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Infant-feeding Practices

Breast Feeding and the Prevention of Infant Malnutrition

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Malnutrition contributes to the appallingly high death rates still to be found in many parts of the world among infants and young children and is the cause of much sickness and ill-health, some of which persists into later life. The recognition of the ubiquity of malnutrition in infants and young children has led to the present interest in infant-feeding practices.

Amongst those peoples in whom malnutrition is prevalent, life is for the most part simple and somewhat naturalistic. It is difficult to find a term to describe these communities; the words 'primitive', 'backward' and 'underdeveloped' are frequently used but none of them is entirely appropriate to such a variety of cultures as is found in large parts of Africa, in the Far East including India and China, and in the Australian bush. For example, many African communities are described as 'primitive', but the majority have a prehistory, if not a history, longer than our own (Sigerist, 1951) and they are composed of settled peoples with agricultural or pastoral pursuits; the term can, however, be more correctly applied to the aborigines of Australia who are among the hunting races and are still at the food-gathering stage of evolution; the civilizations of some of the Far Eastern countries are, of course, amongst the oldest in the world. I shall therefore refer to these communities as 'unsophisticated'; this term also has the merit of applying to some features of their usual infant-feeding practices.

Provision for the health and well-being of the child should of course begin with

antenatal care and a long and ample lactation will partly depend on the care of the mother during pregnancy. However, I shall confine my paper largely to the problem of feeding the child during the period when it may be nursed at the breast; I shall not have time to consider the problem of feeding the weanling, but of course satisfactory feeding during infancy is a contribution to the solution of this problem.

I shall stress the place of the mother and the importance of her nutrition in relation to infant feeding. We have plenty of warning from history (Wickes, 1953*a-e*) of the dangers to infants when the mother does not retain her proper place in the nursing of her infant and satisfactory methods of artificial feeding are not available. Hugh Smith (Still, 1931*a*) records that in London and its suburbs the total number of births each year during 1762–71 ranged from 15,133 to 17,109; approximately half these infants died before the age of 2 years, and two-thirds of them before the age of 5 years. According to Walter Harris, who wrote in the middle of the eighteenth century, 'in the villages about London the passing bell hardly ever ceases ringing out the deaths of infants who have died for the neglect, nastiness, barbarity or intemperance of their nurses' (Drake, 1930).

I shall not in this paper deal with the well-known techniques of feeding infants artificially. These techniques cannot be applied on a large scale to the feeding of infants in unsophisticated communities since sufficient cow's milk, or preparations of it, are not available. It is deplorable that these techniques are given prominence in instructing those who have to deal with the problem of infant feeding in unsophisticated communities. It would seem to be obvious that any such teaching should be based on the use of human breast milk (Platt & Moncrieff, 1947). However, even experts on world food problems tend to overlook the mother as a source of milk and, if it becomes clear to them that a preparation of cow's milk is out of the question, they begin to hunt for a substitute for milk; this they seriously believe should look like milk, as if a baby, properly fed, ever saw milk.

In the middle of the sixteenth century, Thomas Phayer wrote 'wherfore as it is agreeing to nature so it is also necessarie and comly for the own mother to nource the own child' (Still, 1931*b*). Similar advice is to be found throughout the records of the history of infant feeding. As might be expected, breast feeding by the mother is usual in traditional infant-feeding practices. In prescribing for unsophisticated communities our objective, as I see it, should be to retain the best of the traditional practices, many of which we can justify from the results of recent research. I have some grounds for suspecting that future research may provide even better support for many of these practices. Meanwhile our ignorance of some aspects of infant feeding, such as the behaviour of milk in the infant's stomach (Platt, 1954), is so profound that we might sometimes be wise not to try to substitute new methods for old.

One may ask why, if traditional methods are sound, infant and child morbidity and mortality are so high in unsophisticated communities. Where they are worst there will generally be found a measure of sophistication (see p. 102), the results of which may be that the mother does not get enough to eat, and she may wean her infant too early on to inadequate or unsuitable foods; also economic and social

factors may have led to a reduction of the space between pregnancies; and new diseases and more virulent forms of infection may have been introduced.

In addition to noting these economic, sociological and public health aspects of the problem of infant feeding we must remember that studies by anthropologists (Mead, 1947) and psychologists (Goldman-Eisler, 1953) have produced evidence for a relationship between methods of feeding in early life and both the temperament and character of communities and the personality of individuals. I cannot discuss these matters further here; they do, however, serve to show that the feeding of the infant is more than a mere matter of prescribing foods to meet his requirements for nutrients.

We must also keep in mind aspects of the physiology of the infant other than those immediately concerned with the digestion and metabolism of food. The infant at birth is an incompletely developed organism which not only grows in size but develops and matures. Landmarks in his development have been recorded (Gesell & Ilg, 1937*a*) and we can and should relate the methods of feeding and food prescribed to his ability to perform simple acts like mastication and swallowing and to his co-ordination of hand-to-mouth movements.

Establishment of lactation

Infant feeding should begin when the mother is secreting colostrum. This period is of paramount importance in the establishment of lactation. Psychological, endocrine and other factors are involved in the 'let-down' of the mammary secretion and a satisfactory mother-infant relationship is necessary to secure this. The competence with which the infant suckles is also important since the volume of milk secreted is proportional to the degree of emptying of the breast. If for any reason the baby is not able to empty the breast properly then simple manual expression is necessary.

Practices in this early period differ throughout the world; the infant may or may not be allowed to suckle and various foods and other preparations may or may not be given. There seems to be no doubt that the correct procedure is to put the infant to the breast at intervals during the first few days, usually ten or twelve times daily. He thus obtains colostrum which has some nutritional value and possibly contains immune substances; the quantity of colostrum and early milk secreted (Stewart & Pratt, 1939) is sufficient to provide him with the amount of food and fluid he requires at this stage—about $\frac{3}{4}$ oz. milk/lb. body-weight on the 4th day and $1\frac{3}{4}$ oz./lb. body-weight on the 7th–8th day (Illingworth, 1953).

There seem to be no good grounds, therefore, for giving the normal infant any food but the colostrum he can derive from the mother. In fact, artificial feeding may, by satisfying the baby's hunger, reduce his contribution to the initiation of lactation by reducing the amount of fluid he removes from the breast. Loss of weight in the first few days after birth is often a cause of worry, and biochemical preparations and various procedures have been proposed to reduce or eliminate this loss. It is questionable whether such treatments are necessary. If the infant is thirsty,

as he may well often be in a hot climate, then plain boiled water may be given. It would be interesting to know if, under unsophisticated conditions, the newly-born infant does in fact lose weight at the beginning of the neonatal period.

Failure to establish lactation, although common in modern societies, may be an uncommon occurrence in unsophisticated communities. Among the reasons for failure, in this country, are defects in breast hygiene, some of which are consequent upon modern dress and living conditions, bad management of lactation, the attitude towards breast feeding of mothers, their advisers and attendants, and errors in diagnosis. A recent survey in this country revealed that less than half the infants investigated were being breast fed at 3 months, although 70% were being breast fed at 2 weeks (Douglas, 1950). There is evidence that with proper breast management in the prepuerperal period and immediately after parturition few women are physiologically incapable of producing enough milk to nourish their babies; in a series of 400 women over three-quarters were found to be producing enough milk on the 10th day to provide sufficient for a baby weighing 9 lb. at birth (Waller, 1950).

Little attention has been given to malnutrition of the mother as a possible cause of failure to establish and maintain lactation. The composition of milk does not appear to be appreciably affected by underfeeding but the volume produced may be lowered and the duration of lactation reduced (Jeliffe, 1954).

Rhythm and frequency of feeding

For some years a rigid feeding schedule has been in vogue in this country and there are still many advocates of this system. However, the so-called self-demand system, which is elastic and leads ultimately to a regular rhythm characteristic for the infant, has now been introduced, largely as a result of observations in the United States of America. It was before this work was done that I first examined the question of choice of methods of feeding and I asked 'is it desirable to introduce spaced, regular feeding or is it sufficient to instruct the mother to recognise that the baby cries for reasons other than hunger and should not be fed indiscriminately every time he cries, then to leave her to feed the infant at her own discretion' (Platt, 1936). A criticism often levelled at the methods of feeding in unsophisticated communities is that they are haphazard. I suspect, however, that these methods will be found to lead to a regular feeding rhythm as has been shown for the self-demand system (Gesell & Ilg, 1937*b*), which may, indeed, be a reversion to nature's method. Modern opinion is also now in favour of a baby lying, or in America 'rooming', with the mother (Jackson, 1947; Olmsted, 1947; Fries, 1947; Escalona, 1947) as has always been the practice in primitive communities.

Duration of lactation

Differences exist between contemporary practices in this country, where the duration of breast feeding is short, and those in countries where artificial foods are not generally available; in these latter countries some breast milk may be given to

the child for several years, usually for 2–3 years. Of sixty-nine entries summarizing the period of suckling in tribes and sub-tribes of Southern Nigeria, fifty were for periods of 2 or more years (Talbot, 1926*a*). At the beginning of the eighteenth century in this country, breast feeding was continued for about 2 years. Cadogan in 1748 advised a period of at least 12 months (Still, 1931*c*) but, says Still (1931*c*), ‘mothers with social engagements often compounded with their conscience by suckling for a much shorter period; and physicians themselves had begun to realize that the long duration of suckling suggested was a mistake. Nelson’s advice (1753–94) is in accordance with the ideals, one wishes one could say, with the practice—of our own time: our practice corresponds more nearly with the “fashion” of his day. He says “the present Fashion ’tis true, is to let Children suck only three or four months; but surely this is too important an affair for Fashion to take the place of Reason. From my Acquaintance with the Learned on this Head, I gather that generally speaking a Child should not suck less than six months nor more than twelve: but that the Medium, that is nine Months, is for the most part the best”’.

This advice is similar to that offered by most British paediatricians to-day, with the reservations that the child should be accustomed to taking foods other than breast milk for 2–3 months before breast feeding ceases and that, in individual instances, some breast feeds might be continued for longer than 9 months. In deciding on the duration of breast feeding an all-important factor must be the diet available to the child after breast feeding has ceased. There can be no reasonable objection to the cessation of breast feeding during the second 6 months of neonatal life if suitable well-balanced diets can be provided, including cow’s milk, eggs and other protective foods. For the majority of infants such diets are not available and the practice of giving some breast milk throughout the second year of life, or even longer, is therefore most commendable. One might almost say, as a challenge, that breast feeding should be continued until something equally good can be substituted.

There is general agreement that, if the supply of breast milk is ample, it may be the sole source of food for the human infant up to from 3 to 6 months of age. I would, however, entirely agree with the almost universal practice of giving additional foods to the infant from about 3 months of age.

Mixed feeding

Writers on infant feeding are not always clear as to whether they regard the addition of foods to the diet of breast milk as part of the weaning process. This is a question of definition. The word weaning is derived from the Anglo-Saxon ‘wenian’ which means ‘accustom’. There has, however, been a change in the meaning of the word and it has ‘come to suggest sharp detachment and alienation’ (Gesell & Ilg, 1937*c*) which are undesirable features and should be avoided. Generally the process of disengagement is thought of as being from the breast; it might, of course, be a transition from breast to bottle, from bottle to spoon, or from one type of diet to another. I think ‘mixed feeding’ is the term to use for the régime on which some one or more other foods are given in addition to breast milk. One

form of mixed feeding is known as 'complementary feeding', that is when food is given because the breast milk is inadequate as judged by failure of the baby to thrive or gain weight normally; in the view of some this complement should always be milk, but in unsophisticated communities this may not be possible. A complementary feed should always be given after the breast feed. A 'supplementary feed' is one given in place of part or the whole of a breast feed; when not replacing a breast feed entirely it should be given before the breast, which will lead to a reduced secretion of milk. Supplementary feeding is, therefore, essentially a procedure inherent in the process of weaning from the breast.

There are two points which should be noted here—one is the method of giving foods other than breast milk, the other is the need for precautions against infecting the gastro-intestinal tract. Feeding from a cup, which involves a modified form of sucking, can be started soon after birth when it is desired to give plain, boiled water. Spoons, or spoon-like utensils and simple containers, are not nowadays beyond the means of unsophisticated peoples and they are much easier to keep clean and sterile than the more expensive bottle-feeding devices. There is no need to retain the primitive practice of forcibly feeding the infant by smothering it in handfuls of gruel.

The spoon may be used by the mother to introduce thick feeds at 3–4 months; these are preparations that do not have to be chewed and that should be placed well back on the tongue. Throughout the 1st year the infant more or less passively allows himself to be fed with the spoon and it is not until towards the end of the 2nd year that he begins to reach 'a new level of sophistication' (Gesell & Ilg, 1937*d*) in his mastery of the implement; the use of fingers to take up food to feed himself occurs towards the end of the 1st year of life.

The custom of pre-chewing food and introducing it into the child's mouth from that of the mother may possibly be a justifiable practice. I would, however, recommend that infant's foods should be cooked, with certain exceptions such as fruit juices. Even modern preparations of cow's milk are easily contaminated in the bush after the containers have been opened, and one of the worst things that can happen is that they should be given to the infant after being mixed with dirty water.

One purpose of introducing foods other than milk in the early months of life is to accustom the infant to new flavours and textures. Small amounts of each new food should be given separately and they should be introduced at varying ages according to the nature of the food. There is some evidence that the infant's alimentary system may respond to the administration of these foods by developing an increased ability to digest them. Although I have nothing to go on but the knowledge that groups of people adapt themselves to quite varied diets I suggest that the educational value of mixed feeding may be important, not only for accustoming the infant to new foods but also for increasing his capacity to stomach them.

The cereal porridge or gruel used for the early thick feeds will depend on the grain available; there is a good deal to be said, on nutritional grounds, in favour

of selecting ground parboiled or under-milled rice. The use of certain traditional substances, such as the rice-starch cake of China (Platt & Gin, 1938), may have possible advantages. In Hawaii a preparation from fermented *taro* seems to be of value (Crawford, 1937); other starchy roots and tubers, including Irish and sweet potatoes, various yams, and such fruits as plantains and bananas may, if suitably prepared, be introduced at this stage. Occasionally small amounts of cooked egg may be added to these thick feeds. At or about 6 months the infant may be given pounded vegetable, cooked green leaves, mashed pulses of various kinds, including groundnuts, and coconut meat. In view of the interest in soya-bean milk which has recurred from time to time during the last 30 years I may mention that, in my opinion, one of the best of the pulse preparations is soya-bean curd; I have used this as part of the mixed diet for older infants.

Towards the end of the 1st year the child should be gnawing meat bones and should have pounded meat and fish; there is no reason why he should not begin to chew pieces of raw fruits, for example pawpaw, and some vegetables, such as sweet potato, if they can be given free of bacterial contamination. Meat offals, particularly liver, are, of course, of special value.

The older paediatricians, if they did not actually recommend small beer, at least agreed that in the 2nd year the infant might wash down its victuals with this beverage, and I see no objection to young children being given African 'sweet beer', or its equivalent, a 1-day fermented gruel, in fact it may be the cereal preparation of choice. With proper feeding of the mother, and in view of the amounts of ascorbic acid available from the additional foods given, there need be no risk of scurvy. In the tropics it is unlikely that supplementary sources of vitamin D will be required. Broth can be made from some of the foodstuffs suggested above and additional calcium (Williams, 1936) may be obtained from bone broth or from lime-treated foodstuffs. The risk of anaemia developing, as in the wholly breast-fed baby at 6 months, will be reduced by the amount of iron available from additional foods; this may be substantially increased if they are prepared in iron pots and with iron knives (Widdowson & McCance, 1943).

The process of mixed feeding, as I have described it, may be regarded by some as being identical with weaning; it may then be divided into two phases, one in which education and adaptation are the main objectives, and another in which the amount of breast milk is deliberately reduced by supplementary feeding. When breast feeding is continued for a year or more, mixed feeding becomes necessary so that the child may get enough food to meet his requirements. It is essential, then, to recognize the importance of weaning as a biological problem (Clark, 1953) and also to be sure precisely what an author means by the term 'weaning'—for example a whole monograph has been written on the psychological effects of weaning in which the author (Ritchie, 1943) is solely concerned with the abrupt cessation of breast feeding, ignoring the fact that amongst the people he was studying it was customary to give infants a thin gruel from shortly after birth (Gluckman, 1954).

Breast milk during prolonged mixed feeding

As the infant grows the importance of the nutritional value of the additional food increases and if suitable foods are not available the infant may have to continue to derive nutrients, particularly protein, from his mother. Two questions arise here—how much human milk is needed in the 2nd year of life and can the mother produce it?

An answer to the first question can be based on estimates in terms of protein and this is justifiable in view of the evidence that insufficiency of this nutrient is a predominating defect in the diet of many infants. The accompanying chart shows the amounts of each of the ten essential amino-acids contributed, at a 1000 Cal. level, by three typical dietaries of African adults. Guy (1936), discussing the feeding of Chinese children, has expressed the view that if they can, between the ages of 10 months and 2 years, obtain '500–700 cc. of maternal milk in addition to their share of the family diet' the difficulties following on an inadequate diet may be overcome. This amount is about the same as the quantity of skim-milk powder recently recommended during this period (Second Inter-African Conference on Nutrition, 1954). An African infant, however, if he received one of the diets evaluated in Fig. 1 (that is an unmodified fraction of an adult diet), in addition to about 0.5 l. breast milk, would not always obtain sufficient amino-acids to meet his requirements.

Few data are available on the amounts of milk secreted by women in the 2nd

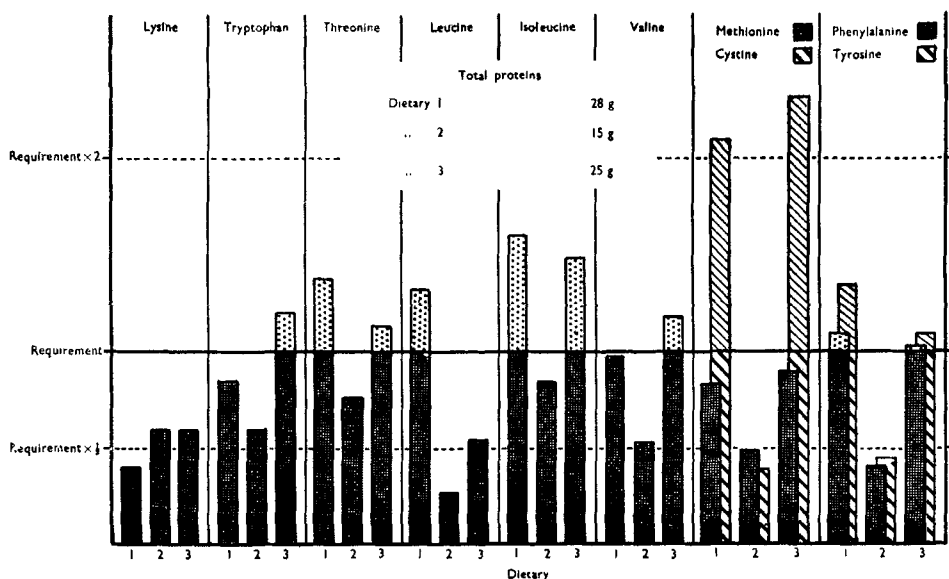


Fig. 1. Relationship of intake to estimated infant requirement (Albanese, 1950) of essential amino-acids in three typical African dietaries at a 1000 Cal. level. The columns indicate the amount of each amino-acid in the different diets, the amounts in excess of the requirement being indicated by change in the marking of the column.

year of lactation. The mean of several observations for the first 2 months of the 2nd year has been given as about 2 l. but most of the subjects were wet nurses (Macy, Nims, Brown & Hunscher, 1930; Budin, 1907; Morrison, 1952). There are other observations which show that similar levels are maintained up to the end of the 2nd year. Eight women from one somewhat unsophisticated community were found to be yielding an average of 357 g milk in 24 h in the 18th month of lactation (Malcolm, 1952). In the same investigation women of the same racial group but in a more sophisticated section of the community were found to have little or no breast milk in the 12th month of lactation. There was no evidence in either sample of extra food being given to the lactating women. Some observers maintain that in the 2nd or 3rd year of lactation the infant probably gets nothing but comfort from the breast; unfortunately we have only scanty evidence for the view, which I believe to be correct, that the child could continue to get milk from a well-fed mother in the 2nd year or even longer. Clearly more information is needed; in the meantime I think it is justifiable to recommend that some breast feeding should continue throughout the 2nd year of life if suitable alternatives are not available, and that mothers should be specially nourished to enable them to continue to lactate.

Feeding infants in the 'bush' when mother's milk is not available

In truly primitive communities, especially those still at the food-gathering stage, the infant's death was believed to be inevitable if the mother's milk dried up or the mother died. There are records of the motherless infant being buried with its mother, for the savage considered this to be preferable to death by starvation which was inevitable as he knew of no foods to replace the mother's milk (Krzywicki, 1934). Outright infanticide has been by no means uncommon amongst primitive peoples and the attitude behind it can be detected in the concept of the 'deposed child'—the child who is born at such a short interval after his predecessor that to feed him would mean taking the birthright of breast milk of the older child. It is encountered in the practice of killing one of twins; I have come across this myself in Africa. It may also be reflected in the custom of the Ibo tribe of Nigeria of murdering or ostracizing the mother of twins and killing both infants (Talbot, 1915). Recently it has been found (Woodruff, 1954) that some Nigerian women may, along with their children, suffer from severe protein malnutrition and that the proportion of mothers of twins in a series of cases was as high as one in four. These women were obtaining only about 10% of the energy value of their food as protein, almost all of it from plant sources, the intake at the end of pregnancy and in the early stage of lactation being less than 40 g/day. There should be no need for such drastic measures as infanticide, and even in the poorest communities it should be possible to provide suitable infant foods for artificial feeding in cases of real need. The employment of a wet-nurse or foster-mother is also a feasible practice which is of common occurrence and at one time was usual in this country. I have described elsewhere various ways in which the system of wet-nursing might be managed (Platt, 1936). One possibility is to set up a human dairy, but where

hygiene is poor, particularly in the tropics, the handling and storage of milk of any kind is a hazardous operation.

The nutrition of the mother

I have argued that an important contribution to the improvement of the feeding of infants in unsophisticated communities might be made if the practice of prolonged breast feeding were retained and encouraged instead of introducing artificial feeding and reducing breast feeding in conformity with contemporary teaching in western countries. More facts are needed before we can dogmatize about this proposal—one consequence of its adoption, however, would be that it would be imperative to pay more attention to the feeding of the mother. The results of some experiments on animals support the need for this attention. We have found that mother rats, fed on certain African diets, invariably eat some or all of their young (Balfour, 1954). There may be some connexion between this observation and a recorded form of cannibalism in which the infant is killed, cooked and eaten (Howitt, 1904).

Recently an East African (Nhonoli, 1954), writing about his own tribe of about a million people, says that 'the pregnant woman is often, one might say always, underfed'; he makes no reference to any extra feeding during lactation. However, in some communities pregnant or lactating women have special or extra foods; for example in Nyasaland they eat the germ and outer layers of maize when it is the staple grain, and mineral-rich 'earths'. Well-to-do women in the Ibo tribe, at any rate up till a few years ago, spent some time in the 'fattening house' after they had had their babies (Talbot, 1926*b*). Chinese women (Platt & Gin, 1938) customarily eat extra foods in the early stages of lactation and in the north (Guy, 1936) those who can afford them have as many as a hundred eggs in the 1st month of lactation. In the history of paediatrics I can find only occasional references to the feeding of the mother, and improved feeding during lactation was not seriously considered except when the employment of the wet-nurse introduced the economic factor. The Israelites were taught that 'when a woman suckles, the work of her hands shall be lessened and her food increased' (Ploss, Bartels & Bartels, 1935). In discussing Avicenna's advice (c.A.D.1000) on the promotion of the flow of milk Still (1931*d*) says that 'one might almost think that Avicenna anticipated some of the endocrine follies of today when he says "some have reported that the teats of sheep and goats, particularly, eaten with their milk in them, have a notable effect in producing milk, and this either on account of similarity of substance or of some obscure quality"'. Phayer followed Avicenna in recommending 'dugges or yader of a cowe or a shepe' and a powder of dried earthworms (Still, 1931*e*); some of the substances he advocates, powdered dried ox tongue, poached eggs and goat's milk, are, however, more in line with present day views.

Traditionally the obstetrician has taken care of the mother and the infant has been the paediatrician's patient and, although in civilized countries the need for improved feeding during pregnancy and lactation is well recognized, the writers of textbooks on infant feeding do not generally devote special attention to the

feeding of mothers. Continuity nowadays is secured by organizations for maternal and child welfare. It is, however, interesting that the first of these organizations, one set up in Paris in 1892, was in the charge of an obstetrician who made valuable contributions to our scientific knowledge of infant feeding (Budin, 1907).

We have now in unsophisticated communities an opportunity to initiate maternal and child welfare projects along lines appropriate to their circumstances; they should not be slavish copies of those in western countries as regards either teaching or practice. It is not necessary in this Society to argue the case for putting improvement of food supplies in the forefront of any development work in poor communities, but the techniques for doing this are by no means properly worked out. I have discussed elsewhere (Platt, 1953) some of the many reasons for regarding work on the welfare of mothers and infants as a good introduction to betterment schemes. I fully appreciate that one of the results of success of such schemes will be an increase in the rate of growth of the population but there is reason to believe that improvement in the status of mother and infant in a society ultimately leads to control of the size of the family and the welfare organizations proposed might easily combine the life-saving parts of their work with advice on family planning.

Note added 11 May 1954. Food supplies and population control in underdeveloped communities were recently discussed in a debate (28 April) in the House of Lords.

I should like to acknowledge the help of Miss M. W. Grant in evaluating the African dietaries used in Fig. 1.

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The Interpretation of the Clinical Stigmata of Nutritional Deficiency

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At the first scientific meeting of The Nutrition Society held at the Physiological Laboratory, Cambridge, on 18 October 1941, the subject for discussion was the Evaluation of Nutritional Status (*Proceedings of The Nutrition Society*, 1944, **1**, 7-18). Both Woolf (1954) and myself deal here with parts of this problem. It is