



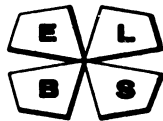
Practical Mother and Child Health in Developing Countries

G. J. Ebrahim

LOW-PRICED EDITION

PRACTICAL
MOTHER AND CHILD
HEALTH IN
DEVELOPING COUNTRIES

G. J. EBRAHIM



ENGLISH LANGUAGE BOOK SOCIETY

and

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Preface

Two thirds of humanity lives in the developing world, where 80 per cent or more of the population lives in rural areas. Young people under the age of fifteen and women in child bearing age comprise more than half of the population of an average developing country. It is surprising that no special services have been evolved for these groups. True there are obstetric, paediatric, nutrition and preventive services. But these are compartmentalised and rarely, if ever, become integrated enough to be called a service for promoting the health of mothers and children within the family and community environment.

Mother and Child Health (MCH) is not a new speciality. It is a method of delivering health care to the most vulnerable groups in society. In many countries existing health services are oriented towards providing a high standard of care for the urban populations. More than three-quarters of the recurrent health budget of the average developing country is spent on curative care which is, of necessity, based on hospitals in large towns and cities. A large proportion of the health manpower is also engaged in these hospitals. Even though a variety of health programmes are expected to reach out of the hospitals to the wider community, in effect this is hardly so. Several evaluations of health care in different countries have revealed that not more than 20 per cent of the rural population is adequately covered with basic health services.

Teaching programmes generally reflect the administrative arrangements in the health service. In the medical and nursing curriculum time is allotted for the teaching of obstetrics, paediatrics, nutrition and preventive and social medicine. It is taken for granted that synthesis will take place in the mind of the student and an understanding of mother and child health will eventually occur. There is little evidence to support such a belief, and a thorough revision of training curricula is necessary to create a place for proper training in mother and child health.

In the rural areas, in shanty towns and even in many inner city areas health care for mothers and children is usually the responsibility of auxiliaries. It is all the more necessary that they receive adequate

training in the subject. A sound knowledge of mother and child health is also important for the physician and the paediatrician because they are called upon to co-ordinate all MCH activities in their district or area.

This book arose out of the author's experience in Tanzania. As the only paediatrician in the country for ten years after independence he was engaged in developing child health services and in setting up relevant training programmes. Since then as tutor to the WHO/UNICEF sponsored Course for Senior Teachers of Child Health for eight years there have been opportunities for studying the health problems in the rural areas of several countries. As a result of these experiences extensive revision and addition of new material has been made in the present edition of the book.

Practical Mother and Child Health in Developing Countries is one of a set of four manuals which comprise the Health Centre Set, and is intended for the community health nurse at the rural health centre. Each of the other manuals in the set is intended for a specific member of the health team. It is hoped that these texts will contribute to improving the standards of care and the teaching of mother and child health in the developing world.

Chapter 1

Maternal and Child Health: Introduction

In most developing countries, children and young adults under the age of 15 make up about 40 per cent of the population (see figures 1 and 2). If to this were added the number of expectant and lactating mothers, then about 60 per cent of the population would need to be covered by the maternal and child health services. The aims of such a service are to ensure that:

- (1) Every expectant mother maintains good health, is prepared both physically and psychologically to look after her child, goes through a normal delivery and bears a healthy child.
- (2) Every child grows up in healthy surroundings, receives proper nourishment and adequate protection from disease.
- (3) Communicable diseases are controlled in the vulnerable groups by taking adequate preventive measures and by health education.
- (4) Sickness is detected and treated early before it become serious or chronic.
- (5) Simple statistical data on morbidity and mortality are maintained at regional and national levels.

Many of the health problems encountered in mothers and children of the developing countries are preventable either by means of health education or regular supervision and immunisation; yet it is these illnesses that take a heavy toll of young lives, so much so that about a quarter to a third of the babies born do not reach the age of five years. It is interesting to note that in many developed societies of Western Europe the health problems were very similar not so long ago and have been finally controlled by the development of suitable health programmes. Thus, England and Wales experienced a reduction of under-five mortality from 74 per cent in 1730 to 31 per cent in 1830. The infant mortality rate in England and Wales has fallen from 153 per thousand in 1900 to 19 per thousand in 1966. In France, during the past forty years the infant mortality rate has dropped from 120 to 24 per thousand.

The diseases that cause heavy mortality in the children of tropical countries are global and not necessarily confined to the tropics. Thus,

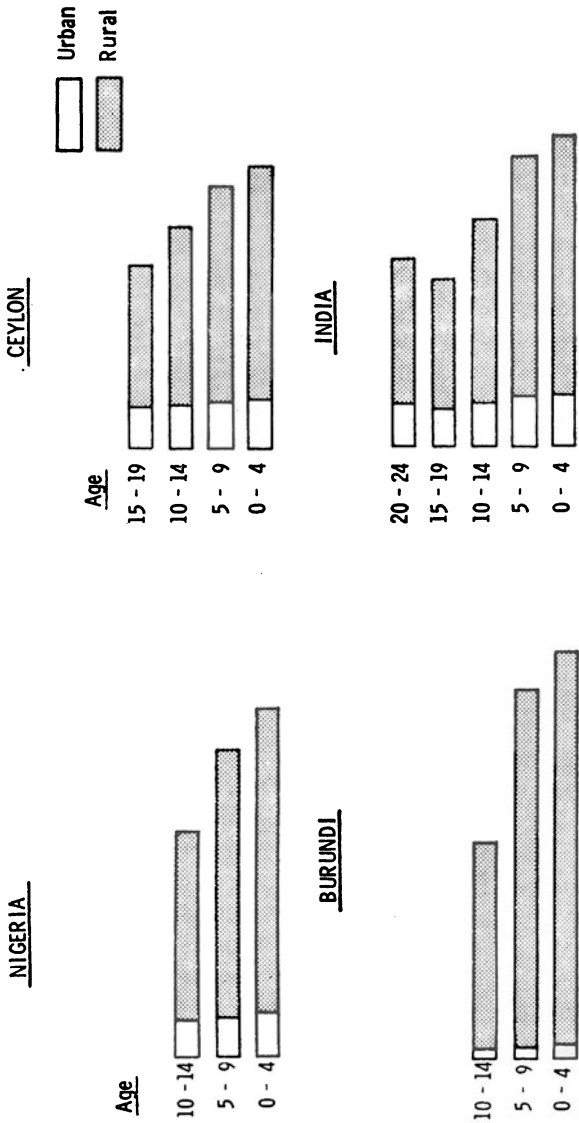


FIG. 1 Population characteristics of developing countries

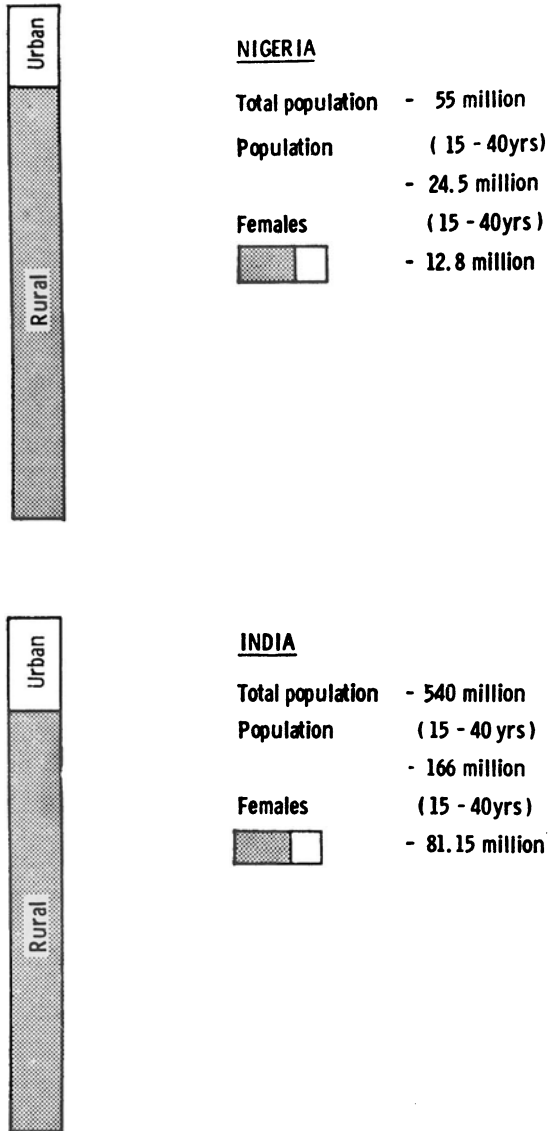


FIG. 2 Mothers of child-bearing age—urban/rural distribution

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geography has very little to do with the large variety of sicknesses seen in the children of the tropics; the causes lie in ignorance, lack of hygiene, lack of sanitation and inadequate health facilities.

One interesting feature of childhood mortality as seen from statistics of teaching hospitals is the presence of multiple pathology. Thus reports from Ibadan show that amongst children dying in hospital, death could be ascribed to two causes in 35 per cent, three causes in 20 per cent and four or more causes in 6 per cent of the cases.

During pregnancy the main problems are anaemia, malnutrition and other forms of maternal depletion syndromes. The average mother in these countries during the child-bearing age passes through a series of cycles of pregnancy, prolonged lactation, and pregnancy again without any rest in between. All this time her diet is poor and supplies only marginal nutrition. During pregnancy, the mother has to supply the raw materials for the formation of the tissues of the foetus, mainly in the form of proteins, iron and calcium. During lactation, the mother has to supply all the nutritional requirements of the baby in her breast milk. If her diet is poor, which is usually the case, and if she does not get a period of rest between successive child births, maternal stores will be exhausted.

The problems of children in early infancy are mainly low birth weight, anaemia and infections. All of these can be prevented by proper antenatal care of mothers and education in the care of children.

In pre-school children the main causes of ill health are malnutrition, respiratory infections, and diarrhoeal diseases. Often these coexist, one perpetuating the other.

The pre-school age mortality in developing countries is several times higher than that of Europe or North America. Children die not because of any one severe disease, but due to the accumulated burden of several factors. Thus, often a child of a poorly nourished mother begins life with a low birth weight, passes through a series of attacks of malaria, becomes anaemic and increasingly subjected to malnutrition, until it takes only an attack of diarrhoea or upper respiratory infection to deal the final blow. With health education for the parents and regular supervision of the child from birth until about the age of five, this high mortality rate can be reduced.

The health of the mother and the newborn baby are closely linked. It is therefore important that the same team of health workers which looks after the expectant mother should continue to look after the infant when it is born. This may not be possible in urban areas where clinic attendances are big and a large number of women must be catered for. Under such circumstances a close liaison between different teams of workers is necessary.

The health of mothers and children is closely related to the general

health of the community, and public health measures that will bring about an improvement in general health will also produce improved maternal and child health—better sanitation and water supply, for example, and control of such communicable diseases as tuberculosis.

From the above discussion it would appear that the health needs of the mother and the young child need to be given priority in the national health programmes and a suitable service should be evolved to look after them. The service for maternal and child health should be thought of as a channel for directing medical and health services to special groups and not a new subject or a speciality. It is a service encompassing the preventive aspects of paediatrics, obstetrics, nutrition, health education and child development. In every country the maternal and child health service will have to be adapted to the needs and the resources of the community it serves; it has to be moulded to the local cultures and traditions and cannot be modelled on a set pattern copied from another country.

Though the goals of maternal and child health are in people's homes, in schools and in clinics, it is founded upon a hospital ward or clinic where adequate attention to sick children can be promptly given. The relationship of a maternal and child health service to the overall health care of a community can be seen in the following diagram (figure 3).

The aims of maternal and child health can be summarised under the following headings:

(1) Health education

- Adequate nutrition of pregnant and lactating mothers.
- Child care.
- Feeding of children.
- Simple hygiene.

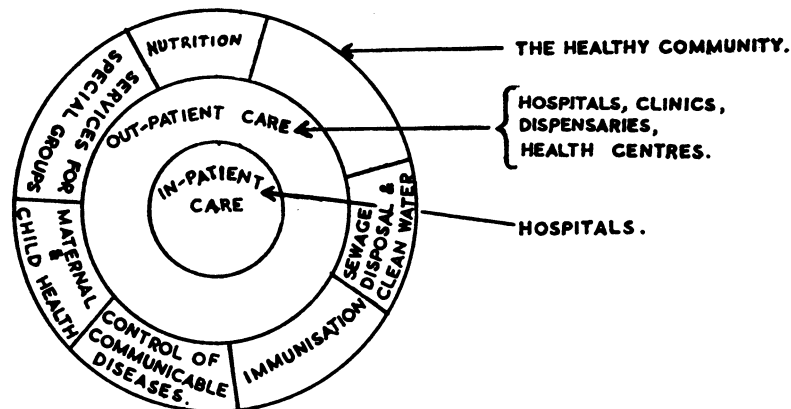


FIG. 3 The place of maternal and child health in the overall health programme

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(2) Health supervision

- This can be achieved by regular attendance at clinics, e.g. antenatal clinics or young child clinics, and in special cases by home visits.

(3) Immunisation.

(4) Early detection and treatment of sickness

Maternal and child health service can reach out to the people through the following media:

- (a) Hospital—through
 - Antenatal clinics.
 - Young child clinics.
 - Outpatient departments.
 - Children's wards. } Home-visiting of problem cases.
- (b) Health centres and dispensaries—through
 - Antenatal clinics.
 - Children's clinics. } Home-visiting.
- (c) Community projects—through
 - Community centres.
 - Day care centres.
 - Mobile clinics.
 - Schools.

Chapter 2

Antenatal Care

The purpose of antenatal care is to ensure good health in every expectant and lactating mother, to enable her to have a normal delivery and a healthy baby and to teach the art of child care. Thus, the antenatal clinic is meant not for detection of rare abnormalities, but for the supervision of the normal pregnancy. The health of the newborn baby is closely related to what happens to him in the womb, e.g. nutrition of the mother, her illnesses, and so on, and therefore if normal maternal health is maintained, the developing foetus will also have a better chance of being healthy.

The assumption that antenatal care which is adequate from the obstetric point of view for the mother is also all the care that can be expected for the foetus is not entirely true; experience has shown that viral or chemical agents which may produce no upsets in the mother may cause harm to the foetus. Hence a knowledge of these noxious agents is essential for adequate protection of the foetus.

The first three months of foetal life are critical. It is the period during which different organs and body parts are being differentiated; any interference with this process may lead to possible congenital malformations (see figure 4). The effects of various drugs administered to the mother or maternal infections like German measles are felt most during this period of foetal life. It is believed that amongst congenital malformations, 10 per cent are due to genetic factors and traceable in the family history, another 10 per cent are due to chromosomal aberrations and the vast majority (80 per cent) are due to some extraneous factors and are potentially preventable. Certain infective agents can affect the foetus directly if they are present in the mother's blood stream. In congenital syphilis the foetus is infected *in utero* and may show signs of secondary syphilis in the neonatal period; malarial infection of the placenta is responsible for low birth weight of the baby and infection of the mother with the cytomegalic virus can damage vital organs in the foetus.

One of the main purposes of antenatal care is to provide a proper standard of nutrition for the mother. In most developing countries, the average woman of child-bearing age goes through repeated cycles of

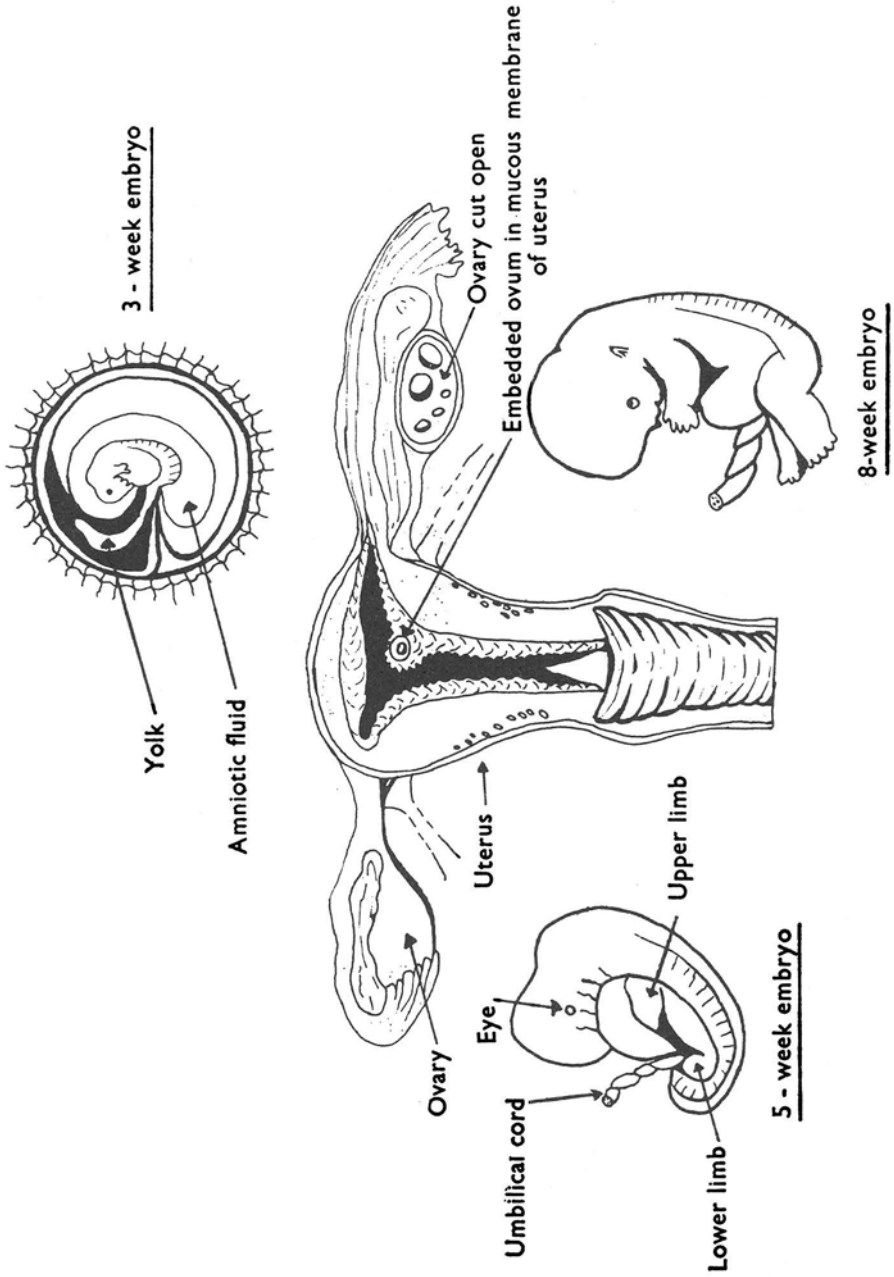


FIG. 4 The developing foetus

pregnancy and prolonged lactation. At the same time, because of superstition or prejudice, the pregnant woman is often forbidden a proper diet, for example, eggs are taboo in many communities. In some, there is a belief that the pregnant woman should eat less so that she will have a smaller foetus and hence less trouble during delivery. In a study of the diets of pregnant women from low socio-economic groups in India, it was found that the average daily intake of proteins was 44 gm (of which animal protein comprised 6 gm), calcium 300 mg, iron 18 mg and a total caloric intake of 1,575 calories; this is approximately half the recommended allowance.

Lecturing to mothers on the value of good food only confuses them and therefore it is better to be precise and practical. One practical demonstration on the choice and preparation of food is better than several hours of lecturing. All foods demonstrated should be available locally and the mothers should be advised on how to buy, what to buy and how to prepare the food.

Repeated and regular examination of the mother is essential during pregnancy. Ideally, a mother who has no complications should be examined monthly from her first attendance until the 28th week, every two weeks between the 28th and 36th weeks, and then every week, (see figure 5). In many places this may not be possible because of shortage of staff and the travelling involved. In these cases a minimum of at least six examinations should be insisted upon, of which at least two should be in the last month.

First visit

At this visit the history of the patient's general health and past pregnancies should be noted. This will take some time and a separate day should be allotted to new cases if possible.

Attention should be paid to the following points. If the patient has a general or past obstetric history, in which any of the following occur, then she should be seen by a doctor.

- (1) Points in general history:
 - Tuberculosis.
 - Heart disease.
 - Diabetes.
 - Syphilis.
 - Gonorrhoea.
 - Orthopaedic condition.
 - Gynaecological operations.
 - Abdominal scars.

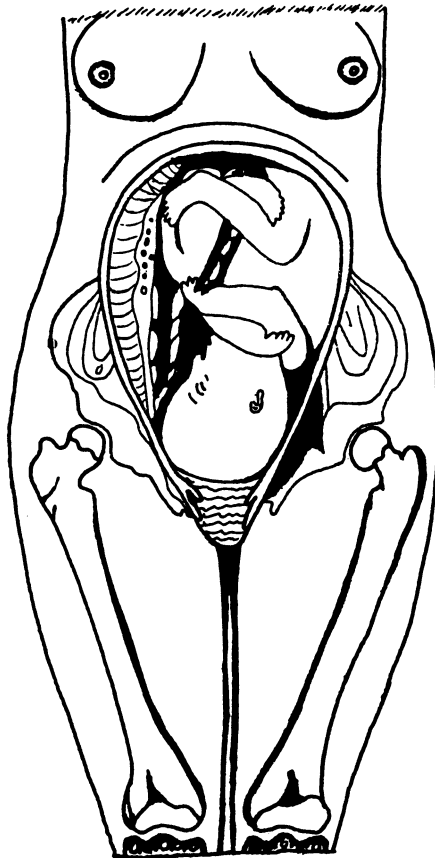


FIG. 5 Full-term pregnancy

- (2) Past obstetric history:
- Abortion and ectopics.
 - Haemorrhages in pregnancy.
 - Toxaemia of pregnancy.
 - Previous difficult labours including forceps delivery.
 - Previous caesarean section.
 - Previous post-partum haemorrhage.
 - Blood transfusion.
 - Stillbirths or neonatal deaths.

With regard to the present pregnancy, the following should be noted:

- (1) Age.
- (2) First day of last menstrual period and expected date of delivery.
- (3) Family history—health of other children. Appearance of pregnancy in a mother should be taken as a warning sign with regard to the health of an older child. He will be taken off the breast by the mother and thus deprived of his source of first-class protein.
- (4) Persistent vomiting, headache, swelling of ankles, bleeding or discharge.

The examination

- (1) General condition, e.g. anaemia, breathlessness, oedema, etc.
- (2) Weight—any gain of over 5 lb in a month is significant and should be referred to a doctor.
- (3) Height—At the first visit, the height should be measured. Mothers who are under 5 feet may have a difficult labour.
- (4) Blood pressure—This should be taken at each visit; if it is over 130/80 mm Hg this may indicate the presence of disease.
- (5) Urine—for albumen and sugar.
- (6) Examination of the abdomen—for height of the fundus and position of the foetus.

Reference to hospital

If any of the following points are noted during the examination of the patient, she should be referred to hospital:

- (1) Height under 5 feet.
- (2) Blood pressure over 130/80 mm Hg or albuminuria.
- (3) Swelling of feet and ankles.
- (4) Vaginal bleeding.
- (5) Anaemia.
- (6) Abnormal presentations.
- (7) Twins.
- (8) Disproportion.
- (9) Hydramnios.
- (10) Abdominal pain.
- (11) Elderly primigravida (over 30).
- (12) Young primigravida (16 and under).

Health education

This is as important as the examination of the mother.

As well as guidance on her own diet, the mother should be given instruction in baby and child care. The importance and the length of breast-feeding necessary for the child should be discussed.

In all these discussion groups it may prove helpful to include fathers, elders in the family and the community.

Immunisation against tetanus

Neonatal tetanus is a common cause of death in many rural areas. In spite of the growing popularity of the Western type of medicine, a large proportion of babies are still delivered at home and this practice may continue for many years to come. Under such circumstances antenatal measures for protecting the baby against tetanus in the newborn period are essential.

Immunisation of the mother during the antenatal period with tetanus toxoid produces a high level of antibody in her blood, which is sufficient to protect the baby from tetanus at birth. Hence, in areas with a large incidence of neonatal tetanus, the mothers should be immunised with tetanus toxoid—three injections of 1 cc each, given at monthly intervals during the last trimester.

Organisation of antenatal clinics

Antenatal clinics are run by a team of nurse/midwives and nursing orderlies based at a rural health centre or district hospital. They should be supervised by the doctor or medical assistant in charge.

It is important to keep a satisfactory record system for the area served, because this not only helps one to understand the pattern of obstetric problems in the district, but is also useful in the evaluation of the obstetric services available to the people. Besides available population data, such records should include:

- (1) Number of deliveries conducted (normal, abnormal).
- (2) Maternal deaths and causes.
- (3) Stillbirths.
- (4) Neonatal deaths.

Measuring the effects of the antenatal care programme

In order to make a measurable impact, the antenatal care programme should fulfil the following requirements:

- (1) At least 80 per cent of the pregnant women in the area should make use of the service on a regular basis.
- (2) A system of record-keeping should be developed in order to maintain records on all women in the reproductive phase of life.
- (3) There should be a system of home-visiting for the defaulters or non-attenders.
- (4) Early diagnosis and treatment of common illnesses should be included in the work of the clinic.
- (5) Criteria should be established to identify the mother who is 'at risk', so that the health and social resources of the community can be directed towards her.

Chapter 3

Nutrition of the Pregnant Woman

Pregnancy produces special nutritional demands in women. If child-bearing occurs too often, especially in poor circumstances without adequate diet, the babies will be smaller in size and maternal exhaustion will result.

Calories. During pregnancy there is a tendency to lay down fat stores. This is part of a physiological process to lay down energy reserves that may be needed at a later stage of pregnancy or during lactation. A poorly fed woman who has to do hard manual work during pregnancy will lay down a smaller reserve and may use it up before the end of pregnancy.

Proteins. Extra amounts of proteins are needed to produce the tissue of the foetus and placenta. In a well-fed person this has been assessed at 25 gm daily during the last six months of pregnancy.

Calcium and iron. The diet of the mother has to provide extra quantities of these minerals which are necessary for the foetus. Moreover, during the last few months of pregnancy the foetus lays down stores of iron to last him for the first six months of life, when his diet is mainly milk which is poor in iron content. It is estimated that in the second half of pregnancy extra iron should be made available at the rate of 2–3 mg day, in addition to the normal 15 mg/day.

When these basic requirements are not met, difficulties arise. In most developing countries, there is a very high rate of foetal loss in the form of both abortions and stillbirths. In any one particular country this foetal loss runs parallel to the social class—in other words, amongst the low income groups where diets are poor and overwork and physical exhaustion common, there is a larger foetal loss than in the higher income groups.

The mean birth weight tends to be low in the developing countries, compared with the more affluent societies of the West. Studies in various parts of Africa have shown the following average birth weights:

Nigeria—6 lb 13 oz

Congo —6 lb 7 oz

Malawi—6 lb 9½ oz

In Tanzania the average birth weight of African children of low income groups is 6 lb 8 oz whereas the weight of African children in higher income groups is 7 lb 4 oz and compares well with the average birth weight of European babies (7 lb 8 oz). This shows that African mothers on a good diet are capable of producing babies who in weight and vitality compare well with their counterparts in Western countries.

If maternal stores of iron are poor (as may happen after repeated child births) and if enough iron is not available to the mother during pregnancy, it is conceivable that the foetus may lay down insufficient iron stores. Such a baby may show a normal haemoglobin at birth but will lack the stores of iron necessary for rapid growth and increase in blood volume and muscle mass in the first year of life. Stresses in the form of malaria and other childhood infections will make the deficiency more acute and many infants become severely anaemic during the early months of life.

Hookworm infestation is a common cause of severe anaemia in many rural areas. Routine stool examination in the antenatal clinic and de-worming are more important than prescribing iron. It is probable that maternal anaemia contributes towards the high incidence of low birth weight babies in many tropical areas.

A variety of factors cause improper nutrition or undernutrition of mothers. In most societies food taboos are aimed at women, especially those of child-bearing age. The taboo against the eating of eggs by pregnant women, and the widespread belief that a pregnant woman should eat less so as to produce a small foetus and easy labour, have already been mentioned. In some tribes fish is prohibited whereas others avoid goats' meat. In any given situation, the cultural blocks and superstitions which exist locally should be investigated and, where possible, the expectant mother should be helped to see that such taboos are a source of danger, not only to her own health, but also to the health of the unborn child.

To consider the nutrition of the pregnant woman in isolation is unrealistic. She is an adult member of the family and social group and therefore her diet will be the same as the habitual diet of the family. The diet will not change during pregnancy except under pressure of food taboos or cultural patterns. Therefore, in the first place, it is important to improve the diet of the whole family. The men of the family should therefore be invited to take part in lessons on nutrition at the clinic.

Superstitions about food habits will disappear only with better education and therefore education in nutrition at school is important, especially in girls' schools.

Lessons in nutrition at the antenatal clinic should not be merely a sermon to 'eat better foods' or to 'eat more'. They should be well

planned and should take into account the local eating habits as well as availability of foods in the region.

Many mothers think that eating better foods will upset their budgets and so, wherever possible, advice on simple menus and buying of foods should be included. When food supplements are issued, such as dried skimmed milk powder, they should be accompanied by a simple cooking demonstration to show how the ordinary daily diet can be enriched with the supplement, by adding milk to gruel or to bean sauce, for example.

In spite of all efforts, there will always remain a few problem cases in every antenatal clinic. These need close, individual attention. In addition to the usual health education session they should have a separate individual 'talk' with the nurse in charge at every visit. They will also need to be closely supervised by means of home-visiting.

Chapter 4

The Delivery of the Baby

By the term 'normal' delivery is meant a delivery occurring spontaneously at full term with vertex presentation in a healthy mother. With adequate antenatal care and supervision it should be possible to diagnose most of the common abnormalities of pregnancy or presentation in time for reference to a hospital. Complicated cases should not be dealt with at the rural health centre or dispensary.

Whereas antenatal care and institutional delivery are accepted readily in the cities, in most rural areas there is undue reluctance to do so. It is believed that more than half the births occur by traditional midwifery. Superstitions concerning disposal of the placenta and the cord stump, or beliefs about prelacteal feeds, handling of the baby by strangers and in some cases, even fears concerning the separation of the baby from the mother, make most rural mothers prefer to be delivered in the traditional way at home. In some communities because of the fear of losing the foetus due to an evil eye, pregnancy is kept secret until it is far advanced; in such cases attendance at the antenatal clinic will also be late and if any complications of pregnancy happen to exist, these progress unchecked. By relaxing the rules at the health centre, maybe allowing the relatives to take away the placenta and other products of conception for disposal in the traditional manner or allowing free visiting, for example, these fears can be allayed and institutional delivery can be made more acceptable.

An effective service

The effectiveness of obstetric services in any area can be judged from maternal and perinatal mortality data. By *maternal mortality* we mean the number of deaths occurring amongst mothers during their period of confinement in every hundred (or thousand) mothers delivered at the centre. By *perinatal mortality* we mean the number of stillbirths plus deaths occurring in the newborns during the first week of life per thousand live births. It is thought that stillbirths are mainly due to maternal illnesses, or abnormalities of pregnancy or factors during

labour, whereas the majority of deaths occurring in the newborn in the first week of life are more likely to be due to causes in the baby like low birth weight, congenital abnormalities or infection.

Unexpected difficulties

Unexpected difficulties can arise in an apparently normal case. Many mothers will come in an advanced stage of labour without a prior booking or without attending the antenatal clinic. Some of those may have planned to be delivered at home by relatives or local midwives, but when things do not work out properly they are sent to the health centre or the dispensary. In other words, they are cases of abnormal labour, and where possible should be seen by a doctor. In all unbooked cases, if any abnormality of pregnancy exists, it is safe to assume that this is in an advanced stage and may have undesirable effects on the foetus. In mothers who are regularly supervised, early diagnosis and care are possible. Thus, in toxæmia of pregnancy there is more foetal wastage (in the form of stillbirths and neonatal deaths) in the unbooked cases than in those who regularly attend the antenatal clinic.

It is a common practice in many communities to give local medicines to the mother in labour. A woman who has attended the antenatal clinic regularly, and in whom everything is progressing normally, may have an abnormal labour through taking such drugs. Whilst working in areas where herbalists and their medicines are popular, it is appropriate to look out for such medications in every case that comes to deliver and note it on the mother's case card. These herbal potions are used because of their analgesic effects or oxytocic action. If analgesic drugs have been used, an overdose may cause depression of the respiratory centres of the foetus and thereby difficulty in initiation of respiration. In the case of oxytocic drugs there may be precipitate labour or other complications, such as rupture of the uterus, tonic contractions of the uterus, etc.

Drugs given to the mother or the newborn child may have similar untoward effects. Pethidine or morphine given to the mother in labour may cause depression of the respiratory centres of the foetus. There are certain drugs that the newborn child cannot tolerate well for the first few weeks of life and these should be avoided. Large doses of vitamin K or sulphur drugs given to the child may produce jaundice. Chloramphenicol is known to cause shock and collapse. Tetracyclines cause staining and undue brittleness of the milk teeth.

The health of the newborn child may be affected because of various events before or during labour. Of these birth trauma and anoxia are most important. Both can cause irreversible brain damage and if the

baby survives, there is a high possibility of psychomotor retardation. The skill with which labour is conducted and the newborn is attended to will, to a large extent, determine whether either anoxia or birth trauma occurs. Amongst the perinatal conditions which can cause neurologic sequelae in the baby may be mentioned prematurity, post-maturity of more than 42 weeks, multiple pregnancies, prolonged labour of more than 24 hours, cord complications, foetal bradycardia and post-partum apnoea of more than one minute.

One of the avoidable dangers of the early period of life is sepsis. Many newborns who are delivered by untrained people die of sepsis and the same can be said of puerperal septicaemia in the mothers. Therefore, during labour, all the necessary aseptic precautions should be taken in handling both the mother and the newborn child.

Chapter 5

Care of the Newborn

At birth the baby makes a transition from intrauterine to extrauterine existence. Until then the placenta has been functioning as the organ for gaseous exchange, for nutrition, for excretion and for the production of various hormones that are necessary for the maintenance of pregnancy. At the time of birth, or soon thereafter, various physiological systems of the baby take over these functions. Thus *respiration* is initiated and the function of gaseous exchange is taken over by the lungs. Full expansion of the lungs may not be achieved until several days after birth, especially in the low birth weight baby or the baby whose vitality and strength have been lowered by disease, drugs or anoxia. As the lungs expand and assume function, the pulmonary capillary bed opens up and pulmonary circulation gets established; at the same time the placenta with its vascular structure is removed from the systemic circulation. With better oxygenation in the alveoli of the lungs the oxygen tension of the blood increases. All these factors act as a trigger mechanism which brings about changes in the foetal *circulation* converting it to the adult type of circulation. Other dormant systems, such as the gastro-intestinal tract and the urinary system also begin to function. Within a day or two of birth, the gastro-intestinal system has to obtain calories and various nutrients essential for the metabolic needs of the body tissues. Until then, the baby has to depend upon food stores laid down during foetal life; if these stores are poor, various deficiencies occur; in the rice-eating populations of South East Asia, for example, infantile beri-beri occurs when thiamine stores of the foetus are inadequate. The glycogen stores of the tissues are important for survival in the first crucial days; animal studies have related survival to cardiac glycogen levels.

Many factors, both in the antepartum and the intrapartum period, can adversely affect adaptation to extrauterine life. In the newborn period, the first 48 hours are most crucial and a large proportion of perinatal mortality occurs during this period. The problem is more acute in developing countries because medical care is scarce, mothers reach parturition often in a stage of poor nutrition and the home surroundings in which a child is born are often insanitary.

Care at birth

As soon as the baby is born, the mouth should be gently swabbed to remove any mucus, and if there is too much of it, the oropharynx should be cleared by sucking with a mucus extractor. Usually about this time the baby gives out his first cry and inflates his lungs.

There should be no hurry to cut the cord. As far as possible, one should wait until the cord has stopped pulsating; it should then be 'milked' towards the baby. This manoeuvre gives about 100 cc more blood to the baby, and the iron contained in this blood will guard the baby from anaemia later on.

The cord is cut about three finger breadths from the umbilicus and tied by means of a tape in two places. A slipped ligature is often a cause of severe haemorrhage from the cord.

The eyes should be wiped with sterile cotton wool moistened in boiled water. Silver nitrate (1 per cent), one drop in each eye, is a good prophylactic against gonococcal ophthalmia and should be used in areas where the risks are high. It can cause chemical irritation in higher concentration, and should always be freshly prepared. Similarly, freshly prepared penicillin eye drops—2,000 units/ml—are a useful prophylaxis against gonococcal ophthalmia. Other antibiotic preparations for the eye should be used only in cases of established purulent conjunctivitis.

The baby should then be left in a cot with a head-low position to recover from the effects of the birth process. The cord is left undressed and is painted with triple dye (a mixture of gentian violet, brilliant green and proflavin), or 0.5 per cent hibitane in spirit, or sprayed with nobecutane spray. A first apgar score (page 25) is taken at this time.

As soon after birth as possible, and always within 24 hours of birth, the newborn baby should undergo a clinical examination. The object of this examination is threefold:

- (1) To detect congenital abnormalities.
- (2) To ascertain that the baby has not suffered any injury during the birth process, e.g. excessive moulding, cephalhematoma, nerve palsies or fractures.
- (3) To look for the presence of signs and symptoms of diseases peculiar to the newborn period, e.g. respiratory distress, vomiting, abdominal distension, change in colour or convulsions.

Bathing the baby

There is no need to bathe the baby immediately after birth. When the baby has awakened from sleep after being born, excessive blood and vernix can be sponged away and the baby may be weighed. The baby is

then cleansed with cotton wool dipped in savlon, 1 in 200 strength, and wiped dry. Thereafter a daily routine of 'top and tail' with savlon solution will suffice.

First feed

As soon as the baby has recovered from the effects of delivery, he can be put to the breast; this will be about 12 to 16 hours after birth. The early secretion of the breast is a yellowish liquid called colostrum; many mothers think it is 'bad milk' and refuse to feed the child. Such mothers need to be reassured.

If the baby appears to be ill, for example, pale or blue in colour, has convulsions, is very limp or vomits, the first feed may be withheld for 24 hours and the baby kept under observation. After this period, he may be put to the breast if he has recovered, otherwise he will need to be fed by either pipette or tube, depending upon whether he can swallow or not.

In many areas various customs are in vogue regarding the first feed offered to the baby. Some people give boiled water. Others offer a gruel, often by forced feeding in which case aspiration pneumonia may occur. If such feeds are prepared in a clean manner and the methods employed for their administration are not dangerous, they may be allowed in small quantities.

Ideally the mother and child should stay in hospital until the cord has fallen off; but this may not be practical, either because of heavy demand on beds or because of the home circumstances of the mother. However, the stay in hospital or health centre should be used for the education of the mother in child care and for establishing satisfactory lactation.

During the stay in hospital, certain disease processes peculiar to the newborn may manifest themselves. Since the clinical picture of disease in the newborn is often different from that in adults, it may prove useful to keep a watch for the following danger signals:

- (1) Cyanosis.
- (2) Pallor.
- (3) Bleeding—from the cord, in the vomitus, or in stools.
- (4) Jaundice.
- (5) Not opening the bowels for 36 hours after birth.
- (6) Not passing urine for 36 hours after birth.
- (7) Convulsions.
- (8) Obvious birth injuries—like cephalhematoma or fractures.

A newborn child showing any of the above danger signals should be seen by a doctor as soon as possible, since all disease processes tend to run a rapid course in the newborn period.

Before she goes home, it is important to make sure that the mother knows about the home care of her newborn child, especially if it is her first-born. Personal cleanliness and hygiene need emphasis. Many mothers apply home brews to the cord stump and these may cause cord infection, septicaemia or even tetanus. It is also not unusual to see very young babies wrapped in a dirty cloth, which may be a source of infection.

Many babies on discharge from hospital are taken to live in overcrowded and poorly ventilated houses. Where possible, the home should be visited by the health visitor soon after discharge to make sure that the home conditions are satisfactory.

Chapter 6

Resuscitation of the Newborn

Neonatal deaths make a major contribution to the infant mortality rate. In a large number of cases this is due to failure in establishing respiration at birth. Certain conditions have been found to be associated with asphyxia of the newborn so regularly that one should anticipate trouble and be prepared for an emergency whenever they occur. These conditions are the following:

- (1) Obstetric factors:
 - (a) Prolapse of the cord or cord entanglements.
 - (b) Abnormal uterine contractions.
 - (c) Difficulty with the delivery of shoulders.
- (2) Maternal factors:
 - (a) Maternal age over 35 years.
 - (b) Grand multipara.
 - (c) Prolonged labour.
 - (d) Prolonged rupture of membranes.
 - (e) Maternal diseases, e.g. diabetes, toxæmia, etc.
- (3) Foetal factors:
 - (a) Meconium stained liquor.
 - (b) Tachycardia (more than 160/min) or bradycardia (less than 100/min).
- (4) Effects of drugs given to mother.

Though the newborn can withstand anoxia better than the adult, spells of apnoea at birth can produce brain damage. Therefore apnoea in the newborn should be treated as an emergency and measures to improve oxygenation of blood should be instituted immediately.

A simple method is available for evaluating the condition of the newborn in order to decide whether resuscitation will be needed. This is known as the apgar score. In this, five clinical signs are looked for one minute after birth and points are allotted as in the table on page 25.

The majority of infants are vigorous. Here the score should be 7-10 points. These infants cough or cry within seconds of delivery, and no special procedures are necessary for them. For mildly or moderately

Table 1. The apgar score

Sign	0	1	2
(1) Heart rate	Absent	Less than 100/min	More than 100/min
(2) Respiratory effort	Absent	Weak cry	Good strong cry
(3) Muscle tone	Limp	Some flexion of extremities	Well flexed
(4) Reflex irritability (elicited by tapping the feet of the child)	No response	Some movement	Cry
(5) Colour	Blue or pale	Body pink, extremities blue	Pink

depressed infants, the score is 4, 5 or 6. For severely depressed infants the score is between 0 and 2; they require prompt and careful resuscitation.

Technique of resuscitation

(1) *Clear airway.* It is of the utmost importance to have a clear airway. Therefore all mucus in the mouth should be cleared and the oropharynx sucked out with a mucus extractor. Positioning the baby with his head low may help in the drainage of secretions.

In the collapsed patient, the tongue tends to fall back and obstruct respiration. Hence, as soon as mucus has been extracted, an airway should be introduced, and the chin should be supported. The size of the airway to be used is Goudel 00 or 0.

(2) *Oxygen.* Even with his feeble attempts at respiration, the newborn child can oxygenate his blood better than during vigorous artificial respiration. Therefore the next step is to connect the infant to an oxygen supply. If any gasps are taken, enough oxygen will then reach the depressed centres in the brain. Oxygen can be administered by nasal catheter or a funnel over the face. The length of the tubing to be passed inside the nostril should be equal to the distance measured from the nostril to the ear. Oxygen should be bubbled through at least 3 inches of water and the flow maintained at 2 litres per minute.

(3) *Mouth-to-mouth breathing.* If after carrying out the above procedures, no respiratory movements have begun, mouth-to-mouth respiration should be started. The operator should put his mouth against the baby's mouth, or against the airway. The baby's lungs are inflated rhythmically but the pressure used must be that produced by the operator's cheek muscles and not by his own expiration.

If necessary, the operator can take the oxygen catheter in a corner of his own mouth, so that during mouth-to-mouth breathing oxygen-enriched mixture can be made available to the infant.

Mouth-to-mouth breathing should be at the rate of 20 to 30 times a minute (see figure 6).

(4) *External cardiac massage.* Even though the lungs may be functioning, this oxygen cannot reach the tissues if there is no heart-beat. Hence the next step is to institute external cardiac massage (figure 6).

For this the baby should be on his back on a hard surface, such as a table or a trolley. All mattresses and cushions should be removed. The heart is compressed rhythmically between the sternum and the vertebral column, at the rate of 80-100 times per minute.

Again it is important not to use excessive force. Pressure applied with the tips of the first two fingers on the lower part of the sternum should produce enough force for massage. It is better to try to feel for the femoral pulse, to make sure that with each compression of the sternum a pulse wave is produced.

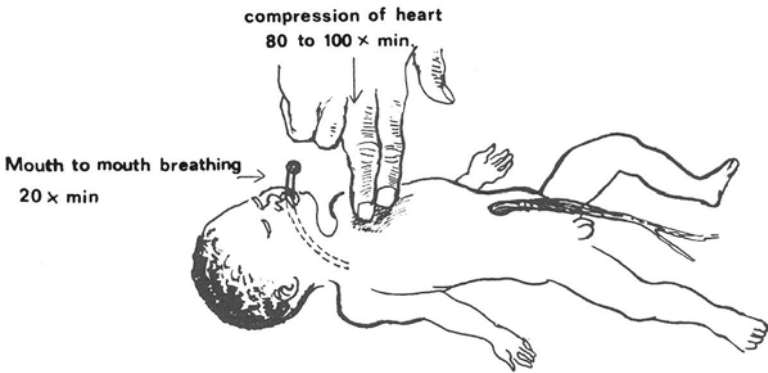


FIG. 6 Technique of resuscitation

(5) *Drugs.* Analeptics in the delivery room are not to be recommended.

If it is clear that depression of the infant is due to morphine or related drugs given to the mother, a morphine antagonist (N-allyl normorphine), 0.2 mg/kg, may be given intravenously.

Nikethamide, 0.5 ml of a 25 per cent solution, placed on the tongue is said to be rapidly absorbed and effective.

Intramuscular injections may not be absorbed if there is no circulation.

Since resuscitation of the newborn is an emergency, it is better to follow a drill and the following steps are recommended in chronological order:

(1) At birth. Note the time, clear nose, mouth and pharynx (and also stomach in hydramnios, diabetes, and after caesarean section).

- (2) Apnoea one minute. Oxygen by funnel—4 litres/minute. Nalorphine (0.25 mg) and vitamin K (1 mg) intramuscularly when indicated.
- (3) Apnoea two minutes. Nasal oxygen, 2 litre/minute. Nikethamide (coramine), 0.5 ml, to be put on the tongue a few drops at a time (halve the dose for prematures).
- (4) Apnoea three minutes. Mouth-to-mouth respiration. Cardiac massage.

In a baby whose heart has stopped beating, external cardiac massage to get the heart beating again is an urgent necessity. In such cases start with step (4) above.

After resuscitation, all babies who had mouth-to-mouth breathing should be given Inj. Streptomycin 1/20 gm daily, for three days, as a prophylaxis against infection.

Chapter 7

The Low Birth Weight Baby

Physiological and biochemical maturity is essential for adjustment to extrauterine life and independent survival; in those cases where pregnancy could reach full term and was not interrupted by maternal ill health, the foetus will develop to full capacity and will have adequate vitality to withstand the rigors of labour. However, in most cases, it is not possible to know the gestation age accurately and some other criterion like the weight or length or performance of the baby has to be used to assess maturity. Experience has shown that the size of the baby at birth has an important bearing on survival and so birth weight is commonly used as the yardstick of maturity.

The international standard for low birth weight has been fixed at 2500 gm ($5\frac{1}{2}$ lbs) and below. In many countries with a good standard of health, babies with a birth weight less than the above would be classified as 'premature'; this is not necessarily so in developing countries. Studies carried out in many parts of Asia and Africa have shown that the newborn child tends to weigh less than his Western counterpart and many babies weighing less than 2500 gm at birth may still possess a full potential for growth. From studies carried out in various parts of East Africa, it would appear that babies weighing $4\frac{1}{2}$ lbs (2200 gm) or less at birth should be considered for special care, while all those below $5\frac{1}{2}$ lbs (2500 gm) should be classified as of 'low birth weight'.

Low birth weight may be due to a variety of factors which can be divided into two main groups:

(1) *Factors affecting the general health of the mother*—Anaemia and malnutrition, the effects of various parasitic infestations like hookworm and malaria, chronic diseases like tuberculosis, or recurrent ill health can influence the weight of the baby. On the other hand, it is not possible to consider the general health of the mother separately from the general health of the population as a whole. A community which is better nourished, with better medical facilities in both curative and preventive aspects, will tend to produce heavier babies than a community which is less fortunate in these matters.

(2) *Factors affecting the antenatal health of the mother*—A common cause of low birth weight is multiple pregnancy. However, in such cases the baby is more mature than his weight would indicate.

The common complications of pregnancy like pre-eclamptic toxæmia, urinary infections or chronic hypertension can contribute to low birth weight if not controlled early in the antenatal period. In malarious areas, it has been noted that heavy infection of the placenta with malaria parasites results in a lowering of the birth weight.

Good prenatal care is essential for healthy babies. It has been estimated that as many as 10 to 15 per cent of all premature births can be prevented by early and regular antenatal supervision.

Survival

Unless special care is available, the chances of survival in the low birth weight baby are poor. For the weight group of $4\frac{1}{2}$ lb (2200 gm) and below there is a steep rise in mortality; the chances of death are about 25 per cent in the $3\frac{1}{2}$ lb (1700 gm) and rises to about 50 per cent in the 3 lb (1400 gm) group. The leading causes of death in the baby with low birth weight are (1) atelectasis with or without hyaline membrane disease, (2) malformations, (3) pulmonary hæmorrhage, (4) intracranial bleeding secondary to anoxia or birth trauma, (5) pneumonia and other infections.

The premature baby faces difficulties in adjusting to extrauterine existence. Resistance is poor and immunity is low, so that the slightest infection can be fatal. Many organs in the body of the premature baby have not acquired full biochemical maturity at birth; thus deficiency of enzymes in the liver may lead to prolonged physiological jaundice, and the kidneys may show poor concentrating ability. The blood vessels can be easily traumatised and intracerebral hæmorrhage or bleeding in other organs is common.

Even in those who survive there is a high incidence of cerebral palsy and other physical defects. Many such babies will not achieve their full growth and development potential. Therefore, in this problem of prematurity and low birth weight the main effort should be towards prevention. General raising of the health standards of the community and regular antenatal supervision of mothers will result in more mature and larger babies.

Principles of care

In the care of the low birth weight baby, attention to the following principles is necessary.

PREVENTION OF INFECTION

The nursery should be in the maternity wing of the hospital and not where medical or surgical patients are admitted. In order to avoid cross-infection, visitors should be prohibited. Special nursing staff and ward attendants should be assigned to the nursery; a nursing staff which divides its attention between the medical sick and a premature nursery is sure to be the chief source of cross-infection. It has been found that in nurseries infection is more easily spread by touch and contact than by inhalation. Infected material, e.g. linen, blankets, etc., should not therefore be shared between the nursery and the wards.

Frequent washing of hands and use of masks and gowns should be encouraged in all nurseries.

A premature baby born outside the hospital should be considered as infected and should not be kept in the premature nursery. Such babies need an antibiotic cover with penicillin and streptomycin in order to deal with infection that may have been acquired outside (see figure 7).

FEEDING

The method of feeding is more important than any complicated formula or feeding schedule. The method employed will depend upon the physiological maturity of the baby; for example, if the suckling reflex is present the baby should be suckled on the breast. Low birth weight babies tire easily and therefore after suckling they should be offered expressed breast milk with a pipette or teaspoon. If the suckling reflex is absent, these babies need to be fed by naso-gastric tube (see figure 8). Generally speaking, babies of 3 lb birth weight and over can suckle and swallow and therefore can maintain a fair caloric intake. For such babies, breast-feeding is the best method, followed by expressed breast milk given by teaspoon or pipette. Babies below $2\frac{1}{2}$ lb birth weight need to be tube-fed, whereas in the $2\frac{1}{2}$ -3 lb range, some can suckle and swallow and others cannot.

In all cases, the milk offered should be breast milk. No dilution is necessary even in the case of the very small babies. The chances of gastro-intestinal upset are small compared with the introduction of infection during dilution.

The best time to start feeding is when mother's milk becomes available. If mother's milk is late in coming or is not properly established, expressed breast milk from other mothers can be contributed to feed the baby.

Those who can suckle should be offered $\frac{1}{2}$ to 1 oz of expressed breast milk after each feed. The tube-fed babies need 1 oz of expressed breast milk every three hours. This quantity is gradually increased.

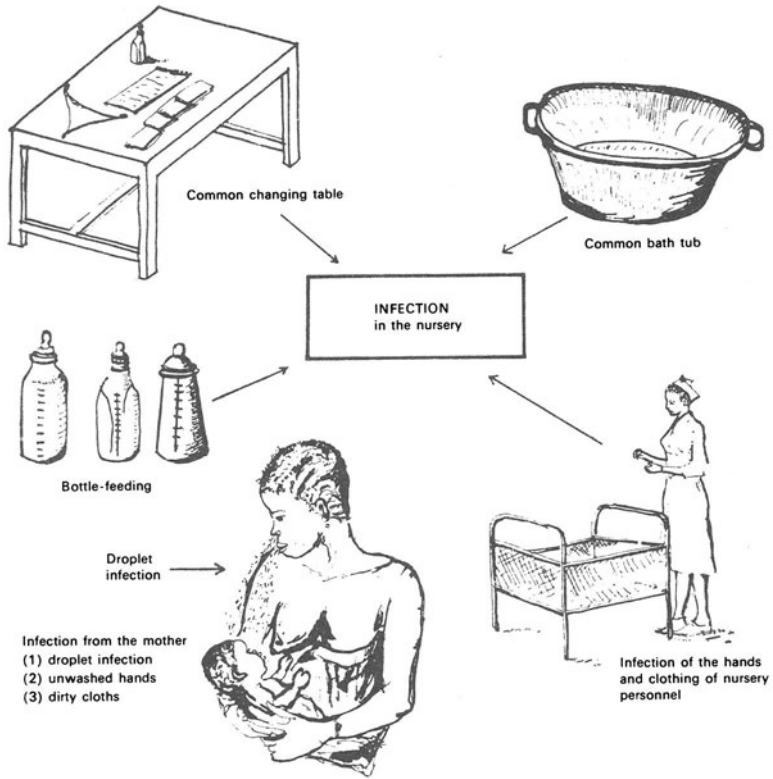


FIG. 7 Infection in the nursery

WARMTH AND HUMIDITY

Even when intake of nutrients may be possible, the low birth weight baby may not be able to burn these with maximum efficiency for the production of heat in the body. Therefore, in cool places, maintenance of warmth and humidity is important. Nothing can be more dangerous than placing a hot-water bottle in direct contact with the baby. This can produce severe burns. A steam kettle in one corner of the nursery will probably be quite adequate. In very cold weather, hot-water bottles may be kept in pockets which are made on the *outside* of the baby's cot. These must be changed at regular intervals to maintain an even temperature.



FIG. 8 Tube feeding

USE OF DRUGS

The low birth weight baby may not be able to detoxicate drugs with as much efficiency as a fully mature baby, and the use of such drugs as sulfa, chloramphenicol, streptomycin, vitamin K, etc., may produce side effects. Careful supervision of dosage is therefore necessary. Roughly speaking, it should be half the dose of a mature baby. Even oxygen, when given in high concentration, can lead to blindness in these children.

Many of the premature babies are born with a low iron store and therefore need supplemental iron, e.g. colloidal iron drops, for a period of four to six months.

After discharge from hospital, these babies require careful supervision of growth. It has been found that even under ideal circumstances they may not catch up in growth with normal children until the second year of life.

Chapter 8

Breast-Feeding

Establishment of proper lactation is one of the most important aspects of infant care in developing countries. A baby who is not breast-fed has a very poor chance of survival in such a situation. Most rural homes do not have the facilities for coping with hygienic methods of bottle-feeding; the principles of sterilisation are poorly understood and the fuel required for boiling the milk or water is always scarce. Bottle-feeding in these conditions invariably results in gastro-enteritis. Furthermore, the expense of artificial feeding is beyond the budgets of most households so that the baby is offered diluted milk and suffers undernutrition.

During pregnancy the high levels of oestrogens and progesterone in the mother's blood promote growth of secreting cells and of the mammary gland as a whole. Soon after child-birth the blood level of these hormones begins to fall, and the pituitary gland secretes another hormone called prolactin. Under the influence of this hormone the mammary gland secretes milk. The production of milk thus initiated is maintained by two other factors:

- (1) The emptying of the breasts at each feed by the infant.
- (2) The sensory stimulus produced at the nipple by the act of suckling.

This sensory stimulus on reaching the hypothalamus in the central nervous system causes the secretion of another hormone from the posterior pituitary, called oxytocin. This hormone produces contraction of the muscle fibres of the mammary gland and thus aids the flow of milk along the ducts to the nipple, and in the complete emptying of the breasts (see figure 9).

Normally, the rural mothers have very little difficulty in breast-feeding their infants. Such mothers are natural 'milk secretors'. Occasionally it has been found that attempts to teach the technique of breast-feeding to such mothers produces confusion in their minds and causes anxiety which may interfere with secretion of milk. Usually it is the educated woman from a higher socio-economic level who is anxious and worried about her capacity to produce milk, who has the problem of inadequate lactation. It is believed that the anxiety and worry in

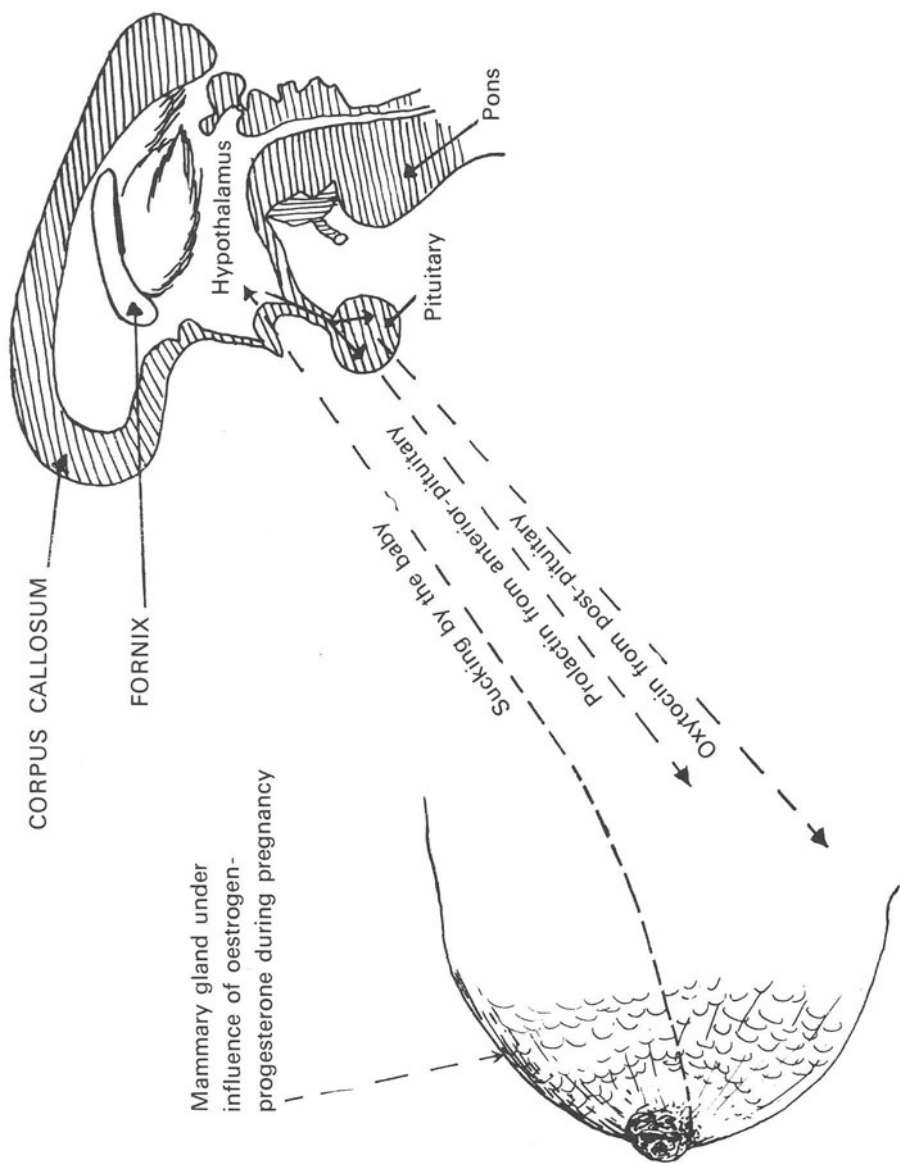


FIG. 9 Secretion of breast milk

such a mother suppresses the nervous impulses from hypothalamus and interferes with milk secretion.

The average baby in the Third World who is breast-fed grows at the same rate as his counterpart in Europe until the age of six months. After this age the demand for calories and proteins cannot be met by breast milk, even with maximum secretion, and additional foods need to be added to the baby's diet. In a mother who is not well nourished milk secretion is poor and the baby may stop gaining weight at an earlier age. In such mothers, it has been found that though the quality of milk remains almost the same the quantity becomes progressively smaller and the mother cannot produce enough milk to meet the growing demands of the baby. In a study among women of the low socio-economic class in South India, it was observed that the daily output of breast milk varied from about 600 cc in the first six months of lactation to about 350 cc between the eighteenth and twenty-fourth months.

In the composition of the milk, fat varies more than any other constituent. It may vary from one pregnancy to another in the same woman, or even from feed to feed or from the beginning of lactation to the end. Protein and lactose tend to vary much less. Human milk contains only traces of iron and the calcium content is lower than that in cow's milk.

If milk secretion is *inadequate* the following signs occur:

- (1) *Failure to gain weight*: If the baby is gaining weight regularly, there is probably no need to worry. The gain in weight may fluctuate from week to week. When in doubt the baby should be weighed weekly for three weeks.
- (2) *Crying*: If the baby is satisfied after a feed he may fall asleep for three or four hours until the next feed is due. A baby who is hungry may sleep for a shorter time and cry earlier, or may even cry soon after the feed.
- (3) *Constipation*: Normally a breast-fed baby has about three to four stools per day which are soft in consistency. In babies who are underfed, constipation may occur.

A variety of factors besides maternal anxiety and malnutrition can interfere with the establishment and maintenance of an adequate secretion. Thus, any acute illness in the mother will result in a reduced flow. It is important in such cases to maintain the milk supply as far as possible, since complete drying up of breast milk could be disastrous. Whenever a mother is admitted to hospital her breast-fed infant should

also come in as a 'lodger'. If the mother is too ill to nurse the baby, the milk should be expressed by hand or with a breast pump, since complete emptying of the breasts is essential to maintain secretion.

Local disease, like cracked nipples or a breast abscess, may interfere with feeding. Here, also, the affected breast should be expressed and emptied several times a day to keep the milk secretion going.

In some cases the baby may not be able to suckle vigorously, as in cases of low birth weight or where the baby has a congenital malformation, e.g. hare-lip or cleft palate. In these cases, after the baby has finished suckling, the milk should be expressed and fed by means of a spoon.

The practice of unilateral breast-feeding is fairly common. In many cases the mother has been told either by the elders in the family or by the local medicine man that one of the breasts is secreting 'bad milk'. She has then stopped feeding the baby on that breast and eventually the milk on that side has dried up. If the mother is reassured that her milk is good, and made to put the baby on that breast, at the beginning of each feed (after which he can be transferred to the secreting side) the milk flow will slowly begin and gradually become adequate.

A similar method is used in the case of mothers who are secreting only small quantities and whose infants are marasmic and 'starving on the breast'. These mothers are better admitted to hospital in order to give them a rest from their daily chores and to supervise their nutrition. They are put on a nourishing diet with vitamin supplements and extra milk (full cream if available). To allay anxiety a sedative may be added, e.g. Largactil 25 mg thrice daily or Serpasil 0.25 mg twice daily. The baby is put to the breast every four hours, for at least ten minutes on either side. After this, if he is still hungry, a feed of fresh milk may be offered. On this scheme the milk supply increases gradually and the amount of supplementary feed needed will diminish.

In the case of a maternal death, any female relative with children can adopt the baby and the above method may be utilised to induce lactation in her. Once the baby is discharged, breast-feeding can be on demand.

A special problem in breast-feeding arises in the case of babies whose mothers have pulmonary tuberculosis. If the mother is under treatment, and is sputum-negative, the baby can be given B.C.G. at birth and the mother can breast-feed the baby. If the sputum is positive, the baby should be put on I.N.H. syrup (isonicotinic acid hydrazide), 3 mg/lb body weight per day, and the mother should breast-feed her baby.

Breast-feeding is so important that even under such conditions as maternal tuberculosis it must be continued. In a developing country, to stop giving breast milk to a baby for any reason may have tragic results.

Advantages of breast-feeding

Besides being the natural food of the baby, breast milk contains several substances which act together to protect the baby against infections, especially those of the gut. The incidence of diarrhoeal disease, for example, is much lower in breast-fed babies as compared to those who are artificially fed. Breast milk also contains a large number of white cells, mainly macrophages and lymphocytes, which also help to protect the baby against bacterial and viral infections.

Active lactation in the mother suppresses ovulation and the subsequent pregnancy is delayed. In rural communities where breast-feeding is common, the average birth interval tends to be between 18 and 24 months. On the other hand, if the baby is stillborn or if there is neonatal death so that breast-feeding does not occur, the subsequent pregnancy tends to be much earlier. Several studies have shown that the family-spacing effect of breast-feeding is maximum during the first nine months of lactation, after which it decreases rapidly and is almost disappeared by twenty-seven months after the delivery.

Decline in breast-feeding

In recent years many developing countries have experienced a steep decline in breast-feeding. The decline is more common in large towns and cities, but similar trends are also present in rural areas. Several factors have contributed to this decline in the incidence of breast-feeding, such as rapid urbanisation, changing social values, etc., but by far the most important causes are the intense advertisement and aggressive sales practices of the milk manufacturers. Attractive displays and catchy slogans in the mass media, 'gift packs' issued to mothers in maternity wards, milk nurses visiting young mothers at home, and free hand-outs of starter cans in children's clinics have together dealt a strong blow to breast-feeding. The baby is thus not only deprived of the benefits of his mother's milk, but in the unhygienic environment of most rural homes he is also offered contaminated feeds causing recurrent diarrhoea. Another disadvantage is that of cost. Many families find that to feed the baby properly on artificial milk, they must spend almost half their income. Hence the baby's feeds get over-diluted and he begins to lose weight. One of the commonest causes of marasmus in infants in developing countries is bottle-feeding. Animal studies have shown that growth failure in an organism is known to affect mainly that organ of the body which is growing maximally at the time, and the tragedy of marasmus occurring in early infancy is that its worst effects occur in the brain, which happens to be the organ growing maximally during the first two years of life.

Chapter 9

Growth and Development

Throughout childhood the individual grows in size and the different physiological systems of the body mature in function. At the same time, social and emotional development occurs and the individual acquires several different skills of which the most important is language function. By growth is meant increase in size which may be due to an increase in the number of cells constituting the various organs or increase in size of individual cells; by development is meant the acquisition of functions and skills.

Growth does not occur by continuous and regular small increments but along a definite pattern. The general body growth takes place in two cycles each with an accelerating and a decelerating phase. The first cycle of growth begins in embryonic life in the uterus; by the time the baby is born he is already in the decelerating phase even though increments in growth are more than at any other time in his life. After the age of about two years growth is slow and regular until puberty is reached when the onset of a growth spurt signals the beginning of the second cycle. Several body organs follow an individual pattern separately from the general pattern mentioned above. Thus the nervous system grows maximally in early life being one fourth of adult size at birth, and more than doubling in size in the first two years of life; on the other hand the gonads, the genitals and mammary glands do not grow until puberty.

During any one cycle of growth, the various body parts do not grow symmetrically, and so changes occur in the body proportions at different ages. In early life, because the nervous system is growing rapidly the head is large in proportion to the rest of the body; later the extremities grow more rapidly than the trunk and both of them grow faster than the head. This gives the appearance of growth progressing from head downwards and is called *cephalocaudal pattern* of growth.

Factors influencing growth

Various factors, both inborn as well as environmental, affect growth. These are:

(1) *Genetic factors*: The size of the parents will influence the size of the child and that is why the people in some tribal groups are taller compared with those in others.

(2) *Nutrition*: In most developing countries, inadequate nutrition is by far the most common cause of growth retardation and as such constitutes a major public health problem. In addition to sufficient calories, the diet should consist of proteins, vitamins and minerals for optimum growth.

Of the protein portion, animal proteins are important because they contain all the essential amino acids required by the human organism; however, a judicious combination of vegetable proteins of different origins may also serve the same purpose and support adequate growth. A diet which is adequate in calories may require much less protein than one with less calories, because the protein is not then diverted for energy production and most of it is utilised for growth and maintenance.

(3) *Endocrines*: Growth gets distorted in the absence of a healthy endocrine system. By far the most important hormone governing growth is the growth hormone of the anterior pituitary. In the absence of the growth hormone, height is reduced and infantile body proportions are retained in adult life. Thyroxine, the hormone produced by the thyroid gland, not only helps growth and development but is also required for maturation. Its deficiency leads to retardation of linear and intellectual growth as well as bone maturation. The growth spurt at puberty is produced by the sex hormones which are secreted under the stimulation of the anterior pituitary.

(4) *Healthy body organs*: Growth is affected in many disease states; every episode of acute illness can cause slowing of growth but on recovery there is a phase of rapid growth called 'catch up' growth in which all lost ground is regained. However, in cases of recurrent illnesses especially when the individual is on marginal nutrition the cumulative effects of such recurrent illnesses may cause serious growth retardation. Wherever community surveys have been carried out in the tropics, it has been found that most children do not reach the average Western standard; inadequate nutrition in addition to chronic ill health and life in a harsh environment combine to cause suboptimal growth.

Methods of assessing growth

Measurements of height and weight are the commonly employed parameters for assessing growth. Like all measurements these are of use only if carried out with care. The weighing machine used should be sensitive and should be checked periodically for accuracy. Weighing

should not be delegated to the most junior member of the team as a job requiring little skill, but should be done by a responsible person. The same comments also apply to measurements of height.

Serial measurements are more useful than a single reading; in this way any deviation from the normal can be detected early and corrective measures can be applied in time. All readings obtained are more informative if plotted on a graph which has the average weight curve or percentile curves for comparison.

In community surveys other parameters besides height and weight are employed; these are the circumferences of the head and the chest, the arm circumference and skin-fold thickness. In routine clinical practice these are hardly employed except the circumferences of the head and chest expressed as a ratio to detect sub-clinical malnutrition.

In a healthy child, centres of ossification in the body skeleton appear at predictable times. In certain clinical states, bone age is estimated and compared with the chronological age to assess growth retardation. In the same way dentition may be employed for comparison with body growth.

Development

As body growth progresses the child also passes through various stages of intellectual and social development, learns motor skills of which the most important are walking and bladder control, and acquires language function. Arbitrarily, this process is divided into several stages.

The neonatal period is the first month of life in which the baby is adjusting to extrauterine life and independent existence.

Infancy is the early year or two during which the child learns to walk and talk and is thus able to explore his environment both physically and socially.

Pre-school period. The physical environment of the child is widened by being taken out of the home more often, or by contact with adults or children of his own age. This is also the period of weaning during which the child is being gradually brought onto the adult kind of diet.

School age. The child has emerged from the first cycle of growth and has not yet entered the second cycle. Both socially and educationally this is an important phase because the child now enters the training and educational system of the society from which he will emerge as a contributing member.

Puberty. This stage is the stage of transition between childhood and adulthood. It is characterised by the onset of the second growth cycle during which increase in height and muscle mass occurs together with the appearance of sexual characteristics.

Chapter 10

Weaning

The period of weaning is one of the most critical periods in a child's life. This is the period of transition during which a child whose main food was milk changes over to adult food. If this transition is well planned and progresses smoothly, there should be no setbacks, but in a large number of children the onset of malnutrition takes place during this period.

Often the verb 'to wean' is taken to mean 'to stop breast-feeding'. This is not correct. The real meaning is 'to become accustomed to new foods'. In other words, breast-feeding should continue while new foods are being added to the child's diet and he is becoming accustomed to these new foods.

Dangers of the weaning period

Several factors together make the period of weaning one of the most dangerous periods for the baby. *Nutritional disturbance* is one of the greatest dangers. Most babies do well on breast milk up to the age of four to six months. After this age, the demand is greater than the mother can supply and the child's weight gain slows down. This is the time when the addition of other foods to the child's diet is essential. These should be introduced in small amounts at first, and as the child becomes accustomed to each type of food, the quantity should be gradually increased. Some mothers realise this, and it is a common practice in various communities to make additions to the child's diet, usually in the form of porridge. Mothers think that the baby may not be able to digest thick porridge and it is therefore usually made thin and watery. As a result it has poor nutritive value.

Also about this time the child is exposed to a variety of *infections*. The immunity derived from the mother is by now at a low level, and the child has to acquire his own immunity. Amongst the various infectious diseases of childhood the worst upsets are caused by *whooping cough* and *measles*. During each illness, either because of superstition or custom, the child is put on a light watery diet consisting

of tea and thin, watery gruels. He may also be given purges. All these have additive effects to those of the disease process and in many cases a child may lose up to five per cent of his original weight.

In endemic areas repeated attacks of *malaria* are a constant drain on the child's health. These become more common from the age of three months onwards, until about the age of one year, when sufficient resistance is built up.

A recurring nuisance during the weaning stage is what is known as *weanling diarrhoea*. The entirely breast-fed child is on a source of food supply which is clean and easily digested. When additions to the diet are made, the food may not be properly prepared or may contain pathogens. Also by this time sub-clinical malnutrition has reduced the child's resistance so that various bacteria, which may be harmless in adults and healthy children, produce low-grade diarrhoea in the weanling.

If the steps of weaning have been planned in advance and carried out gradually, allowing the child to get used to each new item of food as it is introduced in his diet, there may be no difficulties. However, in the case of most village mothers this is not so. Instead of a plan, weaning is a matter of circumstance. As soon as the mother finds herself pregnant again, the child is taken off the breast abruptly and now has to obtain his nutrition from carbohydrate foods to which he has never before been exposed. Because of the abruptness of the weaning process, a child who had hitherto been on a high-class protein diet—human milk—has to change overnight to gruels which he does not take well and which, even in the best circumstances, cannot support the demands of growth. It is no wonder that in all developing countries, the onset of protein-calorie malnutrition has been traced to the period of weaning.

Whenever weaning has to be abrupt, there is associated *psychological trauma*. Up to this stage, there has been close physical contact between the mother and child, who is carried slung to her back. Feeding has been on demand and often the breast has acted as a pacifier to the child, as well as a source of food. Every time the child cried he was offered the breast. All this suddenly stops. In order to make the child give up the breast, all kinds of bitter applications are put on the nipple. Thus, not only does the child find the mother suddenly refusing him her milk, but whenever he attempts to take the nipple into his mouth he finds it so bitter that he gives up. In many tribes the child is sent away to his grandparents to separate him from the mother's breast. The mental confusion and psychic trauma produced by all these practices are enough to take away the child's appetite.

All these factors, together with the effects of infections, parasites and weanling diarrhoea, tend to make this a most critical period in the child's life. It should therefore be usual practice in all antenatal clinics

to enquire about the age and diet of the child at home, since the occurrence of pregnancy is a danger signal for the previous child, who will now be weaned according to local practices.

Improvement of weaning practices

The influence of harmful customs on weaning should not be underestimated. In fact they govern the diet of the weaning period more than any other factor, including the availability of foods. Some of these customs include:

- (1) The prejudice against fish and eggs.
- (2) The prizing of cattle as a symbol of wealth rather than for their milk yield.
- (3) The habit of reserving the best food for elders.
- (4) Sending children to grandmothers as a method of abrupt weaning.

In any one particular situation, it is important to find out the exact details of weaning practices with special reference to food prejudices and taboos. The length of breast-feeding, methods of cooking supplementary foods, of feeding the child, e.g. forced hand-feeding, the common diet of the weanling, effects of urbanisation in larger towns—all need to be investigated before an attempt can be made to improve weaning practices. It is also necessary to know what forms of infant malnutrition prevail locally, as differing feeding practices frequently cause different forms of malnutrition.

In planning any changes, the aim should be to retain the best of the traditional practices, that is, prolonged breast-feeding. Any complicated advice, making use of sterile feeding bottles and exact percentages, is completely impractical and can be dangerous.

Prolonged breast-feeding is vitally necessary for growth and survival, as breast milk is the only available source of good quality protein and it contains all the essential amino acids. But after the age of six months, even an optimal flow of breast milk is inadequate for both calorie and protein requirements and hence its main value is as an important protein and calorie supplement to other foods. The actual length of prolonged breast-feeding is uncertain and is often limited by a second pregnancy, but can be advised to last one and a half to two years.

Use of all available animal protein is essential. If cow's milk is available, the best possible way to use it is to mix it with each feed of whatever starchy gruel is used, thereby supplementing its amino acids.

Similarly, full use of all available plant proteins needs to be encouraged. As soon as the infant becomes accustomed to his first starchy semi-solid food, a cereal-pulse gruel should be introduced.

Methods of feeding and cooking need as much attention as the foodstuffs used. For instance, in hand feedings of thin gruels to infants, it is estimated that about one-fifth flows over and is lost. In most households, the same pot is used for cooking the food of the whole family. The child eats with the whole family or with other children and no attempt is made by the mother to make him eat. Also, with bean and groundnut sauce the child is given only the liquid portion since it is believed that he may not be able to digest the solids, and consequently suffer from diarrhoea.

Amongst the many beliefs and mistakes that need to be corrected, the most important is a fatalistic attitude towards life. People take it for granted that half the children will die. Mothers are reluctant to connect illness and disease with lack of food. The common answer given is, 'The child is weak because he is sick and needs medicines'.

The education of mothers in various aspects of weaning is often arduous and slow. But weaning can be taught in child welfare clinics and hospital wards, at home during home-visiting, in women's clubs and community centres. Often community development workers are as important as health nurses. The mother's interest has to be aroused, and often a discussion group is better than a formal lecture.

At all age levels, it is important to emphasise the relationship between health and nutrition. Fatalistic attitudes towards life are negative attitudes. Until mothers are taught to take a positive attitude towards the feeding of their children, these children will not grow up strong and healthy.

Chapter 11

The Under-fives Clinic

In most rural areas mothers believe that a child is to be taken to a clinic only when sick; they do not appreciate the need for health supervision. Children with minor ailments will turn up at a clinic meant for supervision of health. They should not be sent away. Just as the important aspects of the work of a children's clinic is the maintenance of normal health, so also it is necessary to catch diseases early before the child becomes critically ill. Moreover, treating minor illnesses and producing a cure helps to gain the mother's confidence and she will begin to turn more towards Western medicine, rather than accepting illnesses as something caused by spells or being sent by offended spirits.

The child needs regular health supervision throughout the pre-school period as well as during infancy. To restrict attendances at the clinics to the infant age group is to defeat the whole purpose of the clinic. The age limit should be extended up to the age of five and hence the term 'under-fives clinic' is more appropriate.

A mother usually brings the infant to the clinic strapped to her back; a slightly older child must therefore walk. As a toddler cannot walk more than a mile or so, it is important that the clinic should not be more than a distance of one or two miles from a heavily populated area. Where homesteads are far apart, a mobile clinic may be the answer. Otherwise, holding the clinic on market days, when the whole family visits the market place, may produce a better attendance of toddlers. Mothers should always be encouraged to bring the bigger children to the clinic.

The under-fives clinic combines the concepts of prevention, treatment, health surveillance and education into a system of comprehensive health care. In addition, by identifying those individuals and families who are at risk of disease, it helps to mobilise community and social resources for the welfare of such individuals. Experience has shown that it is one of the least expensive services to set up and one in which the community takes active interest.

The working of the under-fives clinic is easily understood if one remembers that it is in essence a children's out-patient clinic onto which have been grafted the functions of the traditional infant welfare

clinic. Further services may be added in the form of home-visiting, nutrition rehabilitation, family planning, parents' clubs, special care of the at-risk groups, etc., depending upon available resources and local interest and support. An important ingredient for success is the involvement of the community through its natural or elected leaders and social groups like the local women's organisation, the young farmers' club and the youth league. The five main objectives of the under-fives clinic are discussed below.

Supervision of health and promotion of growth

A close relationship is often established between mothers and the clinic personnel, so that the individual problem of each child is known to the nurse in charge. With regular attendance, minor health problems of the child are dealt with immediately as they arise and do not deteriorate into more serious illness. Also, mothers are able to obtain advice on the day-to-day care and feeding of their children. This regular supervision of the child goes a long way towards maintaining his health and is probably one of the most important aspects of such a clinic.

In all clinics, the most important method of growth measurement is by weighing, and in a majority of cases nothing more may be necessary. However, in a child who is not growing well, other parameters of growth such as height, arm and chest circumferences may be necessary. Like all other measurements, weight should be recorded as accurately as possible. A reliable person should be in charge of weighing children and the scales should be checked at regular intervals.

When weight is charted as a graph on the child's card, it conveys more information than when it is written down as a series of figures. This graphic record should also show the average growth curve for children in the region, which serves as a yardstick. Different kinds of graphs based on the same principle are used in various countries. Figure 10 shows an example of the most popular form of such a health record.

Prevention of the common infectious diseases of childhood through immunisation

Many would consider this to be the most important function of the children's clinic. The different immunisations and a suggested schedule are discussed in the following chapter. Certain immunisations are accepted readily, e.g. vaccination against smallpox, which is one reason why this disease has been eradicated from almost all countries. Others are not, either because of the pain of injection or systemic reactions as

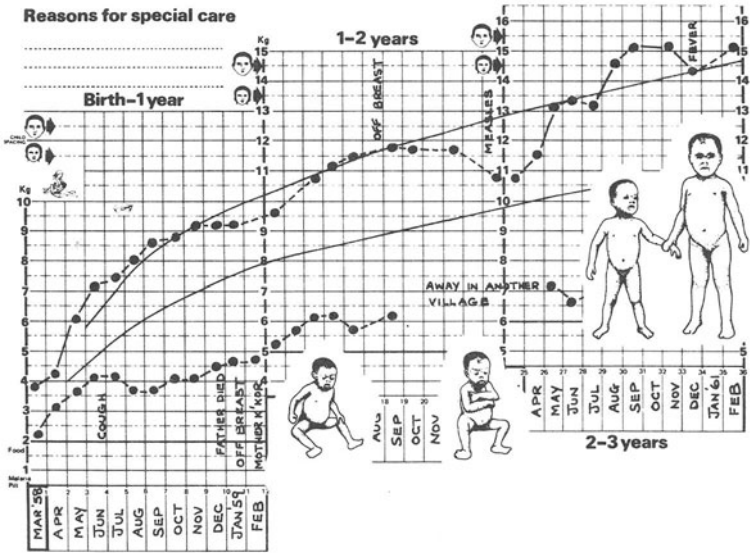


FIG. 10 'Road to health' card

in the case of the triple antigen, or because of lack of knowledge, e.g. oral polio. In any case, it is always important to gain the mother's confidence before attempting to persuade her to agree to any immunisation. The mother should also be warned about any side-effects.

Early diagnosis and management

The following common illnesses of children should be diagnosed quickly, so that the disease process is checked early and does not progress to more serious illness.

(1) *Respiratory infections*—These constitute more than half of all acute episodes of illnesses in childhood. Many are viral infections and usually self-limiting in a well nourished and otherwise healthy child, except in the case of the very young infant in whom serious complications can arise. Secondary bacterial infections occur if there is over-crowding at home and can result in bronchopneumonia. Most such infections respond to out-patient treatment with sulfonamides or penicillin.

Referral to hospital for specialist care and treatment should be considered in the following instances:

- (a) The very young infant under the age of six months.
- (b) The child who develops respiratory difficulty.
- (c) The child with hyperpyrexia.
- (d) The child who does not improve with out-patient treatment within three days.

(2) *Diarrhoeal disease*—Dehydration due to water and electrolyte loss is responsible for many deaths in rural children suffering from diarrhoea. Facilities for intravenous infusion and skills in putting up drips for children may be lacking at the sub-centre or the rural health centre. Recent research has demonstrated that in such children rehydration is possible through the oral route, especially when a hypotonic solution containing glucose and electrolytes is used. Glucose stimulates the mechanism in the gut epithelium for the rapid absorption of water and salt. The efficacy of a solution containing 25.0 gm of glucose, 3.5 gm of sodium chloride, 3.0 gm of sodium bicarbonate and 1.3 gm of potassium chloride in 1 litre of water has been demonstrated in all forms of mild-moderate dehydration, including cases of cholera (see figure 11). To avoid over-concentration, such a solution can be made up

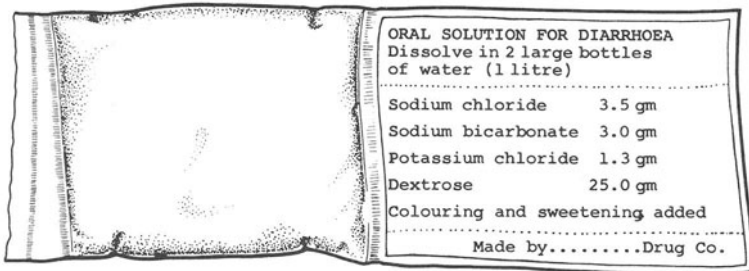
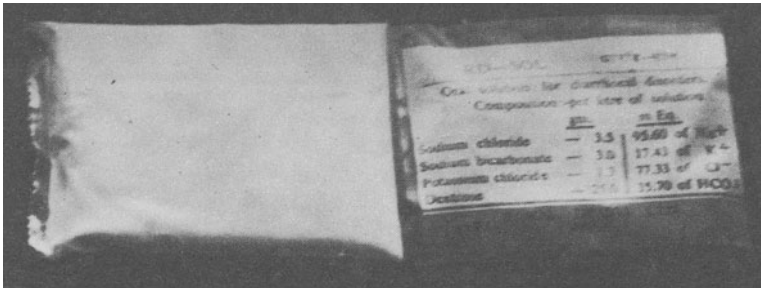


FIG. 11 The oral rehydration pack. (The ingredients are pre-packed for issuing in the under-fives clinic.)

in the clinic and given to the mother for use at home. Babies should be encouraged to drink 150 ml/kg each day and measured quantities of the solution can be given to the mother to be administered over a given number of hours, after which she should receive another fresh supply. Experience in many rural clinics has shown that the use of such oral glucose/electrolyte solution has reduced mortality from diarrhoeal disease and has cut down the number of referrals to hospital for intravenous infusions.

It is the common experience in many rural communities that episodes of diarrhoea are more common in children whose nutritional status is poor. Also, malnourished children tend to suffer the more severe forms of diarrhoea. Hence nutritional advice and even admission to the nutrition rehabilitation centre may be necessary for many of the children attending the under-fives clinic for diarrhoea.

(3) *Malaria*—In many countries malaria is holoendemic and directly responsible for up to 10 to 25 per cent of the infant mortality. The newborn baby is protected for some time by the passive immunity derived from the mother, but from the age of 2 to 3 months the incidence of malaria increases. It is at its heaviest in the first 2 years of life, when maximum morbidity and mortality occurs. After this age, the child's own immunity develops in response to repeated infections. Clinical attacks occur whenever this immunity breaks down, but usually they are not as severe as in the early years of life.

The under-fives clinic can help in the protection of children from malaria by providing regular chemoprophylaxis with chloroquine or other antimalarials, and by the treatment of the established attack to effect early cure. It has been suggested that if the chemoprophylaxis is given once a month, a few random attacks of malaria occur from time to time and thus active immunity is developed.

(4) *Anaemia*—Next to protein-calorie deficiency, iron deficiency anaemia is one of the commonest nutritional disorders seen in rural children. Early diagnosis and treatment with iron will help to prevent severe iron deficiency anaemia.

(5) *Xerophthalmia and blindness*—In many countries of South East Asia, the Middle East and South America, vitamin A deficiency is a major health hazard and the commonest cause of blindness in children. The deficiency is caused by a monotonous diet lacking in green vegetables which contain carotene, a substance from which the body makes vitamin A. Various illnesses like measles, whooping cough, respiratory infections and diarrhoeal disease are known to cause a loss of vitamin A from the body and precipitate acute deficiency in those whose body stores are borderline.

It has been shown that oral administration of vitamin A to children every six months in a dose of 200,000 international units helps to build sufficient body stores and acute deficiency is thus avoided. Toxic symptoms can be avoided by using the oil-miscible form of the vitamin. The incidence of keratomalacia and blindness in children has declined in all areas where such programmes of prophylaxis with vitamin A have been commenced. The under-fives clinic has proved to be an important link in implementing the programme, especially in rural areas.

Health education

The under-fives clinic is an ideal place for the education of the parents in methods of child care and in the improvement of feeding habits. Where possible, fathers, grandparents and other elders should be included. Health education lessons may be provided where mothers assemble in groups—at the start of the clinic or when food is served to children.

In every clinic there are mothers with special problems, e.g. mothers with twins, or low birth weight babies, or those with social problems. These mothers need individual health education, that is, each of them is taught separately about her own social problem. Mothers also *learn by overhearing*, and sometimes this is the most effective form of health education. When one child is being examined and the mother spoken to, the other mothers sitting nearby overhear the advice given and gather useful information.

Issue of food supplements

Food supplements are required for those children who show obvious clinical signs of nutritional deficiency. Iron and vitamins are the commonest nutritional supplements prescribed in many children's clinics. In the past, some clinics also gave out either skimmed milk powder or a mixture of flour and milk powder, e.g. corn, soya and milk (C.S.M.) powder. Such a practice needs to be discouraged because it gives rise to dependence on the part of the parents and loss of dignity. Instead, many clinics now prefer to cook a porridge from locally available foods, which is then served to the children. Some enterprising clinics have even gone further and mobilised the community to grow and process local foods into a nutritious mix which is then issued to the needy children in the clinic. In return, the parents become 'voluntary' workers in the clinic or in the community group which does the processing of the mix. There are several examples of such nutritious

mixes prepared from foods growing locally. A highly successful mixture has been the Hyderabad mix, which has the following composition:

Wheat	35.0 gm
Bengal gram	17.5 gm
Groundnuts	6.0 gm
Sugar	11.5 gm
Total	<u>70.0 gm</u> per packet

Lines of flow

Under-fives clinics may be held in different surroundings, varying from the health centre and dispensary to a shelter under a tree. Often there is inadequate staff, and under these conditions the key to success lies in adaptability and resourcefulness. Local people may be recruited to act as guides or clerks (see figure 12).

The mother usually makes the following stops during an average visit to the clinic.

- (1) *Arrival*—Ample waiting space should be available, and if possible some form of entertainment would prevent the mothers from getting bored. Health education in groups, cooking demonstrations, etc., can be arranged.
- (2) *Registration*—At this point sick children may be set apart from well ones and the sick ones can be referred to the medical assistant or any suitable person available for treatment. The healthy children should be further grouped into those making first visits and those making repeat visits. This will make it easier to take proper histories, both social and medical, from children who are joining the clinic for the first time.
- (3) Weighing and charting of weights.
- (4) Meeting the nurse in charge or the health visitor.
- (5) Minor treatments, if any.
- (6) Immunisation.
- (7) Issue of food supplements.

In a busy clinic one individual may be required for each of the above functions. Where members are few, one person may carry out two functions, e.g. giving immunisations and minor treatments.



Records of the clinic

The records may be maintained by either of the two following methods, depending upon which suits the circumstances of a particular clinic.

(1) The main records are filed at the clinic. All that the mother carries is an identification number. The advantage of this method is the availability of all records, which is helpful in the evaluation of work. Cards can be filed in family groups and thus problem families can be identified for home-visiting and intensive health education.

(2) The main record is kept by the mother, and ideally this card should contain the weight graph of the child, immunisation record, and any bad illnesses that the child might have had. If parents are taught how to interpret this record it will have a permanent health education value.

Evaluation (see also Chapter 23—Assessing health programmes).

Among the various functions of the under-fives clinic, the most important is regular supervision of health and growth of the child. This requires regular attendance at the clinic. Attendance should be at least once a month or more often for children who are not doing well. The effectiveness of a clinic is to be judged not by the total number of children seen each month but by the total number attending regularly.

Those who do not attend regularly should be followed up. This can be done through the local headman, through the youth or women's organisations, or by home-visiting. In fact, every young child clinic should be made a base for effective home-visiting in the area. While one team is running the clinic, another could carry out home-visiting.

As in all maternal and child health work, it is important to evaluate the work of the clinic from time to time. Certain basic information is needed for evaluation. Where exact statistics are not available, approximate figures may be used as base line. It is important to know the total population of the area and the number of children attending the clinic. It is also essential to know how many mothers attending the antenatal clinic gave birth to babies in the health centre, and of those how many attend the under-fives clinic regularly. It is also necessary to maintain monthly statistics of various age groups attending the clinic and the rate at which immunisation is carried out.

The under-fives clinic will have a measurable impact on the health of children when the following conditions have been satisfied:

(1) The *frequency* with which it is run. A daily clinic will be more beneficial than a weekly one, which is better than a monthly clinic. For

rural areas, the ideal will be to have a daily clinic in each village, but this is not always possible, and a compromise can be made by organising a rotating clinic for each cluster of villages such that no home is a distance of more than 2 miles from the clinic on any given day.

(2) At least 80 per cent of the children in the area should be regular attenders.

(3) An individual child should attend at least once a month for health surveillance, and within a day of the onset of any illness.

(4) There should be provision for home-visiting and follow-up care of problem cases or of non-attenders.

(5) A parent-retained growth chart should be available.

(6) Criteria should be established for the identification of the child who is at risk of disease.

Chapter 12

Immunisation in Childhood

The objective of immunisation is to produce in an individual a degree of resistance equal to that which follows natural infection. This is achieved by introducing into the body viruses or bacteria which have been made non-virulent, but at the same time retaining their antigenic properties. In those cases where the ill effects of the infections are due to toxins, the modified toxin called toxoid is used for vaccination, as in the case of tetanus or diphtheria. With toxoids or where the vaccine consists of killed organisms, several inoculations at regular intervals are necessary to achieve an effective antibody level. On the other hand, where a living organism is used for antigenic stimulation as in the case of smallpox, or B.C.G., one administration may be satisfactory. Both with 'live' and 'killed' vaccines the antibody level in the blood tends to decline with time, and so 'booster' shots are necessary at regular intervals.

Whereas the immunity of an individual can be built up against many of the common infectious diseases by administering the appropriate vaccine, the incidence of that disease in the community will depend upon the number of susceptibles in the community. The larger the number of immunised people in the community the less easy is the spread of the disease from one person to another. Thus, in the case of diphtheria, it has been found that immunisation of 75 per cent of the child population either prevents or greatly reduces the hazards of an epidemic. For the purpose of creating 'herd immunity', as this process is sometimes called, it is necessary to achieve 80 per cent immunisation of the community.

The scheme for immunisation in a particular area will depend upon the prevalence of disease, the age groups involved and the willingness with which people accept immunisation. A scheme which may work successfully in one place may be inadequate in another. The following scheme is suggested for areas where childhood infectious diseases are prevalent, involving young age groups, and where, because of ignorance or superstition, the people do not readily accept immunisation.

<i>Age</i>	<i>Vaccine</i>
Antenatal period	Tetanus toxoid to mother
Birth	B.C.G.
One month	Smallpox Triple antigen (D.P.T.) Oral polio
Second month	Triple antigen (D.P.T.) Oral polio
Third month	Triple antigen (D.P.T.) Oral polio Smallpox (if there was not a successful 'take' at the first attempt)
After ninth month	Measles
Eighteenth month	Triple antigen Oral polio
Entry to school	Smallpox B.C.G. Oral polio Triple antigen

In many cases the child's first visit to the clinic may be at the age of five or six months. In such a case some modification of the above regime may be necessary, e.g. smallpox and B.C.G. at the first visit, followed by triple antigen and polio at subsequent visits.

In the case of each immunisation the proper technique should be followed and a knowledge of each kind of vaccine is necessary. The following remarks are for guidance, since vaccines vary from one manufacturer to another and in every case the leaflet supplied by the makers should be studied.

B.C.G.

Testing for tuberculin sensitivity is not necessary.

Two forms of freeze-dried vaccines are available—one for giving intradermally with a tuberculin syringe, and the other for giving by

multiple puncture with a modified Heaf gun. Even though not quite as effective, the latter method has the advantage of being quick and not needing much technical skill.

The modified Heaf gun for B.C.G. vaccination has 20 needles instead of six, and is fired twice.

B.C.G. is rapidly destroyed by exposure to sunlight and so vaccination should be done indoors and vaccine should be kept in a box during transport. B.C.G. also loses its potency on contact with spirit and so the skin should be cleaned with soap and water only.

Smallpox vaccination

Complications are likely to occur in children with eczema, scabies or any scaling-skin disease and in the presence of clinical malnutrition. Therefore in these cases, vaccination should be avoided.

The vaccine is supplied in glass capillary tubes containing one to four doses, or in multidose ampoules. In the case of capillary tubes it may be difficult to make the vaccine flow. In such cases take a rubber teat, like the type used with pipettes, and prick a hole in it with a hot needle. Pass the capillary tube through this hole. Break both ends of the tube. Now if the open end of the rubber teat is closed with the thumb and the teat squeezed, a drop of the vaccine will flow out from the other end of the tube.

Vaccination is usually done by the multiple pressure method with a needle held horizontally. Do not clean the skin with spirit; use soap and water.

Protection of the vaccine from light and sun is important.

Triple vaccine

This is more resistant to sun and light and is given subcutaneously.

Oral polio

This vaccine needs to be protected from light and sun. It is very labile and has a short storage life which makes it difficult to stock.

In the ordinary home refrigerator, live vaccines, such as smallpox, B.C.G. and oral polio, should be stored in the upper compartment, whereas triple antigen can be stored in the lower rack. Often the vaccines need to be transported from the place of storage, which may be a health centre, to the young child clinic. In such cases, they should be transported in vacuum flasks together with bags of silica gel which

have been kept in the freezer compartment of the refrigerator overnight and should be frozen solid. On return to the health centre at the end of the day, the vaccines should be returned to the appropriate compartments of the refrigerator and the bags of silica gel should be kept for freezing in readiness for the next day (see table 2).

Immunisation plays an important part in the work of the young child clinic. It is therefore important to allocate a separate place for this procedure at the clinic and one nurse should be in sole charge of it. Syringes present a problem. Ideally a fresh sterile syringe and needle should be used for each patient. However, in most clinics this is almost impossible. It may, however, be possible to use a fresh sterile needle for every patient and fresh syringes whenever possible, endeavouring to do so for each 10 patients.

In spite of health education and posters, mothers are reluctant to accept immunisations. Smallpox is the most universally accepted one, and even then only about 50-60 per cent of the children attending a clinic take it. Hence in all districts the maternal and child health team has to launch an immunisation campaign periodically, when children in different places are visited and as many as possible immunised. Similar campaigns should also be arranged for schools in the area in order to immunise all new intakes and school-leavers.

In order to achieve adequate coverage of the young population so as to produce effective 'herd immunity' mass immunisation campaigns are necessary approximately every third year. This will look after the number of susceptibles in the community who have escaped immunisation in the clinics. The success of such campaigns depends upon the amount of planning done beforehand. Ideally such a campaign should be organised according to the following stages:

(1) *Study of the geography and the community*

- Condition of roads, type of transport required.
- Existing health stations, their staff and facilities for sterilisation, storage of vaccine, etc.
- Type of community, whether living in villages, scattered homesteads or pastoral.
- Media of information.
- Political and social structure of the community.
- Estimates of the quantity of different vaccines required.

(2) *Plan of operation*

- Communicating with the leaders.
- Administrative and financial details for the receipt and distribution of the vaccine to various health stations in the area.
- Details of deployment of the team.
- Technique for storage, transport and administration of the vaccine.

Table 2. A guide to care and use of vaccines

VACCINE	STORAGE		DOSE		Method	Age (Minimal)	Interval (Range)	Repeat
	Main	Transport	Min.	Optim.				
D.P.T. Absorbed	Lower part of refrigerator	Cold boxes with gel bags (or large thermos)	0.5 ml x 2	0.5 ml x 3	S.C. (Lateral thigh)	1 month	1-3 months	18 months and school entry
SMALL-POX Freeze-dried	Upper part of refrigerator	Cold boxes with gel bags (or large thermos)	x 1	x 1	Multiple pressure	Birth	—	School entry
TB Freeze-dried B.C.G.	Upper part of refrigerator	Cold boxes with gel bags (or large thermos) (Protect from light)	x 1	x 1	Intradermal syringe (or) Demojet (or) Heat gun (20 needle)	Birth	—	School entry
POLIO Oral trivalent	Upper part of refrigerator	(Protect from light)	1-2 drops orally x 3	1-2 drops orally x 3	Oral drops	1 month	1-3 months	School entry
MEASLES Live vaccine (attenuated)	Upper part of refrigerator	(Protect from light)	—	1,000 TCD x 1 sub-cutaneously	Subcutaneous	9 months (? up to 2 years)	—	Uncertain

(3) *Publicity in the area*

— Too long a notice or too short a notice may lead to failure. One week's notice through the local political and social heads with a reminder two days prior to the day of the campaign is sufficient in most rural areas.

(4) *Immunisation*

— Can be carried out at a health station, or a place of social gathering, or a school. The following details will need attention:

(a) Controlling the parents and children and rapid movement of the queue.

(b) Record-keeping, registration, etc.

(c) Announcement of the dates for 'booster-shots' or re-visits.

(d) Treatment of minor ailments; distribution of drugs to counteract high fevers or other side effects of immunisation.

Chapter 13

Feeding the Infant and Young Child

The importance of good feeding during infancy and early childhood cannot be overestimated. The well-nourished child not only grows and develops well, but has much more resistance to infection.

The teaching of nutrition requires a sound and sympathetic knowledge of local foods and food habits. Food habits are deeply ingrained in all communities and usually difficult to alter. No attempt should be made to change a traditional custom until it is proved to be a definitely harmful practice, and all details of the reasons underlying the custom are known. Tact and persuasion must be used to explain to influential members of the community the reasons why one wants to change the habit, and their cooperation sought before teaching mothers any new ideas. It is usually much easier to persuade people to use more or less of a *known* food than to introduce new foods or to condemn a traditional food. If the leading families of the group can be persuaded to adopt new practices, this is likely to influence other members of the society much more than all the formal health instruction they receive.

Pre-natal

The feeding of the baby starts in the uterus. The foetus obtains all his food from his mother, and so it is important that the mother eats well throughout her pregnancy. As the foetus grows, the need of the mother increases for all nutrients, particularly proteins—the body-building foods. Iron and calcium are also important, for lack of iron and calcium may lead to anaemia or dental caries.

The pregnant mother should therefore be told to eat a good varied diet which includes plenty of animal and vegetable proteins, leafy vegetables and fruit. The value of these foods to the growing baby and the mother should be explained to the father where possible.

Attendance at an antenatal clinic should be encouraged so that the mother can be generally advised on her diet, and any deficiencies in her nutritional state (e.g. anaemia) can be observed and treated promptly.

The newborn

Colostrum is not harmful and the newborn child should be put to the breast as soon as he has recovered from the stress of birth. Suckling is the best stimulus for milk production and so the sooner the baby begins, the sooner the milk will come.

Breast-feeding

Since breast-feeding for the vast majority of women in developing countries presents no problems and is rightly regarded as a natural function of motherhood, the only advice that should generally be given is on the mother's own diet. Her needs of all nutrients, especially calories, calcium and vitamins are increased during lactation and she should be encouraged to eat a varied diet, containing dark green leafy vegetables; all kinds of seeds, such as beans, peas and groundnuts; millet flours and milk, eggs, meat and fish when possible.

No food other than breast milk is usually needed by the baby until he is around four to six months old, although in hot climates or where local custom indicates, a little *boiled* water can be given. Fruit juices are seldom required, and as they are often prepared with dirty water or utensils, may lead to gastro-enteritis. Where fruit juices *are* given, they should be fresh, undiluted, sweetened if necessary and given by cup and spoon.

No mention should ever be made of bottle or artificial feeding unless these practices are already in use, or a specific problem—such as the feeding of an orphan—exists. Breast-feeding should be considered by *all*—mothers, community and health staff—as the only normal, practical way to feed a baby, although when the individual mother seeks advice on special feeding she should, of course, be helped.

Four to six months: introduction of first foods

When the baby has reached four to six months of age, breast milk will not satisfy all his requirements, although it remains his principal food.

The first new food a baby is given should be *clean* and *soft* and given by spoon in small amounts. Suitable foods are porridge made with maize, millets or sorghum flours or mashed bananas. Once the baby is used to the new taste and the spoon, small amounts of other soft foods can be introduced gradually one by one. They should be given by spoon (never by bottle) after the breast feed, once or twice a day. These foods can be milk, eggs or finely pounded groundnuts, mashed soft fruits such

as paw-paw, well cooked mashed vegetables or potatoes, and soups. They can be mixed with porridge or banana to begin with, and when the baby is used to the taste, given alone.

A baby should never be given hard foods such as stiff porridge or rice; whole groundnuts or the seeds of fruits; very oily foods or highly flavoured foods, such as sauce containing pepper.

Six to seven months

By six to seven months a baby is more active. Breast milk is still his most important food, but unless he gets plenty of other foods, *particularly body-building protein foods*, he cannot gain weight satisfactorily and will become thin and ill.

The best protein foods for a baby and small child are: *milk* of all kinds; *eggs*; well-cooked and finely sliced boneless *meat, liver* and *fish*; pounded *dried fish*; mashed *beans, peas, cowpeas, chickpeas*, etc; oil seeds, e.g. *groundnuts*.

The protein foods from animals—milk, eggs, meat and fish—are the best body-building foods, although they are expensive and often difficult to obtain. Mothers should be encouraged to give these foods whenever they can afford to buy them. However, in many places, pulses and oilseeds, such as beans and groundnuts, will inevitably be the most practical foods to advise, and given together with breast milk and a good varied menu, can form a satisfactory diet for a child.

As well as these protein foods, the child should by now be having a thick cereal gruel, fresh fruit and dark-green leafy vegetables each day as well as small amounts of other family foods.

In the following chapter, there are some suggestions for showing mothers how to prepare simple dishes for their children.

A child of this age should be given solid foods at least three times a day, using a spoon and plate or mug. Although the child will probably like to try to feed himself, his mother should help him and make sure that he does eat the important body-building foods.

The need for cleanliness in the preparation and serving of the foods should be emphasised at this and at all ages. Food should always be fresh and clean, and water and fresh milk should be boiled. Foods must be covered, utensils kept clean and waste and rubbish disposed of properly.

One year and over

Breast milk is still the most important source of protein but the child should be eating a good mixed diet with plenty of other protein foods, particularly animal protein foods whenever possible.

His meals should include:

(1) *Body-building foods for growth:*

(a) Frequent breast feeds.

(b) Animal protein foods, such as milk of all kinds, eggs, meat, liver and dried or fresh fish in as large quantities as the family can manage.

(c) Large helpings of vegetable protein foods such as beans, peas, or groundnuts, at least twice a day.

(2) *Protective foods* such as coloured or leafy vegetables and fresh fruits.

(3) *Foods that give him energy* to play and grow. The best of these are the cereal foods—maize and millet (particularly the unrefined cereals, like maize, meal, sorghum and rice). Cassava is a very poor food and does not provide nourishment for small children.

In urban areas bottled 'aerated' drinks, sweets and cakes should be discouraged as they are expensive, cause tooth decay and contain very few nutrients, other than calories.

The child's mother should understand that though a child needs a lot of nourishment, he still has only a small stomach and cannot digest large meals. So he should be given at least three meals a day. His mother probably normally prepares food at midday and in the evening for the whole family. In the morning it can be suggested that she gives the child thick porridge mixed with milk or egg, or pounded groundnuts or mashed beans, whichever is most practical for her. Or she can give some beans or sauce left over from the evening meal.

Because a child's hands are small, he has difficulty getting into his mouth his fair share of sauce which is usually the high protein part of the meal. He should therefore be given his own small spoon and plate on which is placed a large helping of sauce, beans, meat or other protein food, and some staple food, such as rice, thick porridge, bread, potato or bananas. His mother should help him feed himself and see that the protein foods are consumed before his stomach is full of the less nutritious staple food.

A small child may not eat well because he is tired, sick, unhappy or jealous of a new baby. It is very important, therefore, that his mother always gives him plenty of her attention, especially at meal times. A child who feels secure in his mother's affection is likely to eat and grow well. On the other hand, a child coming from an unhappy or unstable home should be watched carefully for signs of undernutrition.

Chapter 14

Nutrition Rehabilitation

Malnutrition is a major health problem of young children in the developing countries; either alone, but mostly in combination with other illnesses it accounts for the high mortality in the pre-school child. In addition to the well recognised syndromes of kwashiorkor and marasmus there is also wide-spread subclinical malnutrition in which the growth of the child is below the standard though there may be no obvious illness. From data obtained in field surveys of child health and nutrition, it has been estimated that about one third of the children in the rural areas may have weights below 80 per cent of the local standard.

It is now recognised that the busy hospital ward is not an ideal place for treating malnutrition and that it is both cheaper and more effective to look after these children in a simple building where the parents can observe them recovering with food alone. At the same time, instead of being passive observers, the parents can learn, by active participation, the simple principles of child care and feeding. Thus, the nutrition rehabilitation centre has come to play an important role in mother and child health work in the rural areas.

The nutrition rehabilitation centre is more of an education centre than a clinic; hence all drugs and syringes should stay in the background and the total emphasis should be on giving simple and practical instructions to the mothers about feeding their children from locally available nutritious foods. There can be no better demonstration for a mother than to see her child gain in weight and vitality from the food that she has herself cooked and fed him. Just as a school may have day scholars and boarders, so also in the nutrition rehabilitation centre some mothers may be resident and others may attend during the day-time only, depending on the distance an individual mother has to travel and the condition of her child. Of course it is more desirable to have all mothers living in the centre even for a brief period, yet difficulty in creating residential accommodation should not prevent one from starting such an activity.

Teaching the rural mother is not easy and several factors have to be taken into consideration. All instruction has to be practical and

simple—it is better to teach a few simple recipes well than to give a lengthy discourse on nutrition. The kitchen, the utensils, and the method of preparing and cooking should be very much the same as those which the mothers use at home. Establishment of rapport is the single most important factor in successful education; hence the instructor should preferably be from a background and social group with which the mothers can identify themselves (see figure 13). Often a mother who has herself been previously admitted to the centre and has undergone a course of instruction at the centre makes a good instructor. Group discussions are useful and should be promoted; also the mothers should be encouraged to teach each other and to give demonstrations of what they have learnt. By creating a dialogue amongst the mothers on the one hand, and the parents and the staff of the centre on the other hand, several factors can be brought to light and the educational process can be made more effective. In developing communities with a high illiteracy rate, the spoken word is the most effective means of communication. Short skits, songs or proverbs illustrating the importance of various foods are more useful than conventional wall charts and posters.

In rural areas most people eat those foods which they grow. Hence it is useful to train the parents in simple methods of farming, composting and growing the foods which are used in cooking at the centre. Thus, many nutrition rehabilitation centres have also a small demonstration kitchen garden where the mothers do some amount of daily work. It helps them to realise that the health of their children is very much within their own hands. In the same way poultry keeping and the use of eggs in the children's diet can be demonstrated.

Selection of mothers for admission to the centre

This is usually done from amongst the mothers attending the children's clinic. Cases of malnutrition attending the clinic are the obvious choice, though the very severe cases in whom complications are likely to occur are better referred to a hospital. Amongst the regular attenders at the clinic there may be children whose weight curve is faltering; they are obviously not benefitting from the advice or health education at the clinic and need to be admitted to the centre for better care and more intensive training of the mothers. Home-visiting in areas known to have nutritional or social problems also produces many cases of malnutrition in need of rehabilitation. Such children may not be brought to the clinic by the parents and need to be actively looked for. In addition, it is important to keep a watchful eye on the child at risk, such as the child born with a low birth weight, twins, the child who has been

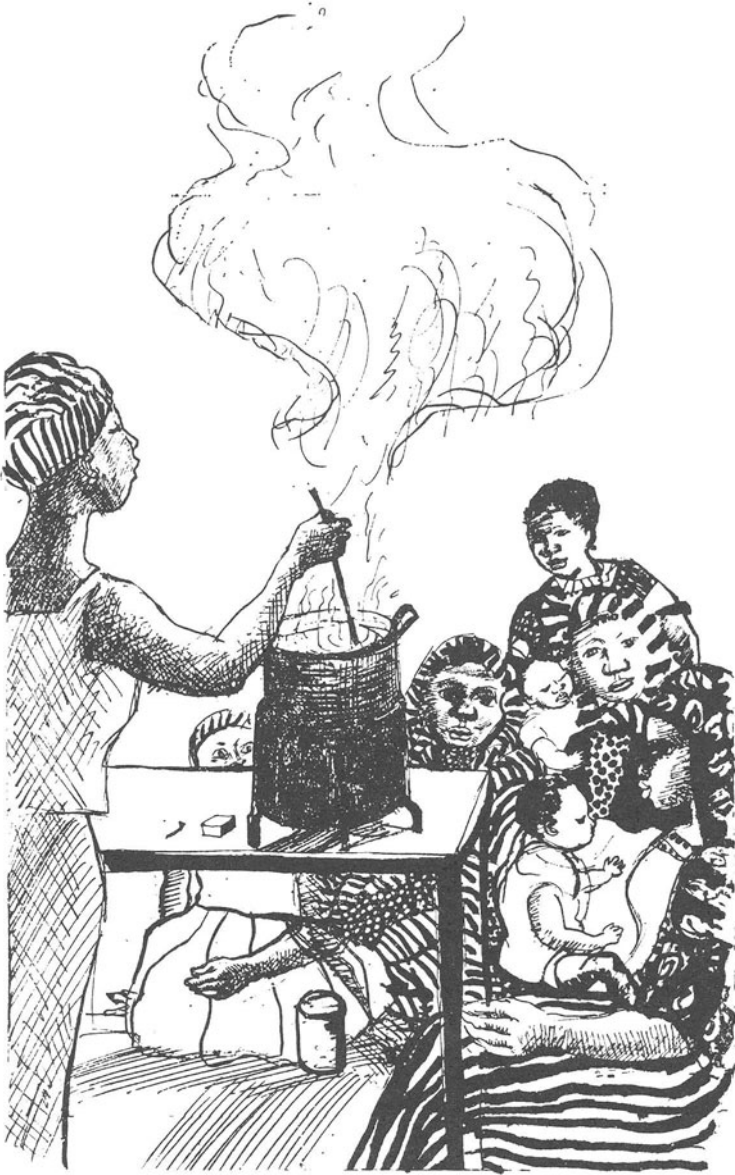


FIG. 13 Nutrition demonstration

weaned early who has suffered from recent measles or recurrent diarrhoea or the child with a social problem in the family. Malnutrition is more common in those groups and one needs to be constantly on the look-out for them.

Integration with M.C.H. work

Nutrition education is a key activity in all M.C.H. work in developing countries and the staff of the centre form an integral part of the M.C.H. team in the area. The work of the centre brings it into close association with many areas of health activity. It will have mothers referred to it from the M.C.H. clinics as mentioned above or from home-visiting or by a hospital or health centre in the neighbourhood. Some mothers may come directly or may be brought by other mothers who have seen their children improve at the centre. On discharge from the centre, the mother may be referred back to the clinic or hospital or health centre where she may be useful as an instructor.

The nutrition rehabilitation centre may also be utilised as a training ground for medical personnel, for community leaders, village elders, teachers from the neighbouring schools, community development workers and social workers. Thus, as the scope of its work grows the centre may become an important influence in the applied nutrition programmes operating in the area. Close liaison in the form of regular meetings and discussion groups with the M.C.H. and other health personnel and also with the above mentioned category of workers may be useful.

Evaluation and assessment

The evaluation of the work of the nutrition rehabilitation centre can be carried out in several ways—(1) by long-term follow up of children who were admitted in order to see whether the improvement in growth is continued or slows down again in a short while; (2) by observing the growth of their siblings. Prevention of malnutrition in the other children in the family gives a good indication of a permanent change in the beliefs and attitudes of the mother; (3) over a period of time when the teachings of the centre have disseminated widely in the community, by observing the prevalence of malnutrition in the community.

Notes on nutrition demonstrations

(1) Always use foods that are cheap, easy to obtain and, above all, known and liked by the audience. Use utensils that are familiar and to be found in the majority of homes—for instance, most people will have

some cooking pots, teacups, plates, dessert spoons, knife, teapot, but are unlikely to have such utensils as sieve or a steamer. Use a method of cooking that is practised locally.

(2) When possible get some of the audience either to help you with the demonstration or to repeat it after you. If you prepare a new type of food, distribute some among the children, so that the mothers can see that they like it.

(3) Ask your audience questions and note down their questions for your future talks. One of the best ways of getting people's attention is to tell them what they *want* to know, as well as what they *should* know. (It is little use lecturing on infant feeding if the mothers are worried about their children having worms. Tell them how to get rid of the worms and then they will listen to what you say about feeding.)

(4) If you do not know the answer to a question, say so. Find out and tell the audience next time. Do not give incorrect or incomplete advice, for it will only lead to confusion in the minds of your audience.

(5) Try to invite fathers and local leaders to your talks or demonstrations whenever possible.

Infant feeding: suitable dishes to demonstrate

(1) Make some of the local kind of gruel remembering that gruel made with millet, sorghum or unrefined maize flour is much better than that made with cassava. Mix into the gruel one of the following:

1/2 teacup fresh boiled milk

or 1 raw egg

or 2 large spoons groundnuts meal or other oilseed meal

or 2 large spoons mashed beans or peas, etc.

In banana-eating areas, mashed or cooked bananas may be used instead of gruels.

(2) Arrange on a plate for a child:

several small pieces of well-cooked boneless meat, liver or fish,

or a *large* spoonful of cooked beans or peas or groundnuts, etc.,

a large spoonful of sauce containing leafy vegetables but not strongly flavoured,

cooked rice,

or cooked bananas or potatoes.

For small children these foods can be well mixed together.

(3) Mash a fruit (without seeds) such as a pawpaw, and mix in a large spoonful of dried milk powder.

(4) Boil an egg for 4-5 minutes. Cut the top off the boiled egg. Feed the egg to a child, using a small spoon.

- (5) Cook some beans or peas, etc., or pounded groundnuts, and mix well. Show how these can be put aside overnight and given to a child early the following morning, with or without bread or left-over staple food.
- (6) Make tea for a child, using half a teacup of milk and a little tea and sugar from family pot.
- (7) Show how to boil and store drinking water.
- (8) Show how a small child may be given his own plate and spoon and encouraged to eat.

Chapter 15

The Pre-school Child

The social and health needs of the pre-school child have been realised rather late and therefore in the health services of many developing countries no special provision has been made for this age group. Whereas the antenatal and maternity services are well established in tradition, the infant is looked after in the infant welfare clinics and the school age child has the school health service to cater for his needs, no programme operates for the needs of the pre-school child. And yet the child in this age group is vulnerable to several disease processes. The infant mortality in many developing countries is high compared with Western countries; the pre-school age mortality is higher still and in some cases it is as much as 40 times the rate in Western countries.

Table 3. Child mortality in developed and developing countries

	<i>Developed countries</i>		<i>Developing countries</i>		
	<i>Infant mortality rate</i>	<i>Pre-school mortality rate</i>	<i>Infant mortality rate</i>	<i>Pre-school mortality rate</i>	
Australia	19.1	1.0	Colombia	90.0	15.6
Belgium	25.8	1.0	Guinea	42.0	55.4
France	23.4	1.2	Mexico	66.3	14.7
Japan	20.4	1.9	India	81.0	12.0
Sweden	14.2	0.8	Malaya	57.0	34.0
U.S.A.	24.8	1.0	Philippines	67.4	81.0

These high rates of morbidity and mortality are due to the combined effects of malnutrition and infection. Where the body's resistance is lowered by undernutrition, minor infections can easily become severe and unless prompt and effective medical care is available, they take their toll. Besides malnutrition, the vitality of the child is also affected by chronic parasitic infections of all kinds. Malaria is widespread and in most of tropical Africa transmission of the disease occurs throughout the year. Improvements of the mortality figures in young children in many regions of the world where malaria eradication has been done,

indicates that malaria infection makes a substantial contribution to mortality in young children in the developing countries. In many rural areas, hookworm and other helminthic infestations are universal and in several countries large areas are infested with bilharzia.

Poor environmental sanitation is a cause of recurrent ill health in the small child. Contaminated water supplies and lack of facilities for disposal of sewage and garbage result in frequent infections, especially of the gastro-intestinal tract. Thus, the pre-school child in rural areas suffers from the accumulated burden of several factors, which together produces a state of chronic ill-health associated with undernutrition.

The child is the least productive member of a rural society. In many cases his care is delegated to the grandmother, because the mother has now another infant to look after and the older child has to be weaned as quickly as possible. His special needs for food are seldom realised by a community that exists on subsistence level and whose choice of available foods is often limited. In many instances some form of food is omitted from the child's diet on the basis of taboo or superstition.

In a number of developing countries large percentages of the population fall into the low economy group. At such a level of existence there is continuous hard work for everyone concerned, food resources are poor and always the best foods have to be reserved for the breadwinner of the family. All home equipment is simple and if women are to be told to cook special foods for the pre-school child, many will have to improvise with their simple equipment.

As well as the above obstacles of cultural and socio-economic origin, there is a shortage of health workers and many of the available ones may not have proper training. In a number of countries, the population is scattered; there are poor roads and communications and for several months in the year people are cut off from the available health facilities.

There is thus an urgent need for including the needs of the pre-school child in health planning, both at the national and the district levels. Both long-term and immediate measures must be undertaken.

(1) *Long-term measures*

(a) Aimed at the community as a whole, such as agricultural extension programmes, community development, improvement of environmental sanitation, etc.

(b) Aimed at the pre-school child population, such as provision of weaning foods, encouragement of child care services, e.g. day care centres, play group centres and under-fives clinics.

(2) *Immediate measures*

Immunisation, distribution of food supplements, nutrition rehabilitation and health education, etc., all of which can be easily undertaken in

defined areas by mobile teams centred at a health centre or a district hospital.

All long-term measures need central planning and different countries have adopted different types of approach, depending upon their special circumstances. The immediate measures undertaken vary from milk kitchens (see figure 14) and food distribution centres in cities to mobile nutrition/immunisation teams in rural areas—organised either by the government or voluntary agencies, with the assistance of international organisations. The ideal approach is the encouragement of immediate measures wherever possible, so as to arouse the interest of the people while long-term measures are planned and take effect. The health of the pre-school child is also protected indirectly through various activities of the health services—malaria eradication schemes, improvements in water supply, etc. Expansion of health services and improvements in training of personnel will therefore have protective effects on the health of the pre-school child.

In any measures that are planned, due consideration must be given to methods of reaching the pre-school child. There are several channels by which all the under-five population of an area may be reached. In the first place, the best way to reach the child is through his mother, and therefore a strong liaison needs to be established with the local women's organisation. Similarly, contact may be made with the parents and the immediate family through community development projects which have established women's clubs and other social groups. In many areas, day care centres, play group centres and children's clubs have been established, and these could be used to contact the pre-school child. At health centres and dispensaries, the scope of all existing children's clinics needs to be expanded to include older children. Such clinics are better termed 'under-fives clinics' in order to accustom staff to the idea of admitting older children to the clinics.

Even though the exact contents of a pre-school child programme may vary from one place to another, certain general principles do apply:

- (1) All kinds of health education in an area should preach the same theme. Hence the planning committee of a programme should include local representatives of agriculture, community development, education and health departments.
- (2) Recent experience in many areas has shown that it is often possible to change people's behaviour without much change in their beliefs. For example, in certain communities, several items of food are not eaten because it is believed that they may upset the 'worms' in the abdomen.



FIG. 14 The milk kitchen

But when the people of the community have been shown that modern vermifuges are an effective cure for 'worms', the old fear of worms disappears, and with it the distrust of certain foods.

Thus, if pre-school age mortality and morbidity are to be reduced, an effort will be necessary in several directions. In rural areas community development plays an important role because it organises a scattered community of homesteads or small villages into co-operating groups, through which the child can be reached.

Chapter 16

Day Care Centres

Day care centres are of comparatively recent origin. They are institutions for the care of healthy children who cannot be looked after in their own homes for several hours of the day. They are not substitutes for family care, but supplement it. A large variety of institutions that exist for the care of young children fall into this group—crèches, nursery schools, kindergartens, day nurseries, etc.

In most industrialised countries, more and more married women are finding employment outside the home in industry, the professions, social work, etc. Many developing countries are becoming increasingly industrialised; in these countries, women form a large percentage of the labour force. Adult education is becoming increasingly popular in developing countries. Mothers participating in such activities are often away from home for several hours of the day, and their children need to be cared for. In joint families, usually some female member of the household is available to care for the children; often this is a teenager with little knowledge of child care or an elderly grandmother who may not be strong enough to look after the children for the whole day.

Hence even in developing countries there has arisen a need for day care centres. Moreover, in these countries, day care centres can sometimes be used directly to help the child, for example, where home conditions are not right for his physical or mental health. Where malnutrition or undernutrition is common, such centres can help in the proper feeding of the children and the education of mothers in correct infant-feeding practices.

Day care centres should never be thought of merely as places for mothers to leave their children when they go to work. The early years of life are the most formative and without proper stimulation in this period, a child may suffer lasting mental and psychological trauma. Separation from the mother is believed to be the basis of such trauma. Moreover, the age group 1-5 years is the most vulnerable because of the increased risk of malnutrition and infection, as well as parasitic infestations. A day care centre thus carries a special responsibility for the physical, mental and social health of the children in its care.

At the time of admission to the day care centre, a thorough *physical*

examination of each child should be carried out by the medical officer of the local health centre. This should include a dental examination as well as tests of hearing and sight. The immunisation records should be checked, and any necessary immunisation given, with booster shots if required. Periodic checks should be made of the children's weight, and physical examinations, annually at least, are required.

In all developing countries *nutrition* is important. Since children attending day care centres receive a substantial proportion of their daily food at the centre, the diet of children should be properly planned. The nutrition department of the country may have such a diet worked out for different areas of the country, or the local medical officer may be consulted in planning the menu for the centre. In order to make sure that the children do take the proper amount of nourishment, meal times should be made as pleasant as possible.

Besides the common infectious diseases of childhood, some of which are preventable by immunisation, the *common illnesses* that may cause problems are: upper respiratory infections, skin sepsis, conjunctivitis and trachoma; and parasitic diseases, such as scabies and ringworm. When any infectious condition is detected in any child it is essential to prevent its spread to the rest of the group. Prompt treatment and isolation for a few days is essential, and wherever possible, the parents should be persuaded to keep the child at home for a few days.

One important aspect of the care of toddlers is the *prevention of accidents* and due caution is necessary to see that these do not occur. Such accidents may vary from simple falls to accidental poisoning. Being aware of their possibility is a major step towards prevention. A first-aid box should be available for minor accidents.

The *activities* at the centre will vary from singing in groups to playing, either in groups or individually. Appropriate toys must be provided and play should be planned according to age groups. Complicated toys, which the child cannot work, produce frustration and fatigue. Creative expression is encouraged, but formal teaching in these early age groups should be minimal. Instead attention should be directed towards formation of healthy habits, (such as washing after using the toilet and before meals) and creative play.

The *situation* of the day care centre needs planning, especially in urban areas, so that mothers travelling by public transport do not have to carry small children for long distances. On the other hand, if these centres are situated nearer the mothers' places of work, it may be possible for the mothers to visit the children during the day for breast-feeding. In all situations, day care centres are an important aspect of the community care of the children. The centres should form contacts with other community services and keep the community informed about its activities.

Chapter 17

Problems of Urbanisation

The problems which the medical worker in towns will face are rather different from the problems of rural areas. Most towns in tropical Africa are of comparatively recent origin and in a majority of them there has been an explosive growth of population. Such rapid increases in numbers, with the consequent strain on health and social facilities, the dislocation of family life and adjustments called upon by various members of the family to suit new modes of life, have created some of the major problems of our age. If the growth of cities is not planned, ever increasing numbers from rural areas migrate to towns in search of work. Until suitable employment is found such families 'squat' in overcrowded conditions scrounging from friends and relatives. Such 'septic fringes' of the cities are often sources of epidemics of various kinds affecting the city population. Reflux from the city to the village will also carry such urban infections to the rural areas.

Urbanisation, if properly planned, has its positive aspects also. Social and health services can reach out to a larger number of people, and the benefits of preventive medicine can be enjoyed by the people. Institutional care for sickness comes within easy reach of the populace. It has been the impression of many health workers that infant and child mortality is much less in cities compared with rural areas. With better environmental sanitation water-borne diseases are abolished and transmission rate of vector-borne diseases like malaria, is reduced. Because of ease of access to people, the task of getting information to people by radio, newspapers, at public meetings and by house-to-house visiting is much simpler.

While it is desirable that people should always understand and support health measures, it may often be necessary to impose rigid rules in the towns in the general interest because of the ease with which communicable diseases can spread in towns if control becomes lax. Such health legislation is more easily enforced in urban than in rural areas. Thus, health education, environmental sanitation including sewage and garbage disposal, and immunisation are important aspects of health work in the town. Besides this day to day work of ensuring

healthy living for the towns people, the health worker should also maintain a check on the prevalence of major endemic or epidemic diseases, by collection of morbidity data, and periodically assess the availability and utilisation of health services by the people.

An important factor in urban areas is the pressure of commercial advertising. Whereas breast-feeding is universal in most rural areas, bottle-feeding has become an increasing menace in the cities. In most cases this is due to the urge to copy the practices of the higher socio-economic groups. Aerated drinks and biscuits are being increasingly used as treats for children even though for the same price enough fresh fruits and vegetables could be bought to provide a meal for the whole family.

Because of the high cost of living in urban areas it is not unusual to find both parents working. In such cases the care of children is delegated to a servant or to a non-working member of the immediate family. This causes problems of feeding and child care. Diarrhoea is common in children of such parents. In order to help parents meet the demands of modern civilisation, it is essential to encourage the growth of various facilities for child care, e.g. day care centres, play-groups, crèches, etc.

Diet is a problem in the towns, although it should not be, since there is usually a large variety of good foods available. Again, the cause is ignorance. People in the lowest social group throughout the world tend to spend their money on the wrong sort of foods, to the detriment of their own and their children's health. Very often too, they will eat the wrong food for reasons of prestige. That is to say, they feel it is socially important to eat only refined flour and polished rice. Very often women, who in the country would pick wild vegetables, or use pumpkin or cassava leaves from their own lots, begin to despise these vital additions to their diet. White bread and sweet tea without milk become major items on the menu, both relatively expensive, but almost valueless as foods.

Another matter which may affect diet is the inability to work out a household budget. Men from the country, where most of the food comes from the produce of the fields, find it difficult to understand how much it costs to buy food in the town. Since most wives are unaware of their husbands' earnings, they often accept too small a sum to buy proper food. Social workers in the towns can quote many cases where the wife and children not only suffer from bad nutrition, but also do not even have enough clothes, although the husband is earning a high salary. Moreover, in the country women usually have their own income from their own fields.

This brings us to another point—the unstable family situation often found in the towns. Some sociologists argue that marriage is just as

unstable in the country as it tends to be in the towns, but the fact remains that in the country a child whose parents separate still has many relatives on whom he can depend, whereas the child in town may be left with only his mother, a situation which can lead to social problems later. A more immediate result for the health worker is the lack of proper care, attention and food, from which children of a broken home may suffer.

It must be remembered too that although people may have moved to the towns and adopted a different style of life, it is probable that many of their basic beliefs about disease and its causes remain unchanged. Greater access to medical facilities may increase their confidence in modern methods, but here, too, is a grave danger, which has been made worse by the spectacular effects of the antibiotic group of drugs. Because of the frequently rapid results obtained by use of these, any more slow-acting medicine is often regarded as ineffective, and therefore many people may go to as many as three or more different places for treatment. At none of these will they tell the practitioner that they have already received treatment.

The greatest enemy is ignorance. Flies, mosquitoes, dirt, and rubbish, must and can be controlled by rigorous health regulations. Ultimately, however, it is best to enlist public support, so that the health inspector comes to be regarded as a friend rather than a nuisance. This can only be achieved when people understand why and what he is doing. We must remember that in the town the danger of spread of disease is multiplied a thousand times, and yet disease can so easily be prevented by simple measures.

Chapter 18

Health Education

Health education is an integral part of all maternal and child health activities. When the M.C.H. worker tells a pregnant woman what to eat, or gives advice on immunisation or works in liaison with the community development worker, she is in fact carrying out health education in one form or another. An educational approach to maternal and child health is particularly necessary in nutrition, child-rearing practice, environmental sanitation and personal hygiene.

The aim of health education is to produce a change in people's behaviour. This is easy in the case of educated people, but difficult in the rural societies of most developing countries. In these, the living and dietary pattern has been established after a long period of trial and error and adjustments to environment. The influence of elders is very strong and all attempts at change meet with strong resistance. However, it also helps to remember that it is not only the developing countries that need health education. For example, in many industrialised nations, patterns of life have evolved which are harmful to health—e.g. smoking, and some food habits. Efforts to educate the people in these countries also meet with difficulty.

During her many M.C.H. activities the health worker will meet with parents in need of advice and help, which may vary from occasional comments on some aspect of child health to intensive health education. Besides those individuals, the whole community may need advice on some subjects—food habits, weaning practices, etc. Again, in the community there may be special groups, unmarried mothers, for example, with whom a special effort is needed. Whereas individual health education is best done during a clinic or home-visiting and is directed towards a specific topic, the approach to the community needs previous planning. The community development worker or officers of the local women's organisations should be drawn into this effort to reach out to all important groups. While planning such an approach all basic data should first be collected, such as foods grown locally, local methods of infant feeding and local ideas about various foods (foods that are considered to be 'hot' and those that are considered to be 'cold' or 'heavy' and 'light' foods). Local forms of disease patterns

should also be studied, such as aspiration pneumonia in the neonate due to force-feeding, and neonatal tetanus.

The exact methods of health education will vary from place to place and person to person, but in all cases the health worker must remember that because he is disseminating information he should not expect people to accept everything as truth and to change their behaviour. Instead of formal lecturing, group discussions and demonstrations are more successful. At the same time, the indirect approach through leaders of the community—local elders, chiefs, teachers, politicians and administrators—should always be kept in mind. Once a certain way of life is accepted as ‘the done thing’ by leaders of a society everyone follows suit.

In order to avoid boredom and repetition one should make health education sessions entertaining, with local music, songs and skits. A gay and humorous approach gets the message across far more quickly.

The subjects to be covered should depend on the clinics and the people who attend. Thus, in antenatal clinics mothers want to know about pregnancy and childbirth, and in children’s clinics the appropriate subjects are infant feeding, diet of the weanling, immunisation, etc.

Though health education is such an important part of all M.C.H. work, it is perhaps the most difficult because it has to take into account the emotional response of the people. It is essential to hold frequent meetings of those involved in health education in the district, so that a common approach to teaching health is established.

Chapter 19

Home-visiting

The maternal and child health service in a rural area may be very efficient and the health personnel running it may be very kind and understanding, and yet all the people in the area do not come forth to make full use of it. Some will hold back because of shyness, some because they do not wish to be accused of wasting their time by the elders at home and some because they believe more in traditional medicine. *Such people who do not make use of a service readily need it the most.* Then there is the reckless mother who habitually ignores early symptoms of illness in her child or resists new ideas even after repeated tragedies. She rejects help and yet needs it and it is obvious that the mother and child health service should reach out to such families. This is best achieved by home-visiting. It is surprising to see how a mother who is negative and even occasionally aggressive in a clinic turns out to be very receptive when visited at home and given help with her child.

The ultimate aim of a maternal and child health service is to improve the care of all young children and pregnant mothers in the community. When each and every home in the community can apply the principles of child care then only will the health of the children improve. Home-visiting helps to carry this message of the health service to people's homes and as such, supplements the work of the clinic. Health education carried out in the homes is much more effective because of the close inter-personal relationship established and also because the mother is taught in her familiar surroundings and is not shy to ask questions.

The health personnel visiting a home can make a proper appraisal of the child, the mother and the family in their social and physical environment. The type of housing, available facilities in the home, the occupations of the parents, attitudes of neighbours and elders in the family can all be studied in detail and an appropriate programme of management can be formulated. Such a programme may be able to utilise the other available social services in the area for the benefit of the child and the family. This can be in the form of placing the child in a day care centre, arrangement for the father to attend a farmers'

training centre, assistance from the community development services or from the administrative officers in the area as the case may be. It is quite common to find that several kinds of social and medical facilities may be available in an area and yet the people know very little about them. It is only after an unhurried appraisal of the problem of a mother or a child and its discussion with the other members of the health team of the area that a proper plan of management can be formulated.

An important aspect of health visiting is *rehabilitation* of a child or mother who has recently been discharged from the hospital. The child who has just recovered from protein-calorie malnutrition, measles, gastro-enteritis or any other acute illness may be in need of prolonged convalescence at home. In all places, hospital beds are not enough to cater for all the ill children so that the ones who are not so ill often have to make place for the very ill ones. Thus, the period of stay in the hospital for an acute illness is usually very short. Many parents feel that once a child has been discharged from hospital he is fully restored to good health and does not require to be nursed at home; in many cases this may lead to a relapse or prolonged ill health in the child. With a close liaison between the hospital, the under-fives clinic and the health visiting team the medical care given to the child can be extended from the hospital wards to the outpatients and clinics and to the home so that full recovery can be assured. Thus, a child who has recently recovered from protein-calorie malnutrition will not only require attention to his diet, but also the parents need health education, the eating patterns and menus may have to be altered and in certain cases even the agricultural practices may need improvement. A child who has recovered from anaemia may require treatment and regular follow-ups for a long time. Similar lists of needs can be made out for almost all illnesses in children by consultations with the health team of the area and can be put into effect by visiting the homes of children who have recently been in hospital.

A similar rehabilitation programme is required in the case of children 'at risk' like the low birth weight baby, twins and triplets, babies with social problems and children who are emotionally deprived. In all such instances an unhurried evaluation of the problem within the home and family environment of the child is necessary which cannot be achieved in the overcrowded clinic.

By means of an active programme of health visiting, it is possible to establish a rapport between the community and the health team. The people then readily come forth with their problems and the health team begins to understand the community it is serving. Delivery of health care becomes more meaningful in this atmosphere of mutual understanding.

As in all fields of human relationships tactlessness can give offence

and interfere with the work of the health visitor. Whereas good commonsense advice is always welcome, unnecessary haranguing may upset parents. A successful and popular health visitor has learned the art of blending easily in the family environment—giving a hand with the baby in one home, helping with the care of a sick child in another and advising on the diet in the third. She does not stay long, does not appear to be prying in the family affairs and is always practical.

Some countries train a special cadre of health visitors whereas in others health visiting is done by the health nurse or a multi-purpose nurse. In every case it is necessary that the person should be a member of the M.C.H. team and be actively involved in the overall functions of the team. In order to be effective, such a person requires a good background of nursing, mother and child health, and midwifery, and in addition, should be capable of analysing the stresses on the child and his family as they are affected by the human and environmental conditions in the community.

The health visitor serves as a useful link between the health service and the community. She takes the message of health and child care into the homes of the people and gathers information about the physical, social and other stresses on the community—information which is useful for devising a meaningful health programme for the community.

Chapter 20

The 'At Risk' Concept

Clinics looking after a large number of mothers and children find it necessary to identify those who may be expected to get into difficulties at some time in the future because of biomedical, social or cultural reasons and to assist them with additional care and supervision. It is common experience that serious illness occurs more commonly in certain families. Nutritional deficiencies and other illnesses of children rarely occur alone; they are commonly associated with poverty, bad family relationships, poor hygiene and living conditions, strong cultural resistance to accepting new ideas and other similar detrimental influences. Pregnant women and children from such families are in danger of running into difficulties and by identifying them early for special attention and care the following advantages may occur:

- (1) Illnesses and other difficulties can be anticipated and avoided.
- (2) When difficulties do arise they can be detected early before they assume serious proportions.
- (3) Adequate standards of care and supervision may be maintained for these families; negligence on the part of patients to attend regularly or to act on advice can be detected and corrected early.

Selection of the 'at risk' person

Criteria for selecting the 'at risk' person may vary from one place to another. In general, for pregnant women, the aim is to select those who are at high risk of abnormal labour or of being inadequate parents later; in the case of children, the aim is to sort out those who, because of family, social or biomedical reasons, are at high risk of developing malnutrition or serious illnesses.

Some of the criteria for identifying the pregnant woman who is at high risk of abnormal labour have been discussed in the chapter on antenatal care. Such women are in need of a supervised delivery and should be referred to a hospital where adequate obstetric care is available. *Primary selection* is done by a consideration of the personal

and past obstetric history of the mother, such as the height of the mother, previous caesarean sections or instrumental delivery. The social history is equally important; the mother with a history of neonatal deaths occurring in her babies, or of death from tetanus of the newborn or of failure to secrete milk, is most likely to be an inadequate parent and needs close supervision. In considering the social history, the actual economic status may not be as important as the social strata. *Secondary selection* depends upon diseases and events occurring during the course of pregnancy—toxaemia, anaemia and other illnesses, family and marital strains, etc.

When a pregnant woman has been included in the 'at risk' category, a decision must be taken regarding (1) place of delivery, and (2) the amount of follow-up care necessary in the form of home-visiting, attendance at the post-natal clinic, or referral and further care in the under-fives clinic.

Some mothers may need further action like family planning advice, referral to a social service, or health education with intensive home visiting. Thus, several different members of the health team may be involved in the management of the 'at risk' case.

The role of each individual in the management can be better defined if the case notes of the 'at risk' mothers are discussed in weekly meetings of the health team. Here the overall course of action can be planned by consultation among different health workers and regular evaluation of the type of care provided can be carried out (see figure 15).

In selecting the child who may be 'at risk' the aim is to be able to identify and reach out to those who need help most. The following factors are known to be associated with malnutrition or serious illnesses in children:

- (1) Broken homes, death of one of the parents, or lack of parental care at home.
- (2) Onset of another pregnancy in the mother so that because of local customs and superstition the toddler is taken off the breast (see chapter 10, Weaning).
- (3) Failure of lactation (see chapter 8, *Breast-Feeding*).
- (4) Multiple pregnancy so that the available breast milk may not be enough to feed more than one baby.
- (5) Family size—nutritional and health problems are more common in children from large families because of inadequate 'mothering'.
- (6) Birth weight. Children of low birth weight may have difficulty with feeding in the newborn period and early infancy. Babies of low birth weight make a major contribution to neonatal and infant mortality.
- (7) Death of siblings may indicate the existence of social, medical and other factors detrimental to the health of children.

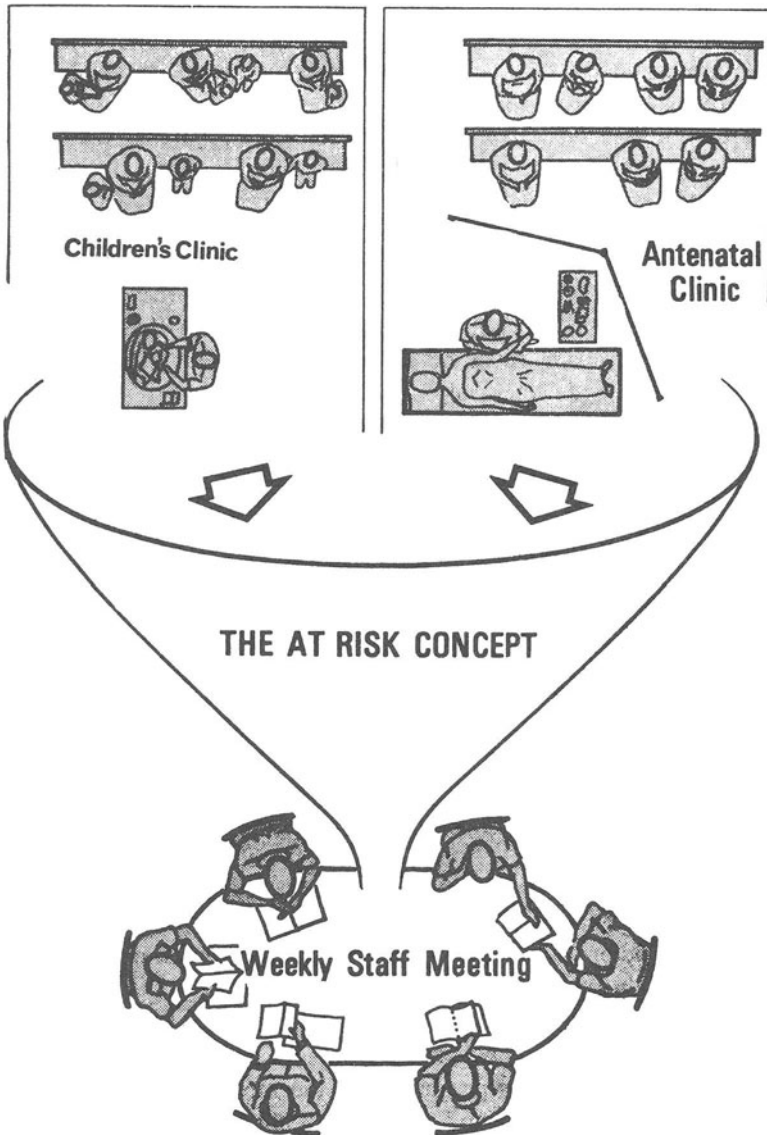


FIG. 15 The 'at risk' concept

(8) Presence of chronic illness in the family like tuberculosis, sickle-cell anaemia, etc.

The remedial action required may include more frequent attendance at the clinic, supply of food supplements, early and comprehensive immunisation or reference to a nutrition rehabilitation centre. Again, the entire health team has to be involved in planning the management of the child 'at risk' by discussing each case note at weekly staff meetings.

The population in rural areas is mobile, and the mothers may be vague about their place of residence. Hence at the time of including a child or a pregnant woman into the 'at risk' group, a careful note should be made of the home address followed by a visit at the first opportunity in order to verify the address given and also to create confidence in the family that the clinic is interested in their welfare. When such a family moves house, all the records should be forwarded to the health centre or the clinic serving that neighbourhood, so that continuity of care can be maintained.

In several centres experience with the 'at risk' groups has shown that it is useful to hold special weekly 'at risk' clinics and also to maintain a system of duplicate records at the clinic or health centre for easy access to carry out evaluation. Because of the small numbers attending the 'at risk' clinic, it is possible to go into the details of each case attending and thus provide intensive supervision and care. Failure to attend or lack of co-operation in the family can also be easily detected. When satisfactory progress has been recorded, the individual can be referred back to the general clinic.

The 'at risk' concept is essentially a preventive one. It is a method of filtering out families who, though they may not have a manifest health problem, are being subjected to circumstances and conditions known to give rise to health problems. If these are anticipated early and action taken, much ill health can be avoided. The remedial action is often not in the form of medicine and drugs but a careful appraisal of the situation and action by different members of the health team. In some cases agricultural extension and community development workers or other social agencies in the area may have to be involved as well. This is best achieved by close liaison between the various agencies involved and by approaching the management of each individual case as a team.

Chapter 21

Community Participation in Health Programmes

The nurse or the doctor is usually so busy in curative medicine that she or he has little time to get to know the community and to establish a relationship with the people. The result is that people make use of health services only in emergencies and not on a regular basis, so that many of the preventive programmes, especially in maternal and child health, do not reach the families who are most in need. The people think of the health service as something imposed upon them by an outside agency—namely, the government—and not as part of their village life and culture. The occasional public function when people may be asked to make use of health facilities by a high official, or even admonished, does not help to overcome the mistrust and the wide communication gap existing between the health workers and the mass of the common people.

The health worker should have a good knowledge of the beliefs and the customs of the people he is serving. What do the people themselves believe about disease and its causes? The educated person is introduced so early to what is called 'the germ theory of disease' that he often tends to forget that uneducated people lacking this information have their own explanations for the occurrence of disease. To look down upon such explanations and beliefs does not help, because any attack on the local belief system will be taken as an attack on the elders of the community who uphold the system. Many of the beliefs belong to one of three groups: (1) beneficial (e.g. the practice of prolonged breast-feeding); (2) harmful (e.g. female circumcision or cutting the uvula for coughs); and (3) neutral (e.g. making sacrifices to the ancestral spirits). The beneficial beliefs should be supported and strengthened, the harmful practices should be discouraged and the neutral ones should be left alone. In this way one avoids falling into the pitfall of attacking all local customs indiscriminately.

What do people believe about the causes of disease?

(1) Probably the most common idea is that the ancestral spirits are angry, often because someone has broken a taboo and they revenge themselves on the living by making some member of the family ill. This

is ascertained by a diviner who recommends that some sort of sacrifice is carried out, or sometimes he may suggest that the sick person has been bewitched and that appropriate counter-magic must be made. It is too easy to say merely that the witch-doctors are cheats. They are not. What they are doing is to provide an explanation for the inexplicable, and almost certainly they themselves believe in what they say.

We also need to know what diseases people recognise, or think that they recognise. For instance, in some areas any abdominal pain is attributed to a worm, and people who no longer believe in local medicines may do themselves harm by repeated doses of de-worming medicine. Faith is a most vital part of any medical treatment, and in Nigeria there has been great success achieved in psychiatric treatment by co-operation between modern and traditional medical practitioners, utilising this existing faith. It may be possible for the intelligent community development worker to enlist the aid of the local herbalist and to get him to support a drive for better health.

(2) If we know what people believe about disease, we also need to know what they believe about good health. For example, in one large area in Tanzania it is generally believed that the fatter a girl is the healthier she is, and the easier it will be for her to have children—both false ideas. A very large number of the common beliefs about what is good for children are wrong, if not dangerous. For instance, in one area, women only use one breast for feeding a baby. In others they tie a rope across their breasts. In many places gruel is fed to babies because it looks like milk.

(3) The third important matter to consider is that of food taboos. This is one of the most difficult problems in health education. Almost throughout the whole of the developing world it is thought that eating eggs is dangerous for women, yet we know that this is the one source of protein available to almost everyone, which could do much towards improving the health of the mother and child. A perfect example of this sort of problem occurred near a large dam in central Tanzania. There were tons of fish available annually but fish was taboo. The people had herds of cattle, but they were rarely slaughtered and the milk was consumed by the older men. Groundnuts were grown but were sold. In other words, in an area where malnutrition was rife, plenty of good food was available but because of custom it was not consumed by the people who most needed it.

Getting to know the community

Every human group has its *leaders*, and it is important to win the trust of such leaders for the success of any community activity. In some rural communities leaders may be established by tradition, such as the higher

caste families in India, or they may be hereditary, like the landlord or the chiefs in tribal communities. On the other hand such leaders may be elected—the Gram Panchayat in India, for instance, or the ten-house chairmen of Tanzania. Obviously, it is easier to interest elected leaders in community welfare as compared with the hereditary or traditional ones, but whatever the case, support and sympathy of the local leaders are vital for the long-term success of the health programmes.

In countries with active departments of community development, the local *community development officer* can be of great help. He has been specially trained to understand the dynamics of the rural community and to mobilise interest in programmes of rural improvement.

Involving the community in health planning

Once the support of the local leaders has been enlisted, the next step is to form a local health and welfare committee. Care should be taken to see that all groups are well represented in this committee, especially those who are at risk, e.g. migrant workers, serfs and the lower social class, and women.

The health committee should be encouraged to discuss freely the health needs of the community and to establish priorities. Very often the 'felt needs' of the people are different from the 'true needs'. On the other hand, the so-called 'true needs' may be based on impressions and assumptions of the health team instead of scientific facts. In order that such a dialogue on priorities in health can be realistic, the health team must provide the following information to the village health committee:

- (1) The target population and the area to be covered, together with population movements, its characteristics and vulnerable groups.
- (2) The epidemiological features of the area, e.g. the health events which may be expected in a year, the prevalent illnesses and the communicable diseases in the area.
- (3) The basic health services required and the extent to which they are utilised, e.g. antenatal care, under-fives clinic, play-groups, nutrition rehabilitation services, etc.
- (4) The resources available to support the health effort of the population should be ascertained, e.g. the personnel available in the health team and the ones that can be recruited and trained locally, supplies of vaccines and drugs, storage facilities, buildings, equipment and transport, etc.

With such data and background it should be possible to determine

objectives and targets. A simple scheme for establishing health priorities is as follows:

- (1) Make a list of the common illnesses as judged from the records of the health centre, or as expressed by the people.
- (2) Draw up a table with the following columns: vulnerability to treatment, prevalence, community concern, and cost of treatment.
- (3) For each of the diseases in the list, give a score from 1 to 4 for each of the headings.
- (4) Multiply the score figures in each column and write the answer in the last column under total score.
- (5) The various diseases are given priority in accordance with the total score, as shown in the table below.

Table 4. Disease priorities in Tanzania

<i>Disease</i>	<i>Vulnerability to treatment</i>	<i>Prevalence</i>	<i>Community concern</i>	<i>Cost</i>	<i>Total score</i>	<i>Rank</i>
Pneumonia	4	3	2	2	48	3
Malaria	4	4	2	1	32	4
Diarrhoea	3	3	3	2	54	2
Malnutrition	2	3	3	4	72	1
Tuberculosis	3	2	3	4	72	1
Measles	1	3	3	2	18	5

When the priorities have been established and the determinants of the diseases identified, as well as local resources ascertained, the next step will be to draw up a plan of operation. Again the community, through its health committee, should be actively involved in the planning as well as implementation of the programmes. It stands to reason that people accept those services which they have helped to plan and formulate as compared with the ones in which they have had no say. The responsibility of the health worker is to enable the people to make a choice in health and then to provide the technical know-how necessary to achieve these chosen goals. A continuing dialogue with the community on the lines described above will result in a popular and viable health programme, unlike the one where the attitude has been 'take it or leave it'.

Recent experience in several countries has shown that health care is more acceptable if it is brought to the people by local individuals *selected by the community* and who continue to participate in the social and economic life of the community as farmers or artisans. Such part-time health workers or 'barefoot doctors' have helped to make a major break-through in taking health care to rural masses in a vast country like China. Following on the Chinese experience the usefulness of such workers has been proven again and again in pilot projects in

many countries, so that it is now obvious that in future such workers will be trained on a national scale in all countries. Besides the above-mentioned advantage of acceptance by the community, the part-time health worker helps to mould the pattern of health care around the life style of the local people and to integrate it with other local activities like agriculture and education (see figure 16).

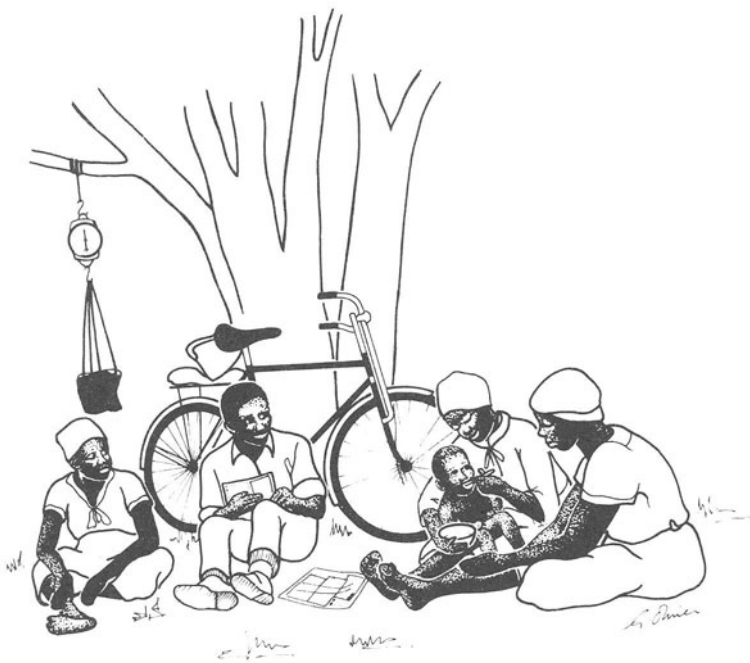


FIG. 16 The part-time health worker

The part-time health worker can make an important contribution to improving rural nutrition by education and demonstrations in rural homes and will become a local resource for information on the subject. He or she will help with immunisation and other programmes of controlling communicable diseases as well as act as a local health scout. Other health activities like conducting the village antenatal or under-fives clinics, selection of problems for referral and supervision of 'at risk' families can also be relegated to such workers. In addition, they are also able to provide first aid and primary care for the common illnesses. Thus, such individuals constitute an important resource in the community which can be harnessed for extending health care to the rural household.

One way of insuring the community's participation is to build clinics and institutions through self-help schemes. When people have contributed their time and effort to projects, however small, they take pride in them and carry a sense of belonging, so that they are ready to make use of services provided within such institutions. Moreover, buildings constructed with local material and using local artisans do not stand out from the houses in the village. Such blending with the scene is essential to overcome the natural shyness and nervousness of the village folk and presents a more acceptable face of scientific medicine to communities where belief in magic and rituals still continues to be the way of life.

Thus delivering health care to each village and spreading the health message to each rural home is not a matter of putting up large hospitals or training specialists. The prime need is an understanding of the rural people and a willingness to establish a partnership in which local resources can be harnessed so that communities can find acceptable solutions to their health problems.

Chapter 22

School Health Service

School age is probably the most important phase of childhood. It is the period during which the child enters society's training system from which he would emerge as a contributing member of the community according to his capabilities. The major problems of this phase do not lie in the field of disease and mortality but in growth and development to adequate physical, mental and emotional maturity and in the acquisition of skills and methods of learning. Even though the child will spend a large proportion of his working hours at school, the major responsibilities for his physical health have to be with the parents and the home environment; no school can become a substitute for these. On the other hand, if the child does not maintain adequate health, the benefits of education will be lost on account of absenteeism or lack of attention due to ill health.

In the rapidly developing countries of the tropics, educational programmes form a major part of national development. With the building of new schools, the number of school attenders is increasing every year. Like all other situations where large groups congregate, the schools can become a potential source for the spread of communicable diseases unless they are properly supervised. On the other hand, the school age population being receptive to new ideas, schools can provide excellent opportunities for health and nutrition education; in a society with poor standards of health all such opportunities should be exploited to the maximum.

Surveys carried out in school children show the prevalence of several health problems. Even though clinical malnutrition is not evident many of them do not reach the same standards of height and weight as their Western counterparts. Similarly, haemoglobin levels are below the accepted normals even though the wide-spread anaemia that affects pre-school children is not evident in school children. On an average, positive conversion to tuberculin testing occurs between the ages of seven and ten years, indicating thereby that most school children acquire their primary infection before this age period. Parasitic disease in the form of malaria parasites in the blood, or helminths in stools are very common; in many places schistosomal infection is almost universal

in the school population. In recent years, episodes of mass hysteria in school children have been reported from several countries indicating that the problems of mental health and the ability to adjust to social and psychological stresses in the school children need intensive study.

In all developing countries, the most important objective of a school health service is the control of communicable diseases. Of these, control of tuberculosis and smallpox is a major need; both can be controlled by adequate immunisation of the community. Provision of clean water supply to the school is necessary for the control of water-borne diseases. In urban areas piped water may be available, but in most rural schools the water has to be obtained from wells—usually shallow wells; in some cases there may be deep wells or bore-holes. Water from the wells is traditionally drawn with a bucket; moreover, such wells are made use of by the whole community for bathing, washing clothes and utensils at the site. In such cases, adequate measures should be taken to protect well water from pollution, and ideally to install pumps for obtaining water from the well. If the water is obtained from a spring or a river, similar protective measures should be taken to avoid pollution. Disposal of sewage and washing facilities at the school must be adequate. Water-borne sewage disposal is possible only in towns; in most villages sewage disposal has to be by means of pit latrines. School children are keen observers and all such sanitary precautions will provide an indirect method of health education for the children and, through them, for their families.

School meals have become common in most schools, either as a national policy or through the assistance of voluntary agencies. It is hoped that such feeding programmes become a regular routine in all national school health services. Health surveys in school children have revealed that most day scholars leave their homes with an inadequate breakfast which may be a cup of tea with or without milk, or some gruel, baked cassava or a handful of ground-nuts. They do not get a proper meal at home until their return from school in the evening. By providing adequate nutrition at school, a school meal service ensures that the children will have enough vigour and vitality to participate in school activities and derive full benefits from the opportunity for mental and physical development provided by the school. The school menu should be properly planned to ensure that various nutrients and minerals are supplied in adequate quantities. The national nutrition unit or a paediatric department may be able to assist with the composition of a diet suitable for the local circumstances. If not well planned, such a feeding programme can easily degenerate into providing the wrong kind of nutrition; furthermore, it may become a source of ill health. The cooking of school meals should be properly supervised and students assigned by rotation to help with the cooking. The cooking place or

stove should be raised from the ground to prevent accidents from fire. As far as possible, local materials should be used for construction of the kitchen and the cooking place, so that it can serve as a model to be copied by the parents in the locality. In most rural homes cooking is done on an open fire with the result that burns and scalds are a common form of accident in children. There should be a vegetable garden or a cultivation plot assigned to the school on which school children should work daily, learning about cultivation methods and about different kinds of nutritious foods that can be grown locally. As far as possible, the school vegetable garden should supply the items of the daily menu at the school. In order to ensure that all these various objectives of the school health service are realised, the teachers should have adequate knowledge of health and nutrition. These subjects should be taught extensively in all teacher-training institutions.

Organisation of the school health service

In a national school health service an individual is assigned in the appropriate ministry to promote and administer the service. In most urban localities the medical officers of health will do the day-to-day administration of the service whereas in rural areas such a service is best administered through the health centre serving the area.

Ideally, each school should have a parents/teachers committee elected annually on which the health personnel concerned may be co-opted members. Such a committee will be useful for discussion of various administrative problems including those of health.

In each school, health records should be maintained on the pupils. On entry to the school, each pupil is given a physical examination including screening tests for hearing and vision, and laboratory tests for stool, urine and haemoglobin. The immunisation record is also checked and brought up to date if deficient, at least in relation to smallpox and B.C.G. if none else. After the annual examination, the health officer concerned should also make an inspection of the school, looking at the adequacy of the premises, the facilities for waste and sewage disposal, the kitchen and the water supply. A written report should then be made to the medical officer in charge of the district who maintains a file on each school in the district. All health problems encountered during the annual examination or during inspection of the school should be promptly dealt with.

Ideally, a school nurse should be available for each school to deal with minor day-to-day ailments in school children. In rural areas this is not possible, and school children have to attend the local dispensary or health centre for treatment. If a record of their sickness is maintained

either at the school or at the clinic, early indications of epidemic or defective physical environment at school can be obtained and measures can then be instituted to prevent any further spread of the illness.

Chapter 23

Assessing Health Programmes

There is a common tendency to believe that since health services and programmes are meant for the improvement of the health of the people, nothing but good must come out of all health work. Certainly those families who make use of the health services on a regular basis, especially the personal preventive services like antenatal care and the under-fives clinic, will derive a great deal of benefit. But there are only few such enlightened families. In fact there is a universal tendency for those who need the services most to make the least use of them. Thus, it is possible that health services and programmes may be organised in a district and the health personnel working in such programmes may be fully occupied, and yet the impact of such efforts on the health of the community can be very little. Hence it is necessary to take stock at regular intervals and measure the effectiveness or otherwise of all health activity, so that appropriate changes and improvements can be introduced if necessary.

In measuring the effectiveness of health services two principles should always be borne in mind.

(1) Since a health programme is meant primarily for the benefit of the community, leaders of the community should be involved in its evaluation. As a matter of fact, it is always wise to involve the community, through its elected and natural leaders, at every step of the programme—planning, implementation and evaluation. Continuing dialogue and consultation should be established between the community and the health team in order to enable the people to identify their health problems, to establish priorities, to define targets and goals, to decide upon the ways and means of achieving these goals, and to evaluate progress.

(2) There are several parameters which are traditionally used to assess improvement in health. Thus infant and under-five mortality rates, prevalence rates of various communicable diseases, anthropometric indices like height, weight and arm circumference, etc., have all been used either singly or in combination to measure improvement in health. However, one important parameter rarely gets a mention. In the rural

areas of most developing countries the basic problem is that of *inadequate coverage* by health services. For example, it is estimated that not more than 15 to 20 per cent of the rural populations receive health care on a regular basis. Whether it is due to ignorance, lack of development of services, or the presence of the wrong kind of service, the fact remains that no improvement in health can be expected if sufficient numbers of families and individuals do not receive regular health care. Hence the primary parameter to be measured is the number of individuals in the vulnerable group and in the 'at risk' category, who are the regular beneficiaries of the health programmes. No health programme can be expected to have a measurable impact unless at least 80 per cent of individuals in the above-mentioned groups are covered by it. Thus the antenatal and the under-fives clinics will demonstrate their benefits only when 80 per cent or more of the pregnant women and children under five years of age attend on a regular basis. And the same applies to creating herd immunity with immunisations.

Monitoring disease in the community

In a well organised health programme with good coverage of the community, it is possible to adopt a more aggressive attitude towards preventable illnesses, especially communicable diseases, and initiate steps either to contain or to eradicate such illnesses. Thus, various diseases can be monitored by locality and age group as they occur. When infectious illnesses like measles, whooping cough or polio occur in a village or a locality in spite of services for immunisation, it indicates a weakness of the programme or an increase in the number of susceptibles. With a good system for monitoring disease, pockets of infection can be identified early and mass immunisation campaigns or other community action can be organised to prevent a large outbreak. Attendance at the clinic of children suffering from tuberculosis, leprosy or trachoma should lead to action aimed at case finding and identification of the reservoir of the infection in the locality where such children live. Similarly, when more than the usual number of cases of malnutrition or vitamin deficiency are diagnosed in children from a particular village or community, failure of food crops or increasing unemployment is the likely cause, and early intervention with nutrition rehabilitation programmes and mobilising of community resources is indicated to avoid widespread hardship.

Regular audit

In addition to monitoring disease, a system of regular assessment and audit will provide ready information about the progress of the health programme, so that if it is not satisfactory, corrective action can be

taken. Easy availability of data and information makes planning more realistic and the health activities do not drift from one thing to another because of changing individual impressions.

In order to keep a health programme under close scrutiny and to carry out regular assessment, very little additional time and resources are required. All that is necessary is to maintain *careful records* of certain specific activities. To take an example, a trader will not know whether his business is flourishing or failing unless he maintains a careful record of his out-goings and income, and balances his books at periodic intervals. Similarly, the health team needs to do some 'book-keeping' in order to determine whether the efforts of the team have been of any use to the community. The requirements for such book-keeping are as follows:

(1) A description of the area and the health programme.

(a) A *map* of the district showing major villages, settlements and roads linking them should be available. Such ordnance maps can be obtained through the district administrative offices. On the map all the existing health institutions should be marked, indicating whether they are hospitals, health centres, sub-centres or aid posts.

(b) At each health institution there should exist a description of the *population* served, lists of community leaders, and lists of officials of the women's organisations and the youth league.

(c) Results of any previous *evaluations* if these have been performed.

(2) *Day-to-day book-keeping* of health activities should be maintained. This can be achieved by using a simple tally sheet, like the one shown in figure 17, at each clinic. Such a tally should aim at obtaining the following information:

Children: Number attending for the first time and for subsequent visits, e.g. 2nd, 3rd, 4th, etc.

Immunisations given according to the type and whether first or subsequent.

Common illnesses seen, e.g. diarrhoea, malnutrition, measles, etc.

Children identified as being 'at risk'.

Mothers: Number attending for the first time and for subsequent visits.

Tetanus immunisations given.

Common illnesses seen, e.g. hypertension, oedema, anaemia, haemorrhage, first attendance in the third trimester or later.

(3) The 'at risk' register indicating children, mothers and families who are at risk of disease, the reason for being at risk, what plans were formulated for helping them at the weekly staff meeting, action taken, and the date of the next review.

(4) The register of persons suffering from communicable diseases like tuberculosis, leprosy, trachoma, venereal disease, etc., giving details of the regularity or otherwise of treatment, steps taken to protect other members of the family, and the details of assessment at the last home visit. Such a register should also contain a section in which are entered details of mass campaigns in immunisation, de-worming and chlorination of local wells.

(5) The register of births and deaths.

The data from the tally sheets should be collated and analysed at regular intervals. From the census data of the village or settlement, the expected number of pregnancies, and the number of infants and children under the age of five can be determined, and the percentage covered by the health services can thus be ascertained. For example,

in a population of 1,000

the number of pregnancies expected annually is between 40 and 45:

the number of infants is expected to be 50:

and children in the age group 1 to 5 will be 150.

Knowing the number of children fully immunised at the clinic from the tally sheets, it is possible to estimate the number of susceptibles in the population, and periodic mass campaigns of immunisation can be mounted to cover such children. In the same way, the percentage of pregnant women who do not come for antenatal care can be determined.

When such data, together with information about 'at risk' families and communicable diseases are regularly discussed with the local community, it is possible to improve community awareness about the determinants of disease and to mobilise local resources in the fight against disease. Collection of health statistics for forwarding to higher authorities to prepare annual reports has very little influence on the critical assessment of local services, and is of little value. Only when such information is widely discussed between members of the health team and representatives of the community can the true impact of the health programmes be measured and improvements in the services occur. Thus medical audit and the regular measurement of gains in health are as important to the health worker as the balance sheet is in commerce. Without such assessment many valuable health programmes are likely to go astray.

Chapter 24

Prevention of Communicable Diseases in Children

It has been rightly said that the diseases responsible for the heavy mortality in young age groups in the tropics are preventable. In many countries of the Western world, where similar mortality occurred not so very long ago, these diseases have been eradicated. Hospital records show that the commonest causes of death in children in the tropics are malnutrition, gastro-enteritis and respiratory infection. Of these, protein-calorie malnutrition is the most widespread; by lowering the body's resistance to infection it not only facilitates infection, but also allows it to spread unchecked and become severe, resulting in early death. Thus, not only is infection commonly associated with malnutrition, but also malnourished children easily become gravely ill and do not respond easily to treatment. Besides these three main causes of death, which are responsible for about 60 per cent of childhood mortality, the other common causes of death are malaria, anaemia, tuberculosis, infectious diseases of childhood like measles and whooping cough, hookworm and other parasitic infestations and accidents, mainly burns.

It is interesting to note that these diseases occur in many countries and are not necessarily 'tropical'. Hospital data of the last century in many temperate countries would reveal an identical picture; and yet in the same countries these diseases are now rare. These changes have been wrought less by curative medicine and more by socio-economic progress. As the living standard of the people improved they demanded and obtained better housing, clean water supply and environmental sanitation. The dramatic reduction in childhood mortality by application of preventive medicine on a mass scale is one of the most important milestones of human progress.

In the developing world, economic and social development is being hindered by disease and ill health; unless the masses are freed from this relentless process of disease transmission, progress will, of necessity, be slow. In recent years, the concept of the rural health centre has emerged as the means of curing illness and preventing disease in rural areas. As such it embodies the principles of both curative and preventive medicine and should not be thought of as a mere extension

of the hospital outpatient departments to rural areas. It is therefore necessary that the health team of the centre should be mobile and work as much in the field and in people's homes as in the centre itself.

By far the biggest need in rural areas is for health education. Unhygienic ways of living are the main factors in maintaining diseases in the community. Such unhygienic habits may be in relation to food, disposal of human waste, housing or even in the form of wrong concepts about diseases. When the individual standard of hygiene in a rural community is poor, the sum total of it—namely, public hygiene—will also be poor. Hence every possible opportunity to promote health education should be exploited. In this respect it is important to remember that home visiting and giving of practical advice where it is needed may be more useful than public talks.

Creating herd immunity is a logical way of breaking the cycle of transmission of diseases. Immunisation of children against the common infectious diseases of childhood should be given a high priority in all health programmes. The work of the routine immunisation clinics can be reinforced by mounting periodic campaigns of mass immunisation in the area.

The needs of specific age groups should be met by establishing appropriate services. Thus, antenatal care is necessary for pregnant mothers. They should be encouraged to come to the centre for the delivery. Under-fives clinics should be established for the babies and the toddlers, and appropriate services should be created to look after the health and social needs of the pre-school and school children in the area.

In order to eradicate the prevalence of water-borne diseases self-service schemes should be encouraged for the protection of the water supply like digging wells, protection of springs, composting of waste and digging latrines. The assistance of agriculture extension officers and community development workers is invaluable in getting the people to 'want' such projects of public health interest. Unless the people are made to see the importance of such projects and unless they actively participate in them, these projects will have little hope of success. Once the public confidence is obtained such efforts can be extended in many other ways, such as treatment of mosquito-breeding sites by drainage or by application of larvicides, etc.

For certain diseases like tuberculosis, leprosy or trachoma special schemes should be established consisting of case-finding, treatment, immunisation and supervision of contacts. Disease surveillance in an area is made easy by keeping records of various illnesses with which people present themselves at the clinic. Such records should be analysed periodically and where necessary, appropriate measures should be instituted to reduce the prevalence of the common diseases.

In all these efforts for improving the health of the people, the assistance of local leaders and workers in other disciplines like teaching, agriculture and community development should be sought to create a committee of local leaders who can set various goals before the people in order to achieve better health for themselves and their children.

Chapter 25

Clean Water

Like food and air, water is an important element for supporting life. In the average rural home, a large amount of time and effort is spent on providing water for the family, mainly by women and children. It is not unusual for many women to walk up to 3 miles to get a pail of water for the family. For example, in 1970 it was estimated that more than 70 per cent of the population of developing countries did not have a source of water supply within reasonable walking distance. It is not therefore surprising that the use of water is limited in the rural household. The present consumption figures for rural areas are 35-90 litres per head as compared to the ideal figures of 60-110 litres per head. Because of this restricted use of water, standards of personal hygiene are low and skin sepsis, ringworm and scabies, as well as eye infections like trachoma and conjunctivitis, tend to be more common. Moreover, the water that is available is rarely clean. It has been estimated that 86 per cent of the population in the developing countries does not have access to safe water. Hence water-borne diseases like enteric infections, diarrhoeal disease, dysentery, etc., tend to be widespread.

Water resources of the community

RAIN WATER

The primary source of water supply is of course the rain, some of which runs off to form streams and rivers or collects to form ponds and tanks (see figure 18).

In some island communities and in areas with heavy rainfall, rain water is collected as it runs off the roofs into casks and cisterns and utilised for washing and drinking. When it is formed, rain water is clean, but gathers impurities on passing through the air and whilst running off the roofs. Hence, in communities where rain water is used as a main source of domestic water, cleanliness of the roofs and the collecting system is necessary.

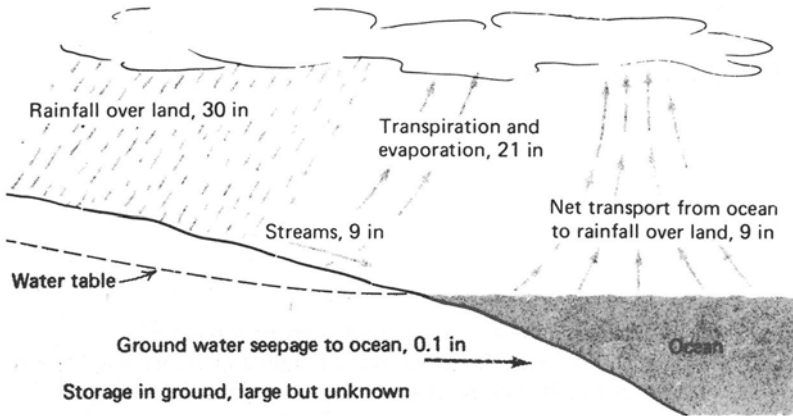


FIG. 18 The water cycle

SURFACE WATER

Rain water which remains on the surface of the earth and does not soak into the ground will give rise to ponds, tanks, streams and rivers. In general, all surface waters are commonly exposed to contamination and should be considered dangerous. Natural processes of purification like sunlight, aeration and the effects of water plants and animals are insufficient in the face of frequent and heavy pollution caused by washing clothes, bathing and human as well as animal waste. Communities utilising such water for domestic use without prior purification or boiling stand a heavy risk of suffering from water-borne diseases (see figure 19).

In the special circumstances of small rural communities, it is not economical to set up water purification systems and the best approach will be to educate the village community so that indiscriminate pollution of the water is avoided. In the case of a river or stream, a place some distance away from the village and *downstream* should be demarcated for washing and bathing. It may be possible to obtain water for domestic use from wells dug in the sand and gravel layers about 30 feet or more from the banks of the streams and protected from surface pollution in the ways described below.

GROUND WATER

The commonest method of obtaining ground water is by means of wells. Many communities in tropical Africa obtain their water supply from shallow water-holes. The water in such water-holes is mainly



FIG. 19 Surface water

surface water and invariably contaminated. It should, therefore, be considered highly dangerous.

The hand-dug well is the commonest form of well in rural Asia. The majority of such wells are about 25 feet deep, but may go down 50 or even 100 feet, with a diameter of about 3 to 5 feet. The water from these wells is also usually polluted because of neglect and the ignorance of the users. And yet it is possible to make the water safe by means of a few simple and elementary steps. The responsibility of the health worker is to interest the parents and the community in the safety of their water supply, so that community action can be taken to ensure protection of the wells from pollution (see figure 20). These precautions are as follows:

(1) All wells should be situated at a safe distance (at least 100 feet) from any source of contamination. The nearer to the surface the water table is, the greater the risk of contamination, because the depth of soil is insufficient to effect natural purification, and hence a greater area all round the well must be protected.

(2) The mouth of the well should be above flood level so that storm water cannot flow into it from the surface.

(3) It should have a watertight lining consisting of brick or stone set in cement, or of concrete or cylinders of steel. The lining should reach at least 10 feet below the surface of the water at the bottom of the well, so that all water enters the well from the bottom, and it should be continued above the ground for several feet.

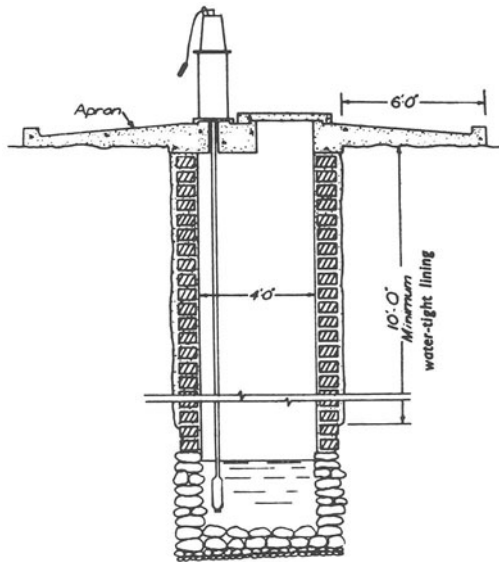


FIG. 20 Protection of the hand dug well

An ingenious method has been developed to help village communities to sink safe wells. Concrete cylinders 5 feet in diameter and 5 feet high are supplied to the village by the local health centre. First, one cylinder is placed on the ground, and the villagers dig the ground within so that as the ground is dug, the cylinder sinks in. Another cylinder is placed on top of the first one and the process repeated several times until water is finally struck, after which digging is continued for a further 4 or 5 feet. The final cylinder is placed so that the top is above the ground level by about 3 to 4 feet.

(4) At the top end, on the ground level, there should be a platform of concrete, at least 6 feet wide and sloping to the periphery in order to carry the waste water away. Such a platform and the watertight lining described above will ensure that water enters the well only after percolation through 15 to 20 feet of soil which ensures filtration and cleanliness.

(5) The top should be covered by a dust-proof and watertight cover.

(6) A pump should be installed to draw water. Pumps are costly and difficult to maintain, however, and if a pump is not possible, there should be a windlass for raising or lowering a bucket which is kept at the well for the purpose. Users should be prohibited from lowering their own buckets into the well. A light chain is more hygienic than a rope.

TUBE WELLS

If the water lies at a depth of not more than 20 feet, it may be tapped by means of a tube well. Lengths of iron tubing 1 to 2 inches in diameter are driven into the soil to the required depth. As each section is driven in, another is screwed onto it, and a pump is fitted at the top. (It should be remembered that the common hand pump is not able to suck water to a height greater than 20 feet.)

Conserving the water resources of the community

Much of the rain water in an area runs off as storm water into streams and rivers. Some percolates through the soil and forms the ground water which is tapped when a well is dug. Thus during the rainy season many rivers and streams are full, but when the rains are over their flow becomes small, dwindling to a trickle, and finally they dry up in summer. Many communities have learnt from experience to think of water as a resource, necessary for supporting life and agriculture. As a resource, water must be conserved. It has been observed that if a dam is built across a stream, the water is held back and slowly soaks into the ground, thereby adding to the quantity of ground water. As a result, the water table rises and if wells are sunk downstream, or in the neighbourhood of the small pond created by damming, water is struck at a shorter distance than otherwise. Building dams requires some amount of technical knowledge and experience, which is usually available in the local water department. The community can thus be encouraged to tackle various projects for the conservation of water.

Methods of purifying water

Nature has her own ways of dealing with impurities in water. For example, when water is stored in large tanks or reservoirs, pathogenic organisms gradually become fewer in number. Sunlight, aeration and other natural mechanisms create conditions which are unfavourable for bacterial multiplication. However, such natural processes are slow, and it may take as long as a week to ten days to create an appreciable reduction in the number of bacteria. If the reservoir is unprotected from pollution by animal and human sources, the natural method is almost ineffectual.

Filtration is another of nature's ways of purifying water. As the water soaks through the ground, the soil acts as a filter, removing a large proportion of the suspended matter and bacteria. Thus, ground

water which is 15 to 20 feet below the surface is clean so long as it is sufficiently distant from a source of contamination like a cesspit.

In the urban water supply, both storage and filtration are utilised as initial steps in the purification of water.

For purification of wells in rural areas, the most practical method is regular chlorination, in addition to protection from pollution. When bleaching powder is added to water it releases chlorine, which combines with bacteria and other organic matter and destroys them. It is necessary that the chlorine should be in contact with the bacteria for a sufficient length of time in order to kill them, and the dose required is dependent on contact time as well as on the amount of organic matter present. There are several ways of calculating the amount of chlorine required. The sanitarian or the health inspector in the health team has been trained in carrying out chlorination of wells, and his help should be sought for the purpose.

All wells in the locality should be regularly inspected for cleanliness and the safety of the water. Shallow wells should be chlorinated regularly several times in the year, and especially after the rains. Also, a sudden increase in the number of children attending the clinic for diarrhoea and dysentery, or occurrence of enteric fever or cholera in the community, are indications for urgent chlorination of all wells in the locality.

Chapter 26

Handicapping and Chronic Illnesses

Several diseases can cause permanent damage to body organs. Such damage may be obvious, such as paralysis of a limb following an attack of poliomyelitis, or hidden, such as myocarditis following a virus infection. The effects of such damage may be a degree of malfunctioning or disability with which the child and his family can easily cope, or there can be marked interference with the child's development and social adjustment. A child is considered handicapped if he is unable to play, learn, or do things which other children of his age can do, and is unable to achieve his full physical, mental or social potential. Even though physical and mental problems are important in the rehabilitation of such children, emotional and social factors also play a significant role at some time or another and in varying degrees in most handicapping conditions of childhood.

All children learn about the world around them from exploration and play. For example, when the baby learns to sit up he extends his line of vision and is able to look round the room. Various objects attract his attention and arouse his curiosity. Soon he will crawl and be able to get into objects and toys and handle them. He amasses experience and knowledge throughout his waking hours out of information received through vision, hearing and touch. Also, as he moves about and learns to balance himself either sitting or standing, he gains the experience of his body in different positions in space. In the case of a child with a handicap all such experience will be lacking. If vision or hearing is impaired, an important source of learning stimuli is cut off. A motor handicap will interfere with play activity or the entire motor development will be slow, so that the child is still lying down at an age when he should be crawling about and exploring his environment.

The child with a physical or mental handicap causes many strains in the family. The parents carry a sense of guilt and will blame themselves for the suffering of their child. There can also be strains on the family's resources. For example, special foods may be necessary for the child, or he may require various appliances and toys to help with his development. The child will need more help with his day-to-day necessities like

feeding, washing, dressing, etc. The families of handicapped children tend to get socially isolated which again contributes to their unhappiness. It has been shown that the most important factor in the family's successful adaptation is their attitude to the child's handicap. This attitude is largely determined by their own personalities, their aspirations for the children, the size of the family, the sex of the affected child, the type of handicap and above all the continuing support and help provided by the health services.

The common handicapping illness of children can be divided into two broad groups—acquired and congenital. In the developing countries where basic health services have not yet reached the majority of the children, the acquired disabilities still constitute a major proportion of all handicapping illnesses. It is all the more tragic because the means of prevention are well-known and easily available. For example, poliomyelitis is one of the important causes of physical handicaps in rural children. Xerophthalmia and keratomalacia are widespread in many countries of South East Asia, the eastern Mediterranean and Latin America. It is estimated that 80,000 new cases of blindness occur every year in these regions, and that in India alone 15,000 children under the age of five years lose their sight every year. Recent research has shown that administration of 200,000 international units of vitamin A every six months can help to build liver stores of the vitamin and acute deficiency is avoided. Trachoma is another common cause of defective vision in many parts of the developing world. Loss of hearing due to recurrent and neglected middle ear infection is common in rural children. In the case of many children presenting with mental retardation there is a history of an acute illness with high fever, convulsions and loss of consciousness. The unexplained pyrexia may be of viral origin; on the other hand malaria is a well recognised cause of high fever in children. Early intervention with control of fever and convulsions may help to prevent brain damage and permanent sequelae in such children.

Improvements in the general health standards of children in the industrialised societies of the West have helped to eradicate or bring under control many of the common illnesses. Blindness was reduced in western Europe even before the advent of modern medicine through improvements in hygiene, water supplies, nutrition and the standard of living. For the same reasons, the incidence of poliomyelitis has been falling since the beginning of the century, and with the advent of the polio vaccine it is now virtually eradicated. Because of these improvements, the most important handicaps are the ones caused by congenital conditions like cerebral palsy. The incidence of cerebral palsy in village children of the developing world is not known, however, and community surveys and longitudinal studies are needed to arrive at national estimates.

Cerebral palsy usually results from either a developmental anomaly or injury or disease of the brain in the perinatal period. Since the maternal and child health services are inadequate in the rural areas of many developing countries, it is likely that the incidence of cerebral palsy will be very high. Observations on the etiology of cerebral palsy have shown that about a third of such children are born prematurely. Abnormal labour is four times more common than in the case of normal children. There is a higher incidence of antepartum haemorrhage, toxæmia, birth injuries and anoxia in such children. Meningitis and encephalitis are two important postnatal causes. In all these conditions, the basic pathology is one of damage to the developing nervous system so that the child is likely to suffer from multiple handicaps. Disorders of motor control are complicated by associated mental, visual, hearing and speech defects, by emotional instability, and often by epilepsy (see figure 21).

Prevention

The basic step in prevention is adequate coverage of the population with maternal and child health services of a good standard. The impact of these services is best seen when more than 80 per cent of mothers and children in the area make use of them on a regular basis. The services must concentrate especially on the needs of the socially deprived families and other 'at risk' groups, particularly in respect of immunisation, adequate nutrition, and control of infection.

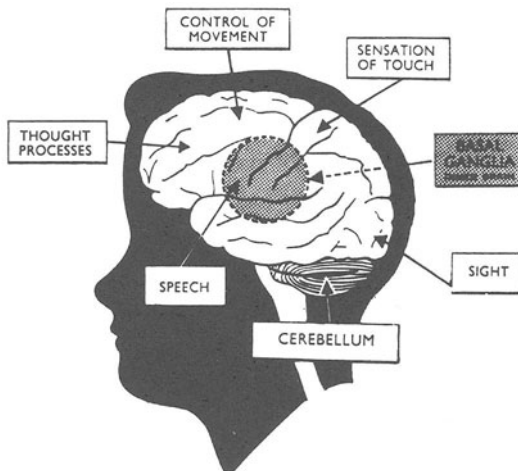


FIG. 21 Different areas of the brain control different functions

In the prenatal period, identification of high-risk pregnancies and early referral to centres with specialist obstetric facilities is essential. Several indications for referral have been discussed in the chapters on antenatal care and the 'at risk' concept.

After the delivery, the emphasis should be on adequate nutrition of the infant and prevention of acute illness. Any severe illness in infancy is potentially dangerous, but the obvious ones as regards neurological damage are infections of the central nervous system, and those resulting in acute biochemical disturbances, e.g. electrolyte imbalance following dehydration. In order to ensure adequate nutrition, brain growth and mental development, breast-feeding is vitally important. The dangers of diarrhoea, growth failure, marasmus and brain damage in bottle-fed babies have been discussed in the chapter on breast-feeding.

Rehabilitation

The key to successful rehabilitation is early diagnosis and training. By the time medical advice is sought and a firm diagnosis is made, the after-effects may have already set in. In the case of a motor defect, a deformity of the limb may be present when the child is first seen, and in the case of a sensory deficit, the child's learning experience may have been so affected that he will be far behind normal children of his age. Hence, a high degree of alertness is necessary, particularly in dealing with children who are 'at risk'. In acquired conditions like blindness, deafness or motor paralysis, the occurrence of a case in a neighbourhood should alert the health team for immediate preventive action to protect other children in the neighbourhood. In addition, local community leaders and government officials should be contacted and involved as early as possible, so that they can assist with the implementation of the preventive programme and become informed about the health risks to the community's children.

In the case of cerebral palsy, early diagnosis requires surveillance and repeated assessment of children who are likely to suffer damage because of exposure to one or more of the following 'at risk' factors.

Children at risk of cerebral palsy

- (1) Those born after a high-risk pregnancy:
 - Very young mother or primigravida above age 40.
 - Birth-order of 5 and above.
 - Toxaemia of pregnancy in the last trimester.
 - Any uterine bleeding during pregnancy.
 - Maternal diabetes.
 - Any acute illness of the mother during pregnancy.

- (2) Those who had a difficult delivery:
 - Abnormal labour, e.g. breech, forceps or caesarean section.
 - Low birth weight.
 - Foetal distress.
 - Difficulty with establishing respiration at birth.
 - Low apgar scores at 1 minute and 5 minutes after birth.
- (3) Those who suffered an acute illness in early infancy:
 - Meningitis, encephalitis, etc.
 - Convulsions.
 - Cyanotic attacks, respiratory distress, etc., in early neonatal life.
 - Diarrhoea resulting in dehydration.
 - Failure to thrive, especially if bottle-fed.

When a diagnosis has been established, plans for long-term management and care should be formulated and discussed in detail with the parents. The following principles should be borne in mind in dealing with children who suffer from a handicap.

(1) As the child grows the effects of muscle imbalance are enhanced. Children with cerebral palsy are not born with deformities. They occur from the pattern of muscle involvement and predominant postures. Bad positioning can be uncomfortable as well as harmful. For example, when sitting on the floor, any position where the knees are turned inward to face each other, or where the lower back becomes very rounded, should be avoided (figures 22, 23). On the other hand cross-leg sitting enables the child to sit with a straight back and should be encouraged (figures 24, 25, 26). The best surface for an infant to lie on is the floor on a sloping support. It is important to stress to the parents the need for periodic change from one selected posture to another during the waking hours. Corner seats, special chairs or standing frames can be made from locally available material for this purpose.

(2) The most important way in which a handicap affects the school child is by interfering with his acceptance by other children. Many children with cerebral palsy suffer multiple handicaps. In addition to the motor defect there may be difficulty in appreciating size, shape and distance, so that they cannot perform simple constructional tasks. There may be visual defect, high-tone hearing loss, or faulty attention span—all of which can cause problems in integrating with other children.

(3) The child's ability to manage his handicap will determine his personality and his capacity for developing personal relationships. Thus, in the management of physical handicap physiotherapy and training are

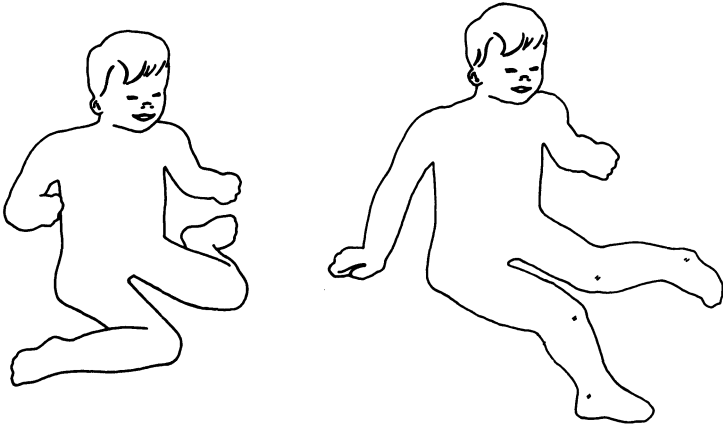


FIG. 22 Positions to avoid (1)

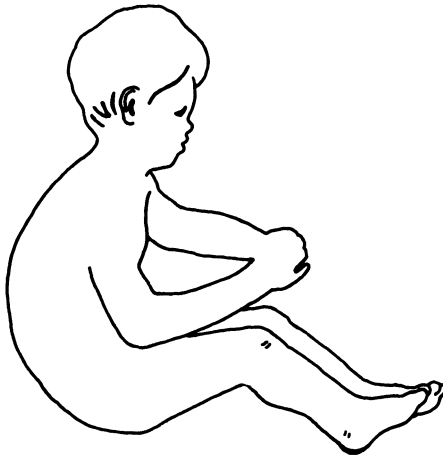


FIG. 23 Positions to avoid (2)

not the only requirements. Encouragement at home to develop mentally and emotionally, and the provision of stimulating play activities, are equally necessary.

The family

Regular home visits and dialogue with parents and family members will help to assess family attitude and identify resources in the home so that



FIG. 24 Positions to encourage (1)

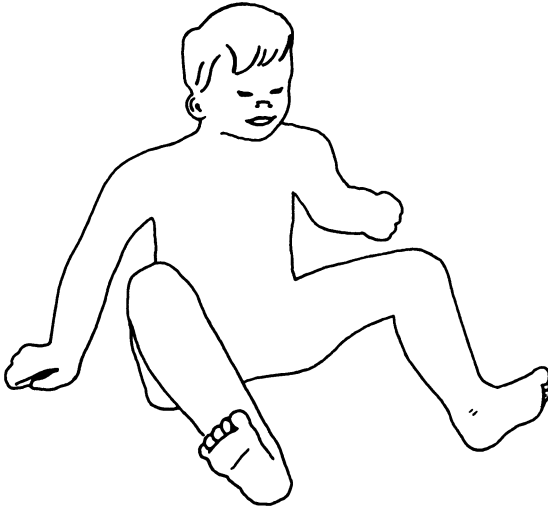


FIG. 25 Positions to encourage (2)



FIG. 26 Positions to encourage (3)

the family can be guided in helping the child. Repeated discussions and advice are necessary before the family members can develop an insight into the child's problems, which of course keep on changing as the child grows older. Besides feelings of guilt, shame and anxiety, parents are invariably worried about recurrence in future children. Hence genetic counselling and detailed information about future risks should be provided to the family at the time of assessment of the child.

Chronic illness

In the case of cerebral palsy or acquired handicaps, the damage is rarely progressive and management chiefly consists of helping the child and his family to learn to live with the handicap. In the case of chronic illness, however, the pathological process can be progressive, such as the nephrotic syndrome, or there can be exacerbations and recurrences, as

with rheumatic heart disease. Many of these episodes require hospital admissions, and in some the child can be critically ill, for example, sickle-cell anaemia in crisis. Such chronic illnesses impose a form of handicap on the child and his family and interfere with his social and emotional adjustment or with learning.

In the management of chronic illnesses, the most important step is to have an accurate and precise diagnosis with assessment of function. Once the diagnosis is made, the management consists of regularity of treatment and follow-up care. Some chronic illnesses require strict dietary management, e.g. a salt-free diet with or without added potassium. As a rule, most parents are willing to co-operate with administration of medicines, but find the dietary restrictions a chore. Regular home-visiting is essential in many cases in order to ensure that the dietetic and therapeutic regimens are properly observed. Children with chronic illnesses can suffer severe emotional problems, especially if they have to be admitted to hospital repeatedly, and the parents need guidance in understanding the emotional problems.

All chronic illness is not necessarily fatal. In some, spontaneous improvement can occur as the child grows older, in asthma for instance, or acute exacerbations may become less frequent, as in sickle-cell anaemia. Others will remain in good control with regular treatment, such as epilepsy. There are only a few conditions where the prognosis is not so good, and even in these the child can have a full and active life with proper therapy.

Chapter 27

Child Spacing

In many countries MCH has come to be synonymous with family planning. In some of the densely populated countries of the world it is understandable that the pressure of numbers is felt acutely. Land-hunger in rural areas creates a large number of people without adequate resources to support themselves and up to 40 per cent of the rural population in some countries is known to exist below the bread-line. Attracted by the hope of employment, rural poverty tends to overflow into cities resulting in the growth of shanty-towns, slums and inner city areas with associated social problems. International donor agencies and national leaders often describe the situation as catastrophic. Crash plans for family planning are devised and at times even enforced on the poorer sections of the population. However, except in a few isolated instances like Singapore, Taiwan and South Korea there is no firm evidence that vertical programmes of family planning have been successful. Even those countries mentioned cannot be called in any way typical developing countries. We must carefully examine the factors contributing to the population problems because if we do not, we may be applying harsh measures to remedy a situation which often stems from social and community factors.

Studies in several peasant societies have shown that parents give a variety of reasons for having many children. A great deal of importance is attached to continuing the lineage so that there will be a living descendant who will commemorate ancestral spirits. In peasant households where every member has to work in the field more pairs of hands mean a large labour force and more productivity. There is also the possibility of protection of property, especially cattle, and security in old age.

At the same time there are also several social restraints to unrestricted child-bearing even though fertility is highly valued. In many parts of East Africa it is generally believed that unspaced and uncontrolled reproduction is animal-like and not dignified for humans. These sentiments are expressed in the words of Julius Nyerere: "Giving birth is something in which mankind and animals are equal but rearing

the young and especially educating them for many years is a unique gift and responsibility of men.”

Under certain circumstances there is a strict avoidance of child-bearing. Post-partum abstinence to prevent the poisoning of milk by another pregnancy is widely practised in many societies and in communities which practice prolonged lactation it acts as a major restraint. At the same time there are prohibitions for a husband to have extra-marital relations or beget a child with another woman. Abstinence is also strictly observed during periods of mourning or of rituals.

Early marriages

In many peasant communities marriage tends to be early and is usually at or soon after menarche. In a study of 400 women in a rural area near Hyderabad, India it was found that the average age of the mother at the birth of her first baby is between 10 and 14 years. This will be typical of many peasant communities. Such early marriages will increase the likelihood of several children per family especially when we consider the probability of conception per menstrual cycle which varies from 15 per cent at age 16 years to reach a peak of 27 per cent at age 25. Hence, if there is to be any programme to limit the number of children per woman it should first aim at raising the age of marriage. Such a move will be beneficial for both the mother and her infant because more women will be entering parenthood at maturity.

Spacing of children

In many communities where on-demand breast feeding is common and is usually continued for two years or more, there is a delay before conception occurs again. This prolonged birth interval has been shown to be due to the effects of prolactin on the ovaries where synthesis of oestrogenic steroids is interfered with. To achieve such a suppression breast feeding must be on demand both during the night as well as the day. In practice this is what happens in most communities since the infant shares the bed with the mother and has easy access to the breast so that night feeding is common. Repeated suckling on the breast results in frequent release of prolactin from the anterior pituitary in the mother which in turn maintains the suppression of the ovaries. In rural communities with on-demand and prolonged breast feeding the average birth interval is between 21 and 24 months. In the community near Hyderabad mentioned above, the average birth interval was 31 months. In rural Rwanda it is 23 months before 50 per cent of mothers conceived

again. On the other hand, in urban Rwanda where feeding takes place by the clock the birth interval is 9 months.

The important role of lactation in maintaining a prolonged birth interval has now been studied in several countries. Such an effect is also seen in most primates. For example in the chimpanzee the average birth interval is five years. It is shortened by infant death which confirms that the prolonged birth interval is induced by lactation. In many nomadic communities that live mainly as hunter-gatherers the average birth interval is known to be four years, and each child is breast fed for three to four years. When such communities take up a settled way of life and babies are weaned early the birth interval becomes shorter. These observations indicate that in primates lactation exercises a central control over reproduction. Throughout the world today more births are prevented by lactation than by all other forms of contraception put together. No doubt the promotion of powdered milks and the growth of the baby-food industry have contributed indirectly to the population explosion in communities where breast feeding has declined.

Family planning

As family planning has come to play a prominent role in the national health plans of many countries it is important to emphasise that this activity should not be thought of in isolation but as an integral part of MCH and family health. A community that does not receive basic health care, including immunization, in the form of services for mothers and children, with more than 80 per cent coverage and with full community participation, should not be pressurised with family planning activities. Experience has shown that in such communities deep anti-pathology towards family planning eventually develops.

In some families it may be considered necessary to prevent another conception because of the health of the mother or in order to enable the mother to devote her time and attention to another child or family member with chronic illness. Some of the situations where counselling for family planning becomes necessary are as follows:—

- (1) If the mother has a psychiatric illness or a chronic disease like tuberculosis or leprosy.
- (2) In maternal depletion syndrome where the mother is malnourished or suffers from anaemia it may be necessary to prevent conception until such time as she has recovered on an adequate diet and treatment.
- (3) If a child suffers from a chronic illness like sickle cell anaemia, nephrosis, tuberculosis or malnutrition it may be considered necessary to prevent another conception until the ill child is considered

to be out of danger. In the case of tuberculosis and malnutrition this would be until full recovery. In the case of sickle cell anaemia, usually crises are rare and easier to treat once the child is above the age of eight years; in the case of the nephrotic syndrome the child may be considered out of danger if in full remission for more than three years.

- (4) A serious illness in the husband or family where the mother is required for full time nursing and care as well as to take on other duties and roles in the family.

The above family situations and problems are best identified through regular contacts with families. Such contacts normally occur in all well organised MCH programmes. Thus, antenatal and postnatal clinics, under-fives clinics, nutrition rehabilitation centres, outpatients and hospital wards, home visiting, 'at-risk' conferences and extension programmes provide opportunities for promotion of breast feeding and identifying families in whom prevention of conception for a period may be necessary.

In suggesting to parents that births may be spaced, thought must be given to those ways of preventing pregnancy which would be most acceptable to them, and this acceptability is often based on cultural, aesthetic or religious grounds as well as practicalities. Careful explanation should be given to the mother so that she will fully understand that she may, at any time, stop avoiding conception and again give birth to normal babies.

Several techniques for avoiding conception are available. Depending upon individual circumstances different couples may choose techniques that they find most easy to understand and practise. It is the duty of the MCH worker to help parents to make an adequate and responsible choice. The MCH worker must realise that for many people moral issues play an important part in the choice they make. For such people, ease of understanding and practice are not the only criteria they want to use. 'Barrier methods' like the condom and diaphragm are frequently used for a short term and have the least number of complications. For long term or on a mass scale the 'pill' and the 'loop' have been extensively used, together with sterilisation in some countries. It is important to remember that with both the pill and the loop complications occur, some of which can be serious, especially in undernourished populations. Expert medical supervision is necessary in the case of both.

In many countries of the Third World, the natural methods of family planning are used extensively. They are accepted because they appeal to local cultural patterns and traditional customs. They rely on a recognition of the cycle of fertility and infertility rather than on drugs and technology which are often less acceptable than in Western civilisation.

Many imaginative methods of teaching parents to recognise their fertility patterns have been devised and the MCH worker will need to spend some time in ensuring that the natural methods are fully understood.

The reproductive activities in a family comprise an important area of human relationships and need to be handled with care, understanding and humanity. A light-hearted or superficial approach can often lead to loss of trust and friendship.

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