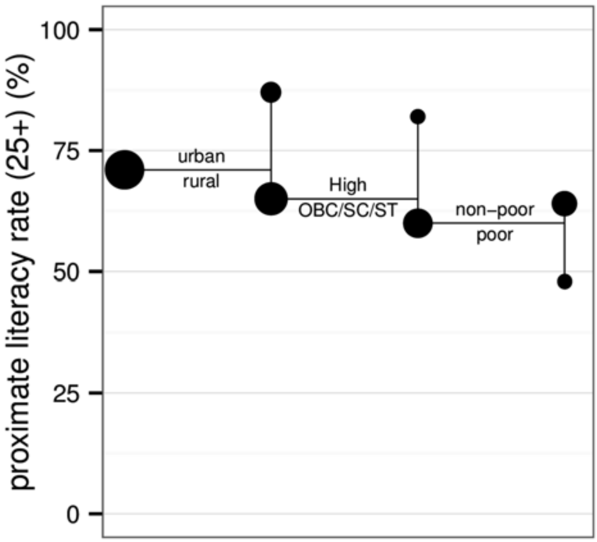


Fig. 11.9 Inequalities in proximate literacy (Data: IHDS)

is determined at the household level. So while the high proximate literacy group consists of the urban population and rural high caste households, distinctly low proximate literacy is specifically characteristic of low caste rural households below the poverty line. The advantage over a regression in this context is that we can see immediately that the disadvantage in this case does not extend to the urban low caste poor, for example.

Due to the large gaps even at elementary school level, little has been said about post-secondary schooling up to this point. That is certainly not because there is less socio-economic inequality at this level. The fact that in the Indian context one encounters all the same debates about higher education marketisation as in OECD countries (Tilak 2004b; Chattopadhyay 2009), suggests social competition may be more fierce at this level. Heated controversies around the application of affirmative action in the form of "reservations", i.e., quotas for SCs, STs, and OBCs, that apply not only to public sector jobs (accounting for two thirds of all formal employment) (Desai and Kulkarni 2008), but also to university admissions, bear witness to this. The present analysis lends credence to the argument that this is a reasonably well-targeted form of support that does not upset an otherwise meritocratic system or that is captured by the "creamy layer" of the richest SC/ST/OBC groups. As a matter of fact, when a classification is performed on all the covariates encountered so far, namely poverty, caste, urban/rural location, EAG state, and gender, caste is determined as the single most important distinction in terms of the probability of having obtained a post-secondary qualification by age 25–29.

In assessing all the above, it is important to bear in mind that even the absence of clear inequalities in aggregate indicators does not necessarily mean the absence of stratification. Even the very meaning of literacy itself can be socially stratified, for example, in a way such that "[e]lites are socialized to an interpretative relation to texts, and nonelites are socialized to a submissive relation to texts" (Collins 1995, 84).

Attempting to achieve universal elementary education in India through targeted, centrally sponsored policy schemes has a history going back decades (Shariff and Ghosh 2000, 1397). Sadgopal (2010, 5) provides an overview of national policies to that effect. The most important recent policy initiatives have been the Education Guarantee Scheme (EGS) (Gopalakrishnan and Sharma 1998) and the *Sarva Shiksha Abhiyan* (SSA) initiative to universalise completion of Grades I–VIII (Tilak 2007a). Crucially, both rely partly on alternative schools, lacking in infrastructure and staffed by the local community, with some government support for teacher salaries, for example. Closing gaps in primary school provision with little capitalisation and at much reduced cost compared to a regular teacher was the key idea behind the schemes. At the same time, the hope was that direct local accountability would lead to improved outcomes.

Evaluations suggest that the similarities between EGS and regular government schools in terms of overall quality of teaching and outcomes are more striking than the differences (Leclercq 2003, 1862). And at the aggregate level, progress towards universal participation at least in Grades I–V has made great strides if all types of schools are considered. However, the notion of "alternative" school provision, not as a temporary substitute, but as a (semi-)permanent arrangement, has been criticised as constituting an effective abdication of government responsibility (Tilak 2007a, 3873). This reading is supported by the rapid growth in the share of students enrolled at unaided or even unrecognised low-fee private schools (Srivastava 2006), especially, but not exclusively in urban areas, and even among the disadvantaged. This growth is witnessed even in the official AISES and DISE statistics that under-record the unrecognised sector. Even according to official figures, fully one quarter of enrolled children now attend fee-paying private schools at the very first level of schooling, a responsibility that unquestioningly and undisputedly belongs to the government. IHDS data show that already in 2005, unaided private schools were on their way to accounting for the majority of primary school enrolments in urban areas. Strikingly, the figures suggest that the entire enrolment growth of the past 10 years may have been absorbed by the unaided private sector.

Conclusions and Outlook

As ever, education in India remains mired in contradictions. A number of "stylised facts" may be extracted from the above analyses. First, that growth in overall literacy proceeds at a steady pace, driven, but also limited by cohort replacement. Second, that school enrolment in primary school Grades I–V is approaching universality, but without full equity in access or quality. Third, that expansion at post-primary levels has not kept pace.

The last point is crucial, because some evidence suggests that in India returns to primary education may be particularly low. Tsujita (2012, 41) provides an overview of a large number of studies from 1985 up to 2010 which show that, in contrast to the patterns in many, if not most other countries, private returns to primary schooling in India are lower than those to secondary schooling or even negative, and are even lower for females. As a result, primary education is insufficient for poverty reduction and development in India. Secondary schooling or higher is needed and continues to yield large benefits in terms of poverty reduction, infant mortality, and life expectancy (Tilak 2007b). Through a feedback effect, the bottleneck at the secondary level may even limit further progress at the upper primary/elementary level (Grades VI–VIII) just below, because access to secondary schooling may be perceived as the main benefit of upper primary schooling (Mukhopadhyay and Sahoo 2012).

A crucial concern is that the possibility of replicating the recent expansion in primary participation at higher levels of schooling, even at the cost of the same compromises, is doubtful. The new central government initiative, "Rashtriya Madhyamik Shiksha Abhiyan", that aims for universal secondary retention by 2015 through establishment of a secondary school within 5 km of every habitation, either through construction or upgrading of existing upper-primary schools (Siddhu 2010), appears highly ambitious. Numerous factors combine to make growing participation in secondary schooling substantially more challenging. Persistent social and gender inequality exerts a greater influence at teenage years. Indeed, it has already been shown empirically that a decline in gender bias in household education investment at primary school ages does not necessarily extend to secondary school ages (Azam and Kingdon 2013). Early marriage and childbearing act as further constraints among the most disadvantaged groups. In terms of policy, while reducing travel distance to the nearest secondary school is laudable, independent travel becomes a greater concern, especially for girls (Siddhu 2011). In addition, entry barriers to secondary school are much greater, with the cost of lower secondary schooling almost double that of upper primary, depending on the type of schools (Siddhu 2011).

It is not clear that low-cost alternatives can be provided similarly to EGS primary schools, because secondary school subject teaching of reasonable quality would appear to preclude the use of "para-teachers", i.e. contract teachers who do not necessarily possess a regular teaching qualification (although Kingdon and Sipahimalani-Rao (2010, 66) note that at primary level, at least, "having lower legal educational qualification requirements for para-teachers than for regular teachers has not led to actually lower qualifications among appointed para-teachers"). Private schools not only suffer the same constraint, but in addition, unrecognised upper-primary private schools face an incentive to seek formal recognition to allow them to issue valid certificates that allow their graduates to seek entry into secondary school (Kingdon 1996, 3307). This is less of a constraint on unrecognised schools at the lower primary level, because their students do manage to gain entry into recognised upper primary schools. At the secondary level, by contrast, the problems of unrecognised schools would be ever greater. Importantly, policy rhetoric aside, while the absolute union budget for education increased substantially in the middle years of the 2001–2011 decade, the overall education expenditure as a share of

GDP, of government expenditure, and of government social sector expenditure has suffered a slight decline. In particular, the allocation share of secondary has also declined (Tilak 2006). This may reflect the dilemma that given current patterns of participation, increasing public spending on secondary education would go disproportionately to higher income groups (Mahal 2005).

In a sense, then, the 2011 census comes at a dangerous time. Right now, we may be just about able to see whether the controversial policies of the past 20 years have truly succeeded in achieving at least nearly universal participation in some form of primary schooling, but without being able to indicate whether these policies have run their course and taken India's schools as far as they can, or whether they actually set the stage for the next phase of educational development.

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Chapter 12
Education in Indonesia: Trends, Differentials, and Implications for Development

Gavin W. Jones and Devanto Pratomo

Introduction

Educational trends are crucial for Indonesia's continued economic success. Over the past two decades, there have been encouraging improvements in enrolment ratios and progression of children further through Indonesia's school system. Attendance in primary school is universal, though completion of this level is not. Increases in secondary school enrollment ratios have lagged only slightly behind those of China, Thailand and Vietnam, and Indonesia has done substantially better than India in this regard (Fig. 12.1). It has also made substantial gains in enrollment ratios at the tertiary level. Yet there are many serious problems facing Indonesia's education system. "The gap in access to education between the rich and the poor remains wide, the quality of Indonesian education is very poor by international standards, and the significant increases in public resources allocated to the sector have yet to have a discernible impact on quality" (Suryadarma and Jones 2013: 13; see also Suharti 2013; Al-Samarrai and Cerdan-Infantes 2013; Suryahadi and Sambodho 2013).

This chapter will summarize information from different sources about the progress of Indonesian education. It will make particular use of the 2010 Population Census data in novel ways: first, to check whether regional differentials in educational enrollment are related in any systematic way to indicators of economic development, in the form of regional per capita income figures and regional poverty levels; secondly, to delve into the generational transmission of educational

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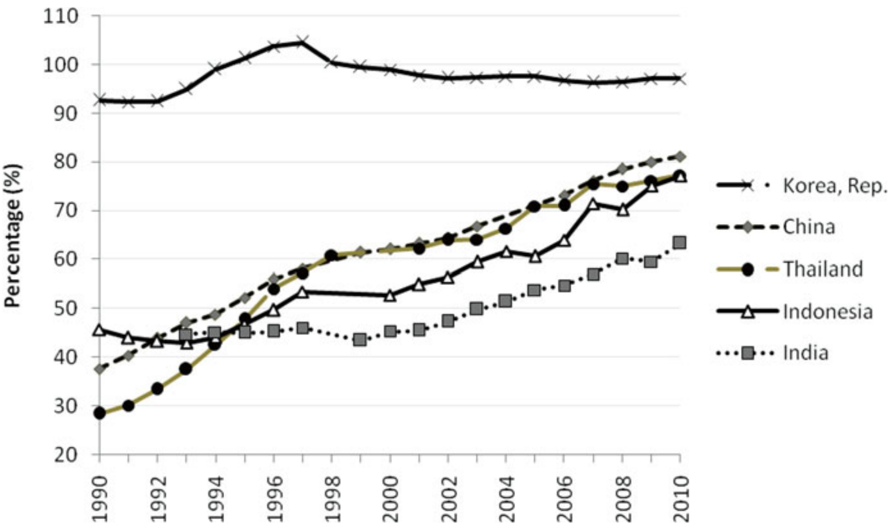

Fig. 12.1 School enrollment, secondary (% gross) (Source: World Bank, World Development Indicators)

attainment through comparison of educational attainment of heads of household and their children.

Sources of Data

There are multiple sources of data on trends in literacy, educational enrollments, progression of students through the system, and educational attainment in Indonesia in recent decades. The key sources are successive population censuses (1990, 2000 and 2010), the annual national socio-economic household surveys (SUSENAS), Demographic and Health Surveys (DHS) and the internal educational data collected and published by the Ministry of Education (MOE). Different sources have their own strengths and weaknesses, and it is clearly prudent, in presenting educational data, to triangulate across different sources as much as possible, in order to avoid gross errors of interpretation and to provide a more reliable summary of trends and differentials.

One measure that can be obtained from more than one source is the enrollment rate at different levels of education. For the year 2010, the Gross Enrollment Rate (GER) and Net Enrollment Rate (NER) can be obtained from both the Census and SUSENAS. The GER for a given level of education is the number of students enrolled at that level as a percentage of the number of children in the official age range for that level of education, while NER is the number of students falling in the official age groups for enrollment at that level who are enrolled, as a percentage of total number of children in those age groups. The GER can exceed 100 %; the NER cannot. In Indonesia, the GER does indeed exceed 100 % at the primary school level, partly because many underage students are enrolled in the first year of primary school, and partly because there is some repetition of grades.[1] In many countries, including Indonesia, the GER at both primary and lower secondary level tends to exceed the NER at those levels. SUSENAS gives a figure of 80 % for the GER at the junior secondary level, while the census gives a figure of 78 %. But the NER at this level is 68 % according to SUSENAS (Suharti 2013: 24) and 55 % according to the Census – a much wider difference than in the case of the GER.

Using the 2010 SUSENAS, Suharti (2013) found that the GER and NER for primary school were 112 % and 95 % respectively, almost 10 % higher than the enrollment rates from the population census. The main reason is that in SUSENAS the school participation status includes people who are studying at non-formal equalization education programs, while the population census restricts itself to formal education for measuring school participation. The other potential reason for this different finding is that SUSENAS provides a direct question about the level of education of students participating in school, while the census combines the information about school participation and the highest education completed to measure the students' level of education. Therefore, for instance, students who have completed primary school education and who remain actively participating in school are assumed to be enrolled at junior secondary level.

What most of these sources do not provide is information on educational quality. To study quality, even more imagination is needed than in the study of enrollment and progression through the system. Happily, the standardized national examination results can now be used to study differences by region and by socio-economic background within Indonesia, and there are also now some data on performance in international tests, the Trends in International Mathematics and Science Study (TIMSS), the Programme for International Student Assessment (PISA), and the Progress in International Reading Literacy Study (PIRLS) (Suharti 2013). Other indicators of the quality of education received by Indonesian school children include assessments of teacher quality (see Bjork 2013; Suryahadi and Sambodho 2013) and even some of the MOE data on quality of school buildings. For example, the proportion of classrooms that are "rusak" (damaged) and "rusak berat" (severely damaged) can be found in official MOE data. These data show that in 2002, 24 % of primary school classrooms were classified as "severely damaged"; the basic problem was that many schools built in the 1970s with INPRES special government funds are now in very bad shape, with leaking roofs, collapsing ceilings and crumbling walls, providing an unhealthy and dangerous environment for those occupying them. In many primary schools, there were totally inadequate toilet facilities and no water supply (see Warta CIMU 2002).

The great advantage of Population Census data is that it can be compared across small administrative areas. But the Census suffers from a number of weaknesses. For example, because of the scale of the census operation and the need to recruit

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[1] Suharti (2013) reported that the proportion of underage students enrolled in the first year of primary school is around 47 %.

very large numbers of enumerators, the quality of interviewing in the census is considered to be generally lower than for the more specialized surveys. Furthermore, the questions on education in the census are limited to school participation, educational attainment, and illiteracy. The SUSENAS and DHS have much smaller samples, and therefore cannot be used for fine-grained regional analysis, but they do include indicators of the socio-economic status of households (e.g. through calculating expenditure quintiles from the SUSENAS data) which enable the analyst to examine the relationship between socio-economic status and progression of students in school.[2] The Ministry of Education data are also very detailed, but the quality of data leaves much to be desired (see Suharti 2013: 16; Jones et al. 2000, Appendix 2).

Trends in Educational Enrollment and Educational Attainment

Between 1993 and 2010, the average number of years of schooling of the Indonesian population aged 15 years or over rose from 6.16 to 7.92 years. This is consistent with the data in Fig. 12.1 showing the rising trends in Indonesia's gross secondary school enrolment ratios since 1990. The rural-urban gap was much wider than the gender gap. In 2010, the average urban dweller aged 15 and over had 9.27 years of education, compared with 6.54 years for rural dwellers, while the gender gap was very small, whereas males had 8.35 years of education compared with 7.50 years for females (Suharti 2013, Table 2.1; data from SUSENAS).

When an education system has been expanding rapidly over time, as in Indonesia, however, averages reveal little unless disaggregated by age. The educational pyramids in Fig. 12.2 show what the census data reveal about changes in educational composition of the Indonesian population since 1990. In 1990, all cohorts aged above 35 had a very small proportion with more than primary school education, and even at ages 25–29 the majority had primary school or less. Over the following 20 years, the educational composition of the Indonesian population has changed greatly. After all, the cohort aged 25–29 in 1990, a majority of which had primary school education or less, by 2010 was aged 45–49. The cohorts below this in the age pyramid have stayed in school longer. In the 2010 pyramid, the proportion with no education or only primary school has shrunk considerably, and the norm for those in their 20s is now to have at least lower secondary education.

Trends in enrollment rates by age are another way of examining the trend toward universal primary school education and towards reaching the goal of 9 years compulsory education (set in 1994). This goal implies that, if there is no repetition of grades and all students progress from primary school to lower secondary school, all children will complete lower secondary school. This goal is still far from being

[2] For useful comparative analysis of DHS data from many countries, including Indonesia, for this purpose, see Filmer and Pritchett (1999) and Filmer (2005).

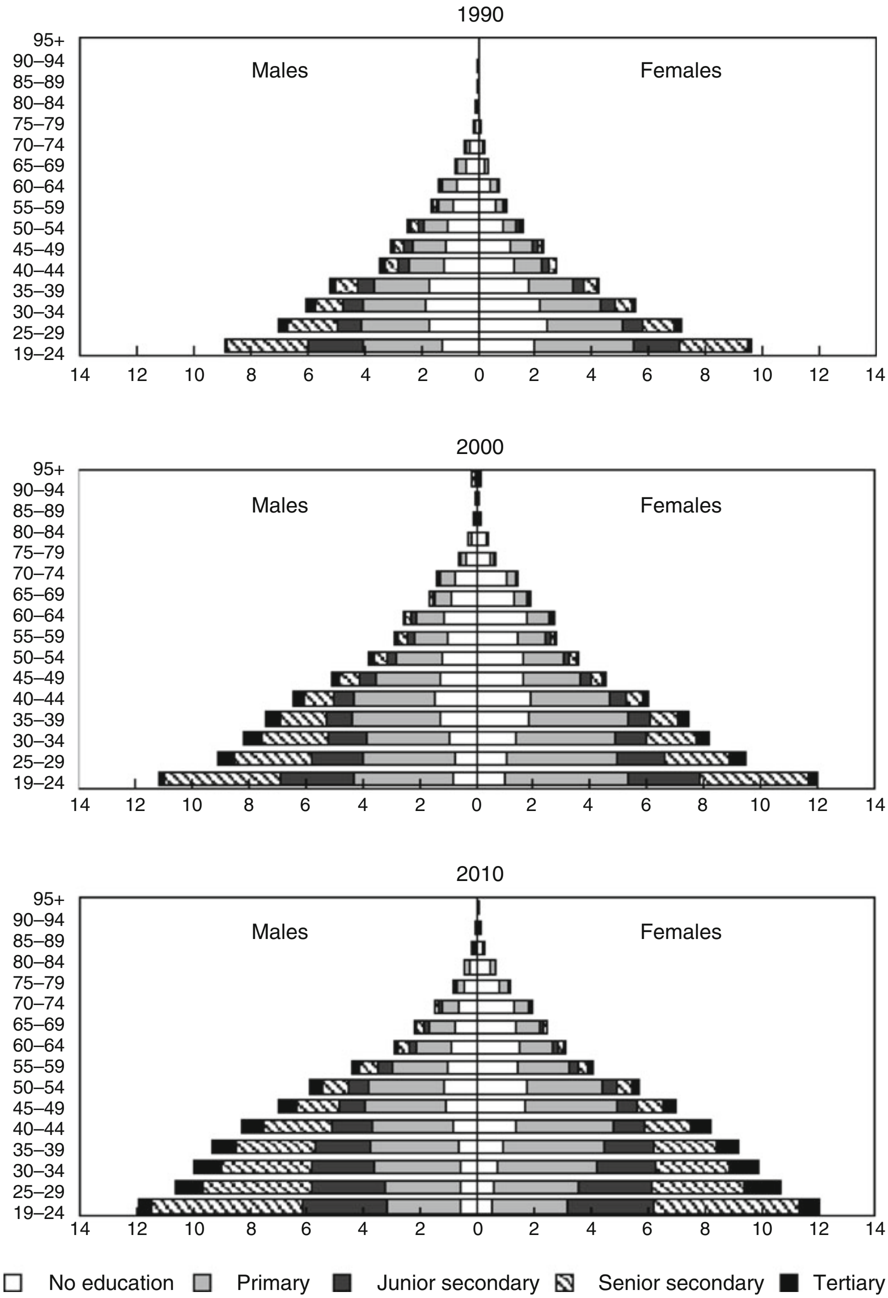

Fig. 12.2 Population aged 19 years or over by highest level of educational attainment and gender, 1990–2010 (million) (Source: Suharti, Figure 2.1. Figure based on 1990, 2000 and 2010 Population Census data)

attained. In fact, the NER for lower secondary education in 2010, as mentioned earlier, was only 68 % according to SUSENAS data and 55 % according to the Census. Whichever source is closer to the truth, the figure is unacceptably low. A different source of data – the internal enrollment data from the Ministry of Education and Culture (MOEC) shows a steady rise over time in the proportion of entering students who graduate from primary school, in the proportion of these who continue to junior secondary school, and in the proportion of those who start junior secondary school who complete this level of education (see Suharti 2013, Figures 2.8 and 2.9). But all of these proportions are well below 100 %, and the cumulative result is that a high but somewhat indeterminate proportion of Indonesian children do not complete junior secondary school. The figure is indeterminate not only because there are problems of data quality and completeness, but also because if we trace the continuation of a particular cohort of children through the school system, the history of recent cohorts is incomplete, because they have not yet reached the point where they could graduate from junior secondary school.

The most recent cohort whose history can be traced from the official data is children who entered primary school in 1998/1999. Of this cohort, 75 % graduated from primary school and 60 % continued to junior secondary school, and of this 60 %, 87 % graduated from junior secondary school. In other words, 52 % of the cohort which entered primary school graduated from junior secondary school. However, for cohorts beginning primary school in more recent years, the proportion graduating from primary school and continuing to secondary school has been rising slightly, which suggests that for the cohort of students beginning primary school around 2005, perhaps 63 % will graduate from junior secondary school in 2014.

Whichever data source we use, we can confidently infer that more than one third of Indonesian children are not completing junior secondary school. One of the key tasks facing Indonesian planners is to raise this proportion much closer to the goal of universal 9 years education. In order to find appropriate policies to achieve this, some of the basic information needed by planners concerns the characteristics of those who are not progressing to 9 years' education, according to place of residence, socio-economic situation and gender.

Regional Differences

In a large, archipelagic and diverse country such as Indonesia, pronounced differences in education across regions are to be expected. Although Indonesia has made remarkable improvements in the education sector over the past 30 years, differences in enrollment rates by regions remain wide. Based on the 2010 population census, the GER for primary school varies from 71.8 % in Papua to 111.4 % in Yogyakarta, with a national average of 104.1 %. Between urban and rural areas, however, there is no difference at all in the GERs. The NER is much lower than the GER with a national average of 86.7 %, indicating a high proportion of students enrolled in primary school whose ages lie outside the official primary school age. This is possible because children in Indonesia are actually allowed to go to school at the age of six, although the compulsory education program starts at the age of seven (Law No 17/2010 on Management of Education), and also because in some regions late entry into primary school is common. Comparing provinces, most provinces have a NER for primary school of at least 80 %. The highest NER (90.9 %) is also found in Yogyakarta, a province with a long tradition of education, while the lowest rate (55.7 %) is found in Papua, a province with poor education infrastructure and a high proportion of remote areas.

Given the relatively high and stable enrollments in primary education, official attention has now shifted to the second phase of basic education, i.e. 3 years of junior secondary school. Compared to primary education, the GERs at junior secondary school are much lower. In urban areas, they are 80.2 % and in rural areas, 76.1 %. At the provincial level, they range from 56.8 % in Papua to 90.1 % in Aceh (Fig. 12.3). Suharti (2013) showed that the enrollment rates for junior secondary school have tended to be stagnant since the early 2000s, requiring more serious attention by the government to the transition from primary school to junior secondary school. There are 15 provinces that exceed the national level GER of 78 %, while 18 provinces are below the national average. Four provinces are considered very low with a GER for junior secondary school lower than 70 %, namely Papua (56.8 %), Central Sulawesi (68.5 %), and two newly formed provinces, i.e. Bangka Belitung (67.1 %) and Gorontalo (67.4 %). Most of the provinces with lower enrollment rates are located outside Java, but two provinces in Java (West Java and Banten) have GERs below the national average of 78.0 %.

At the lower level of government, the GERs show greater inequality both across districts in the country and across districts within provinces. Across 494 districts recorded in the 2010 population census, the GERs for junior secondary level range from 7 % in Nduga in Papua to 97.3 % in Ternate in North Maluku, with a standard

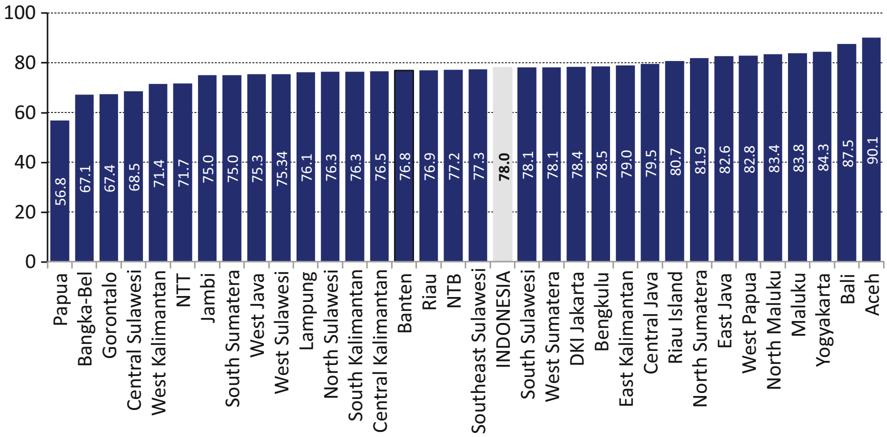

Fig. 12.3 Gross enrollment rates of junior secondary school by province, 2010 (%) (Source: 2010 Population Census (IPUMS International))

deviation of 9.6 %. The worst performing districts in terms of GER are dominated by districts located in Papua. The highest inequality across districts within provinces is also found in Papua with a standard deviation of 19.9 %, while the lowest inequality across districts within provinces in terms of GER at junior secondary level is Jakarta with a standard deviation of 1.3 %. There is a tendency for provinces with higher inequality to have a lower GER at junior secondary level, although the relationship is not very strong, with a rank correlation coefficient of (−) 0.4.

The NER for junior secondary level (55.0 %) is lower than the GER (78 %). Compared to GER, the ranking differs significantly although Aceh, Yogyakarta, and Bali remain among provinces with the highest enrollment (data not shown). However, the NER in Indonesia should be interpreted carefully as the large number of under-age students enrolled in primary school affects the NER for junior secondary level by also entering this level of education below the official entry age. At the same time, some students enter primary school late, and also are late in progressing to junior secondary school.

The 2010 Population Census data on the educational attainment of the population aged 25 years and above show wide differences across provinces. Jakarta and Riau Islands are the two provinces where most of the adult population holds at least senior high school level education. However, Jakarta is well ahead of Riau Islands in two respects: it has a much smaller proportion of population with no education, and almost twice as high a proportion holding tertiary education. Jakarta is matched by North Sulawesi in the very low proportion of the adult population with no education, reflecting the long history of educational development in North Sulawesi (Jones 1976).

Figure 12.4 shows the educational attainment of the young adult population (aged 25–39).[3] Only Papua and Nusa Tenggara Barathave more than 10 % of population in this age group with no education. The proportion of population with no education in Papua remains very high, at 40.2 %. The majority of the young adult population in six provinces in Indonesia, including Jakarta, Yogyakarta, Riau Islands, North Sumatera, Bali, and Maluku hold at least senior high school education. In terms of the proportion of the young adult population with tertiary education, Yogyakarta, a small province in Java with a long tradition in higher education, ranks only slightly behind Jakarta in this proportion (19.0 %).

The average number of years of schooling is another important indicator of educational attainment. Unlike SUSENAS and other survey data, the 2010 population census does not provide a direct measure of years of schooling. A method developed by Thomas et al. (2001) is therefore used to calculate the estimated average years of schooling in each province and district using the information on highest level of education completed from the census. The estimates for the following seven levels are used: no education (0 years), partial-primary (3 years), complete-primary (6 years), junior secondary (9 years), senior secondary (12 years), partial-tertiary or diploma (14 years) and tertiary (16 years). Although the findings are thought to

[3] We did not include those below age 25 in the analysis, because many of them would not yet have completed their education.

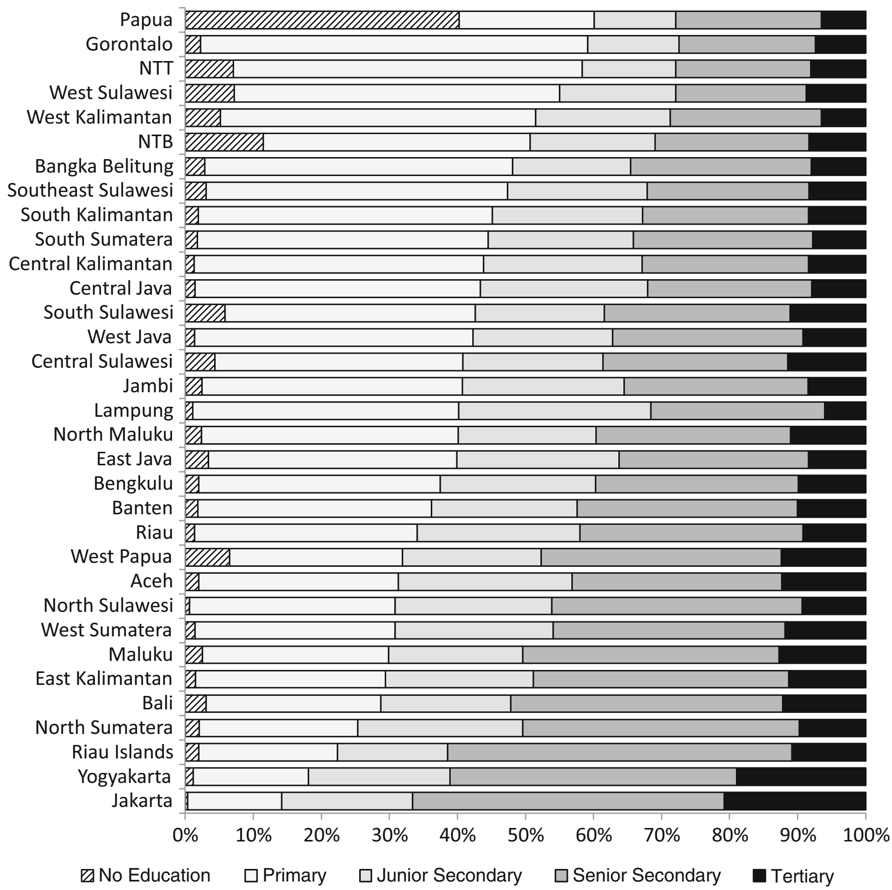

Fig. 12.4 Educational attainment of population aged 25–39 years by province, 2010 (%) (Source: 2010 Population Census (IPUMS International))

slightly underestimate the real figure, the results remain comparable with the other data set in terms of ranking. Using this method, the national average years of schooling among the population aged 25 and over is 7.6 years in 2010, suggesting that adult Indonesians on average have completed around the first and second years of junior secondary education.[4] Comparing provinces, the average years of schooling range widely from 5.3 years in Papua to 10.5 years in Jakarta (Fig. 12.5).[5]

The average years of schooling varies more widely at district level. Comparing 494 districts, there are 292 districts (59.1 % of all districts) below the national

[4] Using the SUSENAS, the average years of schooling for population aged 15 years or over in Indonesia in 2010 is 7.9 (Suharti 2013).

[5] In Jakarta, the average years of schooling is very close to the highest value due to the big disparity between Kepulauan Seribu district, small islands, small population with low educational attainment and the other districts in the mainland Jakarta with more educated population.

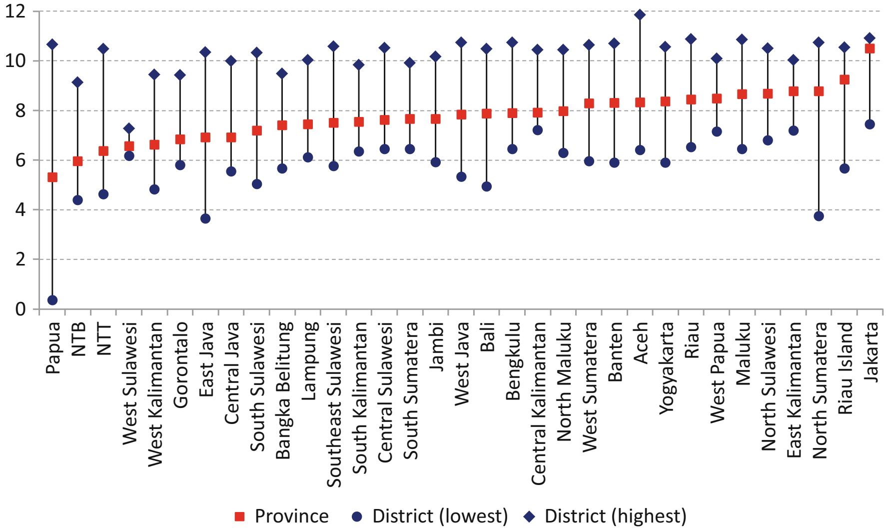

Fig. 12.5 Average years of schooling of population aged 25 and over by provinces and districts, 2010 (Source: 2010 Population Census (IPUMS International))

average and only 89 districts (18.0 % of all districts) achieved an average of more than 9 years of schooling. The lowest average years of schooling (0.4 years) is found in Nduga district in Papua, suggesting that most of Nduga's population has never been to school, while the highest average years of schooling (11.9 years) is found in Banda Aceh. As with school enrollment, districts with the lowest average years of schooling are mostly located in Papua, while districts with the highest average years of schooling are highly concentrated in western Indonesia (except Kota Ambon in eastern Indonesia with an average years of schooling of 10.9 years). Urban-rural differences in educational attainment also remain marked. The average years of schooling of the population aged 25 and over are 9.1 years in urban areas and 6.2 years in rural areas.

Apart from Papua, North Sumatera and East Java have the largest within-province variation. North Sumatera has the third highest average years of schooling in Indonesia with an average of 9.0 %, but there is great intra-provincial inequality, with average years of schooling ranging widely from 3.7 years in South Nias district to 10.8 years in Medan. East Java, the second most populous province in Indonesia, ranks the seventh lowest in terms of average years of schooling for ages 25 and over (6.9 years). Its within-province inequality is high, with average years of schooling ranging extremely widely from 3.7 years in Sampang to 10.4 years in Madiun.

Figure 12.6 shows the inequalities in average years of schooling among the population aged 25 and above across districts in Java. The low educational attainment (below 6 years average of schooling) is heavily concentrated in Madura Island and the eastern part of East Java. Madura Island is well-known as one of the poorest regions in East Java. Unlike the more developed regions in Java, limited economic

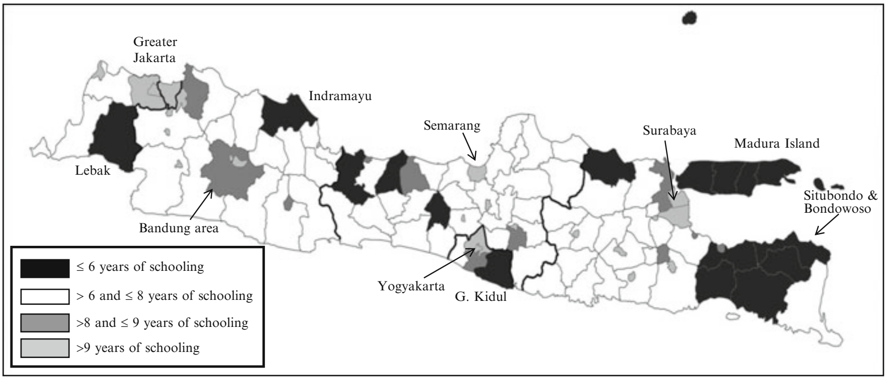

Fig. 12.6 Java Island: average years of schooling, population aged 25+

opportunities and dependence on subsistence agriculture have led to chronic poverty in this region. These factors have also led to a massive migration from the island to other parts of Indonesia with a high proportion of population moving to the eastern part of Java mainland; in Situbondo and Bondowoso, according to the population census, a very high proportion of the population in both districts (91.7 % and 93.6 %, respectively) is Madurese.

In western and central parts of Java, there is relatively less concentration of low educational attainment population. In western part of Java, the low average years of schooling is only found in Indramayu (West Java Province) and Lebak (Banten Province), while in central part of Java is found in Pemalang, Brebes, Wonosobo (Central Java Province) and Gunung Kidul (Yogyakarta Province). Most of them are correlated with the level of poverty. Indramayu, for example, has the highest proportion of population living below the poverty line (16.6 %) of any district in West Java, while Wonosobo, Brebes, and Gunung Kidul in central part of Java have more than 20 % of population living below poverty line.

In contrast, the higher average years of schooling are mainly concentrated in districts with faster growing economies. The more interesting finding is found in Greater Jakarta, Bandung (West Java), and Surabaya (East Java) where districts around them, such as Depok and Tangerang (close to Jakarta), Cimahi (close to Bandung), Sidoarjo and Gresik (close to Surabaya) have also been influenced by them to have relatively high average years of schooling.

Gender Differences

A great deal of international scholarly and policy attention has been given to gender differences in education. While this attention is appropriate in some regions, and would have been appropriate in Southeast Asia some decades ago, it is no longer warranted in countries such as Indonesia, where socio-economic differences in

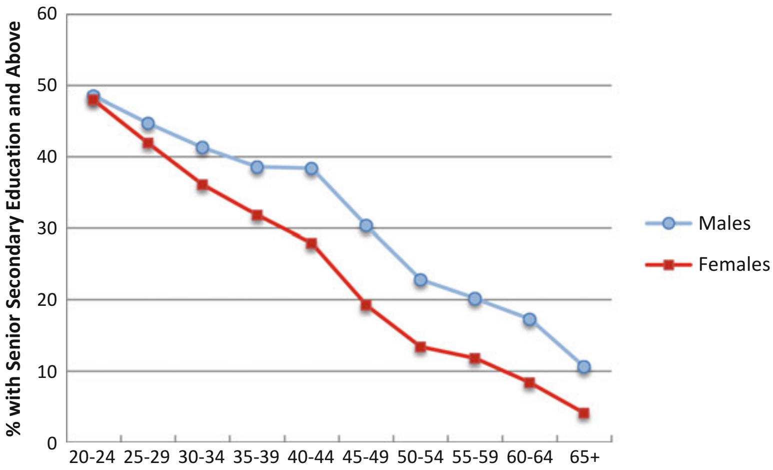

Fig. 12.7 Indonesia: educational attainment differences by age and sex, 2010 (Source: 2010 Population Census (IPUMS International))

access to education are far more important (Knodel and Jones 1996). In Indonesia, the enrollment ratios are almost identical for females and males at all levels of education (Suharti 2013: 26).

The 2010 census data on gender differences in educational attainment by age group allow us to trace the gradual disappearance of gender differences in access to schooling. Figure 12.7 shows the proportion of each age group that had attained senior secondary education and above. Differences between males and females remained considerable for those aged 40 and above, but have gradually narrowed over time. At the youngest ages – those in their 20s in 2010 – there are no meaningful differences. The more relevant question is whether employment opportunities for women in more desirable occupations have risen commensurate with their rising educational levels.

Quality of Education: Indonesia in Comparative International Perspective

Indonesia unfortunately performs poorly in international comparative tests. TIMSS data show that more than half of Indonesian year 8 students are deficient in basic mathematics skills (Suryadarma and Sumarto 2011: 166). While 500 is the international average in this test, Indonesia's scores are well below this (around 400), consistently below those of neighbouring countries – Singapore, Malaysia and Thailand, and did not show any improvement over almost a full decade (1999–2007). Data from the 2011 TIMSS show that about 57 % of Indonesian pupils who participated had scores below 400 points, the lowest benchmark. None achieved the advanced benchmark of 625 points. Indeed, the proportion of Indonesian students reaching the lowest benchmark was lower than the proportion of students in Singapore, Taiwan and South Korea who achieved the advanced benchmark (Suharti 2013: 45).

Indonesian children's PISA reading scores were also substantially below the international average – about one standard deviation in 2009 – but had at least shown some improvement since 1999 (Suryadarma and Sumarto 2011: 174). The scores of Indonesian students on standardized international examinations are poor even after adjusting for socio-economic background, suggesting that deficiencies in the school system, rather than household conditions, are the principal contributor to Indonesia's poor performance (Suryahadi and Sambodho 2013: 142).

Relationship Between Education and Economic Development

A number of previous studies in developing countries showed a potential relationship between indicators of economic development, such as per capita income, regional poverty levels, and educational enrollment. Tilak (1989), Lanjouw et al. (2002) and Mesa (2007), for example, found a negative relationship between poverty incidence and educational performance. The relationship between the indicators of economic development and educational progression is usually not just one-way. Poverty, for example, might limit educational enrollment, but at the same time, education is likely to be viewed as the main instrument to escape from poverty. While these complicated causality effects are not the focus of our study, the relationship between poverty and per capita income and educational enrollment at district level is examined in this section. The analysis of economic development at district level is important in a political regime changing from centralization to greater decentralization in 2001.

Figure 12.8 presents the polynomial regression of poverty incidence and per capita income on school enrollment measured by the proportion of children aged 7–15 (compulsory education ages) enrolled at school across 494 districts in Indonesia. Polynomial regression is used to capture possible non-linear relationship between the economic development indicators and the education enrollment across districts. In the first box on the left side, the effect of poverty on the proportion of children aged 7–15 enrolled in school is examined. The percentage of population living below the poverty line (headcount index) at district level is used as the poverty measure.[6] We can see that poverty tends to have a negative impact on enrollment suggesting that an increase in poverty level contributes to a decrease in the proportion of children who were enrolled in school. This effect is clearer in a district with high level of poverty, such as Papua (mostly shown as the outlier in the figure). The exception is found in districts with low level of poverty where poverty might have a positive impact on enrollment, as shown by the non-linear relationship.

[6]This poverty measure is published by Badan Pusat Statistik (2011) based on SUSENAS 2010 on the average per capita expenditure of basic needs at each districts.

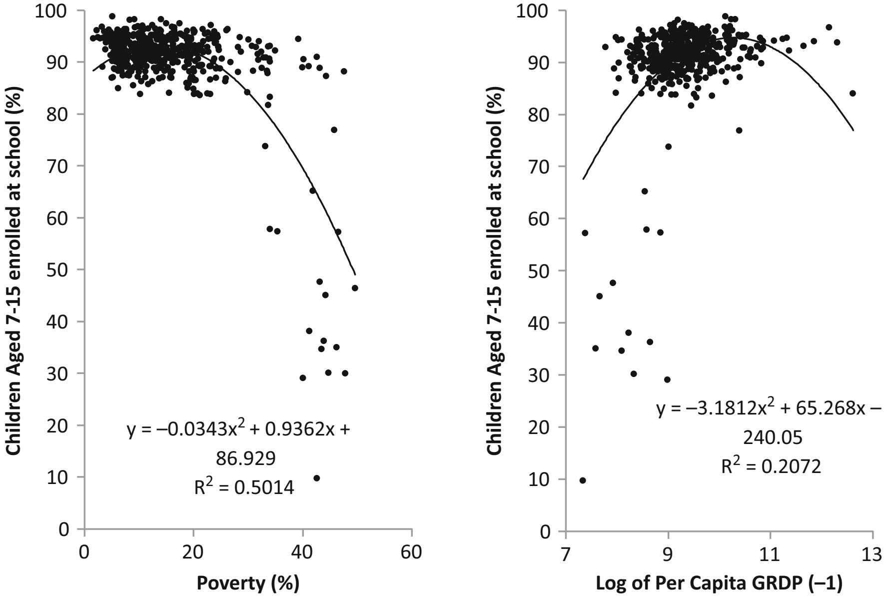

Fig. 12.8 Relationship between economic development indicators and school enrollment (494 districts) (Source: Authors' calculation)

The negative relationship between poverty and enrollment indicates that there is still a problem in basic education; many children from poor families are not enrolled even at this level. It also suggests that bringing people out of poverty will significantly improve educational enrollment at the regional level. Since the relationship might be mutually reinforcing, an increase in educational performance might also be the best way to enable districts trapped in poverty to escape from the "vicious cycle of poverty". Moreover, financial aid to poor families might be beneficial in increasing their possibility of staying in school. Consistent with this finding, Sparrow (2007) found that the scholarship program for poor students increased primary school enrollment in Indonesia, though he did not find evidence that it affected junior secondary enrollment.

Another important indicator of the economic development of a region is the real per capita income (measured by Gross Regional Domestic Product or GRDP).[7] Suryadarma et al. (2006), using SUSENAS data, found that an increase in per capita expenditure, as a proxy for income, increases the enrollment at Junior Secondary School. As presented in the second box of Fig. 12.8, the relationship between per capita income and enrollment also tends to be non-linear. We found that an increase in per capita GRDP at district level has a positive effect on the proportion of children

[7] The 1-year lagged value of the log of real per capita Gross Regional Domestic Product (GRDP) is used considering the lagged response of the GRDP on educational performances. This lagged value also reduces the potential endogeneity bias from the causal effect between GRDP and education.

aged 7–15 (compulsory education ages) enrolled in school, particularly in a district with relatively low per capita GRDP, but interestingly, in a wealthier districts, per capita income has a negative relationship with the proportion of children enrolled in school. This is true in the case of Papua for example, where the relatively high per capita income from mining and other natural resources does not significantly influence to an increase in education enrollment of their population. However, compared with the direct effect of poverty, the R-squared is relatively low at 20.7 % indicating that per capita income appears to have a smaller effect on educational enrollment.

Effect of Socio-Economic Factors on Educational Progression and Attainment

The SUSENAS data have been utilized by many analysts to show the relationship between household expenditure quintiles (a rough measure of socio-economic status) and the survival of students within the school system. Figure 12.9 (from Suharti 2013, Figure 2.11) shows the results. Clearly, at the lower secondary level (year 7–9), the marked inequality in survival probabilities evident in 1993 had lessened considerably by 2009, reflecting the drive towards universal lower secondary education. However, at the upper secondary level (year 10–12), the gap between those from the lowest and highest expenditure quintiles remained very wide in 2009. Indeed, if we continue the comparison upward through the educational system to

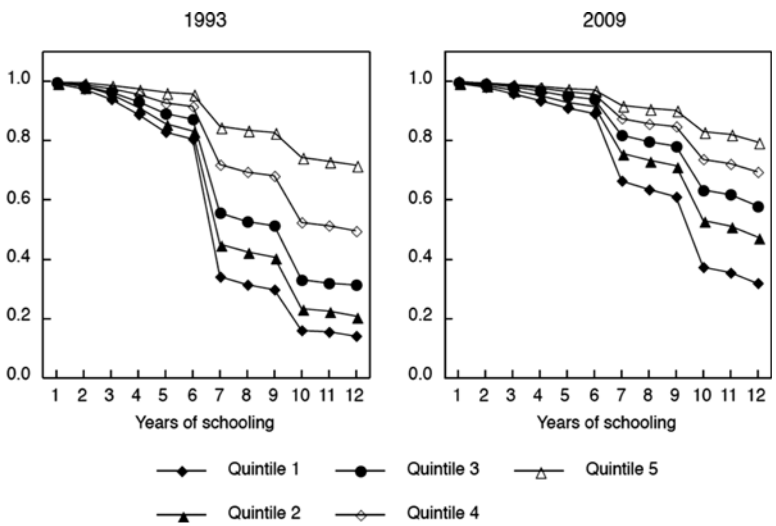

Fig. 12.9 Education survival probability of population aged 16–18 ever enrolled in school by household expenditure quintile, 1993 and 2009. Note: Where quintile 1 is the poorest, and quintile 5 the richest, from 20 % of households (Source: Suharti (2013: Figure 2.11))

the tertiary level, we find that only 2 % of students in Indonesian tertiary institutions are from households in the lowest expenditure quintile (Hill and Thee 2013: 168).

As for the effect of socio-economic factors on educational performance of children who remain in school, there are already multiple sources of data about this. Suharti (2013: 42), using data on the performance of junior secondary students in the 2010 national examinations, finds that students whose parents have a better education and a higher-status occupation tend to perform better than other students. "Students whose fathers are farmers, fishers or blue-collar workers have the worst examination results, while those whose fathers are civil servants or professionals have the highest examination scores in all subjects".

Turning to internationally comparative data, as already noted, the TIMSS and PISA data not only show that Indonesian students perform very poorly when compared with those in most other countries, including neighbouring countries of Southeast Asia (Suryadarma and Sumarto 2011: Figures 7, 8 and 9), but also that there is a sharp socio-economic gradient in the results for Indonesian students (Al-Sammarai and Cerdan-Infantes 2013: Figure 6.7).

Transmission of Education Across Generations

The educational background of parents can be expected to have a powerful impact on their children's education history. Previous evidence for Indonesia suggests a significant correlation between the educational background of children and the educational attainment of their parents (see Mare and Maralani 2006 and Hertz and Jayasundera 2007). This section uses 2010 Population Census data to examine the transition matrices of the relationship between the educational performance of children (including school enrollment and attainment) and the educational backgrounds of parents who are the head of household.

The relationship between children's school enrollment and the educational background of parents is presented in Table 12.1. The age-specific enrollment measures the enrollments in a specific age group as a percentage of the total population in that age group, including 7–12 (primary school level ages), 13–15 (junior secondary

Table 12.1 Age-specific enrollment of children by parent's education (%)

	Education of parents (household head)				
Age of children	Primary and less	Junior secondary	Senior secondary	Tertiary	All levels of education
7–12	94.3	96.5	97.3	97.8	95.7
13–15	79.0	91.4	95.5	97.5	85.8
16–18	43.5	62.9	73.3	87.1	55.1
19–24	9.0	18.4	33.1	57.4	17.1

Source: 2010 Population Census (IPUMS International) ages), 16–18 (senior secondary ages), and 19–24 (tertiary ages).[8] The proportion of children aged 7–12 enrolled in school is relatively high (above 90 %, approaching universal attainment) irrespective of parent's education.

The relationship between parents' education and school enrollment becomes much sharper when children are aged 13 and above. There is a significant drop in enrollment of children whose parents have primary school education (or less) when the children are between 13 and 15 years old (junior secondary ages); i.e. from 94.3 % when they are 7–12 years old to 79.0 % when they are 13–15 years old. Consistent with the earlier analysis, parents with primary school education (the lowest education level) usually have lower earnings or lower economic status. Therefore, children from poor families might find it more beneficial to go to work rather than to school. This finding is in line with the analysis of Mason and Rozelle (1998), who noted that by age 13 a young person (or near adult) can begin earning a wage in the labour market for simple work. But a second factor is that parents with lower education have difficulty in meeting the costs of education at the lower secondary level. According to the SUSENAS 2010 survey, 61.1 % of children aged 13–15 who were not enrolled in school had dropped out of school for financial reasons (BPS 2011).

There is also a decline in enrollment for children at ages 13–15 whose parents have junior secondary education, but the decline is not as sharp as in the case of parents who have primary school education. It is in the higher age groups of children (aged 16–18 and 19–24) that very clear evidence emerges that higher enrollment is associated with higher education of the parents.

The main limitation of this analysis is that it is restricted to the children who were living in the same household as their parent or parents. There is no information about those living outside the home, which would of course include many children at this age who had left home to study or work, or in some cases to marry and establish their own household. Such biases in the data need to be kept in mind in interpreting the results.

Table 12.2 presents the relationship between the educational attainment of the head of household and that of their children aged 20–24 who are living in the same household. The bolded proportions for the diagonal terms in the matrices indicate the children who followed their parents' educational attainment; the proportions for off-diagonal terms reflect the mobility of children's attainment – either upward or downward – compared to their parents' education.

The most striking finding is that among this group of 20–24 year olds living with parents, educational attainment is heavily influenced by that of their parents. Thus, where parents have primary school education or less, only 7 % of the children have reached tertiary level; where parents have junior secondary education, 20 % have reached tertiary level; where parents have senior secondary education 43 % have

[8] This section uses the age-specific enrollment rather than GER or NER as the 2010 Population Census does not provide a GER or NER for Senior Secondary School and Tertiary because the timing of census data collection was during the transition time of students from senior secondary level to tertiary level.

Table 12.2 Educational attainment of children aged 20–24 by parent's education (%)

Education of head of household	Education of children (aged 20–24)					
	Primary and less	Junior sec.	Senior sec.[a]	Tertiary[a]	Total	N
Primary and less	**33.3**	27.3	32.1	7.3	100	694,592
Junior secondary	8.0	**18.5**	53.6	19.9	100	132,319
Senior secondary	3.1	6.2	**47.6**	43.1	100	166,952
Tertiary	1.1	1.2	20.3	**77.4**	100	67,733

Source: 2010 Population Census (IPUMS International)
Note: [a]Small numbers of children are still studying

reached tertiary level; and where parents have tertiary education, 77 % have reached tertiary level. Looked at in another way, 60 % of the children of parents with primary school education or less have not advanced beyond junior secondary school; this is true of only 9 % of children whose parents had senior secondary education. Thus while some educational mobility is certainly apparent in the figures, it is the immobility of those whose parents had little or no education that stands out. Unfortunately, a relatively high proportion of children (33.3 %) whose parents had less than completed primary school education did not complete primary school, even though they were at school at a time when the compulsory 9-year basic education program had already been implemented.

Conclusions

Educational trends in Indonesia have shown encouraging improvements in terms of enrollment and attainment over recent decades. The average number of years of schooling has increased and enrollment at primary school has been universal over the past decade, though not all children complete this level. However, the quality of education remains poor in comparison with other countries. Urban-rural and regional differences also remain wide, not only between provinces but also across small administrative areas within provinces. Though the educationally most disadvantaged provinces (Papua, West and East Nusatenggara) are all located in Eastern Indonesia, some other provinces of Eastern Indonesia are doing much better, and there is no clear east-west division in educational performance. What is clear is that Indonesia as a whole is still far from achieving the objective of universalization of nine-year compulsory basic education. The transition from primary school to junior secondary school needs more serious consideration, as the enrollment rates for junior secondary have tended to level off well below the desired 100 %.

Using the 2010 Population Census, it is possible to compare educational enrollment and attainment across districts and across cohorts without much concern about adequate samples. Across districts, poverty contributes negatively to educational enrollment in Indonesia, particularly in a district with high poverty level, while higher per capita income at district level is associated with but does not guarantee improvement in enrollment. At the individual level, socio-economic background is a key factor in determining the educational performance of children. There is ample evidence that children whose parents have less education and a lower-status occupation tend to perform worse than other children, although the proportion has been tending to decrease over time. There is a need to bring people out of the "vicious cycle of poverty" in order to improve educational performance. One way to level the playing field a little would be to provide quality early childhood education to disadvantaged children. However, at present, early childhood education serves to reinforce the advantage of the better-off. Only 36 % of 4–6 year old children from the poorest 20 % of families in Indonesia attended early childhood education programs in 2010, compared with 68 % of similarly aged children from the richest quintile of families (Suryadarma and Jones 2013: 12).

Looking to the future, cohort succession, with better-educated younger cohorts replacing educationally disadvantaged older cohorts, will ensure that the educational attainment of the working-age population will continue to increase. This chapter has not taken the step of projecting the educational composition of the population forward over the coming decades. Such an exercise has been undertaken by Lutz and Samir (2011); not surprisingly, it shows considerable improvement in the overall educational attainment of the Indonesian population over time, keeping the educational composition of Indonesia's labour force well ahead of that in India, for example. This will be crucial for raising productivity of the workforce and consolidating Indonesia's position as a middle-income country, though it is not only years of education, but what is learned during those years, that will count.

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Chapter 13
Education in China, India and Indonesia: an Overview

Divya Sunder Ramchand

Education expansion, a key development goal in India, China and Indonesia, has proceeded at very different paces. The individual chapters of this section outline the trajectory of expansion in each country. At the most basic level, while all countries have a certain number of years of compulsory schooling as a requirement, each country has had a varying degree of success in achieving its target. Indonesia and China both have 9 years of compulsory basic education as a goal, but as mentioned in the relevant chapters, recent data found that at least one third of Indonesian children are not completing lower secondary school, while in China lower secondary enrollment reached what seems to be a 'saturation point' at 93 % (perhaps due to the data quality issues which cloud such figures). India has set itself the goal of achieving free and compulsory education for all children between the ages of 6 and 14, though from the available data, it has had a hard time achieving even universal primary education from Grades 1 through 5. From another, and slightly more comparable angle, if we look at the number of years a child stays in school on average, recent UNESCO estimates of the school life expectancy[1] of primary and lower secondary children stand at about 9.4 years in China, 7.9 years in India, and 9.0 years in Indonesia for the year 2011, significantly improved from earlier years – from 7.5 years in China (1995); from 6.5 years in India (2002); from 8.0 years in Indonesia (1995) – an increase of around 1 year per decade.

Along with the pursuit of increasing the number of years children stay in school, there has been a strong shift in the attitudes towards the quality of education in all

[1] School life expectancy (primary and lower secondary) indicates how many years children of primary and lower secondary school going age are likely to spend in the education system excluding repeated grades, assuming that the probability of a child being enrolled in school at any particular age is equal to the current enrolment ratio for that age.

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three countries. At the national level, the dialogue on the 'learning levels' in classrooms has taken the spotlight, rather than merely achieving targeted 'enrollment levels' (Jones and Ramchand 2013). Also, there is a gradual uptake in the use of standardized tests and other teaching indicators to assess the quality of learning and teaching in classrooms (in this respect, Indonesia is ahead of China and India in its willingness to administer standardized testing such as PISA, PIRLS and TIMSS across the country, although test results reflect somewhat dismal performance relative to countries of similar income levels and education spending. In China, the test was selectively administered and data was released only for Shanghai, of course with stellar results. In India, the test was administered in two states in 2009, Tamil Nadu and Himachal Pradesh, but stopped being administered in the 2012 round (OECD 2010, 2014). At the individual level, parents in all three countries are investing heavily in shadow learning and private tuitions, and poor families are even opting for fee-paying schools of perceived higher quality over free schooling in the hope of improving their children's future. The 'shadow' nature of this makes it hard to pin down the extent of the investment they make, but it is by no means unsubstantial according to estimates (see Table 13.1). Even in rural India, survey results found that in 2013, 45.1 % of rural children in Grades 1–5 received some private input in the form of private schooling or tuition, an increase from 38.5 % in 2010 (ASER 2010, 2013).

An important point to note here is that even if publicly provided education is 'free' it is not necessarily 'costless'. While school fees may not be charged in some government funded school, school uniforms, books, transportation to school, midday snacks are significant costs which affect parents' ability to afford children's education. In crafting education policy to encourage the poorest families to keep their children enrolled in school, these ancillary costs need to be taken into account. In this respect, India's education policy has, at least on paper, acknowledged this in its Right to Education Act.

Once enrolment goals at lower levels of education are achieved, improving school attendance and learning at higher levels requires addressing transition points between levels of schooling (e.g. primary to lower secondary, compulsory schooling to non-compulsory schooling), which is when most of the attrition occurs. Barriers to continuation include higher fees, transportation to new schools which may be further away, and the opportunity cost of time spent in school for older children who could alternatively enter the workforce. Ensuring that possible transition obstacles are smoothed out (e.g. ensuring that assistance for children of needy

Table 13.1 Private education attendance in India, China and Indonesia

	India	China	Indonesia
% of all primary school going children attending private institutions	17.0 % (2003)	5.7 % (2012)	17.3 % (2012)
% of all secondary school going children attending private institutions	41.9 % (2003)	11.0 % (2012)	41.7 % (2012)

Source: UNESCO Institute of Statistics

families already on scholarship carries through to higher levels of schooling) are crucial steps which contribute to elevating attendance levels at higher levels of schooling.

Another commonly used milestone of educational expansion in a country is literacy, but it has proved to be a somewhat problematic measure. In an ideal scenario, literacy ought to be measured by the canvasser method where each member of the household is tested on reading and writing by the surveyor. Practically, this would simply be too demanding on the census operation. Moreover, overall literacy measures tend to understate the effect of educational expansion initiatives which mostly target younger age groups, and because of this have a very muted impact on overall literacy rates due to slow cohort replacement, thus making literacy a blunt measure of the overall progress of educational expansion.[2] At lower levels of educational development, literacy as a measure holds some merit. In countries approaching middle-income status or where education expansion has progressed beyond the basic level, an improvement in literacy from say, 98 to 99 %, would no doubt involve the gargantuan task of making education accessible to the most marginalized segments of a population, but the miniscule increment in the number lacks the punch to make the reader grasp the immensity of the achievement. As education expansion proceeds in these three countries, the relevance of literacy data in measuring educational progress would need re-examination.

As mentioned in the introductory chapter, the gender gap in educational attainment has improved tremendously and is no longer an issue other than in India where it remains a concern for girls at secondary and post-secondary level even in the most educated households. On the other hand, regional and socio-economic differences in educational attainment have proven much harder to transcend (Jones and Ramchand 2014). Importantly, in all three countries, these disadvantages act in a compounding fashion and any plan to make education accessible to the most marginalized segments of the population requires a holistic, targeted, and concerted effort at tackling the plethora of barriers faced. Merely in terms of funding, these groups would need far higher expenditure per student than the national average, but local economies simply fall short of being able to generate sufficient funds and resources for the most basic schooling provisions. To overcome this, increased support from central government coffers via centralized funding systems is necessary. Towards this, China's 2006 revamp of its education funding system via the Expense Guarantee System which increased the role of the central government in helping central and western regions co-fund education spending relative to coastal regions, was a strong step forward in targeting pooled resources at groups which needed them most.

[2] India did embark on mass adult literacy programs, but failed to reach their targeted improvements in adult literacy. Indeed, improving literacy of older age groups is undoubtedly difficult in areas with already low literacy levels, but interestingly, India's experience found that adult literacy was also slow to improve in high literacy areas, likely due to misaligned incentives due to adults' access to 'literate proxies' in the form of literate family members.

The rural-urban gap in educational attainment is another commonly used measure of the equality of educational development across a country. In some countries, inter-regional gaps in educational attainment, such as the coastal versus inland gap in China, and the EAG (Empowered Action Group) versus non-EAG gap in India, add another level of spatial stratification in educational access. Unfortunately, census data are not perfect for measuring these gaps in educational access because of migration. In theory it would be possible if census surveys recorded education at the time of migration as well as at the time of survey, but in practice the scale of census operations does not allow for such level of detail. As pointed out in the chapter on China by Zhao Litao, census data in China captures population by current residence rather than *hukou*.[3] This causes an overestimation in the rural-urban gaps in school completion rates due to rural residents migrating to urban areas to further their education. In Indonesia, census enumeration is done on a de jure basis for permanent residents and on a de facto basis for non-permanent residents. In the case of India, the census bureau adopts a mixed approach. Despite our inability to rely on these estimates of rural-urban or inter-regional differentials, it is certain that spatial gaps in educational attainment remain wide in all three countries with superimposed effects of other disadvantaging factors (as mentioned in Bilal Barakat's chapter) making them hard to transgress.

Education's auxiliary benefits are many, the most obvious ones including improved health, longer life expectancy and also as a 'soft' approach to family planning witnessed in the lower fertility rates achieved among more educated families. Moreover, as pointed out in the chapter on India, education also serves as a means of establishing a new identity which is separate from a person's identity derived from family history, social status and the connotations inextricably associated with it. If education is made available equally to all, it can serve as a means of moving away from historically recognized status symbols and as a means of economic and social mobility. However, as the experience from the developed world has shown us, ensuring that education is a force enabling intergenerational economic mobility rather than inhibiting it has proved difficult. Among more educated households, investments in shadow learning, exposure to mental stimulus from a young age, having access to learning material, and individual attention all serve to reinforce their advantage. At the other end of the spectrum, in households where parents have very little or no education, the inertia and obstances to overcome in the course of achieving even basic education for their children is immense. Nonetheless, among those in the bottom rungs of the existing social ladder, education can potentially be a valuable alternative source of stratification.

Providing early childhood education is another way of leveling the playing field for marginalized children, though it is largely underprovided in the public education system. While it is not dealt with in depth in this volume, this by no means implies its lack of importance, but more the result of a lack of data.

[3] The de facto enumeration started in the 2010 census while the 2001 census was done on a de jure basis.

From an individual's perspective, the most tangible benefit of investing in their schooling is the returns which they derive from it. There is thus the added task for governments to work with private firms and multinational corporations to strategically develop industries to create higher skilled jobs for the more educated population that will emerge. Once individuals are able to realize the private returns to education in the job market, this would arguably provide the best incentive to invest in their own human capital development. On the flip side, the resulting economic waste and individual dissatisfaction from underemployment is an issue which arises when labour markets are not developed in tandem with education expansion. For example in China, the massive expansion of higher education since the late 1990s resulted in a deluge of college graduates that its labour market was unable to absorb resulting in higher unemployment rates among college graduates (Li et al. 2014).

Beyond the basic level of compulsory schooling, the question of how much schooling is the 'right' amount then becomes pertinent. The bulk of the population may well decide that a secondary education is sufficient to secure a place in the workforce, and thereafter rely on on-the-job training to progress up the ranks. In China and Indonesia, the proportion of the population aged 20–64 whose highest completed education level was secondary schooling in 2000 stood at around 55 % and 36 % respectively, up from an estimated 17 % and 12 % in 1970, and is projected to reach 74 % and 57 % in the year 2030. The proportion of the population aged 20–64 with tertiary education is not expected to go much higher than 10 % in all three countries by 2030 (Lutz et al. 2007; KC et al. 2010). Oftentimes, acquiring all one's education at the 'right age' may not be financially possible or efficient in terms of whether the skills acquired will be utilized in the labour force. Channels to allow those who have missed out on upper secondary, vocational or higher education to make up for it at a later stage can assist those who were not able to progress all the way to their desired educational goal immediately, and at the macro level may increasingly become a more viable solution to efficiently utilizing education resources.

As the introduction pointed out, and is worth re-iterating here, intergenerational transfer of advantages and disadvantages in education attainment are significant and their implications go beyond just education because of its knock-on impact on fertility, life expectancy, spatial mobility among other factors, which serve to reinforce educational advantages/disadvantages. All this serves to emphasize the importance of at least compulsory schooling, which reaches somewhat to the junior secondary level in these three countries, of reasonable quality which equips youth with a bit more than functional literacy to prepare for the future.

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Part IV
Migration

Chapter 14
Internal Migration in China: Changes and Trends

Zhenzhen Zheng and Ge Yang

Introduction

After the economic reform and rapid development in coastal areas of China, an ever increasing flow of labor from rural to urban, and from economically less developed to more developed areas has lasted nearly three decades. China has experienced the largest migration flow in history, mainly driven by regional economic and demographic disparities. While rapid industrialization in coastal areas produced enormous and long-lasting demand for labor, especially among the labor intensive industries, policy relaxation and reform removed rural-urban barricades for temporary migration and lowered migration cost and risk. Agricultural modernization and mechanized farm work have released more rural labor. Parallel with the economic development and modernization, coastal areas and large cities led the demographic transition and stayed at low fertility since the 1990s. With rapid economic development and ever shrinking youth population, the demand for migrant labor has been very strong. Population migration has made a great contribution to economic growth in China, meanwhile changing the population distribution and the population structure of both places of origin and destination locations.

Population migration has also significantly changed urban-rural composition in China, since the major migration flow is from rural to urban. The urbanization process in China has been closely related to the changes in migration and related policies. China experienced a slow increase in the urban population proportion during the first three decades of the People's Republic, from 13.3 % in 1953 to 20.9 % in 1982 (NBS 2011). But the situation changed dramatically in the following three decades, as shown in Table 14.1.

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Table 14.1 Percentage of population residing in urban areas, China, 1950–2050

Year	Percentage	Year	Percentage	Year	Percentage
1950	11.8	1985	22.9	2020	61.0
1955	13.9	1990	26.4	2025	65.4
1960	16.2	1995	31.0	2030	68.7
1965	18.1	2000	35.9	2035	71.3
1970	17.4	2005	42.5	2040	73.4
1975	17.4	2010	49.2	2045	75.4
1980	19.4	2015	55.6	2050	77.3

Source: United Nations, Department of Economic and Social Affairs, Population Division (2012). World Urbanization Prospects: The 2011 Revision, CD-ROM Edition
Note: The percentage was 52.6 % in 2012 by NBS of China. Data after 2015 is projected by UN

Although different factors contributed to the increase of urban residence, including natural increase, definitional changes in statistics and enumeration,[1] in-migration and the settlement of temporary migrants was undoubtedly the most significant factor. As estimated by Chan et al. (2008), in-migration was a major component of urban growth in China after 1978, especially during 2001–2005, with 88 % of urban growth attributed to net in-migration. A recent study by Wang and Huang (2014) estimated that migration has made a significantly higher contribution to urban population growth over the last two decades. The shares of urban population growth by natural growth, administrative boundary change, and migration were 33.5 %, 41.9 %, and 24.8 % in 1991, compared to 9.2 %, 17.6 %, and 73.2 % in 2010 respectively. The share of migration surpassed the share of natural growth in 1993 and the share of administrative change in 1996 to become the dominant factor in urbanization. By the year 2010, the urban proportion of the population reached 63.5 % along the coastal provinces and municipalities, which attracted 77.7 % of national total cross-provincial migrants (estimated from tabulations provided by NBS 2012).

This chapter describes the most recent profile of internal migration in China by using 2010 census data, highlights the changes in the first decade of twenty-first century by comparing it with earlier census results, and analyzes the impact of migration on population structure in major sending and receiving provinces. The future trend of migration and policy implication will also be discussed.

[1] The definition of urban in China has changed over time. China adopted an approach much clearer and more consistent with internationally accepted practice since the 2000 population census. The inclusion of *de facto* residence, rather than by household registration only, also included more urban residents than before. The current definition of urban has been enacted since August 1, 2008 ("Urban-Rural Definition for Statistics", refer to the website of National Bureau of Statistics, http://www.stats.gov.cn/tjbz/t20061018_402603208.htm).

Data Definition and Sources

The definition of migration in China is not only related to time and space of people's move, but also related to the *hukou* status, that is, household registration status. The household registration system, which was implemented for registering vital statistics but served the added function of urban population control, was developed in 1958 and implemented nationwide after 1959. A *hukou* status not only defines a person's rural or urban identity, as many authors have pointed out, but also identifies a person's residence locality. Many other roles have been added to the *hukou* status over time, including social benefits and employment opportunities. The identity is closely related to opportunities of education, employment, housing, as well as entitlement of social welfare and public service. As related policies, regulations and benefits vary by province and by city, a *hukou* identity has a strong influence on one's work and life. Some functions had been separated from *hukou* status after reform, especially after the 1990s.

Change of *hukou* status from rural to urban or from elsewhere to large cities have been strictly limited since the establishment of *hukou* system. Migration with *hukou* change is mainly for marriage, family reunion, and due to officially permitted work shift (of state employees). Migration with *hukou* change has been enumerated separately from migration without *hukou* change in the population census, and is also recorded by the *hukou* registration system (managed by Ministry of Public Security). The volume of migration with *hukou* change has been relatively stable at less than 20 million annual flow for decades.

Migration without *hukou* change was firmly controlled before the 1980s. The management gradually relaxed thereafter, especially after 1992. People who move across county or city boundaries without *hukou* change and leave their household registration origin for more than half a year have been regarded as "temporary migrants"; they are also referred to as "floating population" in some literature. Although different data sources reported different enumeration results on temporary migrants (Chan 2012), they can be identified clearly and consistently in the population census and intra-census 1 % population survey.

In this chapter, we use migrant (instead of temporary migrants) for those whose current residence at the time of the census is not the same as their place of *hukou* registration (meaning that they moved across administrative boundaries without *hukou* change), and have left their *hukou* registration place for 6 months or longer. This excludes those whose residence differs from registration address within a city (*shiqunei renhu fenli*) since they are actually not migrants.[2]

The data source for this chapter is mainly population census data published by the National Bureau of Statistics (NBS) for year of 2010 (the 6th census) and 2000 (the 5th census).

[2]The migration population in this chapter is most close to that of D category in Table 14.1 of Chan's paper (2012).

The Internal Migration Flow: A Profile

The number of migrants increased during the past three decades, with an accelerated speed in the late 1990s. Figure 14.1 shows the number and average annual rates of increase of migrants in China from 1982 to 2010. The number increased from 6.57 million in 1982 to reach a historical 221.43 million during 2005–2010, about 17 % of the total population. The number of migrants is still increasing; there were 236 million migrants in 2012, an increase of 6.69 million compared to the end of 2011, according to "2012 National Economy and Social Development Statistics" released by National Bureau of Statistics (NBS 2012). In the large receiving cities such as Shanghai, Guangzhou, and Beijing, about 40 % of residents are migrants.

Most migrants are young workers moving from rural to urban areas for work—there were 150 million migrants from rural areas in 2010. The proportion of rural migrants was 54 % in intra-provincial migration, and nearly 82 % in inter-provincial migration. Table 14.2 provides an estimation of migrants by their origin and destination

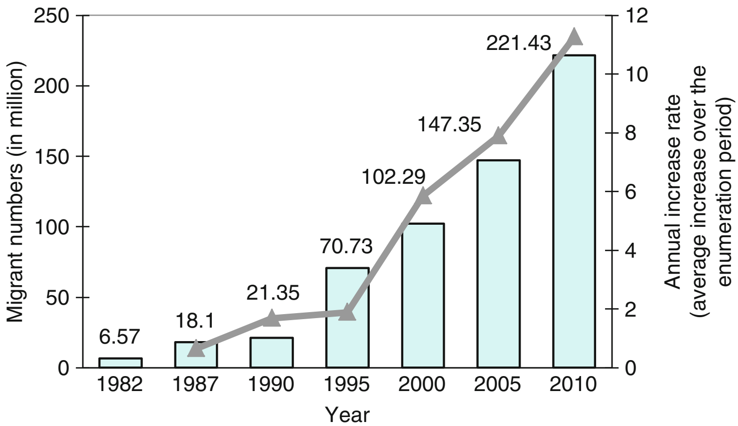

Fig. 14.1 Number of migrants and average increase rate, 1982–2010 (Source: data for 1982–2005, Duan et al. 2008, estimated from population census and 1 % population survey; data for 2010, Population Census Office/NBS 2012)

Table 14.2 Types of migration by original and destination

	Urban-urban	Rural-urban	Rural-rural	Urban-rural	Sub-total
Total migrants	34.4	52.7	10.3	2.6	100.0
Intra-provincial	42.9	45.8	8.2	3.2	100.0
Inter-provincial	17.0	67.0	14.6	1.4	100.0

Note: Estimated by long-form of 2010 Census. Origin is defined by "1 township" and "3 village of town" and urban origin is "2 residence committee of town" and "4 street" in household registration type (item R10 in census form). And destination is defined by current residence category
Source: Population Census Office/NBS 2012

using four categories: (1) migrate from rural to urban; (2) from rural to rural; (3) from urban to rural; and (4) from urban to urban. The major flows nationwide are from rural to urban (52.7 %) and from urban to urban (34.4 %). However, a large proportion of migrants move across provincial boundaries from rural to urban (67.0 %), while 42.9 % move within the province from one city to another.

The main migration destinations have always been eastern and coastal areas. The Pearl River Delta attracted large numbers of labor migrants in the 1980s and early 1990s, and the number of in-migrants in Guangdong has been the largest. More than half of the residents in some cities of Guangdong such as Dongguan, Shenzhen, and Zhongshan are migrants. However, the migrants are highly sensitive to economic changes, and some new trends have been observed in recent years. The attraction of Changjiang Delta (including Shanghai, Jiangsu, and Zhejiang) has grown stronger and the rate of increase of in-migrants to this area was higher than that of Pearl River Delta in the last decade, with Zhejiang experiencing the highest rate of increase. Some scholars concluded that the center of gravity for immigrant distribution has moved from the south to the north, and Changjiang Delta metropolitan area has replaced Pearl River Delta metropolitan area as the new main immigration destination in the twenty-first century (Wang et al. 2012). The cities of Shanghai, Beijing, Tianjin and Suzhou have the fastest in-migration increase in the first decade of the twenty-first century (Yu 2012).

The major sending provinces are still Anhui, Jiangxi, Henan, Hubei, Hunan, Guangxi, and Sichuan as always, and along with Guizhou, they made up 63 % of out-migration nationwide. While Anhui and Henan had the largest increase of out-migration flow and Guizhou had a very high rate of increase over a decade, the stock of out-migration of Sichuan has remained relatively stable at 4–5 million. Although Guangdong is a major receiving province, it had the highest rate of increase of out-migration during 2000–2010.

Economic factors are one of the main forces driving migration flows. Cities with high income and high GDP per capita are more likely to be destinations of large migration flows. The first tier of provinces according to GDP per capita (about 10,000 dollars and above) in 2012 including Tianjin, Beijing, Shanghai, Jiangsu, Inner-Mongolia, and Zhejiang (Table 14.3), are all major inter-provincial migration

Table 14.3 Four groups of provinces by GDP per capita in 2012

GDP per capita ($)	Province/municipal cities
>10,000	Tianjin, Beijing, Shanghai, Jiangsu, Inner-Mongolia, Zhejiang
6000–9000	Liaoning, Guangdong, Fujian, Shandong, Jilin, Chongqing, Hubei, Shaanxi
National average: 6091	
4000–6000	Hebei, Ningxia, Heilongjiang, Shanxi, Xinjiang, Hunan, Qinghai, Hainan, Henan, Sichuan, Anhui, Jiangxi, Guangxi
3000–4000	Tibet, Yunnan, Gansu, Guizhou

Source: Adopted from: Liu, Shucheng. 2013. The gradient development and urbanization: two driving forces of future economic development in China. Chinese Social Sciences Today, April 10, A06.

destinations except Inner-Mongolia. They attracted 45 % of inter-provincial migrants nationwide in 2005–2010 (the share of Guangdong alone is 25 %). The in-migration rates of Shanghai, Beijing and Zhejiang are the three highest among all provinces. The growth of in-migration of Tianjin and Fujian was most significant during this period, obviously related to the development of a new coastal economic zone in Tianjin and the Fujian-Taiwan economic zone in Fujian.

The economic factor is also a driving force of out-migration. The three provinces with the highest out-migration rates, Anhui, Jiangxi, and Guizhou, had relatively lower GDP per capita in the third and last tier (below 5,000 dollars), while other major sending provinces as Henan, Hubei, Hunan, Guangxi, and Sichuan are all in the third tier.

Demographic factors also influence migration. A provincial level multivariate migration study (Wang et al. 2012) found that size of population in the origin province is the second most influential determinant of migration (it is actually the most significant determinant of out-migration, given that the most significant pull factor is urban expendable income per capita). Almost all the major sending provinces mentioned earlier have a large population size with higher population density and higher proportion of rural residence. Above all, they are the provinces with later demographic transition and higher fertility among the rural population, hence they have adequate young labor to send. By contrast, most of the receiving cities and eastern rural areas are in the post-demographic transition phase and some even experienced negative population growth in the 1990s. They are the first areas to enter the era of population aging as well. They have a strong demand for young labor to maintain the rapid and continuing economic growth.

Figure 14.2 shows the net inter-provincial and intra-provincial migration by province/municipal cities. Guangdong is a province with a large migration in-flow

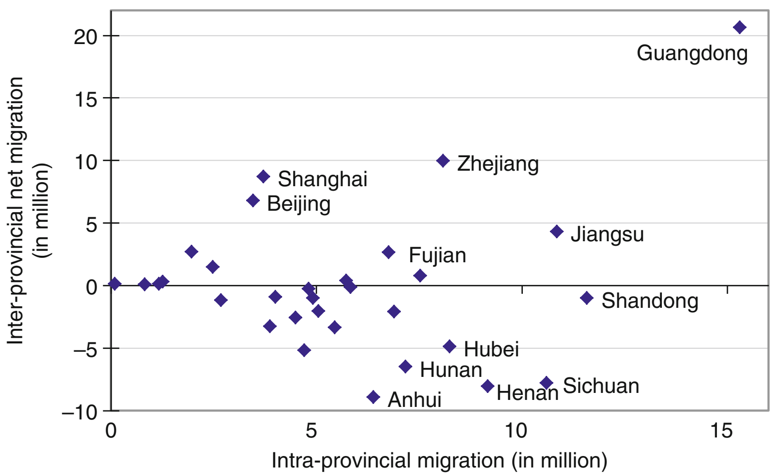

Fig. 14.2 Intra- and inter-provincial migration flow (in million), 2005–2010 (Source: Population Census Office/NBS 2012)

and also large intra-provincial migration, and it has been experiencing a fast increase of out-migration flow in recent years, reflecting the high sensitivity of migrants to economic change. Shandong and Sichuan have very large intra-province migration flows due to local economic growth and demographic change. Both Sichuan and Shandong had below-replacement fertility in 1990, and fertility further fell to below 1.5 children per woman in 2000 (NBS and EWC 2007).

To summarize, the volume of internal migration in China during 2005–2010 was unprecedentedly large, was focused on three major destinations in eastern China, and showed some minor changes in geographical pattern.

Changes in Composition of Migrants

The migrants are young, mostly aged 15–30, with a very high proportion aged 20–24 (see Fig. 14.3). The structure is related to the age structure of the total population and the change of migration timing in recent years: the age group 20–24 in 2010 is significantly larger in size than the preceding and following age groups; with more youth completing 9-year compulsory education or spending even more years in formal education, migrants in the younger age group shrank significantly and there might be a cumulative effect due to a delayed age of out-migration. A large proportion of married migrants do not bring their children along, and therefore there are few children under age 15 in the migration stream, leaving a series of problems relating to the "left-behinds" in their rural home.

The age distribution of migrants has changed over the last three decades along with the increase in numbers. It is no longer composed mostly of working girls and working boys (*dagongmei*, *dagongzai*) as the proportion of married couples has

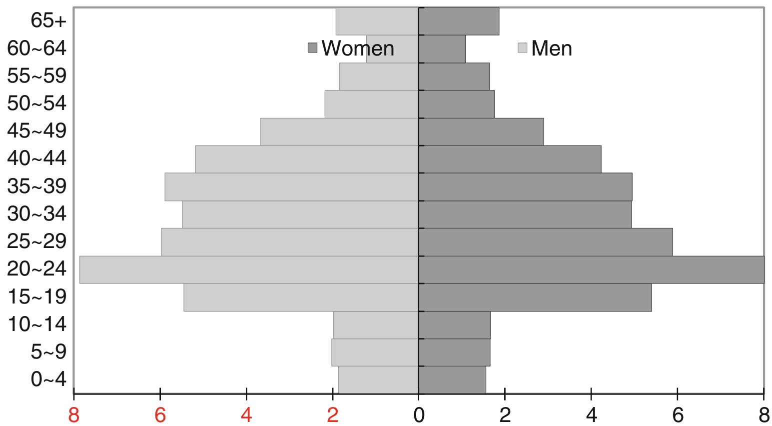

Fig. 14.3 Age structure of migrants, 2005–2010 (percentage of total migrants) (Source: Estimated from Population Census Office/NBS 2012)

increased, and more couples live at the destination with their children. The median age of migrants increased from 23 in 1982 to 29 in 2010. Twenty-four percent of migrants left their *hukou* place for 6 years or more; in Shanghai and Beijing this was even higher, about 32 % and 30 % respectively. Those who stay longer at the destination make an important contribution to the growth of migrants. The rate of increase of migrants aged 35 and above is much higher than for the younger age groups (see Fig. 14.4). Rural people who migrated out in early years have become long-term settlers in cities, and some of their children also joined in the urban labor market. The two generations are still identified as "migrants (*liudong renkou*)" or "migrant workers (*nongmingong*)," however some of the youth actually grew up in the city and never worked on farms.

Nearly half of migrants are women. The migrant population in 2005–2010 is more gender balanced than in earlier years in the 15–30 age group (Fig. 14.5). Such a change is due to the delay of migration timing among young women, who now tend to migrate out at the same age as young men, whereas before 2005, young women on average always migrated out at a younger age than young men.

The age pattern of inter-provincial migration is shown in Fig. 14.6. Migration rate rises dramatically after age 18 for both men and women, and it reaches its peak of above 14 % around age 23–26 for men, and above 12 % around age 20–24 for women. The change in migration timing is obvious from the inter-provincial migration age pattern, where migrants mainly move from rural to urban areas for work. There are several possible reasons why women are migrating out at an older age than before: narrowed gender gap in compulsory and post-compulsory education, more families willing to invest in education for girls (due to either fewer children in the family or more resources available), better employment opportunities for higher educated youth, and delayed age at first marriage. However, some young men seem to migrate out younger than before, which might be related to the continuous wage

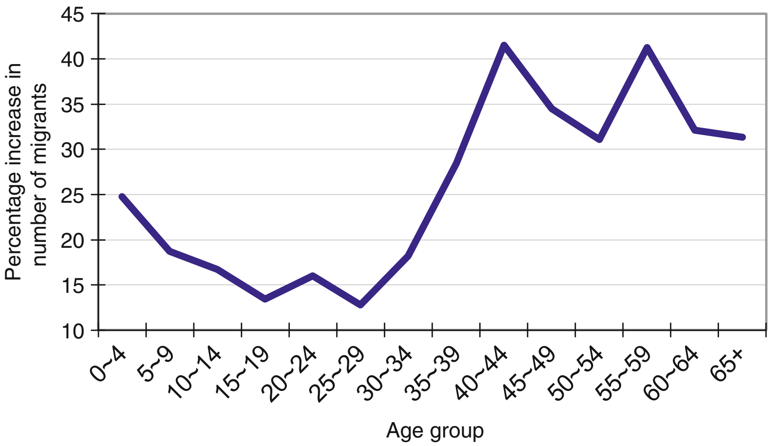

Fig. 14.4 Percentage increase in number of migrants by age group, 2000–2010 (Source: Estimated from 2000 to 2010 population census)

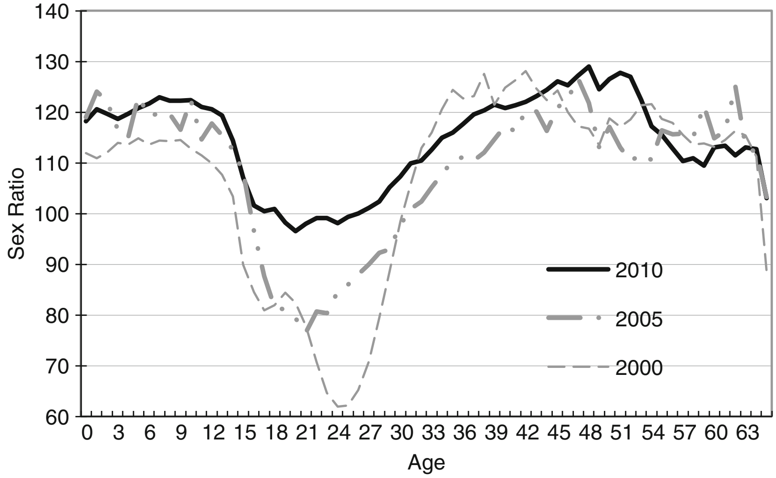

Fig. 14.5 Sex ratio of migrants by age, 2000–2010 (males/100 females) (Source: 2000 and 2010 population census, 2005 1 % population sample survey)

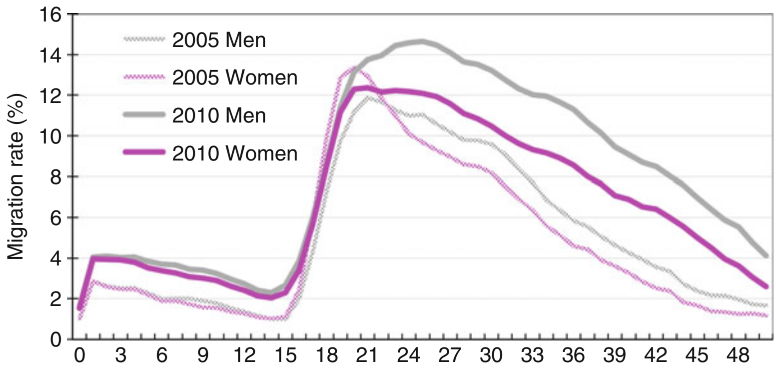

Fig. 14.6 Migration rates by age and sex, inter-provincial migration, 2005–2010 (Source: 2010 population census and 2005 1 % population sample survey)

growth for migrant workers in recent years (National Rural Fixed Site Survey Office 2011). Observation in less developed areas revealed that rural boy students who are more likely to drop-out from middle school are those with lower academic scores or from poor families (Yi et al. 2011).

Figure 14.6 also shows a higher migration rate in older age groups in 2005–2010, implying the trend of settling in the destination whereas circular or seasonal migration pattern has become less popular. Meanwhile, women still return to their hometown earlier than men, mainly for family reasons such as getting married, having a baby, or taking care of school children. However, the proportion of women moving for work increased significantly during the first decade of the twenty-first

Table 14.4 Education distribution of migrants, 2005–2010 (%)

	Intra-provincial		Inter-provincial		Age 20–24, national total[a]	
Education	M	F	M	F	M	F
Primary or lower	17.3	22.0	16.6	21.8	6.7	8.1
Middle school	39.1	38.3	54.1	51.2	46.1	47.0
High school	26.2	23.5	17.7	15.6	22.2	19.2
College or above	17.4	16.3	11.7	11.5	25.0	25.7
All levels	100.0	100.0	100.0	100.0	100.0	100.0

Source: Population Census Office/NBS 2012
[a]Population of age group 20–24, including migrants and non-migrants

Table 14.5 Difference in percentage on occupational distribution of migrants, 2000–2010 (percentage point[a])

Occupation	Intra-provincial	Inter-provincial
Head of government, parties, enterprises, …	0.0	1.1
Professional and technical personnel	–1.0	1.8
Office staff	0.2	1.3
Workers engaged in commerce and service trade	10.3	7.9
Workers engaged in farming, forestry, …	–10.6	–6.8
Workers engaged in industrial production, transport, …	1.0	–5.3

Source: Zheng 2013, estimated from 2000 to 2010 population census
[a]The listed values are percentage point differences, which is equal to the percentage of migrants who working in the occupation in 2010 minus the percentage in 2000 of the same occupational share

century, with a rise of 10 percentage points. The increase is even more significant among inter-provincial women migrants, from 60 to 79 %.

Most migrants have 9 years or more of formal education (Table 14.4); and the proportion of inter-provincial migrants having post-compulsory education increased significantly during 2000–2010, while the proportion of intra- and inter- provincial migrants with primary or lower education fell by 2.5 percentage points and 6.4 percentage points respectively. The improvement in education distribution among migrants is consistent with the education transition nationwide, the effect being most significant for age group 20–24. More employment options and better development opportunities provided mainly by coastal cities are clearly attracting young people with higher levels of education.

Corresponding to the change in educational attainment among young migrants, change in occupation shows a slight increase in the proportion of professional and technical personnel among inter-provincial migrants, and a decrease in the proportion of workers engaged in farming, especially among intra-provincial migrants (Table 14.5). As a response to the structural change in the economy and also contributing to the change, more migrants in 2010 worked in tertiary industries.

The Impact of Migration on Demographic Distribution

The large flow of young workers to eastern and coastal cities, with a large proportion staying long-term, would obviously change the population size and structure of both origin and destination. Some of the socio-economic and demographic impacts of the change are observable in a relatively short period, while others will take longer.

Rural to urban migration is a major driving force of urban population growth. Fertility has been very low in most cities, where TFR is approximately 1 or even lower. The momentum accumulated before 1980s has worn out, and natural population growth of cities is less important. The number of urban residents came to exceed rural residents since 2011 in China, and rural-urban migrants made a great contribution to this historical turning point. A similar phenomenon has also been observed in other developing countries such as in Thailand and Indonesia, where rural to urban migration contributed 80 % and 68 % to urban population growth respectively (Economic and Social Council, United Nations 2013).

Since all the major sending places are highly populated provinces, the impact of out-migration on change in population size of origin is small relative to the impact of in-migrants to the major destinations, especially to the three in-migration centers. For example, Beijing has tried very hard to control urban population size for several decades but the target is always difficult to reach. The "City Plan of Beijing 2004–2010" envisages control of the long-term resident population of Beijing to under 18 million by 2010, but the population census result of the same year shows that Beijing current residents are more than 19.61 million. Shanghai has also been facing the dilemma of urban population capacity and economic development.

However, such a large flow of in-migration is needed for sustaining economic development in these mega-cities. Figure 14.7 shows the age structure of local residents and in-migrants, and we see that in the 20–39 age group, the number of migrants is much larger than the number of residents with a local *hukou*. The mega-city is lively and the economic growth is sustainable because of the work performed by the young in-migrants. The figure also shows that the number of local residents under age 20 is shrinking, and they cannot replace older age groups exiting the labor force. Therefore, Shanghai still needs more in-migrants to fill the gap to maintain its economic growth in the future. The Shanghai story is representative of other eastern cities.

The out-migration from middle and western rural areas contributed greatly to the rise in the proportion of aged population there; correspondingly, as young rural residents moved to cities, this slowed down the aging process of urban areas. In 1982, the proportion of elderly (age 65 and above) was 5.0 % in rural areas, and was 4.5 % in urban areas; in 2000 the rural-urban gap in the elderly share of the population become wider, with 7.4 % in rural areas and 6.3 % in urban areas; in 2010 the gap widened further to 2.3 percentage points. Migration contributed to regional differences in the process of aging. Gansu had the fastest aging population during 2000–2010 (a 64.6 % increase in the share of elder persons in the total population), followed by Heilongjiang, Guizhou, Sichuan, Chongqing, Qinghai, Hubei, Shanxi,

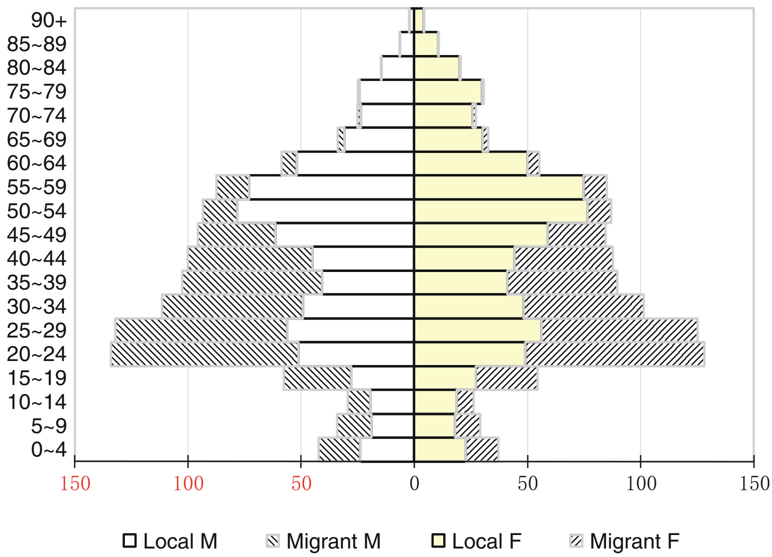

Fig. 14.7 Resident age structure of Shanghai by household registration status, 2010 (in 10,000) (Source: 2010 population census of Shanghai, from website of Shanghai Statistical Bureau, http://218.242.177.53/rkpc/huibian/indexce.htm)

Jilin, Ningxia, and Inner-Mongolia, with a rate of increase above 40 %. Beijing and Tianjin had the lowest rate of increase of 4 % and 2 %, while Shanghai had a 12 % decrease in the proportion of elderly (Lin 2011), obviously due to the large in-flow of young population.

There are three categories of different impacts of migration on population aging: (1) migration slowed down the aging process in 12 major migration destination provinces, such as Shanghai, Beijing, Tianjin, Zhejiang, and Guangdong; (2) migration resulted in a faster aging process in 16 major out-migration provinces, such as Anhui, Jiangxi, Sichuan, Chongqing, and Hunan; (3) migration had a minor impact, mostly in provinces that have mainly intra-provincial migration flow, such as Inner-Mongolia, Jilin, and Yunnan. Note that all the provinces where ageing slowed because of in-migration are developed areas, and most provinces with a faster aging process because of out-migration are under-developed and disadvantaged in terms of elderly welfare. The reality of rural population aging in these areas should be recognized and its social-economic impact planned for.

Future Trend of Internal Migration

Based on the urbanization process and population mobility of other countries, as well as the history of migration in China, we expect that population migration will not decrease in volume in the short term. The urban population in China slightly exceeds 50 % and there is still capacity for further development in urbanization, which will be driven by young people moving from rural to urban areas. As the eastern mega cities continue to attract young migrants, population density will therefore increase and city population will grow further in the three in-migrant centers, namely, Changjiang Delta, Pearl River Delta, and Beijing and Tianjin. However, with the changes in composition of migrant population, the migration pattern and migrant behavior may also change.

Although economic development in western China is catching up as a result of favorable policies under the regional development plans of the state (such as the Western Development Programme since 1999), the existing regional differences are difficult to change; the east coast is and will still be in an advantaged position, and therefore has a stronger pull for young labor. Meanwhile, the “new generation,” (birth cohorts of the post-1980s) differs from the older generation in many ways: more of them migrated in order to learn skills and enrich their experience rather than earn money for the family. Although workers’ salaries have been rising for several years, income is not the only factor holding young migrants in their place of destination. Besides better employment opportunities, more young people are looking for cities with favorable public policies and services, better quality of life and social-cultural environment. Better education facilities have also become a major reason for young migrant parents to stay in cities. As better educated youth join the migration pool, they tend to looking for destinations with a higher standard of living and the less developed areas are obviously not in a good competitive position, while more developed eastern coastal cities are more attractive to high-skilled and highly-educated migrants.

Demographic changes will affect the migration flow. Some provinces with a high proportion of one-child families will probably have more short-distance moves if there are fairly adequate jobs, since the youth prefer to be (or are expected to be) close to their parental home. In 2005, the four municipal cities plus Liaoning, Heilongjiang, Jilin, and Jiangsu had more than 40 % of people under age 30 who are the only child of their family; the percentage was between 30 and 40 % in Sichuan, Zhejiang, Inner-Mongolia, Shandong, and Hubei (Department of Population, Social, Science and Technology and National Bureau of Statistics 2007). Meanwhile, provinces with lower fertility will have fewer young people to send. For example, while the proportion of the population age 0–14 in 2010 was 21.0 % in Henan and 21.9 % in Jiangxi, the proportion was 17.0 % in Sichuan and 13.9 % in Hubei.

From the perspective of labor demand, eastern coastal areas still have a strong need for young labor, although population density is already very high. The main reason is the sustained economic growth and fast process of population aging. As the cohort of the 1950s enters the elderly group, the speed of aging will further accelerate. To adjust to the needs of a young population, the only feasible and practical strategy is to accept more and more young migrants, with the risk of increasing city population size. Eastern and coastal cities have to deal with the dilemma appropriately and practically.

Summary and Discussion

China experienced its largest- ever volume of internal migration during the 2005–2010 period. Although there have been some changes in migration flows and in composition of migrants, the regional pattern and migration distribution overall has remained fairly stable over time, and no significant and sharp change is expected in the near future. Migrants were much more focused on three major destinations – Changjiang Delta, Pearl River Delta, and Beijing/Tianjin area – which received more than 40 % of migrants nationwide. Regional economic and demographic disparities were key factors which influenced migration decisions, while geographic factors such as landform and climate also played a role. The above mentioned factors are relatively stable, and the economically central position and rapid ageing of coastal cities are also predictable and unlikely to change significantly. Therefore, the migration pattern and major streams will not change dramatically despite some efforts by local governments to control, push, or pull migrant streams. Limited success of small towns in most parts of China in boosting their development reveals that small cities without evident development opportunity do not interest young people. The large and already developed cities need to formulate appropriate strategies to further population growth, mainly by in-migration.

Migration contributed significantly to demographic change in both the sending and receiving regions. While most developed mega cities received young labor which allowed them to maintain their levels of economic growth, rural villages were major sending areas which caused them to age faster. It also contributed to changing employment structure; as more migrants worked in tertiary industries, there was a slight increase in the proportion of inter-provincial migrants who worked as professional and technical personnel, while the proportion of workers engaged in farming decreased significantly.

As large cities suffer from problems brought about by large and high density populations, such as environmental and traffic issues, city governments still have to invest more efforts to deal with them by improving planning with a holistic and forward-looking perspective. The three mega city areas (Changjiang Delta, Pearl River Delta, and Beijing/Tianjin area) have received more than 40 % of migrants nationwide, and their development strategy in relation to migration policies will be very important.

It is worth noting that, while the migration trend is relatively stable, the so-called "migrants" who have already settled in their destination for years are still not really in a stable situation; their problems have been raised by different groups for many years. These problems relate particularly to social welfare (such as medical insurance and old age insurance), education of migrant children (mostly about post-compulsory education), and extremely low political and social participation. With half of city residents facing these problems, it is not only problematic for the city, but also for residents and migrants themselves. There have been repeated calls from the central government to emphasize the issues and urge local governments to respond. However, to achieve improvements needs significant reform in regulations and policies with a strong commitment and appropriate input from governments.

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Chapter 15
Changing Pattern of Internal Migration in India

Ram B. Bhagat

Introduction

Internal migration has perhaps not received as much attention as international migration from researchers, international organizations and funding agencies. Yet internal migrants – those who move within the national territory across major zonal demarcations – are several times more numerous than those who move across countries (UNDP 2009: 21). In India, the study of internal migration is not only important from demographic point of view but also from economic, political and cultural viewpoints. The Constitution of India guarantees freedom of movement and freedom to settle within the territory of India as a fundamental right of all citizens under Article 19 in contrast to China where internal migration is heavily controlled by *hukou* (Chan 2012). However, this right is curtailed by certain political forces based on the ideology of *sons of the soil* (Weiner 1978; Rajan et al. 2011). A proper understanding of the trends and patterns of internal migration would not only help in understanding the nature of population growth and redistribution, but also shed light on regional inequalities, labour market forces, modernization, development and political processes which have a bearing on migration.

Despite the social, economic, cultural and political influence which migration (both permanent and semi-permanent) has on the area of origin and destination, migration research has been downplayed among demographers in India until recently (though see Zachariah 1960, 1964). This is partly because of the paradigm shift towards reproductive health issues since the early 1990s, which caused interest in the realm of migration research to dwindle considerably. Reflecting this, new data sets such as the National Family Health Surveys and District Level Health Surveys

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did not consider migration as an important variable that could affect health status in general and reproductive health in particular, and thus did not collect information on migration. Moreover, the wealth of data on migration available from Indian censuses has been grossly neglected by demographers, who focused on collecting data for projects funded by external agencies (Bose 2003). However, the last decade has seen a renewed interest in migration research with the publication of two rounds of migration data by the National Sample Survey Organisation (NSSO) in 2001 (55th round 1999–2000) and in 2010 (64th round 2007–2008). Using this, together with population censuses and other data sources, this chapter focuses on the changing pattern of migration in India in recent times.

India's Economic Growth and Urbanization

Patterns of population mobility are influenced by the economic and social context and it is therefore necessary to examine the nature and pattern of migration in light of recent economic policy changes and consequent economic growth in India. During the last two decades, India witnessed a rising per capita income, increasing regional disparities and improvements in transportation and communication facilities. However, many researchers have criticized India's growth story as being 'jobless' or sluggish in creating employment opportunities; while the service sector has grown in recent years, it has been at the expense of manufacturing sector growth. Moreover, the informal sector continues to dominate the labour market (Ramaswamy and Agrawal 2012; Himanshu 2011).

India has experienced rapid growth in its urban population but only slow urbanization (see Table 15.1). Between 1951 and 2011, while the urban population increased sixfold, the level of urbanization rose only from 17 % to 31 %. The annual

Table 15.1 Trends in urbanisation in India, 1951–2011

Census year	Urban population (in millions)	Per cent urban	Annual exponential urban growth rate (%)	Contribution of net rural to urban migration in urban growth (%)	Contribution of net reclassification and boundary changes in urban growth (%)
1951	62.4	17.3			
1961	78.9	18.0	3.47		
1971	109.1	19.9	2.34		
1981	159.5	23.3	3.79	18.6	31.4
1991	217.2	25.7	3.09	18.7	19.0
2001	286.1	27.9	2.75	20.8	21.5
2011	377.1	31.2	2.76	20.6	35.6

Notes: As the 1981 Census was not conducted in Assam, and 1991 Census was not held in Jammu and Kashmir, the population of India includes their projected figures. Source: Census of India for respective censuses (also see www.censusindia.gov.in). Last two columns taken from Bhagat (2012) growth rate of the urban population reached 3.79 % during 1971–1981 (the highest urban growth since independence), after which it consistently decelerated until the 2001 Census. During 2001–2011 the decline in the urban growth rate halted and the level of urbanisation in the country increased from 27.7 % in 2001 to 31.1 % in 2011. This increase of 3.3 percentage points during 2001–2011 was considerably higher than the increase in each of the preceding two decades. The emerging pattern of urbanization during 2001–2011 was driven more by rural-urban re-classification of settlements than by rural to urban migration. The net addition of new towns (mostly small towns with less than 20,000 population) was 2774 in 2011 compared to 763 and 693 in the 1991 and 2001 Censuses respectively.[1] As a result of the four-fold increase of new towns, the contribution of rural-urban classification of settlements (including changes in municipal boundaries) to urban growth climbed from 22 % during 1991–2001 to about 36 % during 2001–2011, while the contribution of net rural to urban migration has stagnated at about 20 % of urban growth (Bhagat 2012). This is very similar to the *in situ* urbanization reported earlier from China (Zhu 2000). Thus, the stagnation in the contribution of net rural-to-urban migration towards India's urbanisation is a matter of concern which requires detailed analysis.

Nature of Migration Data

Systematic information on migration has been available since the first Indian census in 1872, which provided information on migration based on place of birth (POB). Since 1971, migration data has been collected on the basis of place of last residence (POLR) and duration of residence at the place of enumeration. Unlike POB which provides information on lifetime migration, POLR gives information on the last move of migrants and also captures return migration. If POB or POLR is different from the place of enumeration, the person is classified as a migrant. The lowest units for determining POB/POLR are the villages and towns whose boundaries are administratively defined. Any change of residence beyond the village or town/city boundary qualifies a person to be classified as a migrant. Migration data based on place of last residence is also available by rural and urban segments. Census data on migration is classified by: change in residence within the district (intra-district), from one district to another within the state (inter-district) and from one state to another (interstate).

[1] The Census of India applies the following criteria to identify towns:

(i) All places with a municipality, corporation, cantonment board or notified town area committee etc.

(ii) All other places which satisfy the criteria of minimum population of 5000; at least 75 % of male working population engaged in non-agricultural pursuits and a density of population of at least 400 persons per square km. On the basis of these criteria, some settlements are classified as new towns, while the existing towns may get declassified if they do not satisfy the above criteria. The net addition of towns is the result of new towns minus declassified towns.

Since the 1981 census, reasons for migration have been added to the census questionnaire. Apart from the census, the National Sample Survey Organization (NSSO), a wing of the Ministry of Planning and Programme Implementation, also included a question on migration based on POLR as a part of its employment and unemployment surveys. In NSSO surveys, place of last residence was defined as a place (village or town) where the migrant had stayed continuously for a period of 6 months or more before moving to the place of enumeration. In contrast to the NSSO surveys, the census surveys do not limit the duration of residence in defining POLR. It should be noted that in India, the national sample surveys generally do not collect data on income. Instead, information on monthly per capita consumer expenditure is collected; this is also the case for migrant households.

In this study, both the census and NSSO data have been used. In most demographic studies, migration is analysed in terms of stock, which means that the study is concerned with the number of migrants. While a migrant might be making many moves during his or her lifetime, national datasets such as census and NSSO surveys are not able to capture all moves, but provide data only on the last move based on POLR. Also, all those who have moved within the village and municipal boundaries are not considered migrants. In some cases, where municipal areas are very large, intra-urban migration could be significant.

Census and NSSO data sets are not able to capture 'short term migrants' fully on the basis of POB and POLR criteria, as the short term migration is seasonal, temporary and circulatory in nature.[2] On this count, there might be some underestimation. Despite these limitations, the data from the census and NSSO surveys are increasingly used in the study of migration as they provide consistent measures of migration over time.

Trend and Pattern

Whether Indians have been more or less mobile compared to their western counterparts has been a matter of debate. Kingsley Davis (1951) in his pioneering work on India argued that Indians were less mobile. This conclusion was based on inter-provincial/state migration which stood at 3.6 % in 1931 in India compared to 23 % in the United States in 1940.[3] Davis attributed this fact to the prevalence of the caste system, joint families, traditional values, the diversity of language and culture, the

[2] As per the NSS 64th round of survey (2007–2008), "short-term migrants," were defined as those migrants who were away from their village or town for 30 days or more, but not more than 6 months in the preceding 365 days for the purpose of employment or search for employment. They were enumerated at the place of origin and are treated as not having changed their usual place of residence. The number of short term migrants was 13.6 million in 2007–2008, constituting 1.3 % of the population of India (NSSO 2010; Keshri and Bhagat 2012).

[3] Migration data in Indian Censuses during the British rule was based on place of birth. While it is possible to study inter-province/state migration from this data, the nature of tabulations precludes a study of inter-district migration (Census of India 1931: 114).

Table 15.2 Percentage of internal and international migrants based on place of last residence, India 1971–2007/2008

Census	Total population (in million)	Internal migrants (in million)	Internal migrants (%)	International migrants (in million)	International migrants (%)	All migrants (%)
1971	548.1	159.6	29.1	8.1	1.4	30.6
1981	659.3	200.5	30.4	6.0	0.9	31.3
1991	814.3	220.7	27.1	5.9	0.7	27.8
2001	991.8 (1028.6)	300.9 (309.3)	30.3 (30.0)	5.0 (5.1)	0.5 (0.4)	30.8 (30.4)
2007–2008	1009[a]	287.8	28.5	4.4	0.4	28.9

Sources: India, Census of India 1971, series 1, part II, D(i), migration tables; India, Census of India 1981, series 1, part V, A and B(i), migration tables (tables D1 and D2); India, Census of India 1991, series 1, Part V, D series, migration tables, vol. 2, part 1 (table D2); India, Census of India 2001, table D-2, compact diskette, Registrar General and Census Commissioner, New Delhi. The census was not conducted in Assam in 1981 and in Jammu and Kashmir in 1991. The figures for India from 1981 to 2001 exclude these two states. The figures for the 2001 census including Assam and Jammu and Kashmir are given in parentheses

[a]Estimated population. See NSSO (2010), p. A-100

lack of education and the predominance of agriculture and semi-feudal land relations in India. However, the fact remains that Indian migration is predominantly a within-state phenomenon. According to the 2001 Census – the latest data available on migration as the 2011 Census data is yet to be published – inter-state migrants are about 4 % (41 million) of India's population compared to within-state migration which comprises 26 % (268 million) (Bhagat 2010). Thus, taking into account the entire mobility including within- and between- state migration, the mobility of the Indian population stands at close to 30 %, much higher than what Davis believed.

Table 15.2 shows that the total number of internal migrants was 309 million based on place of last residence in 2001; this had almost doubled since 1971 (159 million). However, in terms of proportion of the total population of the country, it remained at about 30 % except for the 1991 census, when it declined to about 27 %. The proportion of immigrants from abroad constituted only about 0.5 % of India's population in 2001 compared to 1.4 % in 1971. Most of the early immigrants were displaced persons who opted to stay in India during the partition of the country at the time of independence in 1947. Many also came to India at the time of the formation of Bangladesh in 1971. The declining proportion of immigrants shows that many of the older immigrants, who came to India half a century ago, have died.

It is generally accepted that migration slowed down during the decade 1981–1991. India went through economic turmoil in the 1980s which resurfaced in the form of a serious balance of payments crisis in 1991 associated with declining investment, rising inflation and growing unemployment. The National Sample Survey (NSS) data show that the unemployment rates grew between 1983 and 1987–1988, which could be a reason for the substantial decline in migration rates for both males and females as shown by the 1991 Census (Bhagat 2001).[4] In the aftermath of the financial crisis, India initiated economic reforms in the later part of 1991. The economic reforms aimed at loosening the control of the Government and encouraged entrepreneurs to participate actively in the process of economic development. As a result, the growth rate of the economy accelerated significantly in the first half of the 1990s, but then slowed down in the second half, averaging 5.7 % over the decade as a whole, which was not very different from that in the 1980s. However, in the 2000s, economic growth reached about 8 % per annum (Ahluwalia 2011), although the accelerated economic growth did not create greater employment opportunities. Similarly, most of the 1990s was a period of jobless growth as well. Employment did increase significantly between the NSSO rounds from 1999/2000 to 2004/2005, but this was essentially distress-driven and a result of push factors operating due to the agrarian crisis and a deceleration in real wage growth (Editorial 2010:7).

The recent NSSO round pertaining to the year 2009–2010 shows that not enough jobs were created in 2009–2010 compared to 2004–2005 (0.5 million) in spite of an economic growth rate of 8 %. The labour force participation rates for both men and women have declined; this has been attributed not only to rising school and college attendance in the age-group 15–24, but also to a substantial decline in labour force participation rates in the age group 25 and above, particularly among females, in both rural and urban areas between 2004–2005 and 2009–2010 (Chowdhury 2011). Moreover, most of the jobs created were in the low paid informal sector which makes up 90 % of the workforce, whereas jobs in the formal sector are either stagnant or even shrinking (de Haan 2011).

As the data on migration from the 2011 Census are not yet available, Table 15.2 also provides the most recent available figures from the 64th round of NSSO pertaining to the year 2007–2008. It shows a slowing down of migration compared to the 2001 Census, which is consistent with jobless growth. The comparison of migration rates for the year 2007–2008 with earlier NSSO rounds back in 1983 shows that the mobility for males, both in rural and urban areas, has declined somewhat (see Table 15.3). The low employment intensity of economic growth has failed to transfer the labour force from agriculture to the non-agricultural sector. About 51 % of the workforce is still dependent on agriculture and related activities, which contribute only 14 % of GDP. This reflects a huge surplus labour in the agricultural sector engaged in extremely low productivity work (Chowdhury 2011).

The rising mobility of females in recent times has occurred mainly due to the increasing role of non-economic factors such as marriage and family. In most parts of India, village exogamy is practiced; women leave their parental households to

[4] Some demographers pointed out that the turbulent political and social conditions prevalent in many parts of India during the 1991 Census influenced the overall quality of data. There was a strong protest against the reservation of government jobs for the Other Backward Classes (OBCs) on the basis of caste. Also, massive processions organized by Hindu fundamentalists were a source of unrest at the time of the 1991 Census (Srinivasan 1994). The post-enumeration checks also confirmed the lower overall quality of the 1991 Census (Dyson 1994).

Table 15.3 Percentage of migrants among the populations of rural and urban areas, India (Based on NSS Rounds), 1983 to 2007–2008

	Rural		Urban		
Year	Male	Female	Male	Female	Total
2007–2008	5.4	47.7	25.9	45.6	28.5
1999–2000	6.9	42.6	25.7	41.8	26.6
1993	6.5	40.1	23.9	38.2	24.7
1987–1988	7.4	39.8	26.8	39.6	25.4
1983	7.2	35.1	27.0	36.6	23.4

Source: Based on Unit Level Data of 38th, 43rd, 49th, 55th and 64th NSS Rounds

Table 15.4 Percent distribution of migrants by administrative divisions, India, 1999–2000 to 2007–2008

	Male				Female			
Streams	Within district	Inter-district	Inter-state	All	Within district	Inter-district	Inter-state	All
1999–2000	48.5	31.4	20.0	100	63.3	26.7	9.9	100
2007–2008	38.1	35.2	26.6	100	59.2	30.4	10.3	100

Source: Based on Unit Level Data of 55th and 64th NSS Rounds

join the husband's household located in villages different from the village of their parents. Although a majority of the marriages take place within the district, recent data show increased inter-district migration of females (See Table 15.3).[5] Due to increased transportation and communication facilities and rising educational levels of females, it is now possible to find suitable matches at relatively longer distances.

Table 15.4 also shows that mobility within the district for both males and females has declined; on the other hand inter-district and inter-state mobility has increased for both sexes. This is consistent with rising income and increased transport and communication facilities. A recent study shows that there were 12.3 million workers commuting between their place of residence and place of work (8 million rural to urban and 4.3 urban to rural) in 2009–2010 (Chandrasekhar 2011). By the strict definition of migration, commuters are not migrants. However, commuting seems to have to some extent replaced short distance migration, and could be another reason for declining mobility of males in recent years.

In terms of rural and urban streams, the emerging pattern in the 2000s is consistent with migration trends shown in earlier tables. Table 15.5 shows that between 1999 and 2007, the share of different streams such as rural to rural, rural to urban, urban to rural and urban to urban migration among females has not changed, but

[5] Inter-district migration is also affected by creation of new districts (Lusome and Bhagat 2006).

Table 15.5 Percent distribution of migrants by streams of migration and sex, India, 1999–2000 and 2007–2008

	Male		Female	
Stream	1999–2000	2007–2008	1999–2000	2007–2008
Rural to rural	32.3	27.1	70.3	70.0
Rural to urban	34.3	39.0	14.4	14.8
Urban to rural	10.7	8.9	5.2	4.9
Urban to urban	22.6	24.8	10.1	10.3
Total	100.0	100.0	100.0	100.0

Source: Based on Unit Level Data of 55th and 64th, NSS Rounds

there was an increase in the share of rural to urban male migration during the same period. However, the increase does not seem to have been large enough to raise the existing share of net rural to urban migration in urban growth during 2001–2011.

In recent years there has been an effort to provide livelihood security to the rural population through the launch of a massive rural employment programme. Under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) 2005, workers are provided 100 days of employment on demand at the real wage rate of rupees 100 per day by the central government. According to the Economic Survey 2011–2012, 'the MGNREGA has successfully raised the bargaining power of agricultural labour, resulting in higher agricultural wages, improved economic outcomes, and reduction in distress migration' (Ministry of Finance 2012:314). It may be true to say that MGNREGA had some impact on reducing rural to rural male migration, as the wage differentials in rural areas narrowed and seasonal and temporary migration to the urban areas reduced. Several studies point out that seasonal and temporary migration is a livelihood strategy among the poor and is an important component of rural household economy (Deshingkar and Farrington 2009; de Haan 2011; Keshri and Bhagat 2012). However, as seasonal and temporary migrants are counted at the place of origin, unlike migrants defined based on POLR or POB who are counted at the place of destination, this category is not relevant in influencing either population growth or the rate of urbanisation (Keshri and Bhagat 2013).

To sum up, there is an evidence of declining mobility, particularly among males in the recent past. It is likely the result of three important factors, namely the lack of employment opportunities in general and in the organised sector in particular; increased commutation; and the decline in the wage differentials between the backward and prosperous rural areas. On the other hand, rural to urban migration has played only a limited role in speeding up urbanisation, in which rural to urban reclassification has played a more significant role.

The NSSO surveys also elicited information on the reasons for migration. Table 15.6 shows that the contribution of employment related reasons for female migration has declined from 8 % to less than 1 % between 1993 and 2007/2008 in the rural areas, and from about 5 % to about 3 % in the urban areas during the same period.

Table 15.6 Percent distribution of migrants by reasons for migration, India, 1993 to 2007–2008

	Migrants in rural areas		Migrants in urban areas	
Reason	Male	Female	Male	Female
1993 (49th NSS Round)				
Employment-related[a]	47.7	8.3	41.5	4.9
Studies	4.1	1.1	18.0	7.0
Marriage	2.3	61.6	0.9	31.7
Migration of parents/earner	20.8	23.7	28.3	49.5
Other reasons[b]	25.1	5.3	11.3	6.9
1999–2000 (55th NSS Round)				
Employment-related[a]	30.3	1.0	51.9	3.0
Studies	5.3	0.4	6.2	1.3
Marriage	9.4	88.8	1.6	58.5
Migration of parents/earner	26.0	6.3	27.0	31.0
Other reasons[b]	29.0	3.5	13.3	6.2
2007–2008 (64th NSS Round)				
Employment-related[a]	28.6	0.7	55.7	2.7
Studies	10.7	0.5	6.8	2.2
Marriage	9.4	91.2	1.4	60.8
Migration of parents/earner	22.1	4.4	25.2	29.4
Other reasons[b]	29.2	3.2	10.9	4.9

Source: Based on Unit Level Data of 38th, 43rd, 49th, 55th and 64th NSS Rounds
[a]Includes: in search of employment; in search of better employment; business; to take up employment or better employment; transfer of service or contract; proximity to place of work
[b]Includes: acquisition of own house or flat; housing problems; health care; post-retirement

On the other hand, marriage related movement increased very steeply from 62 % to 91 % in rural areas and from 32 % to 61 % in urban areas between 1993 and 2007/2008.[6]

It is interesting to note from Table 15.6 that the increasing role of marriage as a reason for female migration is associated with a declining incidence of unmarried females moving with their parents or earning members, which declined very steeply from 23 % to 4 % in rural areas and from 49 % to 29 % in urban areas between 1993 and 2007/2008. This shows that parents and earning family members leave their unmarried daughters at the place of origin increasingly when they move to the place of destination. If the place of destination is rural areas, parents/earning members hardly took their unmarried daughters in 2007–2008 compared to the situation 15 years ago in 1993. A similar trend is found in urban areas too but with lesser intensity. Male children moving with parents or earning members of the family also declined, but not as much as for female children. This suggests some sort of

[6]Although marriage is cited as a culturally appropriate reason of female migration, a substantial proportion of females work after migration and are part of the labour market (Shanthi 2006). In 2007–2008, 32 % of migrant females in rural areas and 14 % of migrant females in the urban areas were reported to be working (NSSO 2010).

non-preference for giving girl children the opportunities associated with migration at the household level. In the case of males, employment related reasons for migration to rural areas have sharply declined from about 48 % in 1993 to 29 % in 2007–2008. On the other hand, employment related migration to urban areas has seen an increase from 42 % in 1993 to 56 % in 2007–2008, although relatively smaller compared to the huge decline in rural areas. Thus, male mobility has witnessed a decline as noted in the earlier section. Also, there is a decline in migration for educational purposes in urban areas, which is not surprising because as there has been a huge expansion of schools and colleges in the last two decades.

Inter-state Migration

Inter-state migration is not common in India and has remained stable over the decades at around 3–4 % of the total population of the country, either by place of birth or place of last residence criteria. Among all inter-state migrants, about two-thirds moved to urban areas. The most recent figure available from NSSO for the year 2007–2008 shows that about 42 million people were enumerated in states other than their place of last residence, comprising 4.1 % of India's total population in 2007–2008. However, 42 million is low for a country with a billion plus people.

India is a union of 28 states and 7 union territories. However, only a few states are in-migrating states, notable among them Delhi, Punjab, Haryana, Delhi, Maharashtra, Gujarat and Karnataka. Most of the states are net out-migrating states. The regional imbalances in the patterns of migration closely reflect the unbalanced regional development of the country. The imbalance in the pattern of internal migration is shown in Fig. 15.1.

The latest figures available from the National Sample Survey for the year 2007–2008 show that the states which received a largest number of migrants are Maharashtra, Haryana, Punjab, Gujarat and Karnataka. On the other hand, among out-migrating states, Bihar tops the list followed by Uttar Pradesh, Jharkhand and Orissa. All the southern states except Karnataka are net out-migrating states; Assam in the North-east is a net out-migrating state so far as internal migration is concerned.[7] It is further important to highlight that the two highest out-migrating states, namely Uttar Pradesh and Bihar, show very high increases in net out-migration rates between 1990–2000 and 2007–2008 – from 8 to 30 per 1000 in Uttar Pradesh, and from 31 to 56 per 1000 in Bihar. It may be noted that only few urbanised and developed states receive migrants, whereas the majority of states with low levels of urbanisation and income are net senders of migrants. This shows imbalances in the patterns of regional development and inter-state migration.

[7] Casual wage worker is a person, who was casually engaged in others' farm or non-farm enterprises (both household and non-household) and, in return, received wages according to the terms of the daily or periodic work contract (NSSO 2010: 10).

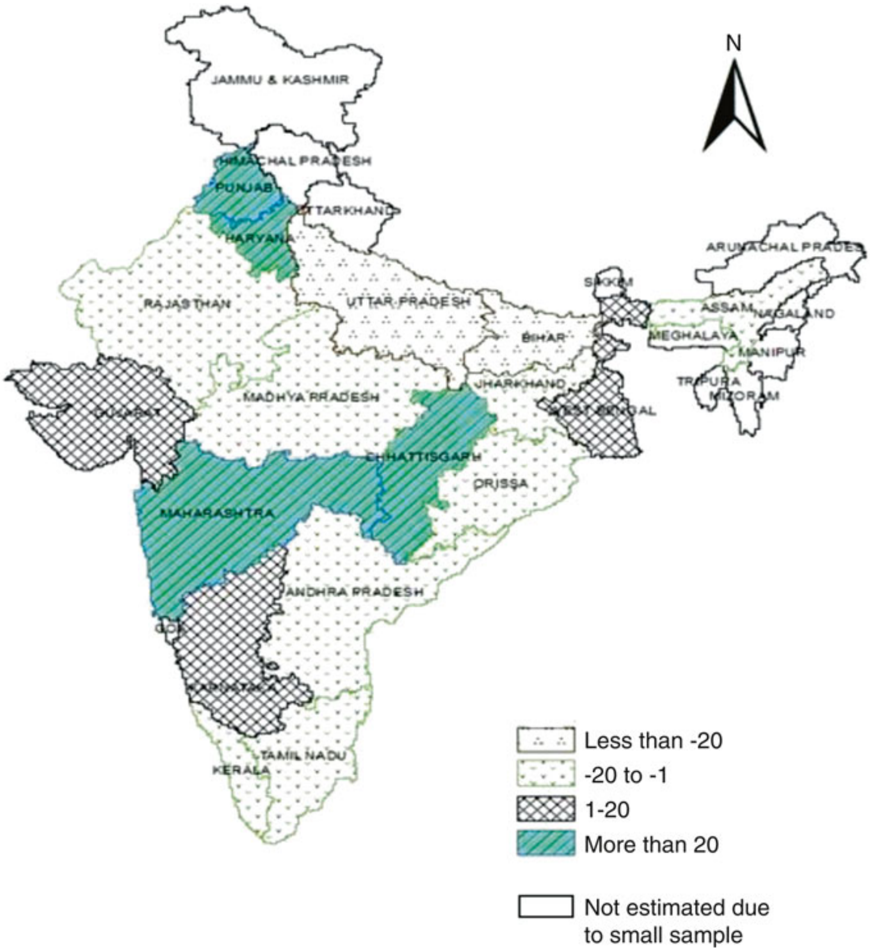

Fig. 15.1 Inter-state net migration, India, 2007–2008 (per 1000 population)

Since the 1970s, both the inter-state and within-state migration have been intensely contested. In one of the early writings, Myron Weiner (1978) surveyed the nature of migration and the emergence of the ideology of *sons of soils* leading to ethnic conflict in different parts India. He presented three types of conflict in three distinct regions – Assam, Chotanagpur and Hyderabad. In Assam, the reason for conflict was the success of migrants while the natives failed; in Chotanagpur, the case was unique where tribes encountered migrants, leading to their subjugation and displacement, and in Hyderabad the basis of conflict was an effort to protect the middle-class *Mulki* from the competing migrants. In all three cases, Weiner (1978) argued that sons of the soil advanced themselves into elitist positions in an effort to oust their non-indigenous competitors. This process has been accelerating rather than subsiding with economic development and modernization. In the 1980s and later, the ideology of nativism further bolstered and spread into others areas like Mumbai, Goa, and Meghalaya, inciting conflict and violence against migrants (Rajan et al. 2011). The hatred against migrants in the case of Mumbai is more organized and violent, as some political parties based on *sons of the soil* ideology articulated strong threats to the migrants (Hansen 2001).

In a nutshell, inter-state migration in India has been impeded by the *sons of the soil* ideology which has hindered rapid urban transition and economic growth in the country. It also violates the fundamental right to move enshrined in the Indian constitution under Article 19.

Socio-economic Characteristics of Migrants

Migration is an age and sex selective process. Most of the migrants are adults; males tend to migrate for employment related reasons, whereas females predominantly migrate due to marriage and family related reasons. Several studies in the past as well as in recent times show that permanent and semi-permanent migration in India (not seasonal and temporary) are more influenced by pull rather than push factors (Oberai and Singh 1983; Skeldon 1986; Bhagat 2010).

The NSSO provides information on migrants by monthly per capita consumer expenditure (MPCE) of the households. Table 15.7 shows that the percentage of migrants in urban areas was as high as 50.5 % in the highest MPCE decile class compared to 23 % in the lowest MPCE decile class. The same pattern was true for those moving into rural areas with corresponding percentages of 36.6 and 20.9 respectively. While the tendency for migration rates to rise with rising per capita

Table 15.7 Percentage of population in each MPCE decile class who are migrants by rural and urban destinations, India, 2007–2008

	Rural			Urban		
MPCE decile class	Male	Female	Total	Male	Female	Total
0–10	2.6	38.8	20.9	9.6	35.7	22.9
10–20	3.1	42.3	22.7	14.2	41.4	27.7
20–30	3.4	43.7	23.5	16.0	41.2	28.4
30–40	3.4	44.5	23.7	17.5	42.9	29.8
40–50	3.7	47.2	25.0	23.8	45.5	34.2
50–60	4.5	48.2	25.7	26.7	47.8	36.8
60–70	4.1	48.1	25.2	30.1	47.8	38.5
70–80	5.3	52.2	27.9	34.7	50.0	41.9
80–90	7.0	54.0	29.4	37.3	50.1	43.2
90–100	16.6	59.2	36.6	46.2	55.5	50.5
All classes	5.4	47.7	26.1	25.9	45.6	35.4

Source: Unit Level Data, Migration in India 2007–2008, NSS 64th Round (NSSO 2010)

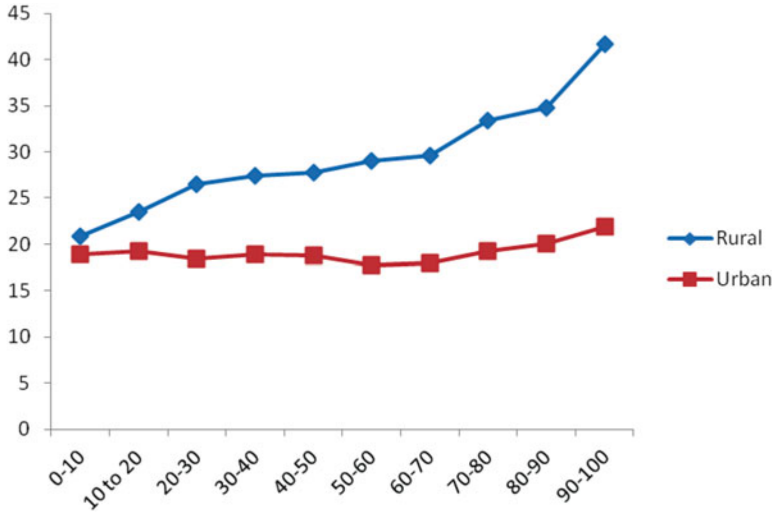

Fig. 15.2 Percentage of households reporting out-migrants at the place of origin by MPCE decile classes, India, 2007–2008

income is true for both males and females, the migration rate rises steeply for males in both rural and urban areas. However, it is important to mention that the data on MPCE presented in Table 15.7 pertains to the time of survey at the place of destination, and not the MPCE of the households from which they migrated. On the other hand, NSS also collected data on MPCE related to out-migrating households at the place of origin which show more or less similar results (see Fig. 15.2). Keeping in view the non-availability of data on income, the MPCE could be fairly considered as a proxy for the economic status of the households.

Migrants have higher educational attainment than non-migrants. The share of migrants with secondary and graduate education is higher than non-migrants, and this has gone up sharply between 1999–2000 and 2007–2008 (Kundu and Saraswati 2012). Further, migrants are not only better off than non-migrants, but also their economic status improved faster than non-migrants between 1999–2000 and 2007–2008. From this, it may be concluded that economic distress is not the critical factor in migration decisions for men in rural or urban areas. On the other hand, with higher levels of education or economic assets, it is easier to establish linkages with the urban economy through socio-cultural channels, to find a foothold in the city and to avail themselves of the opportunity offered by migration. All these changes led to increased economic and social selectivity of migrants and the consequent exclusion of poor in rural to urban migration, which is evident in the decline of male mobility in the last two decades (Kundu 2007; Kundu and Saraswati 2012).

On the other hand, although migrants' educational and economic status is higher, they are predominantly engaged in the informal sector as construction workers, hawkers and vendors, domestic servants, rickshaw pullers/drivers, electricians, plumbers, masons, security personnel etc. The majority of migrants are either self-employed or casual workers. About 32 % of migrant workers are working as casual wage workers who are vulnerable to the vagaries of the labour market and lack social protection, 45 % are self-employed, and 23 % were working as regular/salaried workers (NSSO 2010).[8]

Conclusions

One of the critical findings which emerged from this study is that male migration has declined and female migration has increased since the economic reforms initiated in 1991. The decline in male migration in rural areas is sharper than in urban areas. The possible reasons for the decline in male mobility are: insufficient job creation during the last two decades, a stagnation of job opportunities in the organized sector, rising commutation of workers, and the employment guarantee scheme which curtailed rural to rural labour migration due to reduced wage differentials between places of origin and places of destination within rural areas. On the other hand, increased female migration seems to be the result of increased long distance marriages, which were more predominant among higher socio-economic groups. The emerging pattern of migration is socially and economically selective which negates the persistent popular belief that the poorest and illiterate dominate the migration streams.

On the other hand, a strong negative attitude prevails against migrants in some states of India, namely in the states of Maharashtra, Goa, Andhra Pradesh, Jharkhand, Assam and Meghalaya, which acts as a strong deterrent to inter-state migration. The negative attitude is sustained by anti-migrant tirades and acts of violence, and is articulated through the politics of *sons of the soil*. Migrants are also blamed for many urban problems and perceived as scapegoats for the failures of city planning. Many policy makers also view the need for a migration policy that could discourage or even control migration. However, this would seriously limit the right to move as a fundamental right bestowed by Indian Constitution under Article 19.

The barriers to migration need to be eased for those who intend to migrate, so that the benefits of migration can trickle down to wider sections of society. Migration needs to be viewed positively as a means of widening the freedom and fulfilling the aspirations of the Indian people.

[8] Regular/salaried workers are those who worked in others' farm or non-farm enterprises (both household and non-household) and, in return, received salary or wages on a regular basis (i.e. not on the basis of daily or periodic renewal of work contract). This category included not only persons getting time wage but also persons receiving piece wage or salary and paid apprentices, both full time and part-time (NSSO 2010: 10).

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Chapter 16
Demographic Patterns of Indonesia's Urbanization, 2000–2010: Continuity and Change at the Macro Level

Tommy Firman

Introduction

Urbanization, that is, a transformation from rural to urban-based societies, is one of the most ubiquitous socio-economic changes in the world today. The demographic definition of urbanization is the increasing proportion of the urban population relative to the total national population. This should be distinguished from urban population growth, which refers to the annual rate of urban population increase, either of the national urban population or of individual cities. Basically, there are three elements of urbanization: rural to urban migration, reclassification of locality status from 'rural' to 'urban' and natural increase of the urban population.

Over the last seven decades most countries in Southeast Asia have been experiencing tremendous urban population growth as a result of economic development, especially in the large cities and their outskirts. Urbanization is often associated with level of economic development; developed countries, such as North America, Japan, Europe, Australia and Japan have higher levels of urbanization than developing countries, and this transformation takes place along with the shifts of economic structures from agrarian to industrial and service sectors.

The present study will identify the urbanization patterns in Indonesia by employing the readily available results of the 2000 and 2010 Indonesian population census and applying simple statistical methods to the data. It is an empirical analysis of urbanization in Indonesia employing the available results of the National Population Census 2010.

Urbanization is a very complex phenomenon, involving socio-economic, political and geographical factors, but this study will be focused on the demographic

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factor. Obviously there are some limitations in using macro level and aggregate data for demographic studies, including study of urbanization, as the data will not enable the pattern of urbanization to be depicted in detail at the micro or city level. Moreover, the official boundaries of large cities have constrained the analysis of the actual spread of development of urban areas (see also Jones 2004, 2006; Hugo et al. 2003; Champion and Hugo 2004; Cohen et al. 2004; Cohen 2006; Hugo 2006). Despite these limitations, the 2010 census data are still the best available source of data for a comprehensive study of the demographic pattern of urbanization in Indonesia at the macro level.

As Gardiner and Gardiner (2006) argue, urbanization and rapid urban growth has been a relatively recent phenomenon in Indonesia. The author has conducted several studies on urbanization and urban development in Indonesia using the 1990 and 2000 national census data (Firman 1992, 1997, 2003, 2004; Firman et al. 2007), and the analysis can be extended to examine the change of urbanization in Indonesia from 2000 to 2010. It should be borne in mind however that there might be some problems of under enumeration in collecting data for the Indonesian 2000 population census because of the economic and political crisis at the time, which resulted in an estimated 4.5 million people who were not included in the 2000 Census report (Hull 2001, see also Hull 2010). As Hull (2010) also points out, 'the Indonesian 2010 Census is the most inclusive activity ever undertaken by the Indonesian Government, and has been able to avoid many problems encountered in the 2000 Census (pp. 374–375), thus achieving a better coverage than in the 2000 census (p. 371).

The remainder of this study will be divided into three parts. Part one will discuss the general patterns of urbanization in Indonesia over the period 2000–2010. Part two will examine the growth of small and medium cities (those with population between 100,000 and 1 million), while part three will conclude the discussion.

Urbanization Patterns

International comparisons of urbanization are difficult to make because the definition of 'urban' varies greatly from one country to another, and 'studies of urbanization are forced to rely on the definitions of urban areas adopted in each country' (Jones 2006, p. 247). Meanwhile, the conventional dichotomy of rural versus urban has become inadequate because of blurring of the distinction between the two and also great development of transport networks connecting 'rural' and 'urban' areas (Cohen 2004; Hugo 2006; McGee 2012). According to Gardiner and Gardiner (2006), there are two ways of defining 'urban' in the Indonesian context: (1) administrative, where a local government unit (Kota) is assigned an official status as a municipality, and (2) functional, in which each of the smallest administrative unit (Desa) is assigned a functional status whether 'urban' or 'rural' based on their characteristics.

In the population census of 2000 and 2010, a locality is defined as 'urban' on the basis of three criteria, (1) population density; (2) percentage of households engaging in the agricultural sectors; and (3) urban facilities and physical distance to reach them (Setiawan 2009; CBS 2011). The Central Board of Statistics applies a technical scoring method to determine whether a locality i.e., administrative subdivisions (Desa) that are inclusive of all areas, can be classified as 'urban' or 'rural' on the basis of those criteria (CBS 2011). The score for population density ranges from 1 for density less than 500 people per square kilometer to 8 for density greater than 8500 people per square kilometer. The score for percentage of agricultural households ranges from 1 for percentage >70 % to 8 for percentage <5 %. Scoring for access to public facilities is either 0 or 1. In the case of school facilities for example, the score is 1 if there are schools within 2.5 km, and 0 otherwise. In the case of markets and shops, the score is 1 if they are within 2 km. In the case of cinemas and health facilities, the score is 1 if they are within 5 km, and 0 otherwise. A locality is considered an Urban Locality (*Desa Perkotaan*) if the total score reaches 10 or more, or a Rural Locality (*Desa Perdesaan*) if the total score is <10. Although there are some problems in this method, especially in the over simplified classification of 'urban' and 'rural' and neglect of the quality of facilities available in the localities, it is still useful for analyzing patterns of urbanization in Indonesia at the national level (see Gardiner and Gardiner 2006; Firman et al. 2007).

The definition of urban localities used in the 2000 and 2010 Censuses is basically the same, so it is possible to identify change and continuity in urbanization over the 2000–2010 period. It should be admitted that the urban and rural classification used in these two censuses neglected the existence of 'Semi-Urban' localities, which have been emerging rapidly, especially on the fringes of large cities (see also Jones 2006). Therefore in the future Indonesian censuses, classification of urban and rural localities needs to be improved by adding the category of 'Semi-Urban' localities to capture the real phenomenon of urbanization in Indonesia (for comparison see Hugo et al. 2003; Champion and Hugo 2004; Jones 2004; Hugo 2006).

The number of urban localities in Indonesia increased from 12,351 to 15,786 over the period 2000–2010, thus increasing the proportion of all localities which are urban from 18.0 % to 20.5 % over the period (Table 16.1). However, closer examination indicates that urban localities in Java increased even more significantly, from 30.0 % to 36.7 %. This is in contrast to the slight increase in the proportion of urban localities in the outer islands from 11.1 % to 12.6 % during the period. The province outside Java which experienced the highest increase in the proportion of urban localities is Bali, where the proportion of urban localities increased from 34.2 % to

Table 16.1 Number of urban and total localities in the 2000 and 2010 population census, Indonesia

	2000			2010		
Region	Urban	Total	% Urban	Urban	Total	% Urban
Java	7510	25,015	30.0	9239	25,202	36.7
Outside Java (outer islands)	4841	43,768	11.1	6547	51,924	12.6
Indonesia	12,351	68,783	18.0	15,786	77,126	20.5

Source: Central Board of Statistics (2011) (www.bps.go.id) and Firman (2004)

36.9 % over the same period. The second and third highest increases are for North Sumatera, (from 14.9 % to 17.3 %), followed by East Kalimantan (from 12.4 % to 14.6 %). These figures indicate that urban areas are still largely concentrated on the island of Java, clearly reflecting the urban and sub-national development disparity between Java and the outer islands, although at present some provinces outside Java have already experienced a substantial increase in the growth of urban localities. There has thus been continuity in the urbanization process from the 1990s to the 2000s (see Firman 1992, 1997; Firman et al. 2007).

The results of the 2010 Population Census show that whereas Indonesia's total population increased by 17 % from 203.5 million to 237.6 million over the period of 2000–2010, the urban population grew by 39 % from 85.2 million to 118.3 million, resulting in a significant increase in the proportion of the population living in urban areas to almost half – from 41.9 % to 49.7 % during the period (Table 16.2). About 80.5 million out of the 118 million urban population (68 %) lived in Java, and another 37.8 million (32 %) lived on the other islands. It can be argued that in most parts of the country economic development and urbanization have been greatly fuelled by foreign and domestic investment, especially in large cities, like Jakarta, Surabaya, Bandung and Medan, as the economic activities, most notably the manufacturing, finance, services, property and trade sectors have been increasingly concentrated in these large cities (see Firman et al. 2007).

The Indonesian National Planning Agency (Bappenas) has predicted that Indonesia's urban population will reach 152 million or 67.5 % of the total population by 2025 (Bappenas 2011). The United Nations forecasts that Indonesia will on average add 2.2 million people per year to cities between 2010 and 2050 (see The World Bank 2011a). The annual growth rate of Indonesia's population increased

Table 16.2 Total and urban population in Indonesia, 2000–2010

	Java	Outer islands	Indonesia
2000			
Total population (000)	120,429	83,027	203,456
Annual rate of population growth, 1990–2000 (%)	1.11	1.56	1.35
Urban population (000)	58,874	26,370	85,244
Proportion of population living in urban areas	0.487	0.328	0.419
Share of urban population (%)	69.1	30.9	100.0
Annual rate of urban population growth (%)	4.38	4.43	4.40
2010			
Total population (000)	136,611	101,031	237,641
Annual rate of population growth, 2000–2010 (%)	1.25	1.98	1.49
Urban population (000)	79,949	38,373	118,322
Proportion of population living in urban areas	0.608	0.379	0.498
Share of urban population (%)	67.6	32.4	100.0
Annual rate of urban population growth (%)	3.10	3.79	3.33

Source: Central Board of Statistics (2011) (http://www.bps.go.id) and Firman (2004) from 1.4 % per year between 1990 and 2000 to 1.5 % between 2000 and 2010, perhaps due to more complete enumeration in the 2010 Census than the 2000 Census. However, the urban population growth rate which reached 4.4 % per annum in the 1990–2000 period declined significantly to 3.3 % over the 2000–2010 period. The annual rate of urban population growth in Java reached 3.1 % during 2000–2010, whereas that of the outer islands was much higher, at 3.8 % (Table 16.2).

The number of millionaire cities has increased tremendously. In 1950, Jakarta was the only city which had a population of more than one million, but by 1980, Surabaya, Bandung and Medan were also millionaire cities. By 2010 the number of millionaire cities had increased to 11, including Palembang, Semarang, Tangerang, Depok, Bekasi, South Tangerang (Tangerang Selatan) and Makasar. It should be noted, however, that five of those millionaire cities, namely Jakarta, Tangerang, South Tangerang, Bekasi and Depok, are located within the Jakarta Metropolitan Region (Jabodetabek: Fig. 16.1). In addition to those cities, Bogor City in Jabodetabek had a population of 950.3 thousand in 2010, which is nearly a millionaire city. As a result, about 20 % of Indonesia's urban population is concentrated in the Jakarta Metropolitan Region.

The rate of annual population growth of the millionaire cities is lower than the national average annual population growth rate of 1.49 %, with the exception of Bekasi (3.4 %), Tangerang (3.2 %), Depok (4.3 %) and Makasar (2.1 %) (Table 16.3). The lower growth rates of the other millionaire cities, including Jakarta, Surabaya, Bandung and Medan, is basically due to suburbanization processes which have

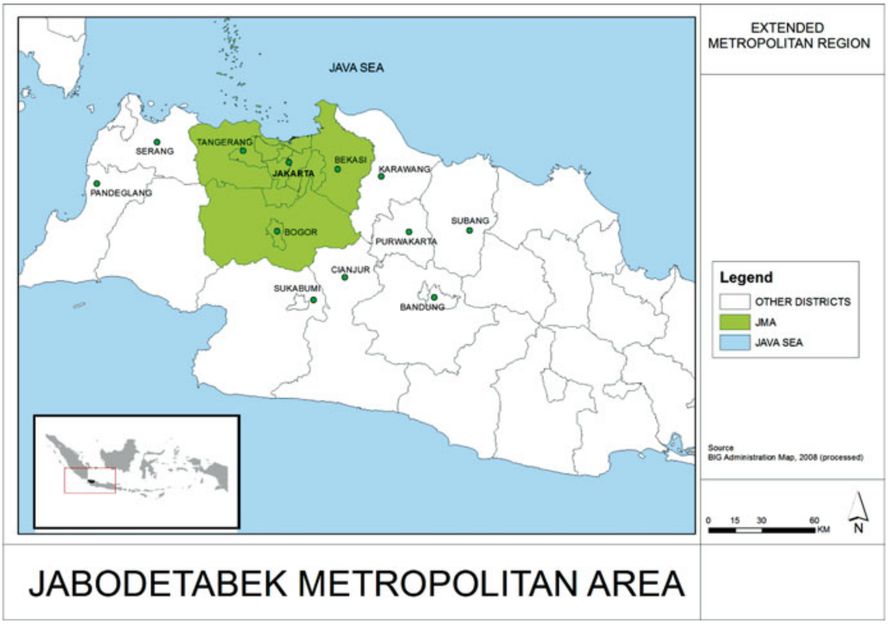

Fig. 16.1 Jakarta metropolitan area (Jabodetabek)

Table 16.3 Population and annual population growth rate of million cities in Indonesia, 2000–2010

City	Population (000)		Annual growth rate (%)
	2000	2010	
Jakarta[a]	8356.5	9604.3	1.49
Surabaya	2578.1	2715.5	0.53
Bandung	2140.0	2394.8	1.19
Medan	1899.4	2097.6	1.04
Bekasi[a]	1663.8	2334.8	4.03
Palembang	1411.5	1455.3	0.31
Semarang	1342.6	1535.9	1.44
Tangerang[a]	1311.8	1798.6	3.71
Depok	1146.0	1738.6	5.17
Makasar	1098.6	1338.7	2.19

Source: Central Board of Statistics (2011) (http://www.bps.go.id) and Firman (2004)
[a]Part of Jakarta Metropolitan Area (Jabodetabek)

resulted in the faster growth rates in the metropolitan peripheral areas adjacent to the core cities. In general, the peripheries of the largest cities are experiencing much more rapid population growth than the core of the cities. For example in Bandung Metropolitan Area the rate of annual population growth of Bandung City – core of the metropolis – was only 1.1 % over the 2000–2010 period, while the adjacent areas grew faster, including Kabupaten (District) Bandung (2.5 %), Kota Cimahi (2.1 %) and Kabupaten Bandung Barat (2.0 %). Jakarta's adjacent cities and kabupaten also had a higher annual population growth, like Bogor City (3.2 %); Bogor District (2.4 %); Bekasi City (3.4 %); Bekasi District (4.7 %); Depok City (4.3 %); and Tangerang City (3.5 %), compared to Jakarta City, the core of Jakarta Metropolitan Area, which had annual population growth of only 1.4 % during the period. As a result, the annual growth rate of Jabodetabek population was 3.6 % over the 2000–2010 period, much higher than Indonesia's annual rate of population growth of 1.5 %, even though Jakarta City's growth rate was slightly below the national average.

It should be kept in mind, however, that the high population growth rates in the areas adjacent to the city of Jakarta were most likely not wholly because of in-migration, but partly due to the reclassification of localities previously classified as 'rural' to become 'urban' in the 2010 census (see also Salim and Firman 2011). These figures clearly reflect a feature of mega-urbanization in Indonesia, just as in some other Asian countries (McGee and Robinson 1995; McGee 2005, 2012; Jones 2002; Jones and Douglass 2008).

Urbanization in the developing countries at present is occurring in rather different global economic conditions and at lower per capita income levels than that in developed countries which began to urbanize in the nineteenth and twentieth century. Yet it is believed that the level of urbanization in a country is highly correlated with the level of economic development (Jones 2006). According to the World Bank

(2011a), over the 1970–2006 period, every 1 % increase in urban population growth in China and India was associated with an average 6 % increase in per capita GDP (Gross Domestic Product). For Vietnam and Thailand the figure was even higher, at 8 % and 10 % respectively. However, for Indonesia and the Philippines, the figure was much lower at less than 2 %. Based on these figures, the World Bank (2011a) argues 'Indonesia is not leveraging urbanization to boost economic output per capita' (p. xiii).

In the case of Indonesia, Jakarta Metropolitan Area (Jabodetabek), defined as Jakarta and its surrounding Districts (Kabupaten) and Cities (Kota), however, plays a significant role in the national economy, producing about 25–26 % of the National Gross Domestic Product (GDP) annually over the period 1999–2006 (Table 16.4). The Jabodetabek Gross Regional Domestic Product GRDP amounted to nearly 26 % of Indonesia's total GDP in 2008, while the Jakarta City's GDP amounted to about RP. 350.6 trillion or nearly 71 % of Jabodetabek GRDP in the same year (World Bank 2011b, p. 107). The other metropolitan areas in Indonesia, including Surabaya, Medan, Bandung, Semarang and Makassar altogether only contributed about 15.1 % towards the GDP, while other urban areas contributed about 14.6 % (Table 16.4), which makes the total share of urban areas in the National GDP 55.2 % in 2006. The figures basically reflect that although urbanization in Indonesia does not contribute significantly to the national economy, Jakarta Metropolitan Area plays a very dominant role in the national economy.

The proportion of core city population to the total population of metropolitan areas also declined significantly. For example the proportion of Jakarta City population – the core of Jakarta Metropolitan Area (Jabodetabek) – to the total population of the Metropolitan Area reached only 35.5 % in 2010, continuing an earlier decline from 54.6 % in 1990 to 43.2 % in 2000 (see also Firman et al. 2007, p. 446). In-migration to Jakarta City declined over time, from 124,420 in 2006 to 69,550 in

Table 16.4 Percent of National GDP by metropolitan areas, 1993–2006

Agglomeration	Population 2005 (million)	1999 (% of the National GDP)	2003 (% of the National GDP)	2006 (% of the National GDP)
Jakarta (Jabodetabek)	25.8	26.1	26.3	25.5
Surabaya (Gerbangkertosusila)	10.4	6.7	6.8	7.1
Medan (Mebidangro)	4.4	2.1	2.8	3.0
Bandung (Bandung Raya)	7.0	1.5	2.0	2.2
Semarang (Kedungsepur)	5.0	1.5	2.0	1.9
Makassar (Maminasata)	2.3	1.9	1.9	0.9
Other urban	43.5	12.5	13.6	14.6
Rural	105.9	47.7	44.6	44.8
Total	204.2	100	100	100

Source: The National Planning Agency (Bappenas); The World Bank Jakarta Office (2011a) and (2011b)

2009, and to 47,000 in 2012 (Office of Population, Provincial Government of Jakarta, *cf* Investor Daily 24 August 2012). In contrast, in-migration to Bekasi City in Jabodetabek reached 80,000 in 2012 while in-migration to Bogor City increased from 10,820 in 2011 to 15,000 in 2013 (Kompas.Com 12 August 2013). These increases in Bekasi and Bogor could include out-migration from Jakarta City.

Lifetime in-migration in Jakarta City (measured by place of residence at the time of enumeration being different from place of birth) reached about 4.1 million in 2010, whereas the lifetime out-migration was only about 3 million (Statistical Yearbook of Indonesia 2012, pp. 82–83). By contrast, recent in-migration (measured by place of residence at the time of enumeration being different from place of residence 5 years ago) was 644,000 in 2010, whereas the recent out-migration reached 883,500 (Statistical Yearbook of Indonesia 2012, pp. 84–85). In other words, recent out-migration substantially exceeded recent in-migration. However, most of the recent out-migrants probably only moved from Jakarta to the peripheral areas of the city, including Bogor, Tangerang and Bekasi, which are nevertheless located in different provinces and therefore appear as inter-provincial migrants (see Browder et al. 1995; West Java Office of Central Board of Statistics 2001). They are attracted there by new job opportunities in the peripheral areas or have been evicted from their residence in Jakarta as a result of urban development projects in the city.

In short, there has been a relative shifting of in-migration destination from Jakarta City to other cities in Jabodetabek. Nevertheless, it should be noted that these in-migration figures only cover permanent migration (*pindah*), and do not include circular migration for which the number is most likely even much greater than the permanent migration.

Similar trends can be observed in the other large cities of Indonesia. The proportion of population in the city of Bandung (the third largest city in Indonesia) to the total population of Bandung Raya (Greater Bandung) declined from 33.7 % in 1990 to 29.4 % in 2000 and decreased further to 27.5 % in 2010. Likewise, the proportion of Surabaya City population to the population of Gerbangkertasusila (Surabaya Metropolitan Area), which had decreased from 34.0 % to 31.8 % over the period of 1990–2000, decreased further to 30.8 % in 2010.

The spatial dimension of urban development in Java has basically taken the form of an urban belt connecting large cities consisting of highly networked cities of different sizes, including Jakarta-Bandung; Surabaya-Malang; Semarang-Yogyakarta; and Cirebon-Semarang. A notable characteristic of these urban belts is the increasing mixtures of industrial economic and agricultural activities, and blurring of the distinction between ‘urban’ and ‘rural’ both physically and socioeconomically (see Firman 2004, 2007, 2009).

In 2000 Indonesia had 27 provinces, but the number increased to 33 in 2010 due to some proliferation of provinces in the new era of decentralization and regional autonomy policy. All provinces in Java have a relatively high proportion of urban population, most notably Jakarta, West Java, Banten and Yogyakarta (Table 16.5). Those provinces also experienced an increase in the proportion of urban population over the 2000–2010 period. Indeed, the Island of Java is a highly urbanized region, but many provinces in the outer islands also experienced a significant increase in the

Table 16.5 Percentage of urban population in Indonesia, 2000–2010, and GRDP/capita at current market prices without oil and gas, 2010, by Province (in billion Rupiah)

No	Province	2000	2010	GRDP/capita 2010[c]
1	Nanggroe Aceh Darussalam	23.6	28.1	14,482
2	North Sumatra	42.4	49.2	21,070
3	West Sumatra	29.0	38.7	17,995
4	Riau[a]	43.7	39.2	38,739
5	Jambi	28.3	30.7	14,572
6	South Sumatra[a]	34.4	35.8	154,632
7	Bengkulu	29.4	31.0	10,871
8	Lampung	21.0	25.7	14,082
9	Bangka Belitung	43.0	49.2	21,221
10	Jakarta	100.0	100.0	89,343
11	West Java	50.3	65.7	17,155
12	Central Java	40.4	45.7	12,071
13	Yogyakarta	57.7	66.4	13,196
14	East Java	40.9	47.6	206,878
15	Banten	34.2	67.0	16,148
16	Bali	49.8	60.2	17,141
17	West Nusa Tenggara	34.8	41.7	11,013
18	East Nusa Tenggara	15.9	19.3	5922
19	West Kalimantan	25.1	30.2	13,763
20	Central Kalimantan	27.5	33.5	19,267
21	South Kalimantan	36.3	42.1	16,308
22	East Kalimantan	57.6	62.1	53,660
23	North Sulawesi[a]	37.0	45.2	16,238
24	Central Sulawesi	19.7	24.3	13,872
25	South Sulawesi[a]	29.4	36.7	14,642
26	Southeast Sulawesi	20.8	27.4	12,707
27	Gorontalo	25.5	34.0	7745
28	Maluku[a]	25.9	37.1	5259
29	North Maluku	29.5	27.1	5192
30	Papua[a]	22.2	26.0	30,979
31	West Papua[b]	–	30.0	18,494
32	Riau Islands[b]	–	82.8	39,606
33	West Sulawesi[b]	–	22.8	9482
Indonesia		**42.2**	**49.8**	**24,980**

Source: Central Board of Statistics (2011) and CBS (2012) (http://www.bps.go.id)
[a]Administrative reorganization during 2000–2010
[b]New Provinces established after 2000
[c]Total figure is subject to rounding

proportion of urban population over the 2000–2010 period, most notably Riau Islands (Kepulauan Riau), East Kalimantan, Bali, Bangka Belitung, North Sumatera and North Sulawesi (Table 16.5). The highest, Riau Islands Province, a region bordering Singapore, has been a destination area of migrants from all over Indonesia, especially to the City of Batam. The Provinces of East Kalimantan and North Sumatera are rich in resources, especially palm-oil plantation, forestry, oil and gas, whereas Bali is an international tourist destination.

In fact, the Provinces of North Sumatera, East Kalimantan and Bali had already reached a relatively high level of urbanization in 2000 (Table 16.5). Most of the provinces outside Java, though, still have much lower levels of urbanization than the national level, most notably Nanggroe Aceh Darussalam, Lampung, East Nusa Tenggara, Central Sulawesi, Southeast Sulawesi, North Maluku and Papua. In short, the urban population is still largely concentrated on the island of Java, but in some provinces outside Java there has been significant increase in the proportion of urban population over the period 2000–2010, to some extent related to the new regional autonomy policy since 1999. Overall there is a relatively high correlation between levels of urbanization and the level of economic development in the provinces (Table 16.5). The Spearman Rank Correlation between the per cent of urban population and the GRDP per capita in the provinces is 0.531.

Small and Medium Urban Centers

As Satterthwaite and Tacoli (2003) argue, small and intermediate urban centers could potentially have an important role in equitable regional and rural development if planned and managed properly, because they can play a role as necessary links between urban and rural development (see also Tacoli 2003). The intermediate and small cities need to be understood within the context of the urban system and hierarchy, not only in terms of size. The United Nations (2012) defines small cities as urban agglomerations with a population size of 500,000 or less, but the small and medium cities in Indonesia in this study are defined as those with population size of 100,000 to 1 million. Their locations are shown in Fig. 16.2. What has been the development experience of such cities? In Java they grew slowly between 2000 and 2010, below the national population growth rate. It should be noted however that the small and medium cities presented in this study are limited to those which have status as ‘Municipality’ (Kota Otonom), because the Indonesian Censuses do not capture the population of non-municipality cities, although they might have populations exceeding 100,000, e.g. Garut City, Cianjur City and Ciamis City in the Province of West Java.

According to the World Bank (2011b) the medium-sized cities in Indonesia (those with population in the range of half to one million) have performed better in terms of agglomeration economies than cities in any other different size group, while the smaller cities (those between 100,000 and 500,000 people) and small urban centers have performed the least well, experiencing declining productivity

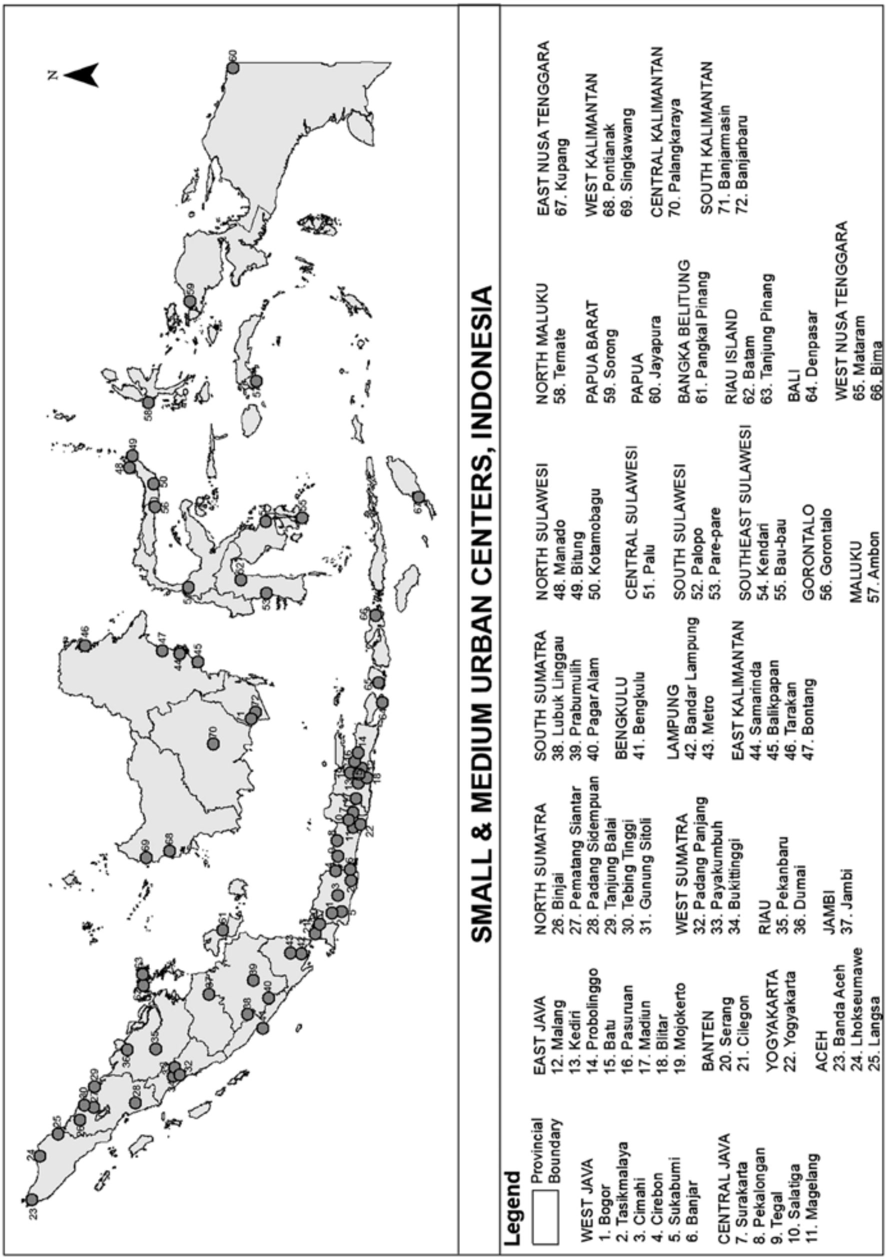

Fig. 16.2 Small and medium urban centers in Indonesia (population 100,000 to 1 million)

and negative growth. This is indicated particularly by the slow increase in population and decline in per capita GDP. This is simply because this group of cities lack infrastructure and skilled labor and have poor access to major cities and ports (World Bank 2011b, p. xiii).

In contrast to the traditional role and function of small towns in Java as centers for distribution and collection of goods, small and medium urban centers in the other islands of Indonesia are experiencing faster population growth than those in Java. The annual rate of population growth of Batam City in the Province of Batam islands reached a high of 8.0 % over the period 2000–2010, which is the highest of any city in Indonesia, due to the large influx of migrants from all over the country, most notably from Java and some parts of Sumatera. The other significantly high population growth can be noted for the cities of Sorong (7.0 %); Jayapura (5.1 %); Tarakan (5.2 %); Pekanbaru (4.4 %); Denpasar (4.0 %); Dumai (3.9 %); Kendari (3.7 %); Bontang (3.7 %); Samarinda (3.4 %); and Balikpapan (3.1 %). In general, this suggests that small and medium cities outside Java play a more important role as centers of economic activities, most notably, natural resource exploitation, such as mining, oil, timber, palm oil plantation, and tourism, than cities within Java. Nevertheless, as Zul Fahmi et al. (2014, forthcoming) argue, development of small cities in Indonesia follows a deeply-rooted local urbanization pattern which is a 'combination of development preparation, market mechanism and conflict of interest' (p. 9).

Concluding Remarks

Urban population in Indonesia has increased significantly, but the annual rate of growth has slowed although it is still much higher than that of the total national population. Urbanization is unstoppable and it is a normal process which goes along with socio-economic development of the society. However, urbanization in Indonesia is still heavily concentrated in large cities, notably Jakarta Metropolitan Area (Jabodetabek). Small towns and medium cities on the outer islands are growing more rapidly than those in Java. Although this is related to the overall lower growth of total population in Java, it might suggest that those outside Java play a more significant role as centers of various economic activities.

Urban development in Java has been characterized by formation of urban belts connecting large cities. The distinction between 'urban' and 'rural' is increasingly blurred. The peripheries of large cities are undergoing rapid urban population growth, whereas the core cities are experiencing slower growth. In order to capture the reality of the urbanization process in Indonesia there is a need to improve the classification of 'urban' and 'rural' in future Indonesian Censuses by adding the category of 'semi-urban' which has been emerging rapidly.

A key limitation of the present study is that it is restricted largely to 2000 and 2010 National Census data (readily available and officially released by the Central Board of Statistics) which is very macro in character. Nevertheless, the study could be used as a basis or a reference for more detailed studies of Indonesia's urbanization in the future as the data become available.

In summary, the trend in urbanization in Indonesia over the 2000–2010 period on the whole shows continuity with the situation in the 1990–2000 period. However, the rate of annual urban population growth has declined significantly, with some provinces outside Java already having levels of urbanization and urban population growth higher than those in provinces within Java. The latter was also the case in the 1990–2000 period, but in the 2000–2010 period both the level of urbanization and rate of urban population growth on the outer islands significantly increased. This is where the pattern of urbanization changed in Indonesia in 2000–2010 compared to the 1990–2000 period.

From the urban development and planning perspective, there should be a national urban development policy which is implemented consistently to stimulate development of cities in the outer islands to become new growth centers. Actually Indonesia has declared an official National Urban Development Policy through Government Regulation 26/2008 regarding National Spatial Development Plan (*Rencana Tata Ruang Wilayah Nasional – RTRWN*), but thus far it has never been consistently integrated with infrastructure and investment planning, which in turn has widened the disparity in the development level between large cities, notably Jakarta Metropolitan Area, and medium and small cities.

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Chapter 17
Migration and Urbanization in China, India and Indonesia: an Overview

Gavin W. Jones

The massive movement of people in these huge Asian countries is leading to important transformations of their regional demographic balance as well as of the age structure of populations in the regions. The net movement is primarily from poorer to wealthier regions, and particularly to the dominant cities of these regions, where employment opportunities are perceived to await the newcomer. Thus the share of national populations in the lagging regions is declining, despite their frequently higher fertility rates. The migration flows, dominated by young adults, are also transforming age structures in both source and destination areas, leading (in the case of China) to paradoxically lower percentages of elderly in cities characterized by ultra-low fertility than in the rural areas, and to similar though less marked differences in India and Indonesia. Migration flows are tending to increase over time, both absolutely and as a proportion of total population. However, there are variations on this theme: in India, male migration rates declined, and female rates increased, following the economic reforms initiated in 1991. In Indonesia, there has been a time-trend of increasing proportion of lifetime migrants, both inter-island and inter-province, and an increase in recent inter-district migration (Muhidin 2014, Table 13.2).

First, though, some attention to measurement procedures is required. When the attention of demographers turns to migration analysis, it must be recognized that definitional issues come to take a more important place than is the case for the analysis of mortality or fertility. After all, a death of a living person is a death, and a birth is a birth (though stillbirths do provide some complications for measurement of both births and deaths). In the case of migration, however, definitions come to

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occupy pride of place. With regard to both the timing of a move and the location of the places from and to which the person moved, definitions need to be clear, and changes between censuses can confound meaningful analysis.

The relative strengths and weaknesses of measures such as lifetime migration, place of previous residence and place of residence at some clear point in the past (frequently 5 years ago) have been widely canvassed and need not occupy us here. The recent censuses of China, India and Indonesia use all three measures. However, more complex issues arise with respect to what is defined as a change of residence, particularly students who live at home for parts of the year and at the place of study for other parts; for people moving to another place, perhaps to stay with family members, to seek out work or other opportunities, but who have not been there long and who keep open the option of returning home after some time. Then there is the issue of what constitutes a change of residence. Typically, moving house within a particular village, town or city does not count as a move for census purposes. A boundary must be crossed, whether a local government boundary, a district boundary or a provincial boundary. Both the volume and pattern of migration measured by the census will depend to a great extent on the decision about the boundary that has to be crossed in order to be considered a migrant.

This point can be illustrated with reference to population mobility in India and Indonesia. As Ram Bhagat's chapter shows, well under one fifth of Indian migrants are inter-state migrants, about one third are inter-district, and the largest number are intra-district (38 % of male migrants and 59 % of female migrants, the high proportion for females resulting from marriage migration related to the practice of village exogamy). In Indonesia, there is a ratio of about five intra-provincial migrants for every interprovincial migrant and these data do not include non-permanent circular migrants or commuters, inclusion of which would tip the balance even further in favour of intra-provincial migrants (Hugo 2012: 133).

A basic decision in planning censuses is whether to follow a *de facto* or *de jure* approach with respect to place of residence. The *de facto* approach is to ask where the person resided on census night. The *de jure* approach is to ask place of usual residence. The *de jure* approach is more difficult to achieve without the risks of omissions or double counting, but while the *de facto* approach may appear simple, it is not so simple when the whole census enumeration is done over a period of time, and not in one day.

In actual practice, the Chinese census of 2010 adopted a *de facto* approach, focusing on current residence, not *hukou* or household registration status. This, however, complicates comparison with the 2000 census, which adopted a *de jure* approach. India, too, adopted a *de facto* approach. The relatively high under-enumeration rate in India (Deshingkar and Farrington 2009) is a source of concern in analysing migration, particularly in light of higher net under-enumeration in northern states, and in urban areas. The Indonesian census adopted a combined *de facto*-*de jure* approach for those who had been at their present place of residence for less than 6 months. They were supposed to be asked about their intentions; if they intended to stay beyond 6 months, they were supposed to be recorded in their current place of residence, but if they intended to return to their home place within less than 6 months, they were supposed to be recorded there. The potential for under- or over-recording is clear.

This discussion of complications around migration analysis from the census data does not mean that little can be learned from the admittedly defective data, but rather that great care should be taken in appropriately interpreting the available data.

Patterns of Movement: Geographic

As fertility rates drop to well-below replacement level (as in China) and to near-replacement level (as in India and Indonesia), the role of migration in modifying the patterns of population distribution as well as the population structure of particular areas tends to increase. This has been stressed in relation to China by Gu (2014), and is further elaborated in the chapters on migration in China by Zhenzhen Zheng and Ge Yang, and in India by Ram Bhagat. In China, the shift of massive numbers from interior parts of the country to eastern coastal areas has been ongoing for decades now; it has had greater proportionate impact on the populations of receiving cities including Beijing, Shanghai and Guangzhou than on the populations of the more populous sending provinces. It has played a crucial role in maintaining population growth in these cities, which otherwise would have experienced drastic declines in their populations, but also in sustaining their economic and social dynamism by expanding their young working-age groups, as shown in the spectacular age-sex pyramid for Shanghai in the chapter on China.

In India, the poor and populous states of Uttar Pradesh and Bihar top the list of outmigration states, while the relatively developed states of Delhi, Punjab, Haryana, Maharashtra, Gujarat and Karnataka are the main receiving states. In Indonesia, the patterns of recent migration are complex, with Riau Islands (its growth greatly influenced by neighbouring Singapore) and a few resource rich provinces benefiting from in-migration and heavily populated provinces of Java (not only Central and East Java but also the capital city, Jakarta) continuing to lose population through migration (Handiyatmo 2011). Indonesian migration patterns are better understood when analysis is conducted below the provincial level. Then the heavy inflows in parts of West Java and Banten resulting from overspill from Jakarta can be observed, along with actual migration losses from some other parts of these provinces. Such analysis is more effective than simple analysis of inter-provincial migration flows in confirming the tendency for migrants to seek better opportunities than in their home region. The migration flows are generally from poorer to wealthier regions, except that in the case of the Jakarta mega-urban region, the inter-provincial movement to areas outside the metropolitan boundaries results from typical "suburbanization" processes in the case of a very densely populated city.

While there are currently no laws restricting movement from one part of the country to another in any of the three countries, there are more subtle obstacles to movement that have restricted movement. In China, the *hukou* system makes it difficult for rural dwellers to move permanently to cities; it increases the costs and reduces the potential benefits to migration (Chan and Li 1999). In India, "sons of the soil" ideology has hindered economic growth, as well as violating the right to move enshrined in the constitution under Article 19. In Indonesia, the transmigration program (largely discontinued since the late 1980s – see Hugo 2012, Figure 7) represented a government program of large scale inter-provincial population transfer, underpinned by a policy of "unity in diversity", that was not replicated in either of the other countries. This policy, however, led to considerable tensions in some regions, and in contradiction with the national ideology, more subtle "sons of the soil" policies have restricted opportunities for migrants from other provinces in some parts of Indonesia.

What is clear is the symbiotic relationship between migration and urbanization. Whereas in much of Southeast Asia (including Indonesia), half a century ago, migration was still largely a process of moving to agricultural frontier areas (mainly spontaneous but sometimes under government-sponsored schemes), currently the dominant migration flows are from rural areas to cities or from one urban area to another. This is also the case in China, where 2000 Census data showed 78 % of total migration flows were either rural-urban or urban-urban (Chai et al. 2008, Table 6.6). The Jakarta mega-urban region is the dominant focus of migration flows in Indonesia; in China, as noted in Zhenzhen Zheng and Ge Yang's chapter, 40 % of migration is directed to the three giant conurbations of the Changjiang Delta, Pearl River Delta, and Beijing/Tianjin area. In India, though, while Delhi, Mumbai and Bangalore have been important foci for migration flows, rural-urban migration has played a less important role than rural to urban reclassification in the country's urbanization process.

Without downplaying the impact of rural-urban migration on urbanization, however, it is important to keep in mind the role of reclassification of rural to urban areas as their character is gradually transformed. Migration, of course, often plays a considerable role in transforming the nature of the areas that are subsequently reclassified as urban, but it is also the case that long-standing residents enter the urban population without physically moving through this kind of *in situ* urbanization.

Patterns of Movement by Age and Sex

Throughout the world, there is a fairly standard age pattern of migration, dominated by the young adult age groups of 15–39, though the sex composition of these flows varies. This standard pattern is replicated in the three countries under consideration, though as noted in the China chapter, the average age of migrants there has been increasing over time, with an increase in the proportion of married couples, more of whom now live at the destination with their children. The average educational level of Chinese migrants is also increasing, consistent with rising educational levels nationwide and the attractive development opportunities of the coastal cities for young people with higher levels of education. Similarly, in India, the share of migrants with secondary and tertiary education is higher than for non-migrants, and is rising over time. Indeed, there has been talk of the exclusion of the poor in rural to urban migration (Kundu and Saraswati 2012). In Indonesia, too, according to the

2010 Census, 48 % of recent migrants had graduated from senior secondary school or had higher education, higher percentages than in the non-migrant population (Handiyatmo 2011). Clearly, the tendency for migration to be selective of the better educated is supported by data from all three countries.

India differs from China and Indonesia in the more sharply differentiated patterns of migration for males and females. Given the prevalence of village exogamy in North India, women leave their parental household to join the husband's household in other villages. Little of this is captured by inter-provincial migration data, and much of it is missed by inter-district migration data, but happily intra-district movement can also be captured by both the census and the NSS. Though longer-distance migration of women is increasing in India, with their increasing education and broadening of employment opportunities, intra-district moves continue to predominate.

As stressed in the later chapters on ageing, the age composition of migration flows makes for differential ageing trends in different regions, in many cases confounding the ageing trends implicit in differential fertility and mortality rates. Without going into these issues in detail here, the key point is that in some cases, provinces or regions that would be most aged if based solely on trends in vital rates and their effects on age structure, in reality are less aged than some of the provinces where, based on trends in vital rates, ageing would be expected to be less pronounced.

Role of Migration in Rural-Urban Demographic Balance

Though also bedevilled by measurement issues, urbanization is clearly increasing in all three countries. China and Indonesia have reached a roughly even balance between urban and rural populations, whereas India is less urbanized at about 32 %, though perhaps more urbanized in reality than as portrayed by the statistics. Over the 2000–2010 period reclassification of previously rural places contributed more than rural-urban migration to the growth of India's urban population. In all three countries, the natural increase of urban populations is being slowed by the decline in fertility. Indeed, many of China's cities would be losing population were it not for the effect of migration. In India and Indonesia, too, migration may be contributing more than natural increase to the growth of the urban population, though the relative contribution of each requires careful investigation.

The large cities of China are an extreme case of below-replacement fertility. They have had ultra-low fertility for so long that population momentum – the residual contribution of higher fertility in earlier times to the continued growth of population – has run its course. These big cities are heavily reliant on migrants for their social dynamism and even for maintaining their population size, because without it, they would be facing a severe contraction in their population. This is not the case in India and Indonesia. Although some of their large cities do have below-replacement fertility, momentum would carry growth forward without any net migration.

Migration will continue to re-shape the populations of Asian countries, particularly those with half or more of their populations currently living in urban areas. Though China and Indonesia have both passed the 50 % urban landmark, there is still enormous potential for growth of their urban populations through migration, and even more so in India, where urbanization has not progressed as far.

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Part V
Aging

Chapter 18
Population Aging in China: A Sketch

Baochang Gu

Introduction

Along with the increase in longevity and the decline in fertility, China's population has aged at a sustained pace. According to the *2013 World Population Data Sheet* published by Population Reference Bureau (PRB 2013), China is not only the country with the largest total population in the world (1.3 billion), but also with the largest elderly population aged 65 and above (122.2 million), even in reference to the other two Asian demographic giants, India and Indonesia, which have 76.6 million and 12.4 million elderly respectively. Should the elderly population in China constitute a single country, it would rank as the 11th largest population in the world, behind India, United States, Indonesia, Brazil, Pakistan, Nigeria, Bangladesh, Russia, and Japan, but larger than the total population of Mexico (117.6 million) (PRB 2013).

The release of the results of the 6th National Population Census conducted in 2010 (NBS 2011, 2012) and the availability of the 2012 revision of *World Population Prospect* published by the United Nations (UN 2013) provide an excellent opportunity to examine the population aging situation in China. This chapter will present the trends in population aging in China by examining the proportion of the elderly and the median age of the total population, the dynamics of population aging stressing its variations across the country and its relation with fertility and migration, as well as the implications for elderly care and the availability of elderly support in China.

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Trends in Population Aging

The 2010 census reports that there were 177.6 million Chinese aged 60 and above. They represent 13.3 % of the total Chinese population, an increase of 2.9 % points since the 2000 census. Similarly, there were 118.8 million Chinese aged 65 and above, accounting for 8.9 % of the total Chinese population as against 7.0 % 10 years earlier (NBS 2011).

Table 18.1 presents the growth of the total population as well as the population aged 65 and above over the last three decades from 1982 to 2010. It indicates that while the total population has increased over the period by only about one third, from 1.0 billion in 1982 to 1.3 billion in 2010, the population aged 65 and above has more than doubled from 49.5 million to 119 million during the same interval. Furthermore, while the intercensal average annual growth for the total population has decreased by almost 60 %, from 17.4 million in 1982 to 7.4 million in 2010 (a reduction of 10 million), the average annual growth of the population aged 65 and above has on the contrary increased almost three times, from 1.4 million in 1982 to 3.1 million in 2010 – an increase of 1.7 million. The population aged 65 and above in China has increased during the last intercensal period between 2000 and 2010 from 88 million to 118.8 million. All these figures indicate that trends in the total population and trends in the population aged 65 and above have diverged sharply: while the growth of total population has slowed over the years, the growth of the aged population has accelerated during the same period.

To take a comparative perspective as shown in Fig. 18.1, China's population will peak by around 2030 before declining afterwards, while India's will continue to increase. By the mid twenty-first century, China's total population will be less than 1.4 billion while India's total will be more than 1.6 billion – a difference of more than 200 million people. China's population will be close to that of the developed regions as a whole (1.3 billion). At the same time, China's population aged 65 and

Table 18.1 Growth of total population and population aged 65 and above in China: 1982–2050

	Census year				Estimate year
	1982	1990	2000	2010	2050
Total population (in million)	1008.18	1133.68	1265.83	1339.72	1384.98
Average annual growth rate (%)	2.09	1.48	1.07	0.57	0.08
Average annual growth number (in million)	17.42	15.69	13.22	7.39	1.13
65+ population(in million)	49.50	63.15	88.10	118.83	331.01
Average annual growth rate (%)	3.93	3.09	3.39	3.04	2.59
Average annual growth number (in million)	1.38	1.71	2.50	3.07	5.30
Growth of aged population/ growth of total population	0.08	0.11	0.19	0.42	4.69

Data Sources: NBS, UN (2013)

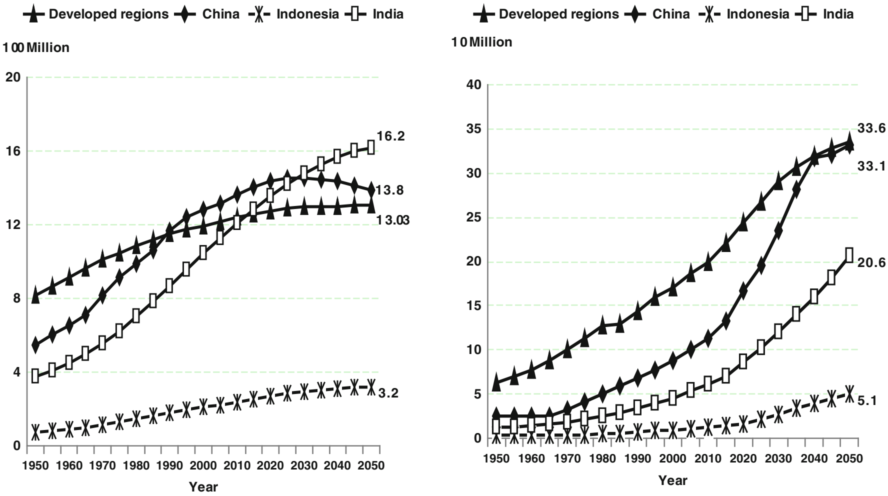

Fig. 18.1 Total population (*left*) and population aged 65 and above (*right*) in China, India, Indonesia and developed regions of the world: 1950–2050 (Data Source: UN (2013))

above will be soaring from now on to reach a population size almost identical to that of the developed regions of the world (around 330 million) by the mid-century, or about the population of Indonesia (321 million). China will have 100 million more elderly people than India (206 million) and six times more than Indonesia (51 million). In short, China's total population will become much smaller than India's while its elderly population will be much larger than India's.

The aging situation in China can be examined not only in terms of the growth of the elderly population, but also vis-à-vis the shrinking of the young population. Changes in age structure are depicted in Fig. 18.2. These figures show that from 1953 to 2010, the proportion of the population aged 60 and above and population aged 65 and above have both been increasing steadily – from 7.3 % to 13.3 % and from 4.4 % to 8.9 %, respectively. These levels are well above the internationally accepted criterion for an aging population. But the largest portion of the population is still of working age, especially from age 15 to 59. In 2010, 70 % of the total population is in the broad working age group.

What deserves attention however, are the changes over time in the proportion of the population in the age group 0–14. During the 1950s and 1960s, this group remained at around 40 % of the total population. It then started diminishing to about one third (33.6 %) of the total in 1982, to one fourth (27.7 %) in 1990, one fifth (22.9 %) in 2000, and finally about one sixth (16.6 %) in 2010. If we look at the population as a dynamic process, the lion's share of the population which is today concentrated in the working-age groups (70 %) will soon enter into old age and generate a huge elderly population. As indicated by UN (2013), by the mid-century, one-third (32.8 %) of the Chinese population will be aged 60 and above, and one

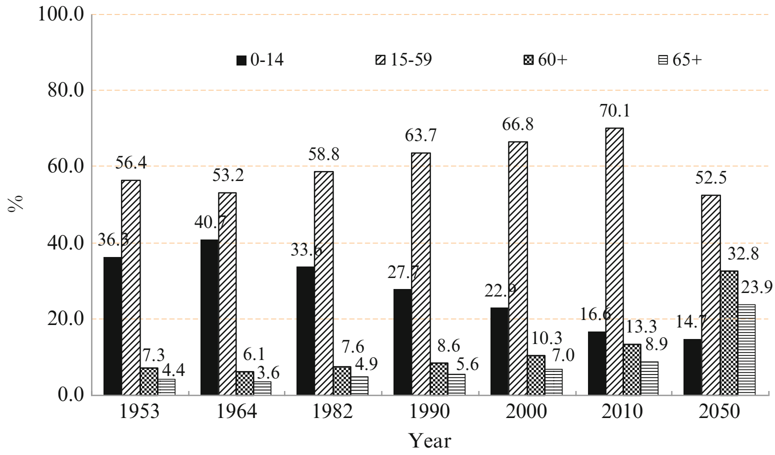

Fig. 18.2 Age composition of China: 1953–2050 (Data Sources: NBS, UN (2013))

fourth (23.9 %) will be aged 65 and above. An offsetting trend will be a sharp reduction of the young labor force aged 15–24 from 242 million in 2010 to 160 million in 2020 to 139 million in 2050 according to UN (2013), a reduction of almost half in the three decades to come. The aged population will thus have to be supported by a shrinking adult population and labor force resulting from sharp fertility decline in the past.

The above discussion suggests that population aging is not merely about the increase of the proportion of the elderly population in the total population. The entire population of China is in fact growing older. The best indicator to monitor the aging process of the whole population is its median age. Figure 18.3 documents the change in the median age in China over 100 years from 1950 to 2050. Using estimates from the 2012 *World Population Prospects* by the United Nations (UN 2013), we compare these figures with the situation in India and Indonesia as well as in more developed countries. As shown in the figure, the median age of China's population was around 20 from the 1950s to the 1970s. It then jumped to age 25 around 1990 and age 30 around 2000. It is predicted by the UN that the median age of China's population will further increase in the next few decades and even surpass that of the developed countries as a whole in the 2030s. By the middle of the twenty-first century, the median age of China's population will reach 46.3 years, exceeding that of the developed countries (44.5 years) by almost 2 years. During this period, China's median age will not only be 10 years above the world's average, but also much higher than the figure for India (36.7 years) and Indonesia (38.4 years). China will therefore have a population older than the population of the developed countries. With half of the population older than 45, it is hard to consider how China will remain economically sustainable or innovative.

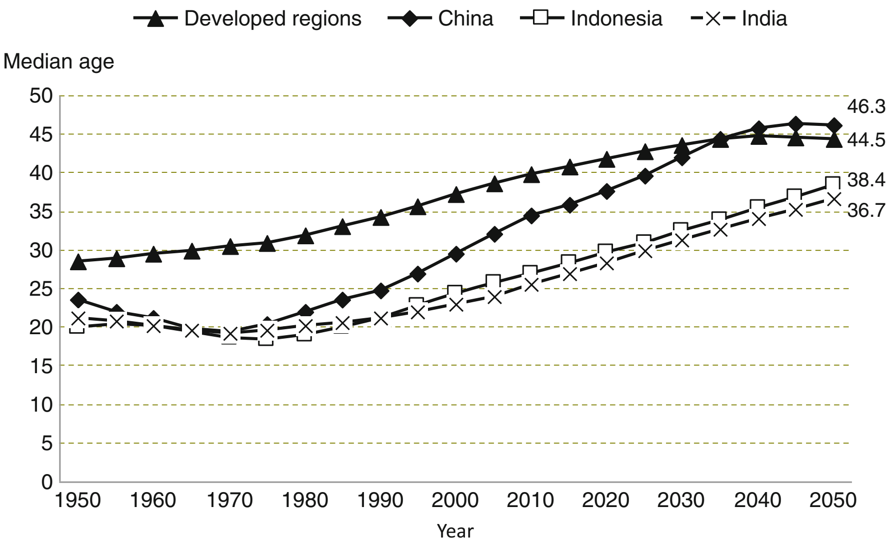

Fig. 18.3 Median age of the population of China, India, Indonesia and developed countries: 1950–2050 (Data Source: UN (2013))

Dynamics of Population Aging in China

Population aging is usually seen as the result of improvement of life expectancy on the one hand and reduction of fertility on the other. In the case of China, the drastic aging trend is regarded as one of the most significant impacts of rapid fertility decline (Gu 2009). China's average fertility was around 6 children per woman in the 1950s and 1960s, and it dropped by half in the 1970s to a level close to 2.6 children. It further decreased much below replacement level since the early 1990s (Gu and Cai 2011). The sixth census in 2010 reported China's fertility at 1.18. The prolonged low fertility will bring smaller birth cohorts into the population while the elderly population enjoys increased longevity.

The overall aging situation can be graphically shown in demographic pyramids. Based on data from the UN (2013), Fig. 18.4 shows the population pyramids for China in 2010 and 2050 and compares them with similar pyramids for India and Indonesia. The left part of Fig. 18.4 shows that China in 2010 has a much smaller base comprising those under age 14 as compared to India, but a much bigger top at age 35 and above. By 2050, the contrast between China and India will be even sharper, in particular because of China's smaller cohorts for age groups below 55 years.

If we consider rural-urban differences, we would expect a higher degree of aging in urban areas given their relatively lower fertility compared to rural areas. But the census results show the situation to be quite different. As shown in Table 18.2, the

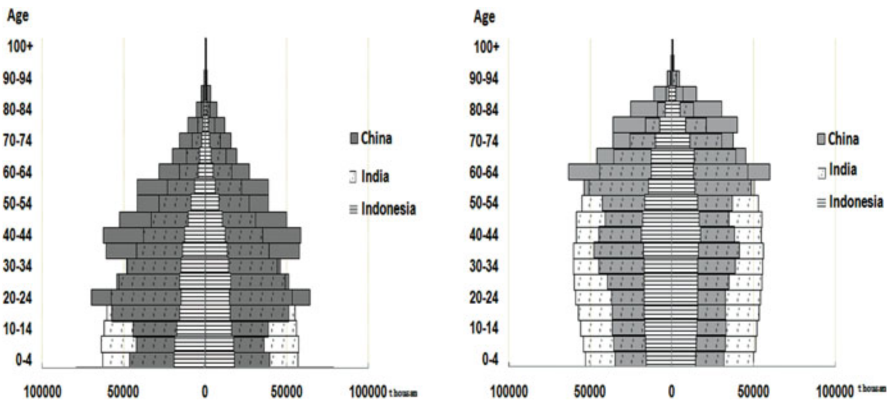

Fig. 18.4 Population pyramid of China compared with India and Indonesia in 2010 (*left*) and 2050 (*right*) (Data Source: UN (2013))

Table 18.2 Population aged 65 and above by residence in China: 1982–2010

	Census year			
Unit	1982	1990	2000	2010
City				
65+ population (million)	6.8	11.4	19.5	31.0
65+ as % of total population	4.7	5.4	6.7	7.7
Town				
65+ population (million)	2.5	3.8	9.6	21.2
65+ as % of total population	4.0	4.4	6.0	8.0
County				
65+ population (million)	39.9	47.9	58.8	66.7
65+ as % of total population	5.0	5.7	7.5	10.0

Data sources: 1982: NBS and MPS 1988; 1990: NBS 1993; 2000: NBS 2002; 2010: NBS 2002

proportion of the population aged 65 and above in urban areas has increased from 4.7 % in 1982 to 5.4 % in 1990, 6.7 % in 2000 and 7.7 % in 2010, amounting to an overall increase of only 60 % in this proportion during the last three decades. In contrast, the proportion of the elderly in rural areas has doubled during the same period: from 5.0 % in 1982 to 5.7 % in 1990, 7.5 % in 2000 and finally 10 % in 2010. This unexpected situation is due to a large extent to the tremendous amount of population redistribution of young people who moved from rural to urban areas: out-migrations have exacerbated aging in rural areas in spite of the slower fertility decline observed in rural China.

Population aging should also be examined from a gender perspective. With the improvement in life expectancy, the gender gap in life expectancy tends to become wider, as is the case for China. Table 18.3 presents the life expectancy for Chinese

Table 18.3 Changes in life expectancy by gender in China: 1960–2010

Year	Total	Male	Female	Diff.
1960	36.4	35.1	37.6	–2.5
1981	67.8	66.3	69.3	–3.0
1990	68.6	66.8	70.5	–3.6
2000	71.4	69.6	73.3	–3.7
2010	74.8	72.4	77.4	–5.0

Data sources: (1) NBS 2001. (2) NBS:http://www.stats.gov.cn/tjsj/tjgb/rkpcgb/qgrkpcgb/201209/t20120921_30330.html

Table 18.4 Marital status of the elderly by gender in China: 1982–2010 (%)

	Male				Female			
	Single	Married	Divorced	Widowed	Single	Married	Divorced	Widowed
Age 60+								
1982	2.56	69.00	1.53	26.90	0.30	41.25	0.37	58.09
1990	2.45	72.64	1.30	23.60	0.28	47.92	0.36	51.44
2000	3.18	77.39	0.97	18.45	0.21	57.75	0.36	41.68
2010	3.26	79.46	0.98	16.30	0.37	62.08	0.60	36.96
Age 65+								
2000	2.75	73.01	0.89	23.35	0.23	48.92	0.35	50.50
2010	3.11	74.95	0.84	21.10	0.42	52.35	0.51	46.71

Data Sources: 1982 and 1990: Feng 1996; 2000: NBS 2002; 2010: NBS 2012

population and by gender over the period from 1960 to 2010. Over the half century the life expectancy for Chinese people has been greatly increased, and in fact doubled from 36 to 75 years. Meanwhile, the gender gap in life expectancy widened from 2.5 to 5 years, which suggests that at current rates of mortality, Chinese females on average would tend to live longer than their male peers by 5 years.

This gap is likely to be further widened in the years to come, with the implication that more women will survive to the older ages than their male peers. This is exactly the situation shown in Table 18.4 with regard to the marital status of Chinese elderly by gender over the 1982–2010 period. For example, in 2010, among the elderly Chinese aged 60 and above, one sixth (16.3 %) of the males were widowed but for the females it was more than one third (37 %), more than double the male figure. For the elderly Chinese aged 65 and above one fifth of the males (21.1 %) lost their spouse, but for the females it was almost half (46.7 %). The differential percentages widowed by gender are of course not only caused by greater longevity among women, but are partly caused by the greater tendency for older men than older women to remarry after the death of their spouse. Nevertheless, the widowhood of the elderly females is truly remarkable, which suggests a trend of feminization of population aging.

The aging situation in China also varies geographically. Table 18.5 presents the proportion of the elderly population aged 65 and above by province in China for the

Table 18.5 Proportion of population aged 65 and above and TFR by province in China: 1982–2010

	Percentage of population aged 65 and above								TFR	
Rank	Region	1982	Region	1990	Region	2000	Region	2010	Region	2010
0	China	3.3	China	5.6	China	7.0	China	8.9	National	1.18
1	Shanghai	7.4	Shanghai	9.4	Shanghai	11.5	Chongqing	11.6	Beijing	0.71
2	Zhejiang	5.8	Zhejiang	6.8	Zhejiang	8.8	Sichuan	11.0	Shanghai	0.74
3	Hebei	5.7	Jiangsu	6.8	Jiangsu	8.8	Jiangsu	10.9	Liaoning	0.74
4	Beijing	5.6	Tianjin	6.5	Beijing	8.4	Liaoning	10.3	Heilongjiang	0.75
5	Shandong	5.6	Beijing	6.4	Tianjin	8.3	Anhui	10.2	Jilin	0.76
6	Jiangsu	5.5	Shandong	6.2	Shandong	8.0	Shanghai	10.1	Tianjin	0.91
7	Guangdong	5.4	Guangdong	5.9	Chongqing	7.9	Shandong	9.8	Zhejiang	1.02
8	Tianjin	5.4	Chongqing	5.8	Liaoning	7.8	Hunan	9.8	Tibet	1.05
9	Henan	5.2	Henan	5.8	Sichuan	7.5	Zhejiang	9.3	Jiangsu	1.05
10	Guangxi	5.1	Hebei	5.8	Anhui	7.5	Guangxi	9.2	Shaanxi	1.05
11	Shanxi	5.0	Liaoning	5.7	Hunan	7.3	Hubei	9.1	Guangdong	1.06
12	Hubei	5.0	Sichuan	5.7	Guangxi	7.1	Beijing	8.7	Inner Mongolia	1.07
13	Hunan	5.0	Hunan	5.6	Henan	7.0	Guizhou	8.6	Sichuan	1.08
14	Liaoning	4.8	Hubei	5.5	Hebei	6.9	Shaanxi	8.5	Shanxi	1.10
15	Sichuan	4.7	Guangxi	5.4	Hainan	6.6	Tianjin	8.5	Fujian	1.12
16	Guizhou	4.7	Hainan	5.4	Fujian	6.5	Jilin	8.4	Chongqing	1.16
17	Tibet	4.6	Anhui	5.4	Hubei	6.3	Henan	8.4	Shandong	1.17
18	Shaanxi	4.6	Shanxi	5.4	Shanxi	6.2	Heilongjiang	8.3	Gansu	1.28
19	Yunnan	4.5	Shaanxi	5.2	Jiangxi	6.1	Hebei	8.2	Henan	1.30
20	Jiangxi	4.5	Jiangxi	5.1	Guangdong	6.1	Gansu	8.2	Hebei	1.31
21	Fujian	4.4	Fujian	5.1	Yunnan	6.0	Fujian	7.9	Hubei	1.34

22	Anhui	4.1	Yunnan	4.9	Shaanxi	5.9	Hainan	7.8	Ningxia	1.36
23	Jilin	4.0	Tibet	4.6	Jilin	5.9	Yunnan	7.6	Qinghai	1.37
24	Xinjiang	3.7	Guizhou	4.6	Guizhou	5.8	Jiangxi	7.6	Jiangxi	1.39
25	Inner Mongolia	3.6	Jilin	4.5	Heilongjiang	5.4	Shanxi	7.6	Yunnan	1.41
26	Gansu	3.5	Gansu	4.1	Inner Mongolia	5.4	Inner Mongolia	7.6	Hunan	1.42
27	Heilongjiang	3.4	Inner Mongolia	4.0	Gansu	5.0	Guangdong	6.8	Anhui	1.48
28	Ningxia	3.2	Xinjiang	3.9	Xinjiang	4.5	Ningxia	6.4	Hainan	1.51
29	Qinghai	2.7	Heilongjiang	3.8	Tibet	4.5	Qinghai	6.3	Xinjiang	1.53
30	Chongqing	N.A	Ningxia	3.5	Ningxia	4.5	Xinjiang	6.2	Guizhou	1.75
31	Hainan	N.A	Qinghai	3.1	Qinghai	4.3	Tibet	5.1	Guangxi	1.79

Data Sources: NBS (1988, 2012)

period from 1982 to 2010. The whole country has been becoming older over the period from merely a fraction (3.3 %) in the group aged 65 and above in 1982 to nearly one tenth (8.9 %) in 2010. Even for the least aging provinces such as Tibet, Xinjiang, Qinghai, Ningxia, the degree of aging in 2010 is almost as high as it was in the provinces along the east coast in 1982 (around 6 %). But the disparity in aging among the provinces has become quite significant. For example, in 2000, while the elderly in Shanghai accounted for more than one tenth of its population (11.5 %), in Qinghai (the lowest) the proportion of elderly was only slightly above 4 % (4.3 %). According to the 2000 Census, the more developed regions with lower fertility tended to have a higher degree of aging than the regions with less development and higher fertility.

The 2010 census however, shows a somewhat different situation. One of the most obvious examples is that of Chongqing, a region located in the less developed western region. It has become the province with the highest degree (11.6 %) of aging across the country, while Shanghai, the largest metropolis in China which has experienced negative growth of its *de jure* population since 1993, surprisingly sank in the rank of aging (10.1 %) to the sixth among all the provinces in China, lower than Anhui (10.2 %), Liaoning (10.3 %), Jiangsu (10.9 %), Sichuan (11.0 %), and Chongqing. The only explanation for this seemingly ironic phenomenon is the effect of inter-regional migration. According to the 2010 census, this amounted to 220 million people (commonly called the floating population). The enormous amount of migration which occurred during the first decade of the 2000s from the less developed regions to the more developed regions has resulted in Chongqing becoming the 'oldest' province in the country and meanwhile "diluted" the extent of aging in Shanghai following the large inflow of young people to the city over the decade. This suggests that with fertility and mortality both having come down to a low level in China, migration has become a very powerful influence on population dynamics, enough to alter the regional variation in aging among the provinces in China (Gu 2014).

Implications for Elder Care

With accelerating aging of the population in China, how can older persons be supported and where will this support come from? With data from the 2010 census, Fig. 18.5 displays the population aged 65 and above by main source of support they have received. One obvious fact from the Figure is that the majority (67.3 %) of the urban elderly have access to pension programs as the main source of support while another one fourth of them have to rely on support from other family members. For the elderly in rural areas however, the pension virtually does not exist (merely 4.9 %). More than half of them (59 %) have to depend on the support from family members, while about one third of them (28.5 %) have to continue working to get support for survival even after they have reached senior ages.

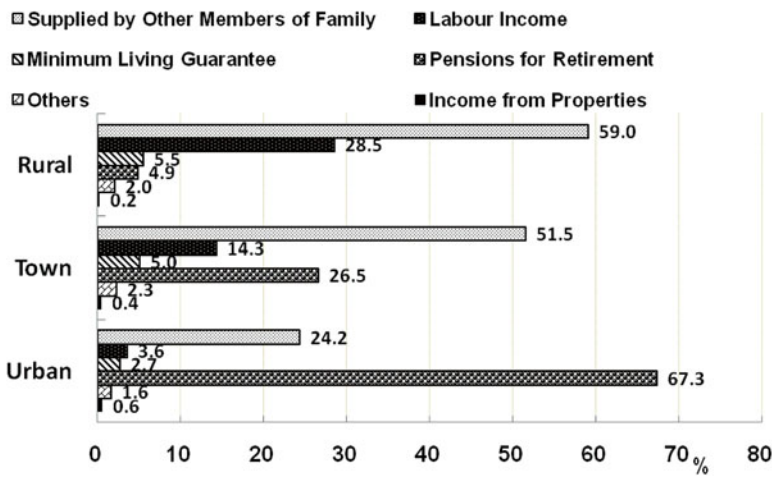

Fig. 18.5 Population aged 65 and above by source of elderly support by residence: 2010 (Data Source: NBS 2012)

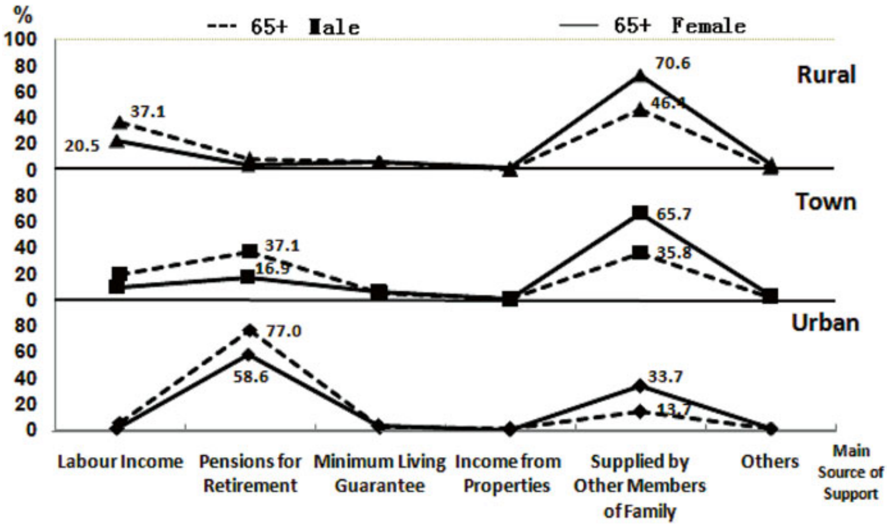

Fig. 18.6 Population aged 65 and above by source of elderly support by gender: 2010 (Data Source: NBS 2012)

There is also a gender gap concerning source of elderly support as shown in Fig. 18.6. Though the majority of the urban elderly can enjoy the availability of retirement pension for elderly support, the figure is even higher for elderly males in urban areas at 77 % but relatively lower for elderly females in urban areas at 58.6 %. In rural areas, too, elderly females have to rely more on family members for support

(70.6 %) than elderly males (46.4 %). It is clear that for elderly females living in rural areas, their longer life expectancy and higher chances of being widowed than their male peers poses double disadvantages to making them much more vulnerable and in need of assistance.

Concluding Remarks

The chapter has provided a brief examination of the demographic situation of population aging in China based on data mostly obtained from the consecutive population censuses, particularly the most recent one conducted in 2010. It also takes a comparative approach to position the Chinese situation in relation to that of two other demographic giants in Asia – India and Indonesia. The census data demonstrate that while the growth of the total population in China has been decelerating, the growth of the elderly population has been accelerating. The country will increasingly end up with a smaller group of younger people to support an expanding group of elderly people in the years to come. The whole population will become quite old as indicated by the rising median age and mushroom-shaped age pyramid. The dynamics of China's aging situation has also been examined with regard to the urban-rural, gender and regional disparities, which shows a higher degree of aging in rural settings, feminization of aging, and altered aging situation as a result of internal migration. A brief discussion of the source of elderly support using 2010 census data reveals heavy reliance on pensions for urban elderly and family members for rural elderly. The situation tends to be relatively worse for females both in rural and urban areas.

China has entered the era of an aging society before the country has become modernized, unlike the case of developed countries (Gu and Peng 1992). This is frequently described in China as "Getting old before getting rich". The challenges posed by population aging in China will certainly be enormous. How to respond to these challenges is a huge task for China with ramifications in almost every aspect of society.

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Chapter 19
Perspectives on Old Age in India

Premchand Dommaraju

Introduction

About 8 % of India's population is over the age of 60, a figure similar to that of Indonesia but lower than China's 12.4 %. In absolute numbers, however, there are more than 93 million elderly in India and this number is projected to increase to about 296 million by 2050 (United Nations 2013). This chapter presents important demographic, economic, social, family, health and policy perspectives on ageing in India. Unless stated otherwise, 'elderly' in this chapter refers to those aged 60 and above.[1]

Demographic Aspects of Ageing

Population ageing is brought about by shifts in the age structure of a population, due to changes in births, deaths and migration. Falling birth rates make a population older. However, the effect of mortality on age structure depends on the age groups which experience the decline – decline in mortality at younger ages makes the

[1] 60 and above has been used by researchers and the Indian Government as a marker of old age. The National Policy on Senior Citizens 2011 categorically states "All those of 60 years and above are senior citizens." It should, however, be recognized that there is nothing sacrosanct about the age 60 or using chronological age based on number of years lived. Population ageing could also be measured using number of years remaining or prospective age. The words 'senior citizens', 'elderly' and 'aged' are used interchangeably in this chapter.

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population younger while decline in mortality at older ages makes the population older.

Demographic transition in India over the last half century has witnessed a steady change in fertility and life expectancy. Fertility began to decline in earnest from the mid-1960s reaching a low of 2.66 by 2011 (Guilmoto and Rajan 2013). Life expectancy at birth increased rapidly between 1950 and 1975, mainly due to reductions in child mortality rates, followed by a steady but slower rate of increase post-1975 (Saikia et al. 2010). Mortality decline in older ages has not been dramatic. While life expectancy at birth increased from 49.7 to 63.5 between 1970–1975 and 2002–2006, life expectancy at age 60 increased by just over 4 years from 13.8 to 17.9 years, and at age 70 increased by less than 3 years during the same period (Government of India 2011).

The shifts in fertility and mortality and the resulting changes in age structure of the population can be visualized using population pyramids in Fig. 19.1. The pyramids show the proportion of the population in each age group relative to the total population and not the absolute number of people in each age group. The broad base

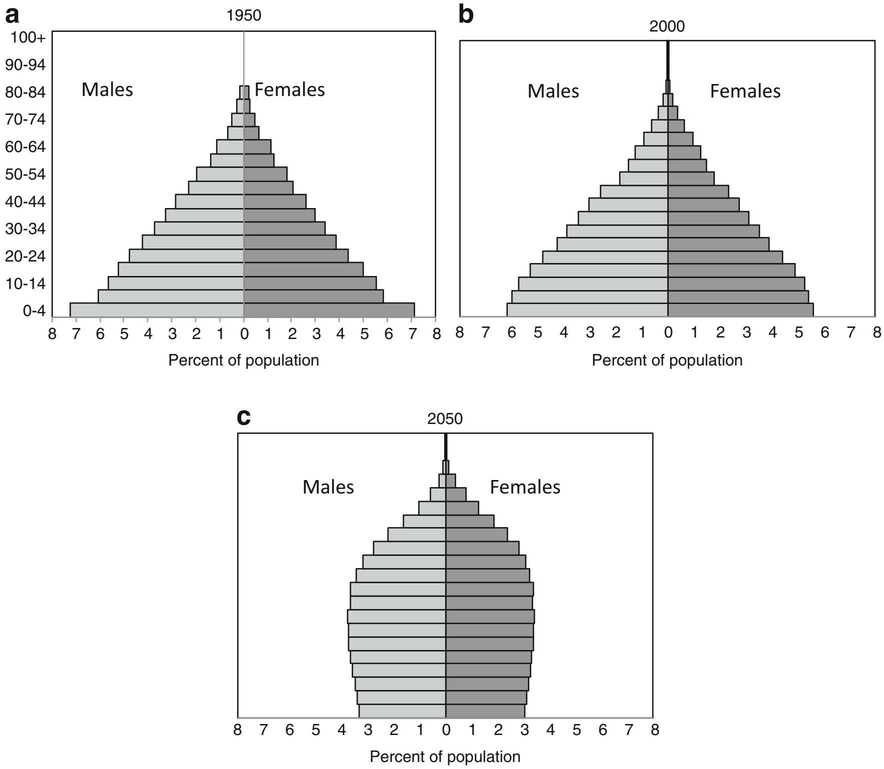

Fig. 19.1 Population pyramids, India, 1950, 2000, 2050 (Source: Based on United Nations (2013) World Population Prospects, 2012 Revision)

of the pyramid in 1950 reflects high fertility rates during the period and the narrow top reflects the small number of elderly in the population. By 2050, declines in fertility will shrink the base (the per cent of population in the younger age groups will decline relative to the total population) and as people from earlier cohorts move up the pyramid, the middle and top of the pyramid will expand. At this stage, the age structure will have relatively higher proportion of elderly in the population.

The changes in age structure seen in the population pyramids create different levels of dependency over the demographic transition. Figure 19.2 illustrates the changes in total dependency ratio (ratio of those aged 0–14 and 60+ to those aged 15–59), old age dependency ratio (ratio of those aged 60+ to those aged 15–59) and the proportion of population aged 0–14 and 60+. The trend seen for India follows what Lee and Mason (2010) described as a pattern of increase in dependency ratio during the initial stages of demographic transition (when mortality declines at a faster pace than fertility), decrease in dependency ratio as demographic transition progresses (as fertility continues to decline) and subsequent increase in dependency ratio (as proportion of older people in the population increases). Total dependency ratio in India peaked in the early 1970s due to the large proportion of young in the population, and has been declining since then. Old age dependency ratio has remained constant over the last 50 years, but is projected to increase. By 2050, the

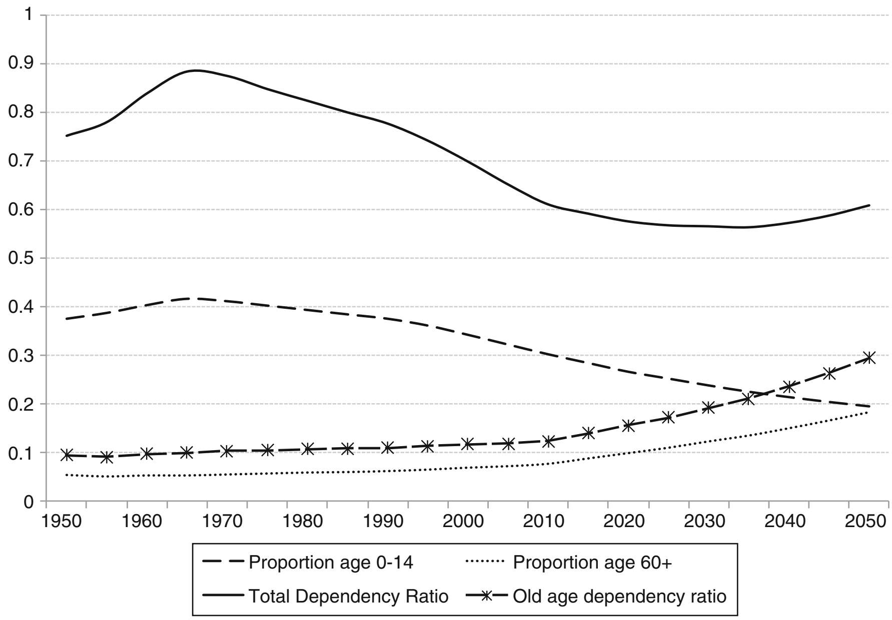

Fig. 19.2 Dependency ratios, India, 1950–2050 (Source: Based on data from United Nations (2013) World Population Prospects, 2012 Revision)

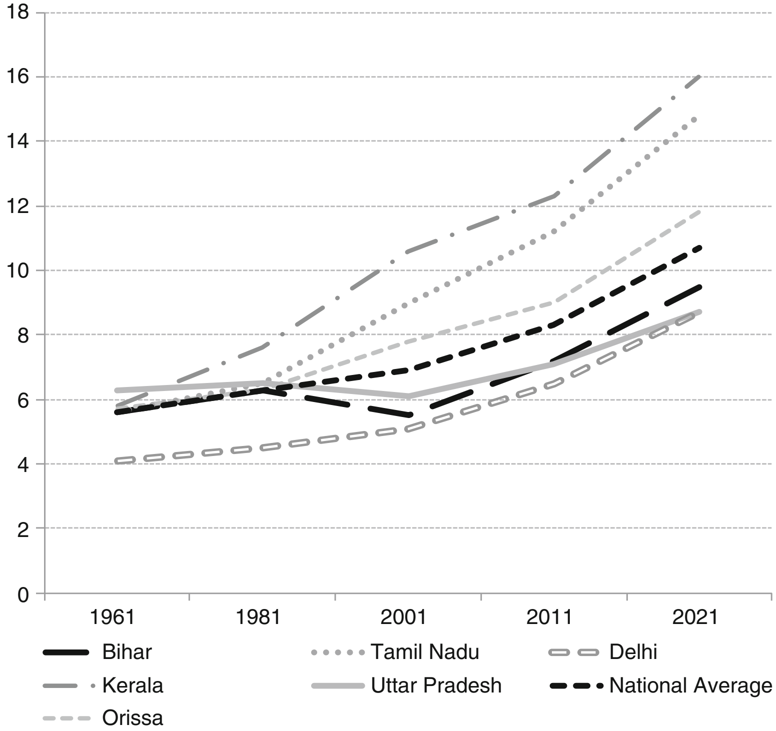

Fig. 19.3 Population 60+, selected Indian States, 1961–2021, per cent (Source: Based on data from Registrar General and Census Commissioner of India 2006)

increase in old age dependency ratio will lead to an increase in total dependency ratio.

India's spatial variation in demographic indicators means that there is diversity of ageing patterns. States like Kerala and Tamil Nadu which have progressed in the demographic transition have a larger proportion of elderly in the population and this is projected to increase to more than 15 % by 2021 (Fig. 19.3). Regional demographic imbalances and economic disparities have intensified the interstate migration of surplus labour from low growth states with large young population such as Bihar to high growth states such as Tamil Nadu (Khandelwal et al. 2012). Much of labour migration is for work in commercial sectors. There are no signs yet of migrants as care providers for elderly in states such as Tamil Nadu and Kerala.

Migration influences the age structure of the population in both the sending and receiving areas. In urban regions, such as Delhi, an influx of working age adults has kept the population relatively youthful. Many of these young migrants might move out of the city in old age, due to high cost of living in the city, keeping population of cities young over the long term (Desai et al. 2010). Migration is important in understanding the well-being of elderly in rural areas where many elderly are "left behind" in villages as their children migrate to cities.

Family, Living Arrangements and Intergenerational Relations

Filial piety, a traditional virtue espoused by religion and culture in India, places the responsibility of support and care for the elderly on children (Bhat and Dhruvarajan 2001; Croll 2006). The traditional Indian family structure of elderly living with children was seen as a reflection of filial piety. However, structural, institutional and ideational changes have resulted in changes in employment structure, migration, shifts towards consumerism and changing notions of family. These may have weakened the support and care received by the elderly and could have brought about changes in the living arrangements of the elderly (Brijnath 2012; Medora 2007).

Table 19.1 presents the living arrangements of elderly Indians in 2005–2006 based on IHDS[2] data. The number of elderly living alone is low at just 2.4 % nationwide, reaching a high of about 6 % for elderly who were not married at the time of the survey. These figures do not include elderly living alone in old age homes or in other institutional settings since IHDS, like most other demographic surveys, does not cover the institutional population. There are no national figures on the number of elderly care institutions or the number of elderly staying in such institutions.

Table 19.1 Living arrangement of the elderly, India, 2005–2006, per cent

			Area		Sex		Marital status	
		Total	Rural	Urban	Male	Female	Not currently married	Currently married
1	Alone	2.4	2.6	1.6	1.1	3.7	6.1	0.2
2	With spouse only	9.7	10.0	8.8	12.1	7.2	0.0	16.0
3	With children only	2.3	2.5	2.9	1.5	3.6	6.0	0.2
4	With spouse and children only	9.8	8.3	11.5	14.3	3.6	0.0	15.0
5	With children's family in the absence of spouse	22.6	22.0	25.0	11.6	34.0	61.0	1.5
6	With children's family and spouse is present	36.8	37.0	33.0	45.5	27.0	0.0	57.0
7	Other living arrangements	17.0	17.0	17.0	13.5	20.5	27.0	10.0

Source: Author's tabulation using IHDS, 2005–2006, data

[2] Indian Human Development Survey (IHDS), 2005–2006, a nationally representative sample survey, interviewed about 40,000 households and collected information on variety of topics including demographic characteristics of all household members (Data available from ICPSR: http://doi.org/10.3886/ICPSR22626.v8).

Studies from some cities in India suggest that old age homes, while not uncommon, are limited and cater mainly to middle and high income elderly (Kalavar and Jamuna 2011). Old age homes are market driven, fee based institutions that effectively exclude the poor and destitute elderly (Ansari 2007). There is not much known about destitute elderly, elderly living in *ashrams* (homes for the elderly run by religious charities), and rural elderly as these groups have been neglected in ageing studies.

In public discourse, elderly living alone or in old age homes is interpreted as a sign of breakdown in traditional Indian values (Lamb 2011). Elderly cited inability of their families to take care of them as the main reason for living alone. However, a small number of elderly preferred living alone for privacy and to maintain distance from family members (Kalavar and Jamuna 2011; Liebig 2003). About 40 % of elderly living alone rarely or never communicated with their children despite the availability of communication technology (BKPAI 2012[3]). While the lack of communication with their families might be a reason why they are living alone, it is also possible that living alone further weakens the ties with family members. Elderly approach living alone or in old-age homes with ambivalence. As Lamb (2011: 509) has observed, living alone is not something the elderly in India find "unambiguously easy or natural" but approach it "with critical self-reflection, self-consciousness [and] effort".

A majority of elderly live with at least one other family member. Nearly 22 % of them live with their spouse, children or both (Rows 2, 3 and 4 of Table 19.1). Many elderly reside with their children's family (such households include at least one of the following members: son-in-law or daughter-in-law or grandchildren. Rows 5 and 6). The remaining 17 % live in households that have at least one person who is not their spouse, child, son- or daughter-in-law, or grandchild. A majority of the elderly living with children expressed satisfaction with their current living arrangement, and a majority stated that children should support the elderly (BKPAI 2012).

There are differences in living arrangements by sex and marital status of the elderly. About a third of elderly women lived with children in the absence of spouse as compared to about 12 % elderly men in a similar situation. The large number of elderly women with no spouse is attributable to the fact that Indian women marry men older than themselves; as life expectancy of women at older ages is higher than men, there are higher chances of women being widowed. This combined with low rates for remarriage for women, leads to a high proportion of elderly women who are not currently married (Rajan and Kumar 2003; Chaudhuri and Roy 2009).[4]

[3] Building a Knowledge Base on Population Ageing in India (BKPAI), 2011, a survey of elderly in seven states – Himachal Pradesh, Kerala, Maharashtra, Odisha, Punjab, Tamil Nadu and West Bengal – interviewed about 8329 household and 9852 elderly residing in these households (BKPAI 2012).

[4] There are more men aged 60 and above compared to women; but, women aged 60 and above are more likely to be widowed than men. More elderly men than women is in contrast to the pattern of more elderly women seen in most countries. Excess female mortality at younger ages meant that until the 1990s life expectancy at birth for females was lower than males. There also might be underreporting of older women (Rajan et al. 2003; Visaria 2001).

When we look at marital status and living arrangements, there is little difference in the percentage of elderly living with children (about 60 %). However, currently married elderly were less likely to stay with non-family members.

The results confirm that majority of elderly live with their children or children's family. To further understand the living arrangements of the elderly, data from LASI[5] was analysed. Elderly with children have a choice of living alone or with children. About 80 % of elderly with at least one child were residing with their children. Bivariate analysis of the decision to live with children versus living alone reveals a positive gradient by education and household consumption (used as proxy for household economic status), with elderly in the lowest category of these two variables more likely to stay with children. This reflects perhaps the economic needs of the elderly and children in poor households to share and pool resources including housing. Elderly who are not currently married and those living in rural areas were more likely to stay with children. Those with one child were more inclined to stay with the child compared to those with two or three children.

The decision to stay with a child is dependent upon the sex of the child. Almost 90 % of elderly who were living with children were living with sons (based on LASI). This is not surprising as there is strong aversion to staying with daughters. About two-fifth of the elderly said that they did not want their daughters to look after them in old age (BKPAI 2012). Ethnographic evidence suggests that even though elderly women have stronger ties with daughters, there is strong antipathy towards staying with daughters (Bhat and Dhruvarajan 2001; Kalavar and Jamuna 2011). The preference to stay with sons should be understood in the context of the Indian marriage and kinship system in which daughters are considered as lost to the natal family after marriage, and the responsibility for parents falls squarely on sons (Medora 2007).

A common narrative in Indian gerontology traces the changes in living arrangements and status of the elderly to the breakdown of the joint family system. Cohen (1992: 124) portrays this narrative as follows,

> (1) Indian families were all once multigenerational "joint" households; (2) in such households, old people had all their needs taken care of, were listened to and respected, and had few complaints – old age was a pleasure; (3) with the advent of the "zations" – Westernization, modernization, industrialization, and urbanization – families begin to break up, and the social support and respect for the elderly declines, along with their quality of life.

Empirical and ethnographic evidence does not mirror this narrative. Elderly in India prefer to and live with children or other family members, and this does not appear to have been deeply eroded by economic, social or other changes. However, demographic shift towards smaller families and subsequent greater investment in children might lead to an inevitable strain in the support and care children can extend to their parents. As Croll (2006) mentions, this shift might lead the older

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[5] Longitudinal Aging Study in India (LASI), pilot round, 2010, was conducted in four states – Rajasthan, Punjab, Kerala and Karnataka – and surveyed about 1500 people. The analysis presented here is based on individuals aged 60 and above (N = 583).

generations to reassess their expectations of the nature of support that their children can provide them.

Living arrangements is one aspect of the complex web of relationships between elderly parents and children. While living arrangement has been shown to be an important determinant for some aspects of elderly life, it should not be taken as a proxy for the care or support received by the elderly or to imply that co-residence is always better (Hermalin 2002). As Chan (2005: 277) points out, co-residence of older persons with a child "is not evidence in and of itself of a net flow of resources from child to parent, or that co-residence reflects the parent's needs". Non-co-residence does not necessarily mean lack of support (Knodel and Saengtienchai 1999). As in other Asian settings, a majority of non-co-resident children in India live nearby and they could still potentially help their parents (BKPAI 2012).

Work, Income and Economic Independence in Old Age

As in other countries, elderly in India consume more economic resources than they produce through labour. The relationship between production and consumption of resources across age groups is presented in Fig. 19.4. Production and consumption of resources changes with age, showing a deficit at younger and older ages and a surplus at working ages. The figure shows that labour income declines rapidly past age 60 and plunges below the consumption level leading to a deficit. This deficit at older ages can be met through public transfers via government, private transfers in the form of intra-family transfer of resources, and asset- based transfers such as through the use of accumulated savings or income derived from assets.

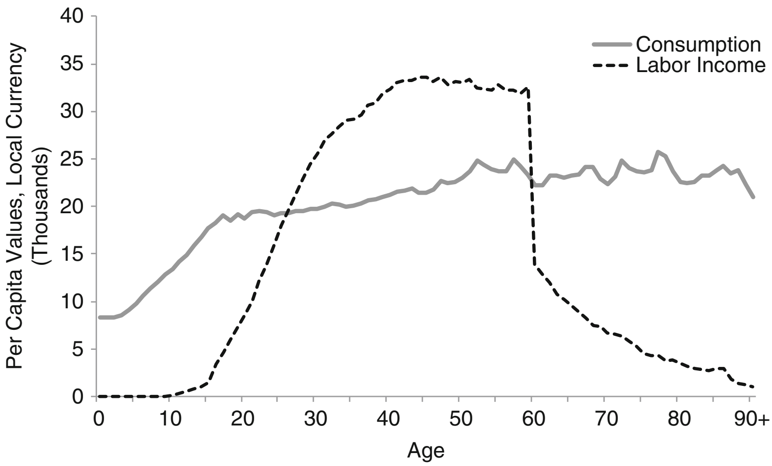

Fig. 19.4 Labour income and consumption by age, India, 2004 (Source: NTA database, available: www.ntaccounts.org)

Asset-based transfers are the main source of support for the elderly in India, except for the very old who rely on public transfers (Lee and Mason 2011). The contributions of intra-family and public transfers are small and do not cover the deficit in older ages in any significant way. Evidence from the National Transfer Accounts (NTA) project in India shows that family resources are used to support the young more than the elderly, and intra-family transfers from children to the parents are not high. In total, elderly contribute more than they receive over their lifetime (Ladusingh 2012; Narayana and Ladusingh 2011). Elderly in India use income from productive assets (such as farms or house) and savings accumulated over their productive years to support themselves in old age (Lakshmanasamy 2012; Lee and Mason 2011).

Public transfers to the elderly through welfare or social security remain low and inadequate in meeting the needs of the aged (Dhillon and Ladusingh 2013). Net public transfers to elders, after taking into account tax and other contributions of the elderly, covers only 5 % of the deficit in old age (Ladusingh 2012). Public cash transfers to the elderly is mainly through the Indira Gandhi National Old Age Pension Scheme (IGNOPS) which provides Rs. 200/month to elderly living below the poverty line[6] (Kumar 2003; Pal and Palacios 2011). IGNOPS is the only nationwide programme to provide cash transfers to the needy elderly. The scheme, funded by the Central Government but administered by the local (state and district) authorities, faces various difficulties: from selecting the beneficiaries based on the laid out criteria without being mediated by personal, political or administrative concerns, to ensuring that funds flow to the intended recipients (Bloom et al. 2010; Vera-Sanso 2010). Despite these and other challenges, the programme is effective in targeting the elderly with minimal leakage of funds, and for many elderly this is an important source of support (Dutta et al. 2010).

In countries of South Asia where most workers are in the informal sector without an official retirement age or pensions, more than half of the elderly continue to work past age 60 (Alam and Barrientos 2010). Indian elderly continue to work as long as possible until they are incapable of doing so, and the age at which they stop work is largely determined by their economic and health conditions (Dharmalingam 1994; Mathew and Rajan 2008). As seen in Table 19.2, nearly 40 % of elderly men and 11 % of elderly women were working in 2012, with almost all elderly working men putting in more than 4 h daily. As life expectancy increases, it is estimated that men aged 60 will continue to work for another 10 years on average in 2050, up from 8.7 years currently; as women increasingly participate in the labour force, they are likely to work for 9 years beyond age 60 in 2050 up from the present 3.6 years (Dhillon and Ladusingh 2013). A majority of men and an overwhelming number of

[6] The scheme, formerly known as National Old-Age Pension Scheme (NOAPS), was introduced in 1995, paid Rs. 75/month to destitute elderly with no adult son. The scheme was renamed in 2007 and eligibility age raised to 65 and cash increased to Rs. 200/month. The scheme was revised again in 2011 with eligibility age lowered to 60 and cash for those above 80 increased to Rs. 500/month. Some state governments provide additional money on top of the Rs. 200 provided by the Central Government.

Table 19.2 Work, income and economic indicators, India, 2011, per cent

	Men	Women	Total
Currently working	38.9	10.9	24.2
Among currently working, working for more than 4 h a day	95.0	88.6	93.5
Working for economic and other compulsions	67.9	82.2	71.3
No income	26.0	58.7	43.3
Elderly contribution to household expenditure (among those who earn an income)	71.2	35.6	52.4
Financially fully dependent on others	32.6	66.4	50.4
Don't own any asset	11.0	34.1	23.1

Source: BKPAI 2012. Selected indicators from chapters 3 and 4

women said they were working because of economic or other compulsions rather than out of choice (Table 19.2). Changing economic structure and employment opportunities, especially in rural areas which have seen a decline in demand for agricultural labour, has meant that the elderly are increasingly finding it difficult to find work and support themselves (Vera-Sanso 2007).

Older people might be economically vulnerable because of lack of regular income or financial support from the family or public support. Estimates suggest that there might be as many as 17.7 million elderly living below the poverty line (Srivastava and Mohanty 2012). More than one in ten elderly men do not own any assets, a quarter of them have no income and nearly a third are financially fully dependent on others (Table 19.2). These indicators show the extent of dependence and potential financial vulnerabilities of the elderly. But are the elderly more vulnerable than non-elderly in India? Contrary to expectations, studies have consistently shown that elderly households (with at least one elderly member in the household) are not worse off than households without any elderly person (Srivastava and Mohanty 2012). This could be because the poor are less likely to survive to old age leading to a survival bias in the number of elderly households (Pal and Palacios 2011). The presence of such bias reflects the cumulative disadvantages of the poor over their life course and calls for caution when looking at poverty in old age.

The economic and financial situation of elderly women is of particular concern. For all the indicators presented in Table 19.2, elderly women are worse off than men. Some of the disadvantages might stem from the lower level of paid workforce participation of women in both the formal and informal sectors (though they might contribute to the household economy in other ways). Lower work participation of elderly women is in contrast to elderly men who face considerable pressure to find paid work to support the family (Mathew and Rajan 2008). Ownership and management of assets by elderly women is also low, which further disadvantages them (Bloom et al. 2010; Kodoth and Rajan 2008). Lack of assets owned by elderly women might partly be a result of the gendered nature of property laws and intergenerational transfers. As Agnes (1999) observes, certain provisions in the Indian law take age of men into account but not age of women; for women only marital status is considered. While Hindu widows and daughters have absolute right to property, the absolute right of men to hold property means that they can sell, gift or will away property which makes the rights of elderly women "illusory" and reduced to claims for maintenance and right of residence (ibid.). Accumulation of disadvantages over the life course means that women enter old age with less financial resources which places them in a vulnerable position in old age (Vera-Sanso 2010).

The situation of elderly widows is precarious. Social and family control exerted on various aspects of widow's life – from sexuality to asymmetric gender and power relationship – effectively consigns many widows to a lower position (Chen 1997). Widow remarriage is not common because of lack of acceptance and social disapproval. The cumulative disadvantages over the life course, and lack of independent source of income or support, affect elderly widows more than any other group. Though there are public cash transfers to widows,[7] it is essential, as Gopal (2006) has advocated, that women be allowed stronger claims to assets so that their position within the family is strengthened and they are better prepared for old age.

Table 19.3 Indicators of health and wellbeing, India, 2007–2011

	Total[a]	Age		Sex	
		50–69	70 and older	Men	Women
WHO DASI score, mean	71.3	74.6	61.7	75.6	66.9
WHO QOL score, mean	71.6	72.3	69.4	72.6	70.5
GHQ-12 score, mean	13.9	–	–	13.1	14.6
Per cent of elderly below the threshold level of ≤12	51.7	–	–	56.4	47.6

Sources: SAGE survey indicators from He et al. (2012)
BKPAI indicators from BKPAI (2012)

Notes: WHO DASI score: WHODASi is an inverted score for WHODAS with 0 = worst health, 100 = best health. This is based on evaluation of day-to-day functioning in the last 30 days. The six domains are understanding and communicating, getting around, self-care, getting along with people, life activities, and participation in society (SAGE survey)

WHO QOL score: Quality of life score with 0 = worst health, 100 = best health. This assess quality of life in four domains: physical, psychological, social, and environment. (SAGE survey)

GHQ-12 score: The score ranges from 0 to 36 with 0 = best mental health and 36 = worst mental health. The threshold of 12 or below indicates good mental health. The scale is based on questions on whether respondents had experienced a particular symptom or behaviour recently (BKPAI 2012)

[a]WHO's DASI and QOL scores are based on respondents aged 50 and over. GHQ-12 score is based on respondents aged 60 and over

[7] Indira Gandhi National Widow Pension Scheme started in 2009 provides widows age 40–59 and living below the poverty line Rs. 200/month.

Health, Wellbeing and Care in Old Age

Health and wellbeing are important aspects of ageing. This section assesses health and wellbeing of the elderly in India using three broad indicators – WHO's Disability Assessment Schedule (WHODASi score), General Health Questionnaire scale (GHQ-12) to measure mental health, and WHO's Quality of Life Assessment (WHOQOL). Details about the indicators are presented in Table 19.3.

Disability among the older population in India is high. The mean WHODASi score of 71.3 is lower (in this score lower indicates worse health) than any of the five countries (China, Ghana, Mexico, Russia, South Africa) that have similar data (Table 19.3). Also, nearly 90 % of the elderly reported suffering from at least one disability (He et al. 2012). Disability and poor health in old age in India is because of the double burden of communicable and non-communicable diseases (Johnson et al. 2011).[8] This is unlike ageing population in developed countries where communicable diseases are not a major risk factor. The burden of disease in old age is further worsened by high rates of smoking and other life style factors (Kowal et al. 2012). As with other aspects of ageing, there are important differences in health status by gender, economic status, dependency level, marital status and living arrangements of the elderly.

Elderly in India report having good mental health and quality of life. Majority of the elderly were below the GHQ-12 threshold for signs of psychological distress or mental health issues (Table 19.3). Elderly in India ranked higher than four of the other five countries (except Ghana) in WHO's Quality of Life Assessment. This high level of subjective wellbeing is in contrast with high levels of disability seen among the elderly. However, indicators of mental health and wellbeing should be interpreted in the cultural and social context of ageing in India where mental or psychological issues in old age are seen as normal process of ageing, and viewed as not needing medical attention (Brijnath 2008; Patel and Prince 2001). Like elderly elsewhere, changes in old age such as loss of authority, increasing dependence, and changing role in the family could affect the mental and psychological wellbeing of the elderly in India (Bhat and Dhruvarajan 2001), and there is a need for greater awareness of mental health and wellbeing issues in old age.

The government's role in treatment and care of the elderly is limited in India. About 24–42 % of elderly with chronic conditions and about 41 % of elderly with acute morbidities sought treatment in public hospitals (BKPAI 2012). The payment for treatment and hospitalization is overwhelmingly borne by the family, with more than half coming from children (ibid.). Even in public hospitals where treatment is free, indirect cost for transportation, bribes, and payment for medicines make treatment unaffordable for many elderly (Balagopal 2009). Lack of affordable health care puts considerable pressure on elderly households and many elderly might not have the resources needed to seek treatment and care.

[8] Disease profiles of the elderly indicate that about half of the profile is due to communicable diseases, 40 % due to non-communicable diseases and the rest due to accidents and injuries (Kowal et al. 2012).

Care for the elderly in India falls on family members. One reason for this is lack of affordable public or private institutional care facilities. Another reason is that seeking institutional care is seen as evading family responsibility and is perceived as bringing shame to the family (Evans et al. 2011). Caring for the elderly might strain financial, emotional, physical resources of many families, but as Brijnath (2012: 15) observes, families attach "deep meaning to care [of the elderly], viewing it through prisms of love, duty and reciprocity". Thus, families continue to be the main (or sole) provider of care to the elderly.

Discussion

The demographic, social, economic and health aspects of population ageing in India presented in this chapter raise important questions about the relationships, roles and responsibilities of individuals, families and the state. In India families remain the main source of support for the elderly. However, the intergenerational relationship is neither unidirectional nor fixed as seen in living arrangements and economic situation of the elderly. The nature, type and direction of support between the generations is determined by the situation and resources of both parents and children, embedded within the wider social and cultural values of support and care, and the expectations and meanings attributed to these values.

The family's role and responsibility in taking care of the elderly is reinforced by the government's approach and policies. National Policy of Senior Citizens, 2011, the guiding framework on ageing, strongly emphasizes that the elderly should continue to live with the family and that the family act as primary caregivers; institutional care is seen as a last resort. This blunt emphasis does not consider circumstances of the family. Neither does it provide any meaningful provisions to help the families support the elderly. The policy does mention that families must be strengthened to support the elderly, but none of the provisions in the "areas of intervention" really strengthen or support the families. Most of the provisions deal with providing support to the elderly in terms of income security in old age, healthcare, housing and welfare.

The government's emphasis on the family is also evident in legislations such as the *Maintenance and Welfare of Parents and Senior Citizens Act, 2007* which provides redress to the elderly to seek maintenance from the family, and provides penalties including imprisonment for family members not providing maintenance or care. This approach to elder care as the primary responsibility of the family without providing support to the families puts tremendous pressure on families. As others have argued, there needs to be a critical examination of the role of individuals, families, state and non-state actors in providing care and support to the elderly, and to evolve social and public policies that maximize the role of each of these actors to create meaningful ageing in India (see Lamb 2013; Silverstein and Giarrusso 2010; Navaneetham and Dharmalingam 2012).

This chapter presented selected perspectives drawing on the empirical and theoretical literature on ageing in India. While there is extensive literature on ageing in India cutting across several social science disciplines, there has been little research on life course analysis and in situating ageing in the context of cumulative (dis) advantages. As elderly in India are a diverse group, research would benefit from paying attention to the diverse life histories across the life course for different groups of elderly. Finally, it is essential to also consider the situation and wellbeing of those caring for the elderly.

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Chapter 20
The Past Three Population Censuses: A Deepening Ageing Population in Indonesia

Evi Nurvidya Arifin and Aris Ananta

Why the Concern About Ageing Population in Indonesia?

Globally, concern has grown over how younger persons would shoulder the burden of caring for the rising number and percentage of older, dependent persons. Indonesia cannot escape this global process of ageing population (Harper 2006; Koesoebjono and Sarwono 2003). Ageing has become an important issue in Indonesia because the fertility rate has been moving close to replacement level, indeed, to below replacement level in some sub-national regions. Furthermore, Indonesia is one of the few low-income economies which is experiencing accelerated ageing (Ananta and Arifin 2009). For example, in the regency of Gunung Kidul in the province of Yogyakarta, the percentage of population aged 60 years and over has reached 18.3 %. The very high percentage of older persons in this regency is because of a combination of very low fertility and high out-migration.

The objective of this chapter is to discuss ageing population issues in Indonesia by describing the trajectory of ageing from 1990 to 2010 using, in particular, data from the last three population censuses. This chapter focuses on 1990–2010 since this period witnessed an important transformation in Indonesia, from an authoritarian into a democratizing era. This change has contributed to the issues and policy debates in the area of population and development, including those on ageing.

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The Total Fertility Rate (TFR) in Indonesia declined from 5.6 in the late 1960s to 2.8 in the 1990s. However, the impact of declining fertility on age structure of the population was only seen starting from the 1990 population census. More precisely, as seen in Fig. 20.1, the impact was reflected in the smaller number of population aged 0–4 years old relative to those aged 5–9 years old. This means that the absolute number of births declined during the 5 years prior to 1990. While the working age population contributes the largest portion of the population, the share of older persons was also increasing. Indonesians are gaining in longevity. In 1990, the average life expectancy at birth was only 59.8 years, in two decades it rose by more than 10 years to more than 70 years. With the rising life expectancy, the 2010 population census extended the presentation of population age-groups to age 95+, rather than 75+ as in the earlier censuses, helping us to better understand the relative proportions of older persons.

This chapter discusses five important points about the ageing process in Indonesia. The first point is that though the percentage of older persons in the total population in 2010 is not as high as that in developed countries, including those in Asia such as Japan and South Korea, the percentage will keep rising. The second point has to do with Indonesia's large total population and therefore its very large absolute number of older persons, which makes providing goods and services for the older persons a mammoth task. Third, Indonesia is a large and heterogeneous country. At sub-national levels, there is diversity of ageing population issues that are unique to each region and need to be dealt with at lower administrative levels such as regencies.

The fourth point is that the issue of ageing is usually only seen with respect to declining fertility and rising life expectancy. However, migration will play an increasingly important role in shaping the age structure of Indonesia as a whole, as

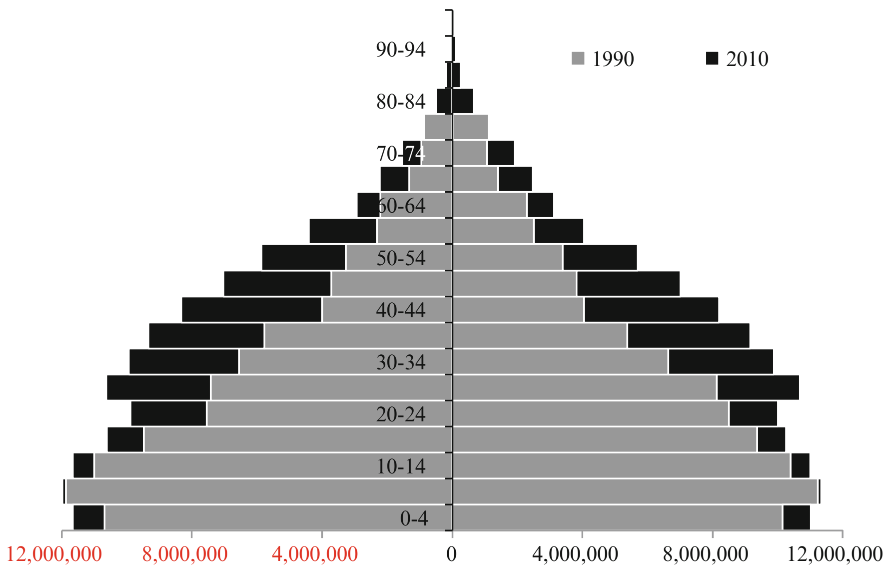

Fig. 20.1 Changing age-structure of Indonesia's population: 1990 and 2010

well as at the sub-regional level. For example, TFR in the province of Papua is already below three children per woman (2.9 in 2006–2009). Yet, the proportion of older persons is quite low at 1.9 %, meaning that Papua still has a very young population. This age structure is due to a history of high fertility and the heavy inflow of young migrants. The last and fifth point is that Indonesia's population is experiencing population ageing even while its average per capita income remains low and the country has rather limited infrastructure.

Migration, Ageing, and Development

Before examining each of these five points, we first provide the analytical framework followed throughout the chapter. There are many ways to classify the stage of ageing population. Arifin and Ananta (2009) described the different stages based on the percentage of persons aged 60+: the initial stage, "very young population" when it is below 6 %; the second stage, "youthful population", when it forms between 6 and 8 %; the third stage, "transitional population", when it is between 8 and 12 %; the fourth stage, "old population", when it is above 12 %. In this chapter, we add a fifth stage, when the percentage is above 20 %, referred to "super-old population". Our use of the threshold of 60+ years for defining older persons, rather than 65+ years used in developed countries, assumes that a 60-year-old person in a developing country is as "fragile" as a 65-year-old person in developed countries—an assumption that can be challenged.

Ananta and Arifin (2009) also showed that there are three possible patterns of interaction between migration, ageing, and development. First is "Slowed Ageing Process in Rich Economies". In this pattern, ageing of the population takes place due to low fertility and high life expectancy. These economies usually suffer from a lack of young persons and are therefore open to immigration in order to slow down the ageing process.[1] This population is usually in the stage of "transitional population" or already at the stage of "old population". Generally, this happens when the fertility rate is already below replacement level. In this pattern, migration is often a policy strategy which is adopted to address the ageing population.

The second pattern is "Accelerated Ageing Process in Low-Income Economies". As in the first pattern, the population is usually "transitional" or already "old". The difference is that their economies are much poorer compared to countries in the first category, which triggers a heavy out-migration mostly of younger persons and accentuates the ageing population. Some of these countries already experience declining and even low fertility. Therefore, out-migration is a distinct determinant of the ageing process in these low-income economies and has accelerated the process.

The third pattern is "Deferred Ageing Process in Rich Economies". This pattern is usually seen in rich urban economies attracting migrants even prior to the onset of low fertility. Migrants are the engine of economic development in these economies. Although fertility is low, the age structure of the population remains

[1] On replacement migration, see United Nations (2001).

young, perhaps in the "very young population" or in the second stage, "youthful population". This "young" population differentiates this pattern from the first one, which is already old. As a result, in the third pattern, migration has deferred the ageing of the population.

Large and Rising Absolute Number of Older Persons

Ageing is measured here as the percentage of the population aged 60 years and above relative to the total population. In 2010, older persons in Indonesia formed 7.6 % of the total population, placing Indonesia near the end of the stage of "youthful population", and ready to enter the third stage of ageing population, the "transitional population". This percentage has continuously risen, from 4.5 % in 1971 ("very young population") to 6.3 % in 1990 ("youthful population") and is projected to rise further to reach 14.1 % in 2030 ("old population"). In 2010, Indonesia is still in the youthful population stage, but the absolute number of older persons is already very large, having reached 18.0 million, a tremendous increase from 5.3 million in 1971 to 11.2 million in 1990. The number is projected to reach 41.4 million in 2030 (Table 20.1).

As at 2010, the number of older persons in Indonesia is three times the total population of Singapore in the same year and represents about 60 % of the old population of Japan, a country already known as a super-old country with more than 25 % of its population above 60 years old (United Nations 2013). Among Southeast Asian nations, Indonesia has the largest number of older persons and they live in a relatively low-income country with limited old-age income security (Ananta and Arifin 2009). The growth rate of older persons was 4.7 % per year, well above the rate of 2.9 % per year for the general population during the period 1990–2010. Without proper management and policies, this large number of older persons can

Table 20.1 Older persons (aged 60+) as a percentage of the total: Indonesia, 1971–2030

	Older persons ('000)		
Year	Number	Percentage	Stage of ageing population
1971	5308	4.5	Very young population
1980	7999	5.5	Very young population
1990	11,228	6.3	Youthful population
2000	14,440	7.2	Youthful population
2010	18,044	7.6	Youthful population
2020	27,333	10.2	Transitional population
2030	41,372	14.1	Old population

Source: Calculated from Biro Pusat Statistik (1975, 1983, 1992)
Note: The 2010 data is online source (http://sp2010.bps.go.id/index.php/site/tabel?tid=336&wid=0). Figures for 2020 and 2030 are the United Nations projection (2013)

pose very serious social and economic challenges for Indonesia, delaying many development programmes due to increased government expenditure on pensions and old age support.

In 2010, the older persons can be divided into three broad age-groups. The first is the "young old" (60–69 years), comprising 10.75 million people. The second is the "old" (70–79 years), consisting of 5.43 million. The third is the "oldest old" (80 years and above), comprising 1.86 million. The disaggregated statistics are important for understanding the need for long-term care as disability is more likely to happen among the oldest old. As the population grows older, maintaining autonomy and physical independence is a key goal for both individuals and policymakers. Physical independence is commonly understood as the ability to perform functions related to daily living and tasks necessary for daily self-maintenance. This functional ability is crucial as it affects their quality of life, but it deteriorates as the old get older. In turn, it affects the need for care giving and perhaps long-term care. When people are unable to perform basic personal care, they become dependent on support either from informal or formal caregivers.

Improving the educational attainment of the population is an important requirement to foster development of a country. There has been significant improvement in the literacy rate and level of education of the older persons. Census figures indicate that those without schooling decreased from 58.5 % in 1990 to 31.6 % in 2010.

There are more older persons in rural areas (10.36 million) than in urban areas (7.69 million), even though the total population is almost evenly distributed between rural and urban areas. The countryside also has a higher ageing ratio (8.68 %), i.e. already in "transitional stage" compared to towns and cities, which are still youthful with an ageing ratio of 6.50 %. With continuing rural to urban migration, especially by the young population, the gap in ageing ratios between urban and rural areas may widen further. In addition, if migrants returning from overseas and from cities to rural areas are relatively older, these returning migrants will soon become older persons and accelerate the ageing process in rural areas.

Trends and Stages of Ageing Population at Province Level

In comparing the data from the 1990, 2000, and 2010 population censuses, we should be careful about the relative coverage of the three censuses, particularly the 2000 census. First, there have been many changes in administrative boundaries and some new provinces have emerged. Second, there was a demographic underestimation in some regions, particularly in Aceh and Papua during the 2000 population count. We therefore need to use the numbers adjusted both for undercount and for changing administrative boundaries. Table 20.2 thus presents the two data series for 2000: one follows the figures by BPS (National Statistical Office) in 2001 while the second is the adjusted population used by the BPS for its projections (Badan Pusat Statistik 2005). In this table we also provide the statistics for provinces where there was no change in administrative boundaries.

Table 20.2 Trend in ageing population among provinces: Indonesia, 1990–2010

No.	Province	1990	2000	2000[b]	2010	Ageing stage in 2010
	Indonesia	**6.3**	**7.2**	**7.1**	**7.6**	**Youthful**
1.	Aceh	5.3	4.7	5.5	5.9	Very young
2.	North Sumatra	5.2	5.5	5.5	5.9	Very young
3.	West Sumatra	7.3	8.1	8.1	8.1	Transitional
4.	Riau[a]	4.0	3.7	3.6	3.9	***Very young***
	Riau	–	–	–	4.1	Very young
5.	Riau Islands	–	–	–	3.4	Very young
6.	Jambi	3.9	4.8	4.8	5.5	Very young
7.	South Sumatra[a]	4.7	5.3	5.2	6.2	***Youthful***
	South Sumatra	–	5.2	5.1	6.2	Youthful
8.	Bangka Belitung	–	5.8	5.8	5.8	Very young
9.	Bengkulu	4.7	5.1	5.0	5.9	Very young
10.	Lampung	4.7	6.0	5.9	7.2	Youthful
11.	Jakarta	3.2	3.9	4.0	5.2	Very young
12.	West Java[a]	6.0	7.0	6.6	6.6	***Youthful***
	West Java	–	7.1	6.9	7.0	Youthful
13.	Banten	–	6.3	5.3	4.6	Very young
14.	Central Java	7.8	9.3	9.5	10.3	Transitional
15.	Yogyakarta	11.0	12.5	12.8	13.0	Old
16.	East Java	8.0	9.4	9.6	10.4	Transitional
17.	Bali	8.3	8.8	8.8	9.8	Transitional
18.	West Nusa Tenggara	5.4	5.8	5.7	7.2	Youthful
19.	East Nusa Tenggara	6.3	6.8	6.8	7.5	Youthful
20.	West Kalimantan	4.4	4.8	4.6	5.9	Very young
21.	Central Kalimantan	4.1	4.1	3.9	4.7	Very young
22.	South Kalimantan	5.1	5.6	5.4	5.8	Very young
23.	East Kalimantan	3.5	3.6	3.5	4.0	Very young
24.	North Sulawesi[a]	6.3	6.9	7.0	7.7	***Youthful***
	North Sulawesi	–	7.6	7.7	8.5	Transitional
25.	Gorontalo	–	5.2	5.2	6.0	Very young
26.	Central Sulawesi	4.3	5.0	4.8	5.8	Very young
27.	South Sulawesi[a]	6.1	7.0	6.9	8.1	***Transitional***
	South Sulawesi	–	–	–	8.3	Transitional
28.	West Sulawesi	–	–	–	6.4	Youthful
29.	Southeast Sulawesi	4.3	4.8	4.7	5.8	Very young
30.	Maluku[a]	5.1	5.5	5.4	5.6	***Very young***
	Maluku	–	6.1	6.0	6.2	Youthful
31.	North Maluku	–	4.6	4.5	4.8	Very young
32.	Papua[a]	1.8	2.0	2.0	2.2	***Very young***
	Papua	–	–	–	1.9	Very young
33.	West Papua	–	–	–	3.1	Very young
	Number of provinces	26	30	30	33	

Source: Compiled and calculated from a series of Badan Pusat Statistik for the three censuses
Notes: [a]Refers to figures for provinces before administrative changes
[b]Adjusted 2000 data

Table 20.2 shows an increasing trend of ageing population in almost all provinces. It also shows different speeds of change. In Central Java, East Java and Yogyakarta, the speed of ageing was relatively high, with an increase of more than two percentage points over the last two decades.

There are two exceptions in Banten and Riau that deserve a more detailed analysis. The percentage of older persons in Banten declined from 6.31 % in 2000 to 4.59% in 2010 despite the fact that the fertility rate declined from 2.7 children per woman to 2.3 during the same period. The industrialisation in the province may have attracted many young migrant workers and this in-migration may have countered the decline in fertility and caused the ageing process to decelerate. The percentage of recent migrants in Banten was very high, 8.6 % in 2000 and 4.9 % in 2010. This is an interesting case of deferred ageing process among population still in the stage of "very young population".

The percentage of older persons fluctuated in Riau, declining from 4.0 % in 1990 to 3.6–3.7 % in 2000, and subsequently increasing to 3.9 % in 2010 based on Riau's old boundaries which included Riau Islands. It should be noted that there had been a heavy inflow of migrants in the new province of Riau Islands, especially because of the creation of special economic zones there. As shown in Badan Pusat Statistik (2011), the percentage of recent migrants into Riau Islands in 2010 is 14.1 %, in contrast to only 1.7 % into Riau. Riau Islands is thus a typical case of deferred ageing process as this migration flow has contributed to the decline in the percentage of older persons in Riau in 2000 in spite of a rather low TFR level of 2.4 children per woman. By contrast, the percentage of older persons has risen in the Riau mainland province during this period even though its TFR is somewhat higher (3.4) than in Riau Islands.

The map in Fig. 20.2 shows that the first four stages of ageing population can be found among provinces in 2010. This situation is different from that in 1990, when there was, for instance, no province in the "old population" category. Since 2000, Yogyakarta has been the first province to fall into this category of "old population", with percentage of older persons at 12.5 % in 2000 rising slowly to 13.0 % 10 years later. In 2010, six provinces (West Sumatra, Central Java, East Java, Bali, North Sulawesi and South Sulawesi) are in the stage of "transitional population", having a proportion of older persons between 8 and 12 %. Seven provinces have a "youthful population" (South Sumatra, Lampung, West Java, West Nusa Tenggara, East Nusa Tenggara, West Sulawesi, and Maluku). The majority of the provinces (19 of them) are still in the stage of "very young population" in 2010.

Yogyakarta may become a province of retirees as casual observation shows an increasing number of older persons going to spend their remaining life there. They may be Javanese who lived outside the home provinces of the Javanese (Yogyakarta, Central Java, and East Java) but intend to return to "Java" by the end of their life, non-Javanese whose spouses originated in this area, or non-Javanese who want to spend the end of their life in this "quiet" city. If this tendency continues, the migration of older persons will accelerate the ageing process in Yogyakarta. Yogyakarta already has one of Indonesia's lowest fertility rates as TFR has been below replacement level since the late 1980s. It was 1.6 children per woman or even 1.5 based on

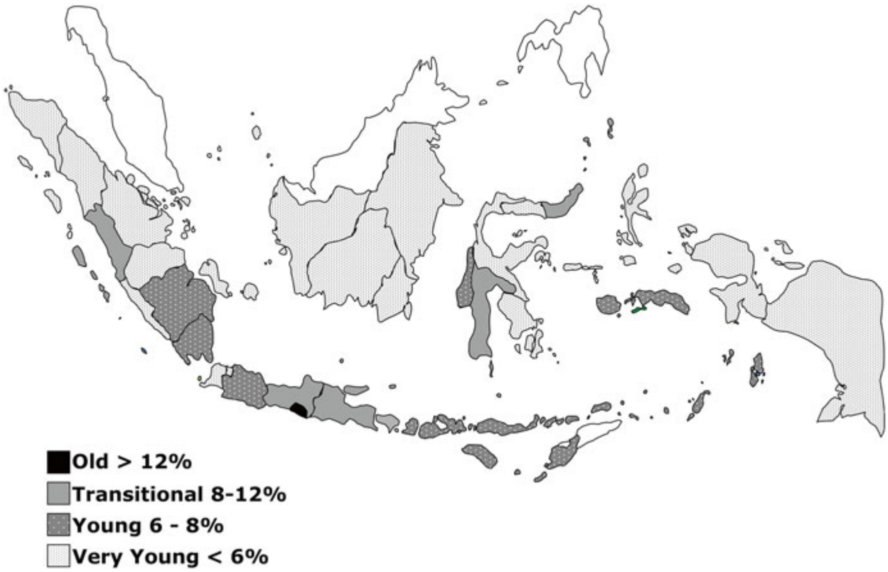

Fig. 20.2 Stages of ageing population: Indonesia's provinces, 2010

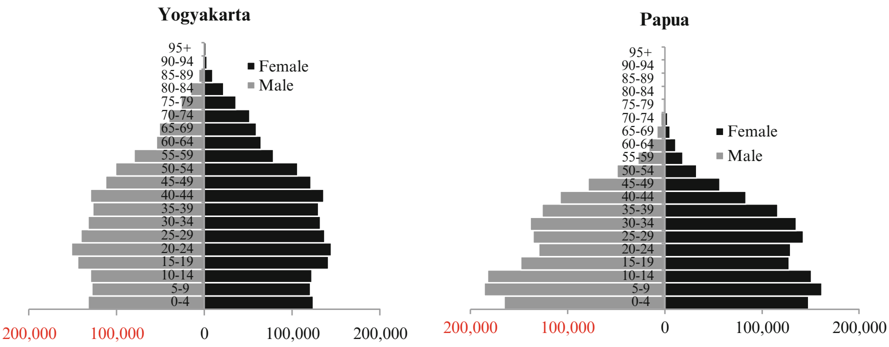

Fig. 20.3 Age structures of Yogyakarta and Papua in 2010 (Source: Compiled and drawn from Badan Pusat Statistik)

the 2007 DHS data (Hartanto and Hull 2009).[2] With such fertility levels, Yogyakarta is indeed demographically similar to many developed countries.

Papua offers a great contrast to Yogyakarta. Still in the early stage of "very young population", Papua's fertility rate is significantly above that of Yogyakarta, 2.9 children per woman and 1.9 respectively according to 2010 census estimates. As seen in Fig. 20.3, the age structures of Yogyakarta and Papua are starkly different.

[2] The 2010 census provides a higher fertility estimate than the earlier census. This rise, if confirmed for Yogyakarta and other Javanese provinces, may slow down the ageing process in Central Java and East Java. See the chapter on fertility in this volume.

The difference is seen among the older persons aged 60 and above, and among the young population aged below 15. The number of the oldest old is significant among the aged population in Yogyakarta, in contrast to Papua where most of the older persons are the young old. At the same time, the percentage of young people aged below 15 in Yogyakarta is much smaller than that in Papua.

It can be noted here that though the population of Papua is very much younger than that of Yogyakarta, the health status of the population of Papua is worse than that in Yogyakarta. Using the 2005 Intercensal population data, Arifin et al. (2012) found that 36 % of older men and 31 % of older women in Papua are perceived to be in good health, while the corresponding figure in Yogyakarta was higher, 49 % and 50 % respectively. This comparison shows that the more advanced stage of ageing population does not necessarily correspond with a lower health status.

West Sumatra shows an unusual pattern; although its TFR was relatively higher than the national rate (2.9 versus 2.4, respectively, in 2010), it also had a relatively aged population (8.1 % elderly). The Minangkabau ethnic group, which is dominant in West Sumatra, is well known for its *merantau* culture in which young men leave their natal home to get experience. They are not supposed to return home before they become successful. In other provinces with similar fertility levels, the percentage of older persons is about 4–5 %. Therefore, out-migration is one of the likely reasons for the higher percentage of older persons in West Sumatra.

There is no province with a "super-old population" in Indonesia. However, there are some regencies which have almost finished their stage of "old population" and may soon enter the stage of "super-old population". Pacitan in the province of East Java and Gunung Kidul in the province of Yogyakarta are two such examples. Both regencies had a population of more than a half million in 2010 and older persons in Pacitan account for 16.1 % of the total, while they account for an even larger proportion –18.3 % – in Gunung Kidul (Fig. 20.4). Both age structures do not follow the traditional pyramid shape. As shown in the top bar, those aged 75 years old and over in both regencies are numerous, with a clear difference between women and men as older women clearly outnumber men.

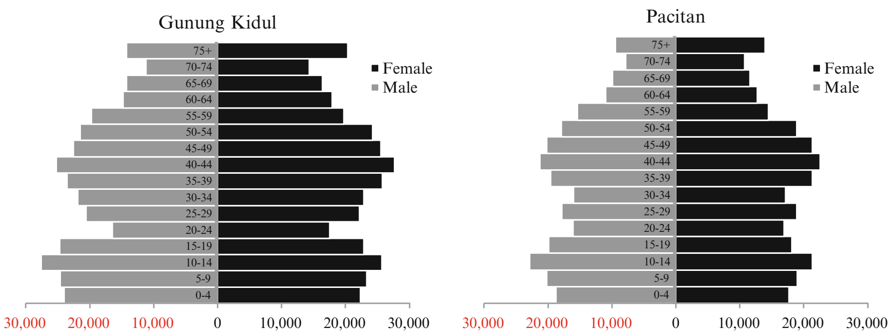

Fig. 20.4 Age structures of two regencies: Gunung Kidul and Pacitan, 2010

From Liability to Asset

An important issue of ageing population is how to finance the rapidly increasing number of "unproductive", older persons. As population ages, the old age support ratio – the percentage of working age population (15–59) over older persons (60+)[3] – tends to decline. A decreasing support ratio points to an increasing economic burden of the working age population taking care of the rising percentage of the old. As seen in Table 20.3, the support ratio in Indonesia declined only slightly from 9.1 % in 1971 to 8.4 % in 2010, but it will decline further to 4.5 % in 2030 and 2.8 % in 2050 according to United Nations 2013 projections. This support ratio assumes that everyone aged 15–59 is productive and everyone aged 60+ is not productive, an assumption that is obviously not empirically true. Table 20.3 also provides three other measurements of support ratio. The second one defines the productive population as population aged 20–59 years old, because many of those aged 15–19 may still be at school, as there is a growing proportion who continues in school up to 12th grade, equivalent to age 18. With this assumption, the support ratio is smaller, meaning that the society has a higher burden compared to when it is described with the first measurement.

The third measurement is similar to the second one, but the number of years of working life is extended to 45 years until one reaches 64 years old, as in the first ratio. With this definition, the support ratio is higher. For example, there are 11.4 persons of working age per old person in 2010 versus only 8.4 using the first measurement. Thus, even if we postpone the entrance of young people into the labor market we can increase the old-age support ratio, provided we delay exit from the labor market.

Indeed, many older persons in Indonesia are still working. The labor force participation rate among the old population in Indonesia is relatively high as compared to developed countries. The labor force participation rate among Indonesians aged 60–64 was more than 60 % in the three censuses, much higher than that of 20–24 years old. As seen in Fig. 20.5, the labor force participation rate for older women is

Table 20.3 Support ratios according to different measures: Indonesia, 1990–2050

Support ratio	1990	2000	2010	2030	2050
(15–59)/60+	9.1	8.7	8.4	4.5	2.8
(20–59)/60+	7.4	7.2	7.2	4.0	2.5
(20–64)/65+	13.0	12.0	11.4	6.6	3.7
(20–69)/70+	–	–		11.9	6.1

Note: The data in 1990–2010 are based on the three population censuses, the projections in 2030 and 2050 are based on the UN's medium variant (United Nations 2013)

[3] We use 15–59 years as an older person in Indonesia is defined as those age 60 years old and over.

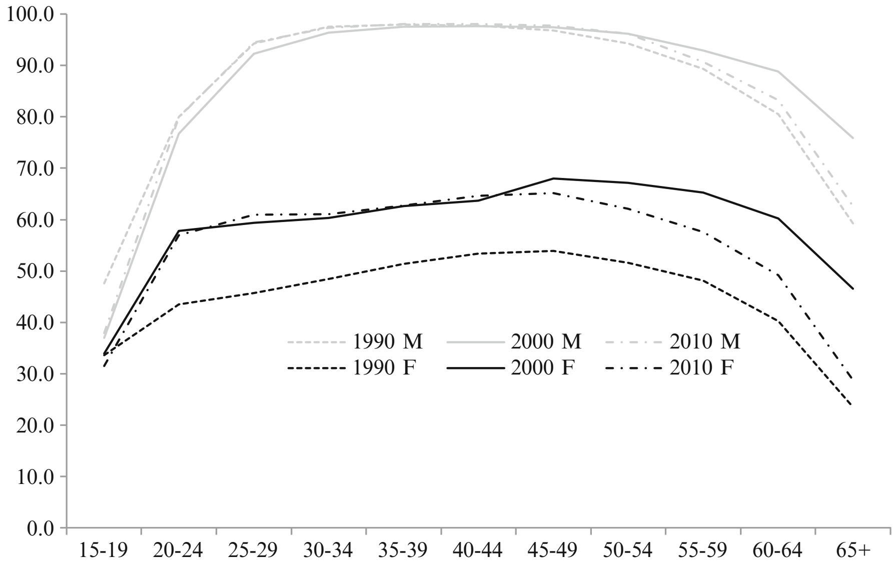

Fig. 20.5 Labor force participation rate: Indonesia, 1990–2010. Notes: The data in 1990 and 2010 stop at the age group of 65+ (Source: Biro Pusat Statistik 1992, Badan Pusat Statistik 2001 and online source for 2010)

lower than for men, yet there is an indication that their participation in the labor market is rising. Bringing older women into the labor market can reduce the economic burden of the working-age population.

The fourth measurement is a scenario to show what will happen if Indonesia can make 70 years the new threshold of older persons in 2030. With this scenario, the support ratio will increase, rather than decrease, to reach 11.9 in 2030, instead of only 6.6 in the third measurement. This scenario may be achievable, given that the United Nations (2013) has projected that life expectancy at age 60 in Indonesia will be about 21 years in 2030.

The concept of support ratio is actually very crude. It assumes that all those in the working age population are equally productive, whereas in fact some may have lower productivity or may be sick or inactive. The next policy question is therefore how to ensure that the working age population is healthy, independent, and productive, thus increasing the likelihood that at older ages they will also be healthy, independent and active. As a result, they will require less health expenditure and care-giving needs. Indeed, they may still make financial or non-financial contributions to their families and societies.

Most older persons in Indonesia cannot rely on pension or savings to finance their old age. Muliati (2013) noted that pension schemes are limited to civil servants, military and police as a defined benefit scheme providing lump sum benefits, pre- and post- retirement life insurance, and monthly pensions after retirement.

Some private sector workers have been participating in social security since 1977. The scheme has steadily progressed and in 2004 the Government of Indonesia issued the Law number 40 on the National Social Security System. Its implementation was delayed and only enacted in 2011. For further details see Muliati (2013). However, the data revealed that the main source of financial support, based on the 2005 Intercensal Population Survey, was from work or doing business. Arifin et al. (2012) found that work and business was the primary source of financial support for more than half of older men, while transfers from children or children-in-law was the primary source of financial support for more than half of older women. Furthermore, pension was the main source of finance for only 12.7 % of older men, and a smaller percentage (7.0 %) of older women.

Because the amount of pension, if available, is low, only at about minimum wage, many older persons may be forced to work to survive. Older working persons are mainly self-employed (30.1 % in 2000 and 30.4 % in 2010) or self-employed assisted by temporary employees (27.9 % in 2000 and 30.5 % in 2010). There is also a substantial proportion of unpaid family workers among older persons (19.2 % in 2000 and 13.0 % in 2010). Although they are unpaid, they are actively contributing to the economy.

Finally, we should realize that the concept of support ratio is dynamic, in particular with regard to the threshold used for the ages considered productive and unproductive. We can change the definition as the conditions change. If we can make older persons healthy, active, and productive, the threshold to be classified as old (unproductive) can be raised and the support ratio does not have to decline – it may even rise.

Whatever the social characteristics of the older persons, they will eventually need financial and non-financial support from family members, friends, or their governments. One important source of non-financial support to the older persons is their living arrangements, which can be an important determinant of their social, psychological and financial well-being. The household composition such as the presence of children, relatives, and domestic helpers will directly affect the types of living arrangements of older persons. Marital status is the first factor influencing the type of living arrangements of older persons. Table 20.4 provides the statistics of marital status of older persons for three successive censuses. As they become older, the percentage of older persons currently married declines while that of widows and widowers increases.

However, the data from the three censuses show different trends for men and women. A large majority of older men are married. The small proportion of them who are single even appears to have shrunk from 1990 to 2010 while the proportion of widowers increased slightly. In contrast, the majority of women above age 60 are widows and the proportion of them who are currently in union is half that of men. The gap between men and women is the result of a combination of sex-specific factors such as mortality risks (women have longer life expectancies), spousal age difference (women tend to marry older men) and remarriage rates (men are more likely to re-marry after the death of their spouse). There are no clear trends in marital status among older women according to these census figures.

Table 20.4 Marital status of older persons by sex: Indonesia, 1990, 2000 and 2010

Sex	Year	Single	Married	Divorced	Widowed	Total
Male	1990	3.2	83.7	1.7	11.4	100.0
	2000	2.6	85.0	1.3	11.2	100.0
	2010	0.8	84.1	1.5	13.6	100.0
Female	1990	1.8	37.7	4.9	55.7	100.0
	2000	3.5	41.4	3.1	52.1	100.0
	2010	1.2	39.1	3.2	56.5	100.0

Source: Badan Pusat Statistik (1991, 2001 and online source for 2010: http://sp2010.bps.go.id/index.php/site/tabel?tid=336&wid=0)

Being single can be a particular concern among older persons and an indicator of vulnerability through childlessness (Kreager 2004). Table 20.4 indicates that the percentage of never married among older persons is rather small. However, Kreager also argued that never having married is not the only determinant of childlessness since migration of the children may also cause "childlessness" and this situation may increase the vulnerability of the older persons. Further studies should be conducted on *de facto* childlessness when parents are left alone after the departure of their children.

Co-residence with children is the most common type of living arrangement among older persons in Indonesia (Frankernberg et al. 2002; Arifin 2006; Witoelar 2012). Frankenberg et al. (2002) found that 70 % of population aged 55 years and above live with at least one child. Later, Witoelar (2012) also found a similar high percentage. In his assessment in the last 14 years from 1993 to 2007, there was no significant change in the type of living arrangement among Indonesian older persons, although there is some indication of a declining trend of co-residence with a child. The second type of living arrangement is living with spouse. Living alone is not common – less than 5 % of men and between 9 and 11 % of women lived alone during the observed period (Witoelar 2012).

Therefore, the fact that older persons are still working and some are still living with members of the family implies that a given support ratio may mean less burden for the working age population. Moreover, using ethnographic and quantitative data in a village of East Java, Schroder-Butterfill (2004) found that the net flow of intergenerational support is downwards, meaning that the flow is from the old to the young generation. She argued that older persons are therefore not dependent. Although the main type of living arrangement was mostly living with one's child, she argued that the older persons were independent and cohabitation was more often the response to the vulnerability of the younger generation.[4]

[4] This, of course, is a study of only one village, and the findings need to be assessed against the finding reported earlier (from Arifin et al. 2012) that transfers from children or children-in-law were the primary source of financial support for more than half of older women.

Concluding Remarks

Using the data from the last three population censuses, this chapter has illustrated some of the challenges of ageing in Indonesia. Our chapter examines in particular the role of migration in the demographic process of ageing. Currently, the role of migration is only very clear at the sub-national level – the provincial and particularly the district level. But with rising globalization and widening global markets, more Indonesians will go overseas and more non-Indonesians will enter Indonesia. Future changes in international migration patterns may affect Indonesia's age structure as well as its composition by education, health status, and occupation. In the next decade, migration within Indonesia may significantly affect the age distribution of the population and ageing may become more severe in rural areas and in specific districts.

The challenge for policy makers is to delay the age at which people become dependent. If we define older persons as those age 60 years old and over rather than 65 and over as in America, Indonesian policy makers should aim at making people aged 60 healthier, more independent and active than a 65-year-old American. This target should even continue to rise and reach for instance a threshold of 70 years in 2030. In addition, Indonesia should also attempt to improve the health status and education level of both the working age population and older persons. Raising the human capital of older persons, which includes being healthy, being more educated, being geographically mobile, and being free from fear, can reduce the health expenditure and the need for care givers. At the same time, the older persons are still contributing to the society, in both monetary and non-monetary terms. Further studies should be done on raising human capital for older persons.

Finally, although support from family is needed, the older persons cannot rely on family support entirely as the number of children has declined and the children may live far-away from the older persons. The government must intervene. The government must set up a just and sustainable social protection system for the older persons who do not have support from family members and friends.[5]

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[5] Detailed discussion on the issue of financing the older persons is beyond the scope of this chapter. Readers can for example refer to Ananta (2012).

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Chapter 21
Ageing in China, India and Indonesia: an Overview

Gavin W. Jones

Population ageing is proceeding inexorably in China, India and Indonesia, though at varying pace. The elderly's share of total population is increasing more rapidly in China than in India or Indonesia. Between 2015 and 2030, the proportion of the population aged 65 and over is projected to rise from 9.5 to 16.2 % in China, from 5.5 to 8.2 % in India and from 5.4 to 9.2 % in Indonesia. The number of aged in China is immense, far larger than in India; in 2015 China's elderly make up over 34 % of the elderly in the countries defined by the United Nations as "developing", though China's population is only 23 % of the developing country total.

Where do these three countries fit into the picture of ageing in developing countries? Table 21.1 helps to answer this question. The comparison of China, India and Indonesia with developing countries as a whole is not very useful, as these three countries make up more than 49 % of the population of the developing countries, and therefore dominate the observed trends. When their populations are excluded from the developing countries, the comparison is more revealing. In 2010 and 2020, ageing in China was well ahead of that in the remaining developing countries, but India and Indonesia were very close to the developing country group. As time goes on, though, China is expected to forge well ahead of the developing country group in proportion of elderly, and India and Indonesia are also expected to open some distance from the other developing countries. This, of course, is mainly because of the slow ageing in sub-Saharan Africa.

Because of the diversity of developing countries, it makes more sense to compare the trends in our three countries with those in the regions of which they are a part. In the case of China, it so dominates the East Asian region that such comparisons are of

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Table 21.1 Projected proportion of elderly (aged 65+) in developing countries, 2010–2050 (United Nations medium projection)

Country or region	2010	2020	2030	2040	2050
China	8.4	11.7	16.2	22.1	23.9
India	5.1	6.3	8.2	10.2	12.7
Indonesia	5.0	6.3	9.2	12.7	15.8
Developing countries	5.8	7.3	9.6	12.1	14.0
Developing countries excl. China, India and Indonesia	5.0	6.0	7.7	9.4	11.5
South Asia	4.9	6.0	7.9	10.0	12.9
South Asia excluding India	4.6	5.3	7.2	9.8	13.4
Southeast Asia	5.5	7.1	10.3	13.5	16.7
Southeast Asia excl. Indonesia	5.8	7.7	11.0	14.1	17.2

little value. However, the comparison of India with the rest of South Asia and of Indonesia with the rest of Southeast Asia is more revealing. In the case of India, it is ahead of the rest of South Asia in ageing, but the gap is expected to close and actually reverse between 2040 and 2050. In the case of Indonesia, it is expected to remain behind the rest of Southeast Asia in its ageing trend throughout the projection period. This is because of rapid ageing in countries such as Singapore (a minnow in demographic terms), Thailand and Vietnam. Overall, then, China is a pathbreaker among developing countries in its ageing trends, whereas India and Indonesia are not especially noteworthy in this regard. As noted by Baochang Gu in his chapter, not only will China be far ahead of developing countries in ageing trends, but its median age will be higher than that of developed countries in the 2030s.

Population ageing has to do not only with the share of the elderly in the population, but with the gradual shift in the centre of gravity of the population toward older ages. The median age of China's population, which was 25 in 1990, will reach 46 by mid-twenty-first century, exceeding the median age of developed countries by almost 2 years. Median ages in India and Indonesia will also be climbing, but by mid-century will have reached about 37 and 38 respectively, much lower than in China.

Geographical differences in ageing in the three countries appear to be affected much more by patterns of migration than by differences in fertility and mortality. Thus the chapters in the migration section of the book are closely interlinked with the ageing chapters. In all three countries, the rural areas are older than the cities, despite their higher fertility. In China, the proportion elderly in rural areas, which was almost the same as that in urban areas in 1990, had climbed to 10 % in 2010, compared to 7.7 % in urban areas. Likewise, inter-provincial differences in ageing are also greatly influenced by migration patterns. For example, in Indonesia, the high in-migration province of Riau Islands has a much younger population than Lampung, although Lampung's fertility is higher. Similarly, in China, in Shanghai, migration of young people to the city has modified the very high level of ageing that would have resulted from fertility and mortality trends alone, while outmigration from some of the less developed provinces in the west of the country has boosted their percentage of aged population.

There are wide gender differences in marital status of the elderly. In particular, a far higher proportion of elderly women than of elderly men are widowed, as a result of three tendencies: for women to outlive men; for men to marry women younger than themselves; and for men to remarry if their spouse dies, a tendency much less marked for women whose spouse dies. The rarity of widow remarriage is particularly marked in India, where although the Hindu Widow Remarriage Act in 1856 allowed widow remarriage, a strong distaste for widow remarriage remains, and widows continue to occupy a very low social status (Chen 1998). In terms of support needs of the elderly, the difference in marital statuses of males and females is compounded by differences in the work history, with elderly women in India and Indonesia in particular far less likely than elderly men to have been consistently in the workforce during their working ages. While in Asian countries, the elderly, especially those without a spouse, generally live with children or other family members, the proportion who do so is tending to decline. Family support, of course, can be maintained without living in the same household (Knodel 2014). However, it is observed that in India and elsewhere in South Asia, the situation of elderly widows tends to be precarious.

An important point to note is that comparative international studies indicate that human capital expenditures per child are substantially higher when fertility is lower; clearly, part of the demographic dividend is invested in human capital, reinforcing the economic benefits of fertility decline, and this could reduce or at least postpone the support problems brought on by population ageing (Lee and Mason 2010: 177). Given the declines in fertility that all three countries have experienced, this benefit is being experienced in all of them.

As noted in the introductory chapter, the evidence that there is a second demographic dividend, resulting from the effect of increased longevity on savings rates, may serve to undercut to an important extent the pessimism and indeed alarm permeating much discussion of ageing. Of course, much will depend on the political, economic and social institutions in the countries concerned, in particular the form of support systems for the elderly, which can broadly be classified into three groups: public transfers, private transfers, and asset-based reallocations (Mason and Lee 2011: 21). In some East Asian countries, private (familial) transfers are an important source of support for the elderly, and net public transfers are relatively unimportant; but the reverse is the case in Japan. Drawing on assets – the key motivation for savings to be built up during the working years and hence the basis for second demographic dividend arguments – is particularly important in Philippines and Thailand, and is the main basis for elderly support in India.

Because of its rapid pace, ageing is of more immediate concern in China than in India or Indonesia, and Chinese planners are certainly alert to the issues involved. But this does not mean that policy decisions can be postponed in the other two countries. Policy responses "that involve advance saving and prefunding are most effectively implemented decades before population aging actually begins, while the future elderly are still in their early working years" (Mason and Lee 2011: 30).

The discussion of ageing tends to employ fixed definitions of the elderly – usually the proportion of population aged more than 60 or more than 65. The notion that people cease to be productive at a fixed age is misleading, particularly in countries where the majority of the working population are not in formal sector employment. A proposal for a new definition of the elderly, focusing on remaining years of life according to life table analysis (Sanderson and Scherbov 2010; Gietel-Basten et al. 2015), has much to recommend it because it probably reflects the thought processes of many people as they consider their future, if and when they should cease to work and what financial provision they need to make for their retirement years. Such a measure may also serve to lessen the concern about the capacity of economies to deal with ageing issues.

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Chapter 22
Observations on Population Change and Human Capital in Asia's Demographic Giants

Geoffrey McNicoll

Introduction

The occasion for this collection of essays was the completion of the 2010 round of population censuses in China, India, and Indonesia. Contributors have drawn on early census results, along with other relevant data, from each of these three countries to describe the broad features of population change and growth of human capital. That is a lot to cover. Moreover, mention of "other data" is a reminder that censuses no longer stand alone as information sources but compete with numerous household and labor force surveys and registration materials, variously reinforcing or contradicting the census findings. The resulting picture of levels and trends in human development is typically blurred in important respects. Seeking ways to sharpen the focus necessarily becomes a significant part of the analyst's task. Inevitably, therefore, each of the preceding chapters has had to give attention to data appraisal as well as data interpretation—a balance that is variously struck depending on the topic and the interests of the writer. In the present commentary I will pay most attention to interpretation, but will occasionally venture into issues of data quality.

Demographic Knowns and Unknowns

The three countries were chosen both as the demographic giants of their respective sub-regions and as a simple way of capturing much of Asia in just three national units. But as societies and economies each is itself far from homogeneous: country-wide

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averages obscure that diversity. Each of them also has distinctive governance problems related to their size, with implications for public administration—and, not least, for data collection. Altogether, size is a significant complicating factor in trying to pin down the levels and rates of change of key demographic characteristics.

Census-Taking As in any populous country census taking in China, India, and Indonesia are massive operations, even with all the advantages of modern computer technology. China's 2010 census reportedly mobilized over 6 million enumerators to visit some 400 million households (Cai 2013). Although now mostly seen as a routine function of government, the census does not have an assured future. It typically tries to collect sensitive information on individuals, which can evoke hostile reaction against perceived official intrusiveness. And it is extremely costly. In a number of Western countries these considerations have led to cutbacks in the scope of census questions and in some cases, usually where registration data or sample surveys can substitute, even to abandonment of the whole operation. The European situation—tending toward abandonment—is described by Coleman (2013). In the United States, a decennial census is constitutionally required as a basis for political reapportionment but its content is now minimal. (As with many censuses, a longer form is administered to a population sample.) In Asia, perhaps reflecting greater public deference to governmental wishes, census taking, at least thus far, seems to remain securely founded.

It might be expected that census operations should steadily improve over time, giving progressively more accurate results. That does not always happen. Budget priorities change. A decade—the usual intercensal interval—is time enough for institutional memories of best practice to wane. And public trust in assurances of privacy, fencing off census taking from other government activities, may vary with political circumstances. China's census data on births, to take a well-known example, is argued by some observers to have been "contaminated" by its birth control policies.

The future of censuses may be influenced by advances in registration systems. These may eventually offer full population coverage with information on births, deaths, and relocations that can be mined for demographic purposes. China and India both have ambitious registration programs. China's National Resident ID system is fairly well established; India's Unique Identification system is supposedly to be completed this decade. Each of these aims at comprehensive registration; both have scope for addition of biomarkers. They offer not only legal proof of identity but potentially an independent sampling frame for population researchers. Of course, they also have less comfortable implications for official monitoring and surveillance. Registration is typically part of an *administrative* system, not a *statistical* system. As such it is inherently attractive to governments, and especially to authoritarian regimes. Certain registration categories may be invidious—religion or ethnicity, for instance. Location too may be monitored: in China, registered *hukou* assignment accords nominal rural or urban status to each person, governing access to certain state services. In an age of "big data" there are plenty of opportunities for both use and misuse of such information.

Fuzzy Data As data consumers demographers are positivists: there is an underlying determinate demographic reality to be uncovered, not some cloud of probabilities and contingencies. But in most country situations we are some way from achieving a firm grasp of that reality. Thus, although census populations are typically cited to the nearest thousand—and sometimes to the last person—we know that even the best enumerations can rarely do better than a ±2–3 % accuracy and, for most, getting within 5 % of the true value would be achievement enough. On vital rates, where estimation is less straightforward, the uncertainties are often even greater. Indonesia's life expectancy, according to Soeharsono Soemantri and Tien Afifa in this volume, could lie anywhere within the range 64–71 years. More strikingly still, China's current fertility has been variously set between 1.2 and 1.8 births per woman (chapter by Zhigang Guo). (The lower bound is the raw estimate from the 2010 census.) The degree of fuzziness in India's vital rates is harder to discern. These rates are mostly estimated from state-wise annual Sample Registration System (SRS) data, typically shown with scant attention to the level of sampling errors and none to (likely larger) non-sampling errors. (Estimates for India from the latest census were not available for comparison: both Nandita Saikia on mortality and Christophe Guilmoto on fertility rely chiefly on SRS data in their chapters.)

It is commonly remarked of legislatures that making laws, like making sausages, is a process best hidden from the public; the same should probably be said about adjusting censuses and reconciling conflicting population data. These are matters for debates among specialists. Non-specialist users of demographic data are usually offered single, consensus estimates. For most purposes, the UN Population Division's estimates, published biennially in *World Population Prospects* (WPP), serve as acceptable time series of point values for population totals and vital rates; the detailed footnotes recounting their origins are rarely consulted. (The WPP's vital rates are not strictly point estimates: they are given as averages over 5-year intervals.)

But the writers in this volume *are* specialist users, unwilling to close any debate over uncertainty or, at a minimum, insistent to inspect the details of any effort at adjustment or reconciliation. A major case in point concerns the estimate of China's current fertility rate, within the range mentioned above. This is a highly consequential number for any projection of that country's population and one also with great political sensitivity for discussion of population policy. Appraisals advanced by expert analysts, drawing on various statistical sources in addition to the 2010 census, have argued for a narrowing of China's TFR (total fertility rate) range from the wide bounds noted earlier to 1.4–1.6. The complexities that must be confronted in adjusting the raw Chinese census data are well described by Zhigang Guo. Professor Guo favors the lower end of this narrower range; another prominent expert, Wang Feng, the middle. Yong Cai (2013) argues for "around 1.5 or lower." The UN Population Division (2013), in its 2012 Revision of WPP, issued in mid-2013, settled on 1.63 for 2005–2010 and 1.66 for 2010–2015. The 1.4–1.6 range may be as close to a consensus as can be achieved.

Indonesian fertility is also a sensitive matter, as recounted by Terence Hull in his chapter. An expected steady downward trend in total fertility recorded in successive household surveys had been widely expected to have reached or be very close to replacement level by 2010. The census-based TFR estimate of 2.6 for that year was thus an unwelcome surprise, well above such expectations. If borne out, this will force a rethinking of the country's demographic situation—and an upward revision of its future population trajectory. Government officials are not neutral consumers of such estimates. They may be committed to certain policy directions and have strong interests in recording successful outcomes. Or they may seek justification in the numbers for new or reinvigorated policy action.

India's fertility decline, Guilmoto tells us in this volume, was almost linear over the last 40 years, aside from the disruption in the Emergency years of the mid-1970s. In comparison to China, the pace was "sluggish but serene." It has usually also been thought to be relatively slow compared to Indonesia. But India's current TFR, 2.66 for 2005–2010 according to WPP and slightly lower in the SRS, is virtually the same as the census estimate for Indonesia just cited. There are, of course, major regional fertility differentials in both India and Indonesia—notably the north-south difference in India, with near-replacement levels achieved in some southern states and still-high fertility in a swath of northern states.

Fertility as a measure of births per woman refers to events that may extend over several decades of a person's life, so that a fertility rate for a particular year can be affected by shifts in the life cycle timing of those events. Demographers are well aware of this fact and are cautious not to put too much behavioral weight on year-to-year variations in TFR. (Those period variations, of course, do have consequences: they directly determine the size of successive birth cohorts.) For both China and Indonesia, the earlier chapters have pointed to likely differences between period and cohort fertility. In China, period fertility may have been temporarily lowered by a rising trend in the mean age at first birth—a change that need not show up in lifetime average births per woman. In Indonesia, earlier marriage, seemingly prompted by resurgence of fundamentalist beliefs, may have offset the opposite trends in marriage age previously underway, resulting in higher period fertility—though with as yet uncertain effect on lifetime births for the cohorts concerned. The relative significance of period and cohort measures as a description of demographic behavior is a perennial debate in demography: in France, it was once fought out in the public media between two factions of government demographers. But the issue has potentially major policy significance. In China, plausibly, fear of a fertility rebound may have been a factor in keeping China's one-child policy in place long after its apparent demographic rationale had ended—however unreal that fear may seem to many observers.

A Note on Population Projections

Any consumers of population projections should of course be aware of the uncertainties inherent in them. Thirty years ago, Nathan Keyfitz (1982) wrote an article titled "can knowledge improve forecasts?"—that is, improve them beyond simple extrapolation. His answer was: possibly just a bit, but working not through theory and historical experience directly but through the improved intuitions of scholars immersed in that theory and experience. This view would support recourse to Delphi-type approaches to population forecasting—such as those used in the global projections of the International Institute for Applied Systems Analysis (IIASA). The IIASA projections are described as probabilistic, though how much credence can be placed on resulting confidence limits surrounding medium-variant trajectories is debatable.

The most widely known and used global and country-level population projections are those of the UN Population Division, noted above (WPP). Lately, these also have used probabilistic methods—though in very different ways from IIASA. In the 2012 Revision, however, the dominating assumption for the UN's medium-variant demographic future is that in the long run Asia's fertility will not differ greatly from replacement level. (The high and low variants simply take fertility at each time to be 0.5 births per woman above and below the medium.) Thus, in the current (2012 Revision) WPP, by mid-century it is envisaged that South Asia's fertility will have declined to 1.9 and East Asia's present very low fertility will have recovered to 1.8.

The historical experience that Keyfitz had in mind was to do with fertility transition in Western countries and East Asia. The UN demographers implicitly draw on that experience at least in broad terms in specifying the future fertility trends of high-fertility countries. Even for India, now in the later throes of demographic transition, historical experience may still be of value for gauging the future. How to make use of that experience, however, is not set in stone. Guilmoto's "unorthodox attempt" at simulating India's future fertility rules out drawing on the standard correlations with child mortality, urbanization, or female autonomy—conventional transition theory—and instead adopts an atheoretical "chartist" approach based on scrutiny and extrapolation of past district-level trends. This approach points to a faster drop in fertility than is anticipated in the WPP medium scenario.

The post-transition demographic landscape is relatively new territory. Experience with it is limited to a few decades at most in regions of Europe and East Asia. These offer scant material for a theoretical basis to support prediction. For China, the UN demographers have nevertheless drawn what insights they could from it to bet on a significant recovery in TFR over the next few decades. It is not an impossible future, but nor is it one that is readily foreseen. The UN low-variant assumption—fertility remaining below 1.5 over the whole period—would to many observers seem more realistic.

As a caution about how seriously projections can go wrong—on a scale that could not be repaired by any recourse to probability theory—consider the sequence of projections of US fertility rates made by one highly competent statistical authority, the US Census Bureau, as summarized in Fig. 22.1, displaying the meager success of that agency's projection efforts even in this data-rich country. (The period shown, admittedly, encompassed the baby boom years, a challenging time for forecasters.) The bottom line is that much about the demographic future—about fertility especially—is inherently unknown.

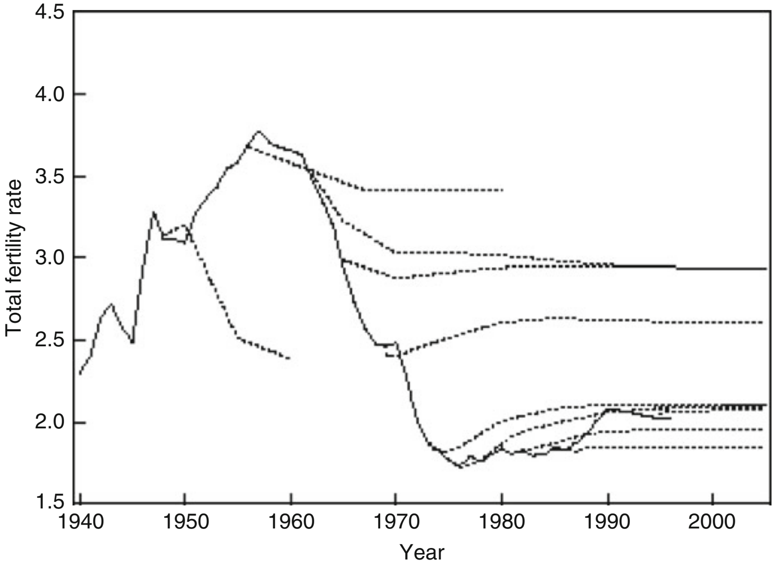

Fig. 22.1 Fertility forecasts compared to actual trajectory of fertility, United States, 1940–1995. Note: forecasts shown (*dotted lines*) are middle projections from US Census Bureau (Source: Lee (1998: 168))

Labor Supply: Numbers, Ages, Skills, Location

After vital rates, the second major thematic content of the volume is human capital. The contributions and discussion range over education, labor force size and sectoral allocation, workforce aging, and old-age support.

Education On education, little in the 2010 censuses has seemed thus far to be cause for surprise. The picture shows a continuation of familiar trends and differentials. China is far ahead, concerned now with enrollment growth at the upper secondary and tertiary levels as Litao Zhao points out in this volume. Its gender gap has narrowed, even reversed—a pattern now familiar in the advanced economies. Attention has shifted to further quality improvement. Indonesia's educational progress, documented by Gavin Jones and Devanto Pratomo in their chapter, is fairly impressive in nominal terms, especially at the secondary level where enrollment rates are now nearing 80 %, little below China's. But there are serious deficiencies in quality. In part, these deficiencies may be a byproduct of the accountability lapses created by the country's highly decentralized system of public finance and public administration. India is the educational laggard of the three, able to point to near universal primary education but still with far to go at the secondary level—Bilal Barakat, in his chapter, sees little prospect of India meeting its goal of universal secondary schooling by 2015. And there are large (though narrowing) gaps by gender, rural/urban location, caste, and income.

In all three countries private education is making considerable inroads—responding to parental demand in the face, often enough, of weakness in the state sector. No surprise here: these are essentially all market economies at the grass roots, though all of them also have a large residue of statism. Indeed, even the public education systems tend to garner informal market elements in the form of sub rosa payments by students' families to teachers or de facto part-privatization of some public facilities.

Investment in education per child can clearly be greater when there are proportionately fewer children. That is a simple calculation for parents, but it is true too at the country level. In the course of the typical demographic transition, there is a period during which falls in fertility yield lower child dependency rates. Mortality declines have already improved child survivorship and thus the potential returns to education, while they have not yet boosted old age dependency. In this period, the age structure is particularly favorable to investment in human capital. This, of course, is the so-called demographic dividend. Commentaries on Asian—in particular, East Asian—development performance in the last three decades routinely point to the significance of this effect on economic outcomes. (Demographers of a certain age recognize the age structure effect as the core of the original economic case for birth control proposed by Coale and Hoover (1958) in their classic study of alternative fertility trajectories in India, which became one of the principal justifications for the expansion of family planning programs in the 1960s and 1970s. The demographic dividend—Coale-Hoover redux—offers renewed vigor to this economic case.)

As arithmetic, the argument is unassailable; as causal explanation, it is less so. When development takes hold, all kind of things start working in its support, notably a faster movement of young adults from low- to high-productivity occupations and from countryside to city. Greater willingness by parents to invest in their children's education and to demand similar attention to education by their government might be expected under such conditions whatever the dependency rate. Plausibly, the liberalizing economic reforms undertaken in India in the 1990s would have boosted the growth rate even if they had not coincided with the low-dependency "window."

Labor Force Entry Improving educational levels in the labor force as younger cohorts enter and older cohorts depart is a major factor propelling economic development. But that turnover describes only part of the process underway. Changes in the numbers of entrants to the labor force ages, and changes in relative numbers in rural and urban areas, are also important factors in the economic outcome, determining how and where the new skills are deployed. The trends in both fertility and urbanization discussed in the earlier chapters are together implicated here.

One of the major growth theories of the heyday of development economics—in the 1950s and 1960s—was derived from the work of W. Arthur Lewis (1954) on the "unlimited supply of labor". Formalized by others as a simple two-sector (agriculture and industry) model, growth was seen as a process of absorption of "surplus" agricultural workers into a more dynamic industrial sector. Exhaustion of the labor surplus was a *turning point* in the process, after which industrial wages would begin to rise in accord with improving marginal productivity: essentially, the two sectors merged into a single economy. This dual economy model soon fell much out of favor among many Western economists—along with development economics itself, which was no longer seen as a distinct sub-field of the discipline. These economists denied the existence of an unlimited supply of labor as an empirical reality in any actual economy. But the model has nevertheless remained a powerful heuristic device to characterize the development process. In particular, the concept of a labor absorption turning point has proven fruitful. It has been widely applied to China, notably by economists at the Chinese Academy of Social Sciences (see Cai and Du 2009).

China's base-level wages have certainly been rising, attributable both to higher productivity as capital intensification proceeds and to the emergence of labor shortages. On a closer look, the drying up of the labor surplus may refer mainly to young workers moving to the large industrial cities on the coast (Zhenzhen Zheng sketches the picture from the 2010 census in this volume). The fertility declines that started in the 1970s have also been felt country-wide as a tightening labor market. Complicating the China case, however, is effect on wages of the *hukou* system, creating a "floating population" and thus a new form of dualism within urban areas.

If the dual economy model and the conceptual notion of a turning point in labor absorption can be applied to China, could it also be applied to Indonesia and India? For the most part it has not been, although "dualism" in a somewhat different sense was used earlier in Indonesia by some Dutch economists. Likely reasons may lie in the lesser degree of homogeneity of India's and Indonesia's labor markets, with their greater linguistic and ethnic divisions and less efficient transport infrastructure. A recent fall-off in interstate labor migration in India, at least for males, is reported by Ram Bhagat in his contribution—partly attributed to anti-immigrant sentiment in the receiving states. In Indonesia, there are the obvious mobility impediments of being an archipelago, although Java alone, with well over half the country's population, represents a large and highly concentrated labor market. Contrasts in density and urbanization levels between Java and the "outer islands" have been a longstanding economic and demographic reality (Tommy Firman's chapter). For whatever reasons, a single turning point is likely to expand into a lengthy interval. A close examination might of course reveal somewhat analogous divisions segmenting the labor market in China, but they are downplayed in the long-entrenched socialist assumptions of the government—and belied by relative ease in de facto if not de jure geographic mobility.

It should be noted that wages need not be a dependent variable in the development process, at the mercy of other forces. Singapore undertook a deliberate (and very successful) policy initiative in the 1970s and 1980s of forcing up base wages precisely in order to induce an upward shift in labor productivity. Labor intensive manufacturing was intentionally made uneconomic.

An already-evident problem for modern economies is that labor productivity in manufacturing can become potentially so high that the sector does not require many workers—absent a large export industry, itself problematic in the longer term. And services in some cases are following the same route. There is no guarantee that the labor force supplied by a country's demographic patterns and educational systems will mesh with labor demands, either in numbers or skills—nor that wages will equilibrate to clear the employment market. It is possible for a new generation of surplus labor to emerge—and how to give it a claim on the social product can then become a serious matter for social policy. This is already a problem in some Western countries; it may lie in China's future as well.

Asia's Post-transition Demography

Now and into the future population aging is the dominant demographic reality in much of the world, not least in Asia. Typically, it is portrayed as a looming problem for societies. That may be correct, but as Zhongwei Zhao et al. have reminded us in this volume, aging should also be celebrated as a striking demonstration of demographic success. It is a direct consequence of a society's completion of its transformation to a modern regime of low mortality and fertility. Of the three countries considered here, aging is proceeding very rapidly in China, less so in Indonesia, and fairly slowly in India. Country-wide averages can mislead, however: in each case, rapid urbanization is depopulating the countryside, drawing away its youth in particular, and thereby accentuating the aging process there. The elderly farmers of Japan may be the extreme Asian example, but China is headed in the same direction and Indonesia and India will eventually experience similar trends. The substantial fertility- and migration-induced differences across Indonesian provinces in proportions of elderly are set out by Evi Arifin and Aris Ananta in their chapter.

Just as with global warming or any other problematic development, population aging can elicit two kinds of positive response on the part of societies and governments: adaptation and mitigation.

Adaptation In the discussion of aging in the three countries in the preceding chapters, adaptation received most attention. As the proportions of elderly rise, old age support becomes a serious societal challenge. Traditional expectations are that families will look after their older members: this has been widely assumed in Asian societies—in significant contrast to some European traditions. But family support comes under strain when fertility is low and where members of the younger generation may have moved away. Put bluntly, filial piety erodes. The elderly, of course, do not simply accept a dependent role: their inclination may be to keep working where feasible and, to the extent they can, to rely for support on their own assets. But that option has limits and eventually some kind of social support must be organized. A pension tied to work history is the simplest design—indeed, earned pension rights could reasonably be treated as part of an individual's assets. But collective support typically must be designed on a broader scale—ultimately, very often, at the national level.

The allocation among these three possible supports for the elderly—own assets, within-family transfers, and transfers through the public sector—has been systematically calculated for many countries in the elaborate National Transfer Accounts (NTA) project (Lee and Mason 2011). In China, according to the estimates made by

NTA participants, public transfers are the most important component of old age support, though with significant residual support coming from families and own assets. Other data in the present volume offer further insight into this allocation. Baochang Gu in his contribution notes the large urban-rural differential in public transfers: China's rural population has virtually no pension support, hence for many no option of retirement. Zhongwei Zhao et al., however, point to fairly wide coverage of medical insurance, although of greatly varying scope and quality.

In India, in fairly striking contrast to China, NTA estimates are that own-assets are the most important support for the elderly—and net family transfers appear to be *negative*, i.e., on balance, the elderly subsidize younger family members. (See the discussion of the Indian case in Premchand Dommaraju's chapter.) Comparable calculations for Indonesia are in preparation: the fragmentary data assembled by Arifin and Ananta point to non-retirement and co-residence with children as the main supports for the elderly.

The NTA project is based on an elaboration of national accounts data to record age-specific transfers. It therefore necessarily omits any consideration of non-monetary transfers—in-kind or time transfers, notably the contributions of family carers. Emotional support to the elderly from friends and relatives is also omitted. With modern communications, such support can be offered from a distance.

Over time and with falling or continued very low fertility, countries seek to devise socialized support systems for the elderly, at least as a safety net for the poor. The Asian giants are far from the region's forerunners in this endeavor, although China has taken some significant steps. Lessons can of course be learned from successes and failures elsewhere: from more and less effective public inter-age transfer arrangements. Singapore's Central Provident Fund—a country-wide forced-saving program—is one remarkable model, though it may work less well in situations lacking that country's high levels of administrative competence and probity. Japan's system of social insurance also warrants careful examination. And other insights—and cautionary tales—can be garnered from the experience of Europe's welfare states.

Mitigation The second category of positive responses to population aging—mitigation—encompasses policies to raise fertility and policies to encourage immigration. For any populous country, the migration option is unlikely to be either feasible or acceptable: the relative numbers of migrants called for to make any appreciable difference to the pace of aging are simply too large. (This was in effect demonstrated by the calculations presented in the controversial report of the United Nations Population Division (2001) on "replacement migration".) Raising fertility might be a more plausible option, though the generally disappointing experience of pronatalist policies—in various European countries, Russia, and Singapore, notably—is not promising. Removing measures aimed at further *lowering* fertility where it is already low would be an obvious first step. That move has been urged on China's government by many social policy experts and other observers, from within China as well as from outside. Of course, in this case it is by no means clear that a full relaxation of the one-child rule would appreciably boost the country's birth rate:

very low desired fertility may now be entrenched in the population. But China has amply demonstrated its willingness to adopt radical measures to attain its policy goals: confronted with extreme aging and falling population numbers (perhaps by one-quarter or more per generation), what could it do? Demographers and social planners have a large and little-explored policy research agenda here.

Asia and the Rest of the World in the Asian Century

As noted in the introductory chapter to this volume, the 40 % of the world proclaimed in the title is not a permanent reality. It has been the case for most of the twentieth century and will be so for the first few decades of this century. But in earlier times, the share was much greater—probably over half—and by 2050 the share will likely be near one-third and falling. The Big Three will have joined the post-transition world, their peak populations passed.

The United States, relatively welcoming to (legal) migrants and with a birth rate that has stayed fairly close to replacement level, seems set to continue moderate population growth—forecast to add another 100 million by 2060. Europe and Russia, assuming no deluge of immigrants, will by then be strongly contracting in size, except perhaps along the northwestern fringe.

The major remaining high-growth region will of course be Africa. The UN medium projections for sub-Saharan Africa in particular are fairly spectacular: a 2010 population of 830 million expanding to 2.0 billion by 2050 and to 3.8 billion by 2100. These numbers assume substantial fertility decline over the century, although well delayed in comparison to other regions. Ironically, the Asian Big Three can claim some responsibility for that delay: each of the three contributed to the idea that fertility control could be hastened by enlisting the administrative powers of government in meeting target levels of family planning acceptors—or, in the stricter variants, of births. This muscular, sometimes overtly coercive, approach became known as the "Asian model" of family planning, and reaction against it helped to generate the anti-target "Cairo Agenda" of 1994—taking the steam, and much of the financing, out of the international birth control movement. By that time, of course, Asia was well on the way to its present low (or fairly low) fertility status, with childbearing mostly determined by individual preferences and family economic circumstances. But the overall fall-off in economic and political support, many now believe, had damaging consequences for Africa that are only now coming to be repaired.

The comparative demographic circumstances emerging over the next several decades are captured in part by the projected populations in the peak labor force ages of 20–40 in Table 22.1. The decline in numbers projected for China, even in this fairly conservative "medium-variant" trajectory, is wholly remarkable: by 2025, a drop of 12 % below the 2010 population and by 2050 a drop of 30 %. To give economic substance to these figures, consider how these potential workers would be employed. The characteristic Asian pattern of regional development is the one often

Table 22.1 Population aged 20–40 years (millions), selected countries and regions, 2010–2050: (estimates and medium-variant projections)

Region	2010	2025	2050
China	451	398	317
India	390	458	460
Indonesia	79	85	86
Europe and North America	303	278	272
Sub-Saharan Africa	238	361	646

Source: UN World Population Prospects, 2012 Revision

described as the "flying geese" model, with countries in succession moving up the productivity ladder from low-skill to high skill manufacturing. Japan, the lead goose, was the regional forerunner. As labor shortages start to appear in China and wage rates rise, labor-intensive export industries shift to lower wage countries. There are many Asian contenders, Vietnam and Bangladesh prominent among them. India and Indonesia should be there too, though their success in exports of manufactures has thus far been fairly modest. Africa potentially offers a very large pool of workers: there is not much evidence as yet of a new manufacturing era in Africa, but not many observers foresaw one in Asia either.

Concluding Remarks

This collection of essays, by design, was focused in its concerns. The standard demographic variables of fertility, mortality, and (internal) migration were one major area of attention; education and labor force participation made up another; and population aging and social support of the elderly made up a third. In passing, the corresponding absences should perhaps be mentioned.

The discussion of fertility had almost nothing to say about one significant characteristic of births in two of the countries, China and India: their gender disparity. The sex ratio at birth varies somewhat by region but on average is strongly masculine—a consequence of widespread son-preference along with access to ultrasound technology and ready acceptance of abortion. The extensive literature on this topic suffices to justify its omission here. It is not, however, entirely unrelated to considerations of education and labor force—or, indeed, to future trends in fertility and in old-age support. (Moreover, the problem may not be quickly waning. Survey-based calculation of the "desired" sex ratio at birth in some Asian countries, and in some major Indian states, show this number often exceeding actual sex ratios at birth—which therefore might rise further as sex-selection technology spreads. See Bongaarts 2013.) At least in China, however, gender disparities in infant mortality have greatly diminished over the last intercensal period—a clear sign of lessening discrimination against daughters.

The treatment of education has left aside the other main component of human capital: health. The counterpart to a country's record in educational attainment is its record in combating mortality and adding years of healthy life—in childhood and childbearing ages, and, as survival there becomes nearly assured, in old age. In this case too, of course, there is a whole research industry at work that may have left little new to be said here.

Finally, there is the matter of exogenous factors bearing on the course of demographic change and human capital development in the three countries—those that can be vaguely discerned (the known unknowns) and those that would be true surprises (the unknown unknowns). (The terms are those of the former American defense minister, Donald Rumsfeld.) Environmental change is the most likely source of both of these: fresh water limits; coastal flooding; shifts in agricultural zones; extreme weather events; epidemics; natural disasters; and so on. The relative vulnerability of the vast cities that have grown up in Asia—many in coastal areas or on deltas—calls for particular attention. The geopolitical sphere could also be source of disruption to a smooth demographic future. Growing economic strength is often accompanied by exercise of hegemonic muscle and build-up of arms, and both China and India are parties to unresolved border disputes and territorial claims. Over a period of decades, and especially in a time horizon extending over the whole century, any of these may turn out to be dominant factors in the region's future. Consider how few of the determining forces and events of twentieth century Asia could have been foreseen a hundred years ago.

This is not the sort of volume that yields a neat set of conclusions. The census data stream on which it has been based is still in full flow. The contributors in effect are engaging in exchange of information and experience, not in reaching determinate findings. Yet the reality that the three censuses have sought to describe—the demography of the 40 %—is of enormous consequence. Even a partial and interim account of what is going on, and what it may portend, is well worth having.

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ERRATUM

Chapter 20
The Past Three Population Censuses: A Deepening Ageing Population in Indonesia

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The affiliations of the authors of Chapter 20, Evi Nurvidya Arifin and Aris Ananta, were incorrectly published in the List of Contributors on Page ix and in the footnote present in the chapter opening page on page 309. The correct information is given below:

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