Department of Health and Social Security

Report on Health and Social Subjects

32

Present day practice in Infant Feeding : Third Report

Her Majesty's Stationery Office

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Report of a Working Party of the Panel on Child Nutrition
Committee on Medical Aspects of Food Policy

London
Her Majesty's Stationery Office

First published 1988

ISBN 0 11 321124 4

Preface

This report is the third in the present series about infant feeding and follows those prepared by the Committee on Medical Aspects of Food Policy (COMA) in 1974 and 1980. The importance of safe and appropriate infant feeding cannot be over-emphasised. Young infants are totally dependent. Their needs are immediate and there is no room for error.

In 1943 the Ministry of Health commissioned a report on breastfeeding[1] in response to concern that only 80 per cent of babies were leaving hospital wholly breastfed whereas the figure was 95 per cent for babies born on the district. The report stressed the importance of the 'flying start' which breastfeeding can give. By the time of the 1974 report the proportion of infants aged 6 weeks who were wholly or partially breastfed was only 24 per cent. The rate of breastfeeding at 6 weeks showed an increase to 42 per cent by 1980 but the figure for 1985 (40 per cent) shows no improvement and there are warning signs that breastfeeding rates may not be maintained in the future. All these reports have endorsed breastfeeding as the best means of infant nutrition yet the rates remain unsatisfactory. New initiatives to support breastfeeding may be called for particularly in view of the social class and geographical gradients that are so consistently maintained.

I am pleased to see that this report also deals with the diet of the toddler and young child and subsequent health in older life. There is a high degree of interest in this relationship particularly following the 1984 COMA Report on diet and cardiovascular disease.

I am grateful to all who have enabled the Department of Health and Social Security to make these regular reports, in particular, the Chairman and members of the Working Group. They gave generously of their time and expertise in this subject which concerns the wellbeing of every child in this country.

DONALD ACHESON
Chairman, Chief Medical Officer, Committee on Medical Aspects of Food Policy

Committee on Medical Aspects of Food Policy

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Acknowledgements

The members of the Working Party wish to express their gratitude to those listed below. The Panel on Child Nutrition of the Committee on Medical Aspects of Food Policy formally considered the draft report; others assisted by giving expert advice and other information or by commenting on the draft report.

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Contents

1. Introduction

1.1 Background to this report

1.1.1 In the early 1970s there was increasing concern that infant feeding practices were often unsatisfactory. Fewer and fewer babies were being breast-fed and there were problems with artificial feeding. A Working Party under the chairmanship of Professor Oppé prepared the report "Present day practice in infant feeding" for the Committee on Medical Aspects of Food Policy (COMA) and it was published by the DHSS in 1974.[2] This report was well received and its recommendations were largely adopted. In 1980 infant feeding was again the subject of a report from COMA. "Present day practice in infant feeding: 1980"[3] took account of the large body of new information available following the widespread interest in infant nutrition as a scientific subject. A welcome return to breastfeeding was reported.

1.1.2 One of the recommendations in the first report had been that patterns of infant feeding should be continuously reviewed. As a result the Office of Population Censuses and Surveys (OPCS) has carried out surveys of infant feeding in 1975,[4] 1980,[5] and 1985. The first two infant feeding reports preceded the surveys. It was decided to delay presentation of the third report until account could be taken of the major findings from the 1985 OPCS survey. In 1985 COMA established a Working Group to prepare this latest report. It met over a period of two years so as to help in planning the survey and to receive the preliminary results.

1.1.3 The establishment of the COMA Working Group took place at a time when public interest in the relationship between diet and health was increasing. Certain of the recommendations in the COMA report on "Diet and cardiovascular disease"[6] excluded the under 5's and part of the Working Group's report covers this age group although a lack of information about the dietary habits of the older pre-school child has precluded detailed comment. The new report, like its predecessors, reviews the latest scientific information about infant feeding.

1.2 Terms of reference

1.2.1 To review current practices in feeding infants and young children and to make recommendations.

1.3 Meetings

1.3.1 The first meeting of the Working Group on Child Feeding was on 14 May 1985. Seven meetings were held and the report was accepted by COMA at the June meeting 1987.

1.4 Scope of the report

1.4.1 The report deals with the practice of feeding infants and young children in England, Scotland and Wales. It is chiefly concerned with the continued nutritional well-being of healthy babies. While the greater part of the report concerns the first six months of life, more emphasis has been given to the second six months of infancy and beyond than in previous COMA reports about infant feeding.

1.4.2 Discussion of the feeding of low birth weight babies or infants who have metabolic or other abnormalities with special dietary needs has not been included in any detail. Maternal diet in pregnancy and lactation falls within the scope of this report in so far as it affects the nutrition of the infant.

1.5 Definitions

1.5.1 The following definitions will be used:

An *infant* is a child who has not attained the age of one year.

A *young child* is a child aged from one to three years.

These definitions were discussed in the earlier COMA report "Artificial feeds for the young infant".[7]

2. Infant feeding practice in the United Kingdom

2.1 Introduction

2.1.1 The re-awakening of interest in the feeding and nutrition of infants that was noted in our previous reports[2,3] has continued. Research done in many countries has resulted in further understanding of the nutritional requirements of infants and of those feeding practices most likely to promote normal growth and development and to avoid diet related diseases in young children and perhaps in later life.

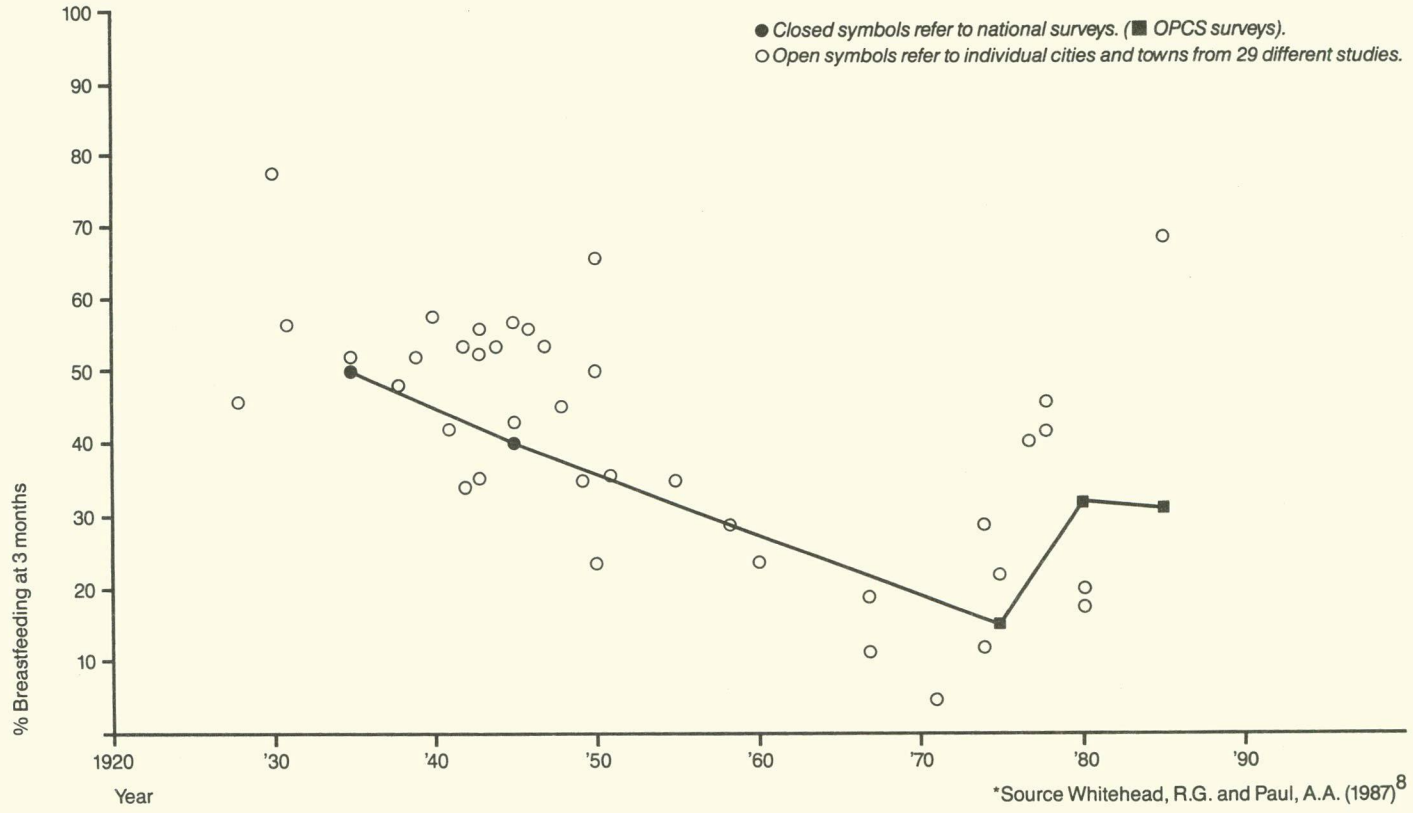
2.1.2 The resurgence of breastfeeding observed in earlier national feeding surveys continues to be welcomed. Further knowledge is now available about the composition of human milk[9,10,11] and about the physiology of lactation[12] as well as the many factors that influence breastfeeding,[13] and research continues. At the same time the Working Group endorses the importance of monitoring human milk for the presence of any harmful agents which could be toxic, mutagenic or infective to the young baby.

2.1.3 Infant formulas that are now in current use in the United Kingdom conform to compositional guidelines published by the DHSS in the report from COMA "Artificial feeds for the young infant".[7] Similar standards or guidelines have been set by a number of international and national bodies and in some countries compliance with standards is a statutory requirement. The result of these regulatory processes has been to ensure that the nutrient composition of the present generation of infant formulas does now, in practice, come as close as is technologically possible and biologically desirable to that of human milk.

2.1.4 The 1980s have been characterised by a surge of scientific interest in and public concern about the relationship between diet and health. In so far as the "child is father of the man" in dietary matters and with our understanding that rapid tissue growth and immunological immaturity may increase the susceptibility of fetuses, infants, and young children to adverse effects from dietary factors, we included these aspects in our review.

2.1.5 The interest in food and health and the likelihood of significant reductions in mortality and morbidity to be gained from modification of the

Figure 2.1: *Proportions of mothers breastfeeding at 3 months from 1920 to 1985 (England and Wales)**



national diet have led to increasing demand for a Government led food policy and for the public to be more fully informed about the nutrient contents of processed and manufactured foods. There is particular concern about the diet of expectant mothers and of the foods offered to infants and young children during the weaning period. For these and other reasons we have looked more closely than before at the diversified diet of the weanling although we had no prior evidence of harm arising from the foods in current use.

2.2 Surveys of infant feeding practice

2.2.1 Throughout the preparation of this report we have been greatly helped by the information obtained from the OPCS surveys of infant feeding carried out in 1975,[4] 1980[5] and 1985. These surveys were commissioned by DHSS in response to the recommendations of our first report (1974) that provision should be made for "a continuous review of patterns of infant feeding". The first survey covered only England and Wales, while the second and third surveys included Scotland, which enabled statistics about infant feeding for the whole of Great Britain to be produced from 1980.

2.2.2 The 1975 survey was carried out by means of personal interviews with the mothers of a nationally representative sample of over 2000 babies born in September and October 1975. The two later surveys were carried out largely by means of postal questionnaires sent to similar, but larger, samples of mothers. In order to achieve comparable response rates with the interview survey, mothers who did not return a questionnaire after two reminders were visited by an interviewer. On all three surveys contact with mothers was made initially when the babies were about six weeks old. On the first two surveys a further contact was made with some mothers at four to five months. Those still breastfeeding were followed up at six months and at one year on the 1975 survey and at nine months on the 1980 survey. For the 1985 survey, in order to examine weaning practices, all mothers were followed up at four to five months and at nine to ten months.

2.2.3 In 1985, a proportionately larger sample of mothers in social class five and whose social class was not classified was selected so that such mothers could be studied in greater detail. Thus in 1985 a sample of 8156 births was selected for the survey. Of the mothers who were sent an initial questionnaire when their baby was six to ten weeks old, 82 per cent replied by post. A further 9 per cent completed the questionnaire when contacted by an interviewer, giving a total response rate of 91 per cent. Most of the non-response was because mothers had moved from the address given when they registered the birth; only 1 per cent of mothers refused to take part in the survey. At the second contact, when the babies were four to five months old, the response rate was 81 per cent. At the third stage, when the babies were nine to ten months old, the response rate was 83 per cent. Thus there is complete information from some 5000 mothers.

2.2.4 Preliminary analyses from the 1985 survey of infant feeding practices have been available to the Working Group preparing this report. A full analysis of the survey is expected in 1988.

2.2.5 *We recommend that national surveys of infant feeding practice be continued.*

2.3 The 'WHO Code'

2.3.1 In response to widespread concern about the safe and adequate nutrition of babies world-wide but particularly those in developing countries, the World Health Assembly, in May 1981, overwhelmingly approved a resolution to adopt, in recommendation form, the World Health Organisation International Code of Marketing of Breast-Milk Substitutes.[14] The aim and principles of the WHO code, as it is often called, are to protect and promote breastfeeding and to ensure the proper use of infant formulas.

2.3.2 The UK governments fully endorsed these aims and a voluntary code of practice was drawn up by the then Food Manufacturers' Federation (FMF), now the Food and Drink Federation, in consultation with government. A Health Circular HC (83)13[15] (in Scotland 1983 (GEN)14)[16] (in Wales WHC(83)16)[17] set out DHSS guidance about the responsibilities of health professionals in respect of the aims of the WHO code and of compliance with the applicable provisions of the FMF code. The FMF Code of Practice for the Marketing of Infant Formulae in the United Kingdom (FMF Code) provided for the establishment of a Committee to ensure that participating manufacturers comply with its regulations.[18] The Code Monitoring Committee for the Marketing of Infant Formulae in the UK under an independent Chairman has eight members nominated by government and four members who represent industry. We are not satisfied that Health Authorities have taken adequate steps to inform managers and health professionals about the FMF code and the arrangements made to ensure that it is implemented. (para 4.4.3). *We recommend that HC(83)13, 1983(GEN)14 and WHC(83)16 should be updated and re-issued. We recommend that all concerned with the marketing of infant formula in this country should comply with the FMF code.*

3. Human milk and breastfeeding

3.1 Introduction

3.1.1 Breastfeeding from a woman who is in good health and nutritional status provides a complete food which is unique to the species. There is no better nutrition for healthy infants both at term and during the early months of life. The Working Party endorses its earlier recommendation that breastfeeding is preferable to feeding with infant formulas and should be encouraged. *The Working Group recommends that the Government Health Departments should encourage all mothers to breastfeed their babies.*

HUMAN MILK

3.2 Colostrum and mature milk

3.2.1 There is no accepted definition of colostrum, transitional and mature milk as it applies to the human. Changes in composition during the course of lactation are greatest and tend to occur more rapidly during the first week post-partum. At ten days after birth the term "mature milk" may be used.[19] The composition and volume of a mother's milk varies according to the individual mother; the volume of milk is also influenced by the infant's feeding demands. There are variations in volume and composition dependent on whether the milk is suckled or expressed, on the time of day, and on the extent to which the breast has previously been emptied.[20, 21, 22, 19]

3.2.2 *Colostrum.* The milk produced in the first few days after birth is known as colostrum. It provides all the nutrients, including water, that are needed by the infant in this early period. Colostrum is compositionally distinctive. The concentrations of protein, vitamin A and vitamin B_{12} are higher in colostrum than in mature milk. The fat content of colostrum is somewhat lower than that of mature milk.

3.3 Anti-infective factors in human milk[23]

3.3.1 Colostrum contains a high concentration of immunoglobulins. Especially important is immunoglobulin A (Ig A) which is active in the lumen of the gut where it limits the multiplication of bacterial and viral pathogens within the digestive tract. The mature newborn will already have received immunoglobulin G prenatally from its mother by placental transfer and there is a further transfer from the milk. The transfer of living lymphocytes and

macrophage cells from mother to infant in human milk is thought to contribute to the infant gut's immune defences. Other known anti-infective agents in human milk such as the iron binding protein lactoferrin and the enzyme lysozyme may also increase resistance to infection by the inhibition of bacterial growth or by reducing the pathogenicity of micro-organisms.

3.3.2 Anti-infective agents continue to be found in mature human milk but not in the same concentrations. The clinical relationship between breastfeeding and infection in the infant in the developed world remains uncertain.[24] In India, human milk has been shown to exert a protective effect against infection in high risk low birth weight infants.[25] In Brazil breastfeeding was found to be protective against infant deaths from diarrhoea and respiratory infections.[26]

3.4 The composition of human mature milk (Table 4.1)

3.4.1 *Energy.* The COMA report "The composition of mature human milk"[20] stated that mature expressed human milk provided on average 70 kcal/100 ml (290 kJ/100 ml) but there is a considerable range. Mean values from various other studies have laid between 67 and 75 kcal/100 ml. More recent estimations of the energy value of human milk using the doubly labelled water method on free living infants give average energy levels which are lower than these.[27] Fat is the major energy-donating component and the variation in the fat content of milk is mainly responsible for the considerable range of energy values (para 3.4.6).

3.4.2 *Protein.* The protein in milk is traditionally classified as curd (casein) protein or as whey protein depending on the observed reaction of the respective fractions to the souring and fermenting of milk. There are several compositionally distinct caseins and the whey fraction also contains a number of proteins of which alpha-lactalbumin, lactoglobulin (Ig A), and lactoferrin are present in highest concentrations. 100 ml of mature human milk contains on average 1.1 g protein (calculated by the traditional method: total nitrogen x 6.38)[7] of which about 0.45 g is casein. It is uncertain to what extent the protein in the remaining whey fraction is absorbed.[28]

3.4.3 Human milk contains other nitrogenous substances which are not proteins such as urea, creatinine, uric acid and free amino acids, which, together with the protein fraction, make up the total of the nitrogen containing components of human milk. This so-called "non-protein nitrogen" constitutes up to 25 per cent of the total and the biological significance of this high proportion in comparison with the non-protein nitrogen in the milks of other mammals is uncertain.[22, 29]

3.4.4 *Carbohydrate.* The principal carbohydrate of mammalian milks is lactose which yields a mixture of galactose and glucose when digested. Galactose is necessary for the synthesis of glycoproteins and glycolipids of the central nervous system, and can be synthesized from glucose in the liver.

Lactose is not therefore an essential sugar and infants can thrive on lactose free diets. However, lactose may have special functions within the lumen of the gut including the facilitation of calcium absorption, and in developing the acidity of the gut contents and the nature of the bacterial flora.

3.4.5 *Fat.* Fat provides much of the energy and all of the essential fatty acids and it is also the carrier of fat soluble vitamins A, D, E and K and of prostaglandins. The fatty acids present in human milk reflect to a considerable extent those present in the maternal diet and may therefore vary particularly between individuals at the extremes of maternal diet, from the vegetarian to the meat and fish eating mother. As a general rule the fat in human milk is different from, and better absorbed by, the human infant's gut, than the fat in the milks of other mammals.[30] In addition human milk lipase assists the efficiency of fat absorption. Human milk fat is rich in long chain fatty acids which are either unsaturated or which have specific structural qualities which contribute to the ready absorption of human milk fat. It also contains 12 to 25 mg cholesterol per 100 ml.

3.4.6 The total fat content of the milk the infant receives is low at the beginning of each feed,[21] and depends on the extent to which that breast was emptied during the previous feed. As the infant feeds the fat content rises by as much as 3 or 4 fold but the extent is very variable. There is also evidence that average fat levels vary at different times during the day in a cyclical manner. In spite of these variables, it is still apparent that women have individual and different fat concentrations in the milk they secrete. These variations must all be appreciated when information derived from the analysis of samples of expressed human milk about the lipid composition of "average" mature human milk is considered (para 3.4.1).

3.4.7 *Vitamins.* A plentiful supply of breast milk from a well nourished mother will normally satisfy the infant's requirements for vitamins although vitamins D and K may be exceptions.[31]

i. *Vitamin D*: Breastfed infants rarely develop rickets and this has been taken as evidence that human milk usually contains sufficient amounts of vitamin D to meet the needs of growing infants. However, there is still some uncertainty about the sufficiency of vitamin D in human milk,[32] when the vitamin D status of the mother is low. Vitamin D stores in the liver of the newborn and also exposure of the infant to sunshine help to achieve a satisfactory vitamin D status in the breastfed infant.

ii. *Vitamin K*: Human milk contains low levels of vitamin K (1-2 μg/ml). If haemorrhagic disease occurs in the newborn it is usually as a result of low vitamin K stores rather than the low levels in human milk. More recently vitamin K deficiency has been implicated in "late haemorrhagic disease". In these cases, which are rare, exclusively breastfed infants develop bleeding states beyond the neonatal period.[33]

3.4.8 *Major minerals and trace elements.* Human milk will provide all the major minerals and trace elements known to be essential for healthy infants

(ie infants born with adequate stores and not affected by short gestation or by severe placental insufficiency; see para 7.4.1). The list includes sodium, potassium, chloride, calcium, phosphorus, magnesium and iron, copper,[34] zinc, manganese, chromium, molybdenum, cobalt, selenium,[35] iodine and fluorine. The actual requirements of young infants for these nutrients are not precisely known. Although the intakes of some trace elements from human milk may appear low, no evidence of deficiency is found in breastfed infants due, in part, to the excellent bio-availability of these elements from human milk.[36]

BREASTFEEDING

3.5 Trends in breastfeeding

3.5.1 The OPCS surveys of infant feeding show that the incidence of breastfeeding, defined as the proportion of infants who were put to the breast, increased in England and Wales from 51 per cent in 1975 to 67 per cent in 1980. Since 1980 there has been little change either in England and Wales or in Scotland although the incidence of breastfeeding is still considerably lower in Scotland than in England and Wales, 48 per cent compared with 65 per cent in 1985. Moreover, in both there has been virtually no change between 1980 and 1985 in the prevalence of breastfeeding at ages up to 9 months (Table 3.1). In view of the stated superiority of breastfeeding as a means of infant nutrition[2, 3, 37, 38] the Working Group has been disappointed about the lack of increase in the degree to which these country's babies are being breastfed.

Table 3.1 *Prevalence of breastfeeding in 1975, 1980 and 1985 (per cent)*

	England and Wales			Scotland		Great Britain	
	1975	1980	1985	1980	1985	1980	1985
Birth	51	67	65	50	48	65	64
1 week	42	58	57	44	41	57	55
2 weeks	35	54	53	41	38	52	52
6 weeks	24	42	40	32	29	41	39
4 months	13	27	26	21	22	26	26
6 months	9	23	22	18	19	22	22
9 months	*	12	12	9	10	12	12
Base (number of infants):	1544	3755	4671	469	552	4224	5223

3.5.2 All three surveys have shown that earlier birth order, education of the mother beyond the age of 18 years, high social class, living in London and the South East, and being a mother of 25 years of age or over, are factors associated with the highest incidences of breastfeeding. For example, in 1985, 87 per cent of mothers in social class 1 (professional and managerial) started to breastfeed compared with only 43 per cent in social class 5 (unskilled). Mothers in the groups which were most likely to start breastfeeding were also those who continued breastfeeding longest.

Figure 3.1: *Proportions of infants being breastfed in the first 9 months: England and Wales. (OPCS Survey 1975, 1980, 1985)*

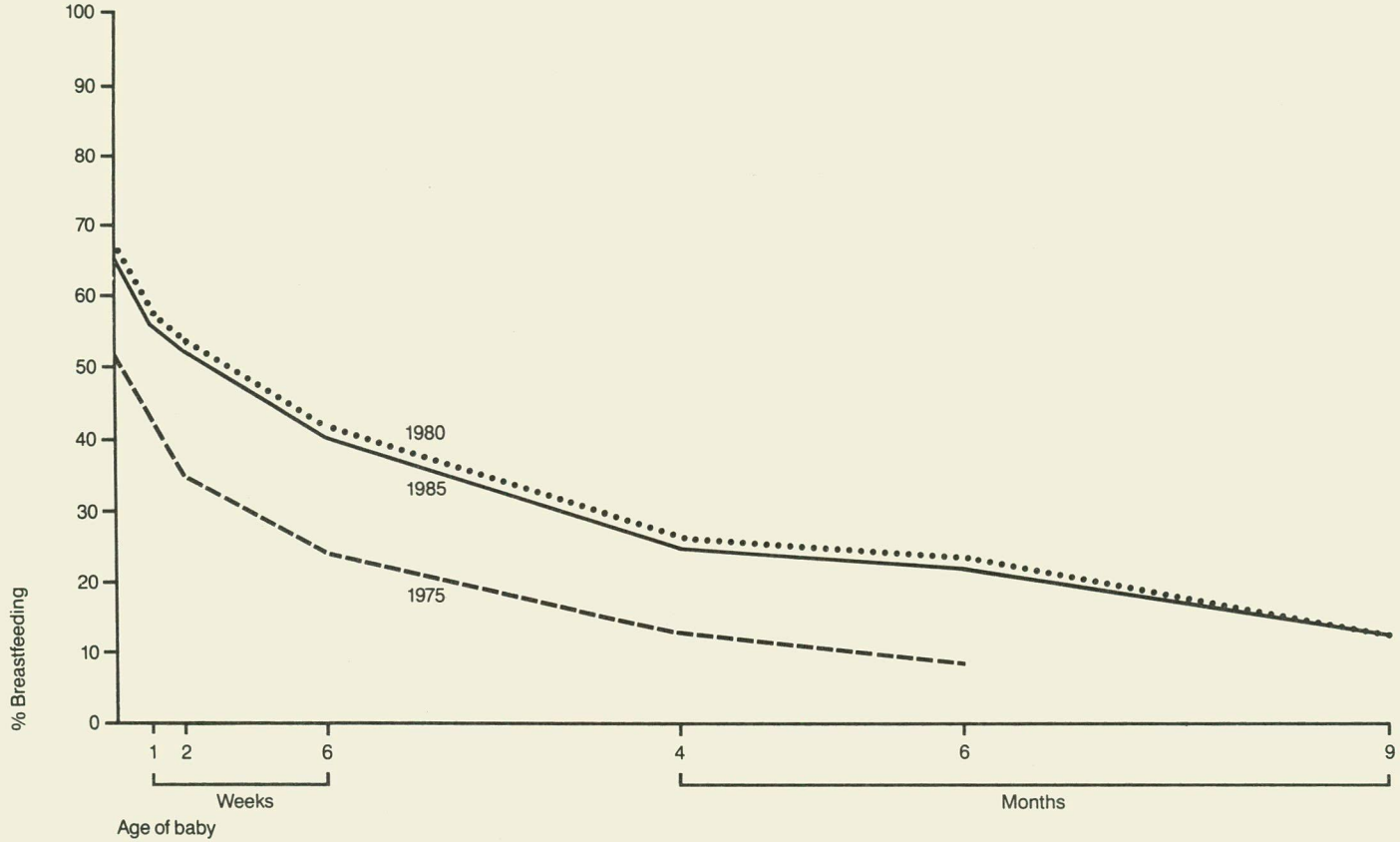
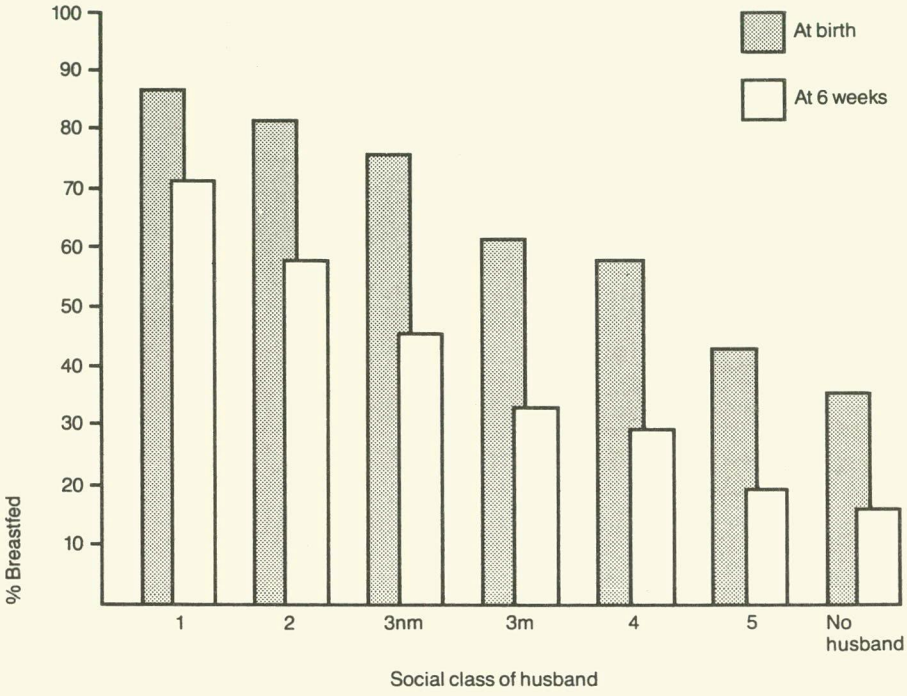


Figure 3.2: *Proportions of infants put to the breast at birth and proportions of infants being breastfed at 6 weeks by social class of husband: Great Britain 1985 (OPCS 1985 survey)*



3.5.3 *Breastfeeding and birth order.* For mothers having a second or subsequent child, the experience of feeding the first child was a major influence on the choice of method for the later children. The OPCS surveys have all found the highest rates of breastfeeding among first babies, with successively lower rates for higher birth orders. However, the decrease in incidence with increasing birth order is less marked in 1985 than it was in 1980. Compared with 1980, the rates for second and third births have barely changed, while the rate for fourth or later births has risen. But the rate for first births has fallen from 74 per cent to 69 per cent (Table 3.2). This decrease is important because all the surveys have shown that a mother's experience of feeding her first child crucially affects her choice of method for her later children. So the rates of breastfeeding for second and subsequent children in 1985 will be determined largely by mothers' experiences some years ago when their first children were born. This probably explains why the rate for fourth or later births is higher in 1985 than it was in 1980. It also implies that a fall in breastfeeding among first births in 1985 compared to 1980 may herald a decrease among later births to such mothers and thus an overall decline in the incidence of breastfeeding in coming years.

Table 3.2 *Prevalence of breastfeeding by birth order 1980 and 1985 (per cent)*

	1980	1985
First birth	74	69
Second birth	60	60
Third birth	56	57
Fourth or later birth	49	56
All second and subsequent births*	58	59
All births	65	64

*includes some babies whose exact birth order was not known

3.6 Influences on a mother's decision about breastfeeding

3.6.1 Those who wish to encourage mothers to breastfeed must first know what factors will influence a mother to choose a particular feeding method. Although this choice does not have to be made until the birth of the mother's first baby, the 1975 OPCS survey showed that 30 per cent of mothers of first babies had decided on their feeding method before they became pregnant. Many of the remainder made their choice early in pregnancy. This suggested that in order to have an influence on the choice of feeding method attention should be directed to young women before they leave school rather than waiting until they become pregnant (section 9.1). Nevertheless, professional advisers do have the opportunity to talk to women about their decision during pregnancy. The 1985 OPCS survey found that only half the mothers of first babies reported both being asked about their plans and having some discussion about feeding during antenatal visits.

The Working Group recommends the search for new ways of encouraging breastfeeding especially in those sections of the community where it is shown to be low.

3.6.2 Experience in feeding the first child is a very important determinant of the method chosen and the success of breastfeeding of subsequent children (para 3.5.3). It is important to pay particular attention to parents having their first baby; they need help in making an informed decision about the method of feeding and those who choose breastfeeding should have readily available help if needed.[39]

3.6.3 The OPCS surveys and others[40, 41] have consistently shown that the mother's choice of how she will feed her baby is strongly associated with her socio-economic circumstances. Although the factors listed in para 3.5.2 and 3.5.3 are strong indicators of the likelihood of a woman choosing to breast-feed, they are not in themselves direct influences on her choice. There are other factors in a woman's background and environment, closely associated with her socio-economic group, which have a more direct influence, but are less easy to study.[42] For example, the knowledge that in 1985 87 per cent of women in

social class 1 chose to breastfeed does not explain why they chose to do so, nor why the other 13 per cent chose to bottle feed. Several studies have identified factors which appear to have a more direct effect on a mother's choice of whether she will breastfeed or not. These include a woman's personal attitudes and beliefs and whether she herself was breastfed. The attitude of the baby's father is very important. She will also be influenced by her mother and by her friends and what they believe and have experienced in feeding their babies.

3.7 Antenatal preparation

3.7.1 *The Working Group recommends that the subject of infant feeding should be raised with every pregnant woman* in time for discussion, consideration and decision-making before the birth. The role of professional advisers is to inform, support and advise; excessive zeal in the promotion of breastfeeding can be counter-productive.

3.7.2 Consistent advice and support both pre- and post-natally by a midwife and/or health visitor with whom the parents are familiar has been associated with successful breastfeeding[43]. The Working Group would wish to encourage further adoption and assessment of this practice.

3.6 Initiation of breastfeeding

3.8.1 It is important in the initiation of breastfeeding to establish early contact between mother and baby usually by putting the baby to the breast soon after birth for a short while. The OPCS surveys have shown that delays in initiating breastfeeding of more than a few hours after the birth are associated with early cessation of breastfeeding.

3.8.2 There is no doubt about the advantages of "on demand" feeding for both mother and child. The proportion of mothers reporting having to breastfeed at set times in hospital declined from 64 per cent in 1975 to 19 per cent in 1985. Such mothers were more likely than those who fed on demand to stop breastfeeding in the early weeks. Frequent suckling stimulates the mother's secretion of prolactin which, in turn, contributes to an increased milk supply. If the milk is regularly and frequently removed from the breast by suckling, breast engorgement very rarely occurs. The frequency of "on demand" feeds may rise to 2 hourly in the early days, but, towards the end of the first week of life, the milk supply becomes adjusted to the baby's demands which become less frequent. Rooming-in of the baby is to be encouraged during this period of initiation of lactation.[10] If a mother wishes to breastfeed, no other fluid should be given to the baby. There is no need for it in a well baby[44] and once feeding other than breastfeeding is begun, successful lactation is jeopardised.

The Working Group recommends that more encouragement be given to those practices which favour the successful initiation of lactation.

3.8.3 All who come into contact with the newly delivered mother should encourage her in gaining confidence in breastfeeding and in accepting that her milk can supply all her baby's nutritional needs. Health professionals may need to help her in regard to positioning of the baby, and may need to give guidance if the baby appears either too sleepy or too hungry, and so on. However, there are very many mothers who successfully initiate breastfeeding with no more guidance than the re-assurance that what they are doing and enjoying is right. It is also important that the father and other close family members have confidence in her abilities; open visiting for the father may help to gain his support.

3.8.4 *Complementary feeding.* This is the term sometimes applied to the practice, during the establishment of lactation, of giving infant formula feeds in addition to breastfeeding at the same feed. Complementary feeding, usually after breastfeeding, may be given to provide additional nutrients or fluid if breastfeeding is thought to be insufficient. If lactation is to be successfully established this practice should be avoided unless in exceptional circumstances (para 3.10.2).

3.9 Neonatal jaundice and breastfeeding

3.9.1 An association between breastfeeding and the occurrence, severity and duration of neonatal jaundice is well recognised although the responsible factors are not entirely clear and may be related, in some cases, to a so far incompletely identified substance in human milk.[45] It is important to consider other causes of jaundice before the diagnosis of "breastfeeding" jaundice is made. The serum bilirubin concentration in the blood of infants affected by breastfeeding jaundice is rarely at a level to cause concern. However, on occasions, the paediatrician may have to chose between advising temporary cessation of breastfeeding or the institution of phototherapy as the most desirable means of reducing unduly high levels of bilirubin.

3.10 Maintenance of breastfeeding

3.10.1 The 1985 OPCS survey of infant feeding practices has shown that the previous increases in prevalences of breastfeeding at various times post-partum have not been maintained.

3.10.2 The most common reason given for stopping lactation earlier than the mother had planned was "insufficient milk". True failure of lactation due to a recognisable pathological cause can occur but it is rare. Where a breastfed baby appears to be hungry the first response should be to increase the frequency of breastfeeds. Every opportunity should be taken to encourage the mother to continue to put the baby to the breast with the prediction that the

flow of milk will increase after a few days. Confidence and satisfaction in breastfeeding favourably influence the outcome. If the mother responds to the baby's demands by giving infant formula feeds or dextrose water[46] instead of extra breastfeeds, it is likely that her supply of milk will not increase to match her baby's needs and she will then find that she has "insufficient milk".

3.10.3 Health workers need to work collaboratively with the mother and other immediate family in tailoring guidance and plans for the best welfare of individual mother and child. They should avoid seeming to take over the care of the baby. Both the initiation of breastfeeding and its maintenance are strongly associated with socioeconomic background.[47] There is a special need to support mothers from groups with low rates of breastfeeding who decide to breastfeed so that they are helped to breastfeed as successfully as mothers from groups where breastfeeding is more common.

3.10.4 One of the most important factors in the support of breastfeeding is time for the professional adviser, experienced friend, relative or volunteer to listen to the mother and provide ample encouragement and reassurance. This may involve cooperation with voluntary bodies (Appendix I).

3.11 Breastfeeding while giving other feeds

3.11.1 Once lactation is well established, mothers need to be reassured that there can be flexibility in breastfeeding. If, for some reason, a mother cannot feed her baby for a short while, it does not mean that breastfeeding must end. Successful lactation can often be re-established even after a week without suckling.[48]

3.11.2 Breastfeeding need not stop abruptly. If the lactation is tapered during a period of mixed feeding with other fluid or solid feeds, the output of milk will diminish but it will not cease altogether. The term "supplementary feeding" is used when a non-human milk feed is given in place of one or more feeds at the breast. A period of continued lactation in association with other forms of feeding is a natural progression as the child gets older (para 6.1.1). Breastfeeding, in association with other food intakes, can continue into the second year. At whatever stage a mother decides to halt her lactation, gradual weaning off the breast is a safer and more comfortable way for her.

3.12 Paid employment by the mother

3.12.1 Feeding an infant whether by breast or bottle is time consuming and a mother will need plenty of help from those in her household especially during the early months. A woman's intention to return to paid work soon after having a baby does not seem to be a major influence on her choice of method of feeding. The 1985 OPCS survey showed that a minority (11 per cent) of women returned to work within 5 months of having a baby, and 21 per cent

had returned within 9 months, most to part-time work. Many mothers breastfed until they returned to work; also, mothers who returned to work early were just as likely to have breastfed before they started work as mothers who did not do paid work when their babies were very young.

3.12.2 Employed mothers with young babies tend to come from the extreme ends of the social class spectrum, but are no less likely to breastfeed than other mothers of the same social class and educational background. The better educated women, who are more likely to have paid maternity leave, generally breastfeed until they return to work. Those at the opposite end of the social class and educational scale, who come from backgrounds where rates of breastfeeding are in any case very low, tend not to breastfeed.

3.13 Social acceptance of breastfeeding

3.13.1 *We are concerned that breastfeeding has not yet gained complete social acceptance as the usual way of feeding babies. The Working Group urges social, community, educational, commercial and other concerns to take a positive approach to this matter.* It is important that mothers should feel free to feed their babies when and where this becomes necessary. We are pleased at the increasing trend towards social acceptance of breastfeeding in a variety of places. There are occasions when a degree of privacy may help the nursing mother and large shops, offices and colleges, for example, should be encouraged to set aside space for this purpose. The 1985 OPCS survey of infant feeding practices found that women would welcome more facilities to feed and change their babies; thirty-two per cent had experienced problems finding somewhere to feed their babies when in public places. Shops and shopping centres were most often mentioned as places which mothers thought should provide these facilities.

3.13.2 Baby care facilities need to be separate from adult toilets. Such facilities should be clean, with soft furnishings to encourage a relaxed atmosphere. This service is just as important for bottle feeding parents who will not want to be separated from their babies when they go out. Most larger towns now have at least one such facility which is designated by the National Baby Care Symbol (see front cover).

3.14 Smoking

3.14.1 Mothers were asked for the first time in the 1985 OPCS survey whether they had smoked before, during or after the pregnancy. In each social class those who smoke were less likely to breastfeed. Thirty-nine per cent of all mothers were smokers before pregnancy; of these only 24 per cent started breastfeeding. High social class was correlated with low smoking rates before pregnancy and high rates of giving up the habit in pregnancy.

3.15 Breastfeeding and HIV

3.15.1 Universal antenatal screening for human immunodeficiency virus (HIV) is not being recommended by the Royal College of Obstetricians and Gynaecologists;[49] we endorse their proposals for selective testing or "case finding" and we would consider this method an adequate safeguard for the baby as regards the mother's intention to breastfeed. It is probable that no more than a very few women of reproductive age in the UK are infected with HIV at this time. The number who are pregnant is tiny, but there is, nevertheless, a need for guidance for these few UK mothers about the feeding of their babies. A proportion of mothers who are HIV seropositive in pregnancy will transmit the virus to the fetus in utero, and infection has been reported to have been transmitted by breastfeeding.[50] The additional burden of risk to an infant from breastfeeding from its HIV seropositive mother seems likely to be only a small proportion of the total. Nevertheless, as a means of reducing the risk to the baby to a minimum, HIV seropositive mothers in the UK should be discouraged from breastfeeding. However, where a mother insists on breastfeeding it is her right to be assisted to do so. Women from high risk groups who have not been serologically tested should be given the same advice as those who are proven seropositive. This guidance is relevant to the UK only and may need to be reviewed if the prevalence of HIV sero-positivity changes. It is relevant only where there is a safe alternative to breastfeeding. *We recommend that women known to be HIV antibody positive or those at high risk who have not been serologically tested should be discouraged from breastfeeding in the UK.*

3.16 Chemical contamination

3.16.1 Infants, whether breastfed or artificially fed, ingest many inorganic and organic chemicals which have no nutritive or protective value for them. Maternal hormones, maternal medicines[51] and pesticide residues were considered in the 1980 report,[3] and heroin and other drugs of addiction must now be added to this list. The British National Formulary continues to provide guidance about the greater care needed when prescribing drugs to breastfeeding mothers. The Report of the Working Party on Pesticide Residues (1982–1985) describes a fall in organochlorine residues in human milk from pesticides since 1979 in a Scottish survey.[52]

3.17 Infant feeding and contamination of foods from radioactive materials

3.17.1 The Chernobyl nuclear reactor accident in 1986 caused concern among certain members of the public with respect to the extent of the contamination of food in the shops and in particular whether any specific action was necessary to protect infants. In the event of future similar concerns it may be helpful to be aware that any decisions on actions, necessary to control contaminated food and made by Government, take full account of potentially

sensitive groups such as infants and therefore there would be no need to be concerned about the safety of food in the shops. Of course, any particular guidance given by Government should also be followed. There is quantified evidence from Austria that, following the Chernobyl event, pooled human milk had a tenth of the concentration of radioiodine compared with that in cow milk on the market.[53] It would seem sensible, and in line with good general nutrition policy, to continue breastfeeding for as long as possible if there is any increase in risk of radioactive contamination of cow milk.

4. Infant formula and bottle feeding

4.1 Introduction

4.1.1 Infant formulas are artificial feeds which are manufactured to take the place of human milk and as such they provide the sole source of nourishment.[7,37,54,55] The manufacture of infant formula whether based on cow milk or on soya protein isolate is designed to make the composition of the final product when made up for consumption by the infant, as close to, and as biologically adequate as, human milk. Most infant formulas which are at present available in the United Kingdom are based on cow milk. Some formulas contain other proteins, for example soya protein, but in general these more specialised foods are used for infants with special requirements.

4.2 Infant formulas

4.2.1 *Energy.* Infant formulas have energy values which are similar to the currently accepted average for mature human milk, and in both, about 50 per cent of the energy is derived from fat. (Table 4.1) If more recent estimations of the energy values of mature milk are confirmed then the energy values of infant formulas now available exceed those of human milk (para 3.4.1).

4.2.2 *Protein.* Infant formulas derive between about 8 to 12 per cent of their energy content from protein. This is somewhat higher than the contribution from protein in human milk,[56] and compensates for the excellent protein utilisation from human milk without imposing undue strain on the infant kidney (renal solute load) from excessive dietary protein.

4.2.3 During the manufacture of infant formulas the protein fraction is adjusted to give a final formulation with either more whey than casein protein, or, alternatively, more casein than whey protein. These are known respectively as "whey dominant" or as "casein dominant" types of infant formula.[28]

4.2.4 In the preparation of whey dominant infant formula demineralised whey protein is first prepared and the remaining components of the finished product are then added according to a specific formula. These infant formulas have a whey : casein ratio which is closer to that in human milk. The casein dominant formulas have a whey : casein ratio which is closer to that in cow milk although they, too, are substantially modified during manufacture.

4.2.5 The amino acid content of infant formula is adjusted to approximate that in human milk. All the essential amino acids are present in adequate

amounts although the concentrations may not match exactly those found in human milk.[56] However, such variations in essential amino acid content have not been shown to be biologically significant. The amino acid taurine is added to some infant formulas because it is present in higher levels in human milk and may reasonably be considered semi-essential for young infants.[57]

Table 4.1 *Composition of mature human milk and nutritional guidelines for the composition of artificial feeds per 100 ml*

		Mean values for pooled samples of expressed mature human milk[20,7]	Guidelines for infant formulas[7] Minimum	Maximum
Energy	kJ	293	270	315
	kcal	70	65	75
Protein (a)	g	1·3	1·5	2
(b)	g		1·2	2
Lactose	g	7	2·5	8
Total carbohydrate	g		4·8	10
Fat	g	4·2	2·3	5
Vitamins				
A	μg	60	40	150
D	μg	0·01	0·7	1·3
E (c)	mg	0·35	0·3	
K	μg	0·21	1·5	
Thiamin	μg	16	13	
Riboflavin	μg	30	30	
Nicotinic acid	μg	230	230	
B_6	μg	6	5	
B_{12}	μg	0·01	0·01	
Total folate	μg	5·2	3	
Pantothenic acid	μg	260	200	
Biotin	μg	0·76	0·5	
C	mg	3·8	3	
Minerals				
Sodium	mg	15	15	35
Potassium	mg	60	50	100
Chloride	mg	43	40	80
Calcium (d)	mg	35	30	120
Phosphorus	mg	15	15	60
Magnesium	mg	2·8	2·8	12
Iron (e)	μg	76	70	700
Copper	μg	39		
Zinc	μg	295		
Manganese	μg	1·2		
Chromium	μg	0·6		
Selenium	μg	1·4		
Iodine	μg	7		
Fluorine	μg	7·7		

(a) Casein dominant infant formula
(b) Whey dominant infant formula.
(c) The ratio of tocopherol (mg) to polyunsaturated fatty acids (g) should not be less than 0.4:1.02
(d) The ratio of calcium to phosphorus should not be less than 1.2:1.0 or more than 2.2:1.0
(e) Guidelines for trace elements other than iron are not set.

4.2.6 Infant formulas contain no human anti-infective, humoral or cellular factors. (Section 3.3)

4.2.7 *Non-Protein Nitrogen.* (para 3.4.3) About twenty per cent of the total nitrogen in human milk and in cow milk is non-protein nitrogen. This fraction is not present in infant formula.

4.2.8 *Carbohydrate.* The carbohydrate level in infant formula is raised during manufacture to that in human milk. Lactose, sucrose and maltodextrins are all used for this purpose.

4.2.9 *Fat.* In infant formulas based on cow milk all or part of the butterfat is removed and is replaced by blends of animal and vegetable fats so as to reproduce more nearly the fatty acid composition of human milk. This leads to ratios of saturated to unsaturated fatty acids more like those in human milk and to more complete absorption.

4.2.10 *Essential fatty acids.* The human infant has been shown to have a specific requirement for linoleic acid and there may also be a requirement for alpha linolenic acid. The compositional guidelines require that linoleic acid and alpha linolenic acid shall, together, provide at least 1 per cent of the total energy. These essential fatty acids are required for normal development and for the development of the central nervous system. The compositional guidelines for infant formula in Britain recommend that linoleic acid should not constitute more than 20 per cent of the total fatty acids; this is slightly higher than the maximum of 16 per cent found in human milk.

4.2.11 *Vitamins.* The vitamin content in infant formula should match that in human milk[58] and many vitamin concentrations are in excess of this to guard against losses during processing and storage. There is deliberate fortification of infant formula with vitamin D. (para 7.2.1)

4.2.12 *Major minerals and trace elements* In the manufacture of demineralised whey, the concentrations of the minerals and trace elements are reduced to very low levels and these are subsequently adjusted to levels which are close to those in human milk. All infant formulas have higher levels of iron to compensate for the relatively poor absorption of iron compared to that from human milk.[59] Not all trace elements reach the levels found in human milk, for instance zinc and selenium, and absorption may also be reduced where they are present in bound forms. Full term healthy infants do not seem to be adversely affected by these low intakes.

BOTTLE FEEDING

4.3 Trends in bottle feeding

4.3.1 Although in 1985 the majority of mothers started breastfeeding, 36 per cent gave infant formula feeds from the start. Thirty nine per cent of those who started breastfeeding had stopped by 6 weeks and some of those who continued were giving formula as well as breastfeeds. Thus by the time they

are four weeks old the majority of babies in Great Britain are being fed infant formulas and at four months three quarters of babies are fully bottle fed. It is clearly important that mothers should know about infant formulas and bottle feeding (para 9.3.1).

4.4 Feeding with infant formula

4.4.1 Infant formulas are so manufactured that they are either liquids which are ready to feed, or liquids or powders that require the addition only of water and no other substance. Detailed instruction about the preparation of feeds is clearly set out by manufacturers on the labels of their packs, in booklets and articles; this report does not give additional instructions. *The Working Group recommends that every opportunity must be taken both before and after the baby's birth to educate parents about the use of infant formula preferably by demonstration and discussion* (para 9.1.3, 9.3.1).

4.4.2 It is not only errors in the preparation of bottle feeds that are important. Many factors which are desirable in breastfeeding, namely close contact between care-taker and infant, feeding on demand and consideration of individual variation are also important in artificial feeding. Inadequate bottle feeding has the same effects as inadequate breastfeeding and, if the young bottle fed infant appears to be hungry or not satisfied the amount of each feed (but not the concentration) and/or the number of feeds per day should be increased. Evidence that hungry infants may be more satisfied by casein dominant than by whey dominant formulas is anecdotal (section 4.5). No harm is likely to result from changing from one to another and this course, if apparently effective in individual cases, is preferable to the premature introduction of solids.

4.4.3 *Samples.* Samples of infant formula are no longer included in the free parcels sometimes distributed to mothers in maternity departments but it is still the practice in some units for all mothers to be given free samples of formula on discharge. The practice, recalled by 25 per cent of mothers who were fully breastfeeding in the OPCS survey, is not in conformity with the WHO code (para 2.3.2) and may be associated with a premature resort to artificial feeding. However, it may occasionally be necessary for a mother who is not breastfeeding to be given an emergency supply of infant formula to take home.

The Working Group recommends that samples of infant formula should not be given to mothers.

4.4.4 *Feeding bottles and teats.* There is a British Standard (BS5239) for baby dummies. This is being amended to include a test procedure and a limit for nitrosamines in the latex of baby dummies and feeding bottle teats. At the same time the Standard will cover the more recent concern that teats may break under prolonged use.

4.4.5 The instructions about cleaning feeding bottles and teats which are given on the labels and other information provided with infant formula is generally satisfactory. We are concerned that complex shaped bottles may not be easy to clean. The bottles may be disinfected in a solution such as hypochlorite or boiled for three minutes in a pan of water. Domestic microwave ovens are not effective for sterilising feeding equipment.[60]

4.4.6 Infant feed should not be warmed in a microwave oven once it is in the feeding bottle. Very hot fluid at the centre of the bottle may be missed and may scald the baby.[61]

4.5 Choice of type of infant formula

4.5.1 Of just over 4000 mothers who were bottle feeding at 6 to 10 weeks (OPCS Survey 1985) 44 per cent (1799) had already changed the type of infant formula they were giving and a minority of these mothers had changed more than once. The formulas used were classified according to whether the dominant protein was whey or casein or other, and the types of changes made were examined. Table 4.2 shows that the most common first change was from a whey dominant to a casein dominant infant formula (64 per cent of first changes), with a change from one whey dominant to another also being quite common, (20 per cent). For subsequent changes, a change from one casein dominant brand to another was the most frequent type of change.

Table 4.2 Changes between whey dominant (WD) and casein dominant (CD) infant formulas in the first 6 to 10 weeks (OPCS Survey 1985)* (per cent)

Type of change of infant formula given	Number of change			
	First	Second	Third	All changes
WD to WD	20	4	9	16
WD to CD	64	28	21	54
CD to WD	7	19	11	10
CD to CD	5	43	43	15
Other change	4	6	16	5
	100	100	100	100
Base (number of changes):	1799	566	151	2427 (incl. 28 fourth changes)

*Based on 1799 mothers who changed the brand of infant formula.

4.5.2 Table 4.3 shows that the most common reason for changing the type of infant formula was that the mother thought that the baby was still hungry or not satisfied. This reason was given for over two-thirds of the changes made. It was by far the most common reason given for changing from a whey to a casein dominant formula and also for changing between casein dominant formulas. Although allergy was not frequently mentioned as a reason for changing brands it was particularly associated with 'other' changes, which were usually to a soya protein isolate based formula.

Table 4.3 Reasons given by 1924 mothers for changing the infant formula used (OPCS Survey 1985) (per cent)*

Reason	WD to WD	WD to CD	CD to WD	CD to CD	Other change	All changes
Still hungry/not satisfied	41	85	46	71	15	69
Kept being sick	32	11	30	18	28	18
Constipation	15	7	21	14	5	11
Allergy	1	1	3	3	33	3
Other reason	22	5	17	7	29	10
Base (number of changes):	392	1301	245	374	115	2440

*percentages do not add to 100 as some mothers gave more than one reason for a particular change

4.5.3 The OPCS survey showed that while 82 per cent of bottle feeding mothers gave a whey dominant formula at birth only 41 per cent were still using this formulation at four to six months. The proportion of babies receiving casein dominant infant formulas increased with age. There was no evidence that casein dominant milks led to a later introduction of solids. There is no firm evidence upon which to base a choice of one particular infant formula as being more suitable than another. Whey dominant infant formulas have a protein composition which is closer to that of mature human milk but no important differences have yet been demonstrated between the biological value of whey dominant and casein dominant formulas.

4.5.4 Some soya protein isolate based milk substitutes either conform or approximate to the compositional guidelines and only these infant formulas are suitable as the sole source of nourishment for young infants. Four examples are listed and these are free of lactose as well as of milk protein:

Formula "S"
Isomil
Prosobee
Wysoy

They have been approved for prescription in the National Health Service as borderline substances for established forms of milk intolerance. Those of entirely plant origin are acceptable to vegans.

4.5.5 All the infant formulas in use in the UK at the time of this report accord with the guidelines for artificial feeds in the COMA report "Artificial feeds for the young infant".[7] It was recommended in that report that infant formulas should be marketed only after scrutiny and acceptance by a panel of experts and this was subsequently endorsed in the report "Present day practice in infant feeding: 1980".[3]

We recommend that all infant formulas marketed in the UK should meet acceptable compositional standards. We further recommend that such infant formulas should be distinctively marked so as to enable identification by the purchaser.

4.6 Infant formula and microbiological hazard

4.6.1 Water is the main source of microbiological hazard in infant formula feeds (section 7.9). There have also been occasions when powdered infant formula has been contaminated by pathogenic microbiological organisms prior to retailing and has been implicated in infection. The most recent was in 1985.[62] [63] [64] The advisory "Guidelines for good hygienic practice in the manufacture of milk-based powders"[65] give a high degree of protection by the institution of preventive control hygiene principles in the factory. However, the manufacture of powder is not a sterile procedure and contamination may also occur in the home. When preparing a feed the water should be boiled and then allowed to cool (to about 70°C) before mixing. This temperature will ensure a final pasteurisation in the feeding bottle.

5. Introduction of solids

5.1 Trends in feeding practices

5.1.1 The 1975 OPCS survey of infant feeding practices in England and Wales revealed that 3 per cent of the babies had been given some food other than milk in the first two weeks of life, 18 per cent within the first month and 97 per cent by four months.[4] A change was recorded in the 1980 infant feeding survey. Only 4 per cent of babies had received solids at the age of four weeks, 24 per cent at eight weeks and 89 per cent at four months.[5] The 1985 OPCS survey showed little change from 1980. In all surveys a strong association has been found between bottle feeding and starting solid foods early.

5.2 Starting solids

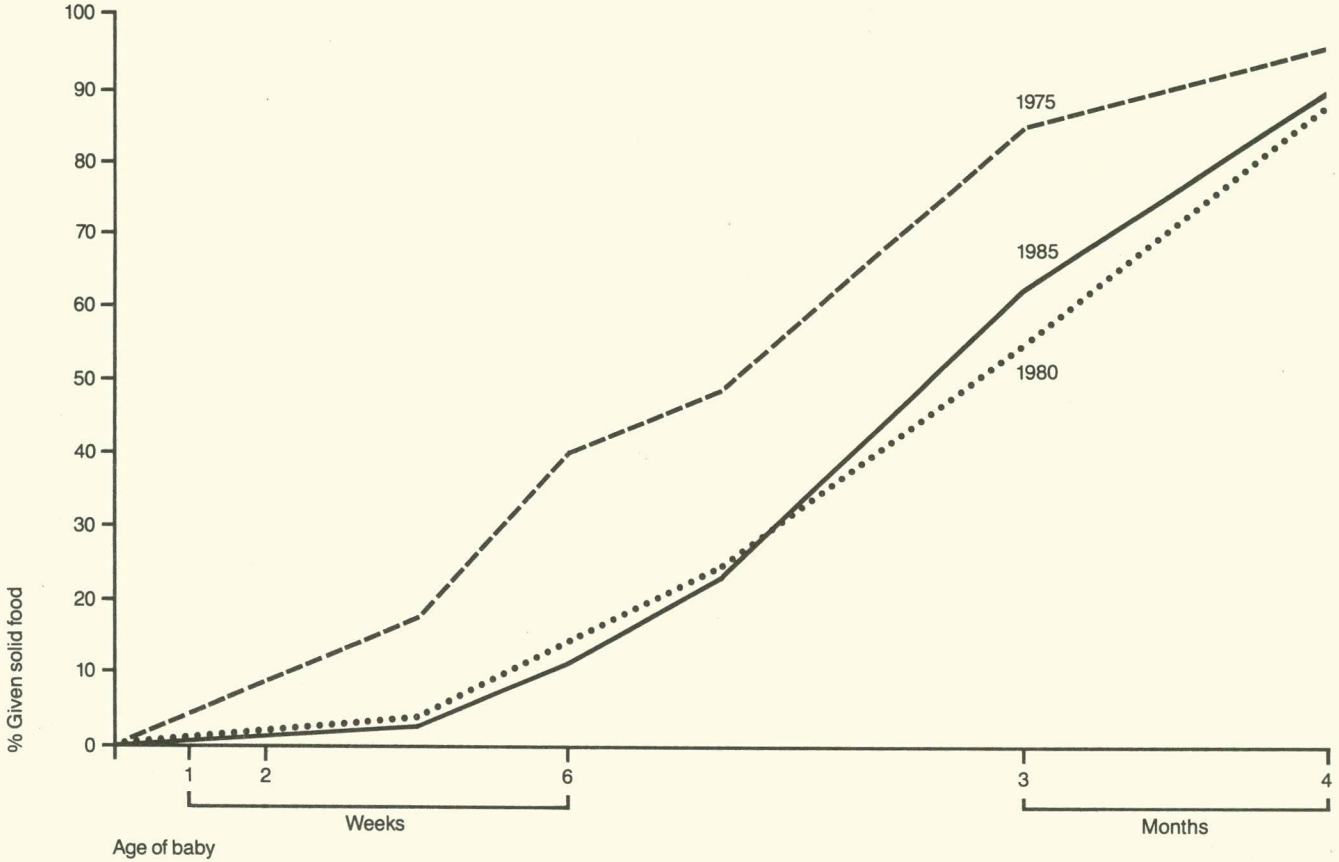
5.2.1 *Weaning* begins when semi-solid food starts to be given in addition to milk. Weaning should be a gradual process which extends over a period of weeks or even months. Weaning does not commence at the same age or the same weight for all infants.

5.2.2 *Mixed feeding* refers to the use of any food other than human milk or infant formula and includes the use of liquid milks as well as semi-solid foods. Infants need a mixed diet when nutritional requirements are no longer satisfied by milk alone and the development of feeding behaviour has progressed from sucking to biting and chewing. In addition to developmental and nutritional considerations, cultural, social and medical factors also appear to influence the age at which solid foods are introduced.

5.2.3 The age at which individual infants should be offered solid food varies. *Very few infants will require solid foods before the age of three months but the majority should be offered a mixed diet not later than the age of six months. We recommend accordingly.*

5.2.4 The length of time that an infant can fulfil its nutritional needs from breast milk or infant formula alone varies considerably from baby to baby. It is known that in breastfed infants milk (and energy) intake per kilogramme body weight falls in the first half of infancy. There is also less rapid weight gain from the third month. These changes appear to be compatible with good infant health.[66,67] Because male babies are bigger than females, and grow more quickly, boys tend to be given mixed feeding sooner. Provided that the baby receives adequate nourishment and that due regard is paid to the development of feeding abilities a flexible approach is desirable.[68] The amount of

Figure 5: *Proportions of infants being given solid food up to the age of 4 months: England and Wales. (OPCS Surveys 1975, 1980, 1985).*



solids taken at the outset of weaning is so small as to be of little significance in the overall intake. If the baby is reluctant to accept solids, and weight gain is satisfactory on milk alone, further diversification of the diet can be delayed until the infant accepts the food more readily.

5.2.5 The premature introduction of solids is undesirable for a number of reasons. Before the age of 3 to 4 months some infants do not readily develop the ability to bite and to chew solid foods nor are they eager to experiment with foods of different flavours, textures and consistency. The gut is more vulnerable to infection and to allergy and the use of energy dense foods may facilitate obesity.

5.2.6 The OPCS surveys have shown that the first foods used during weaning were rusks, cereals and commercial baby foods. The mothers who gave their babies solids at 6 weeks tended to choose rusks and cereals; by 4 to 5 months the majority were giving solids and many babies were eating commercial baby foods (Table 5). The reason why home prepared foods were used by only a minority of mothers is not clear. There is much to commend first offering small amounts of home puréed vegetables or fruit from the family diet provided that they are given without additional salt or sugar.

Table 5 *Percentages of mothers who had given different kinds of food on one day at 6 to 7 weeks, at 4 to 5 months and at 9 to 10 months (OPCS survey 1985: preliminary results)*

Type of food	*Age of baby*		
	6–7 weeks	*4–5 months*	*9–10 months*
Cereal (Baby/Adult)	52	65	84
Rusk	54	40	28
Commercial weaning food	30	82	52
Homemade weaning food (itemised in 9–10 month questionnaire only)	3	35	
Bread			64
Cheese			9
Yogurt			26
Egg			21
Meat			37
Fish			9
Potato			47
Other vegetables			49
Fresh fruit			26
Soup			7
Casserole/stew			12
Other dessert			21

5.3 Coeliac disease

5.3.1 Earlier reports drew attention to the relationship between giving gluten containing food in early infancy and the incidence of gluten enteropathy (coeliac disease) in susceptible infants. For the majority of infants wheat-based cereal foods present no hazard of inducing coeliac disease although those "at

risk'' cannot be identified in advance. There has been a sustained reduction in the incidence of coeliac disease in the past ten years.[69] Factors such as the later introduction of mixed feeding, the increased use of rice as a first food and the wider availability of gluten-free weaning cereals may have contributed to this fall in incidence although the trend was current before these changes in feeding practices were widespread.

5.4 Trends in mixed feeding

5.4.1 *OPCS survey 1985:* preliminary results. The age at which infants are given a mixed diet varies and by 9 to 10 months a wide range of foods is being given. The 1985 OPCS Survey asked mothers to list all the solid foods eaten by her baby on the day before completing the questionnaire: the results are shown in Table 5.

5.4.2 *Dietary survey of infants aged 6 to 12 months: MAFF.* In the autumn of 1986 a dietary survey of infants aged 6 to 12 months was carried out for the Ministry of Agriculture, Fisheries and Food by the market research company Research Surveys of Great Britain. Almost 500 mothers completed diaries of the quantities of all the food and drink consumed by their infants. Preliminary examination of the diaries show that infants of this age consume a very wide range of foods.

6. Other milks and drinks

6.1 Milk for infants and young children[70]

6.1.1 Human milk or an approved infant formula will provide the sole source of nourishment during early infancy. Thereafter milk continues to be an important source of energy and nutrients for most infants throughout the weaning period. The onset of weaning does not mean that breastfeeding or feeding with infant formula needs to stop. An extended period of mixed feeding is to be encouraged. *We recommend the advantages of a continued intake of breast milk or of infant formula throughout the first year.* Milk and milk products remain popular items in the diet of young children because they are nutritious, convenient, cheap and readily available.

6.1.2 *Milk in late infancy.* During weaning and the establishment of a fully developed diet the contribution made by liquid milk decreases to an extent that varies considerably between individuals and about which there is little quantitative information. The OPCS survey 1985 of infant feeding practices found that 5 per cent of infants were being given liquid cow milk as a main drink at 4 to 5 months and this figure had increased to 60 per cent at 9 to 10 months. Whole cow milk is a good source of energy, protein, calcium, thiamin, vitamin A and riboflavin.[71] (Table 6). The nutritional merit of unmodified whole cow milk has been questioned by some because of the high proportion of energy derived from saturated fatty acids, its high salt content, its low content of iron and vitamin D and the occasional occurrence in children of milk intolerance.[72] It is the opinion of the Working Group that guidance about which milk to use as part of a diversified diet of the older infant or toddler must be flexible and that a consideration of the composition of the diet as a whole is of greater importance than the identification of certain foods as being desirable or undesirable. Milks considered suitable for inclusion in the diets of infants from the sixth month are human milk, infant formulas, follow-up milks and whole pasteurised cow milk. Whichever milk is used, but particularly with whole cow milk, it is important to ensure that the infant receives an adequate intake of Vitamin D (section 7.2) and of iron (section 7.3).

6.1.3 Milk and milk products remain a prominent feature of the diet of preschool children and whole cow milk should be used as a staple dietary item until at least 5 years of age. Skimmed and semi-skimmed milks are not recommended because of their low energy density and Vitamin A content (Table 6). Where parents are anxious for the young child to participate in the family meals, and where semi-skimmed milk is in general use in the home, there are no strong objections to its progressive introduction from the age of two years (para 8.2.5). In these cases the child's overall dietary intake of sufficient

Table 6 Composition of whole, semi-skimmed and skimmed cow milks per 100 ml

		cow milk*		
		whole	semi-skimmed	skimmed
Energy	kJ	264	188	132
	kcal	63	45	31
Protein	g	3.1	3.2	3.2
Lactose	g	4.5	4.5	4.6
Total Carbohydrate	g	4.5	4.5	4.6
Fat	g	3.8	1.6	0.1
Vitamins				
A	μg	53	24	1
Riboflavin	μg	160	165	170
C	μg	1.4	1.4	1.4
D	μg	0.03	0.01	0
Minerals				
Sodium	mg	53	54	55
Potassium	mg	140	145	145
Calcium	mg	110	115	115
Magnesium	mg	10	10	10
Iron	μg	49	50	51
Copper	μg	10	10	10
Zinc	μg	350	360	360

*Source: Ministry of Agriculture, Fisheries and Food.

energy and fat soluble vitamins must be made good from other sources. *We recommend that fully skimmed milk should not be introduced below the age of five years.*

6.1.4 *Follow-up Milk.* The EEC Scientific Committee for Food defines "follow-up milks" as foodstuffs intended for particular nutritional use by infants aged over four months and constituting the milk element in a progressively diversified diet of this category of persons. They are manufactured formulated foods and there is more iron and vitamin D and less saturated fatty acids in these than in whole cow milk.

6.1.5 Experience with follow-up milk in the UK is small although it has been more widely used elsewhere. Only 1 per cent of babies in the 1985 OPCS study had been given follow-up milk at 9 to 10 months. In choosing a milk drink for the infant over six months breast milk or infant formula can be continued with advantage. Alternatively, follow-up milk or whole cow milk may be given and, of these, follow-up milk is a more reliable source of vitamin D and iron.[71]

6.1.6. *The Working Group recommends that the milk given to children should be pasteurised* as a safeguard against milkborne infection. Unpasteurised milk may not be sold in shops, or used in restaurants and hospitals but it may still be provided direct to the consumer or is available at farms. Mothers may be advised that pasteurised milk is safe provided that it has been kept cool. All unpasteurised milk must be boiled before being given to infants.

6.2 Goat and sheep milk

6.2.1 Parents sometimes consider giving their child goat milk, or milk from a range of mammals other than the cow. These milks may be perceived as less allergenic or as providing special and additional nourishment.[73,74] None of these claims can be substantiated on nutritional or microbiological grounds. Goat milk is deficient in folic acid. As no safe infant formula based on the milk of the goat or the ewe is available these milks should not be given to infants of less than six months. For the older infant and pre-school child, goat milk can be used so long as precautions against mineral and vitamin deficiencies are taken (para 6.1.2) and that due regard is paid to microbiological safety.

6.2.2 Commercial non-cow milk producers need not be registered or inspected and there is no requirement to pasteurise the milk. However, once the milk has left the dairy it must meet the requirements of current food legislation. Codes of practice for the hygienic controls of goat and sheep milk have been adopted in Scotland since 1984[75] and 1985[76] respectively. Occasionally, parents perceive this lack of processing as an advantage and believe that the child will benefit from nutrients supposedly destroyed by pasteurisation; there is no scientific evidence to confirm this view. If parents elect to give an older child goat or sheep milk as part of a varied diet then it should be pasteurised, or, if not, boiled.

6.3 Infant "drinks"

6.3.1 There is a range of products designed to add flavouring to water; the flavours may be herbal such as fennel or vanilla or based on fruit juices. There is some doubt about the need for breastfed babies to receive additional water.[44] Thirsty infants will take water without flavouring.

6.4 Yogurt

6.4.1 Yogurt and yogurt desserts are popular foods for infants from the age of six months. They are useful and convenient foods for the older infant especially for the protein, calcium and riboflavin content. There are variations in the energy values of different types of yogurt largely depending on the fat content and the low energy value of "diet" yogurts should be remembered when they form part of an infant's diet.

7 Special Dietary Considerations

7.1 Maternal diet in pregnancy and lactation

7.1.1 *Dietary energy in pregnancy.* Most tables of recommended dietary allowances for pregnancy and lactation allow for an increased intake of energy and of many nutrients. DHSS, for example, recommends an extra 240 kcal per day during the second and third trimesters of pregnancy and 600 kcal per day during lactation which are additions of about 10 per cent and about 25 per cent respectively of the recommended daily amounts.[77] However, many women seem to accommodate pregnancy and lactation with either the usual diet or with an additional intake that is less than that recommended.[79,80] A reduced level of physical activity, especially in the later stages of pregnancy, may be part of the reason for a lesser increment in dietary energy needs but there may also be additional compensatory changes in physiological function during pregnancy. The best way of ensuring that a mother is having adequate dietary energy during pregnancy is by monitoring weight gain; during pregnancy as a whole the accepted normal average increase is 12.5 kilogrammes.

7.1.2 *Nutrients in pregnancy.* Most pregnant women in the UK eat a satisfactory diet.[81,82] All additional requirements for vitamins and minerals are best met from dietary sources although sometimes supplements of iron and folate are given.[83] The need for vitamin D is discussed in para 7.1.5. In spite of diets which are adequate in energy and nutrients to prevent traditionally recognised clinical deficiency states in the mother or her infant it has been suggested that periconceptual vitamin deficiency states especially of folic acid, may manifest as fetal deformities.[84] This is now being investigated.

7.1.3 *Lactation.* Lactation imposes greater daily energy and nutrient demands than does pregnancy. However, women may lactate successfully for extended periods of time on substantially smaller increases of food and nutrient intake than those considered advisable in tables of recommended dietary allowances. Physiological and behavioural changes in energy expenditure may account for these observations.[85]

7.1.4 *Vitamin supplements.* The vitamin tablets, which are available through the Welfare Food Scheme at maternity clinics, at child health clinics, and at welfare food distribution centres for expectant mothers and for mothers up to 30 weeks after the birth, are sold at a low price and are free of charge to those who qualify for special benefits (Appendix 2). The composition of the tablets which includes vitamins A, C and D has been changed to exclude potassium iodide which is now deemed unnecessary.

7.1.5 Vitamin D supplementation remains desirable for all pregnant and lactating women. Vitamin D deficiency still occurs, chiefly among young Asian women as a result of deficiency of sunlight or from a poor intake of vitamin D containing foods.[86] Even when such women appear to be healthy they may show evidence of vitamin D deficiency when subjected to the physiological and metabolic stress of pregnancy and lactation.

7.1.6 Deficiency of other vitamins, particularly the vitamin B group, may occur in women who are consuming unconventional diets or very low calorie diets that do not include supplementary vitamins.

7.2 Vitamins for infants and young children

7.2.1 *Dietary sources of vitamins.* Healthy infants born near term who are either breastfed or fed infant formula are unlikely to become vitamin depleted or deficient and most do not have any physiological need for vitamin supplements (para 3.4.7) (para 4.2.11). Young infants who may be at risk are those who are breastfed by a mother who is in poor vitamin status or those who are given artificial feeds that are not suitable for the early months of life. At present it remains prudent to safeguard infants by giving supplementary vitamins.[87] Other young infants who may be at risk but who are outside the scope of this report include infants born very prematurely, those who may have had major resections of the gut and those with certain metabolic abnormalities that interfere with either absorption or the metabolism of vitamins.

7.2.2 It is rare to encounter clinical manifestations of vitamin deficiency in young British infants and children. Many of the foods marketed for infants and toddlers contain added vitamins. Conventional household diets properly prepared also contain a variety of vitamins but Vitamin D is an exception because there are few foods in Britain that are naturally rich in vitamin D although it is added to some foods. Vitamins may be destroyed in the preparation of food, for instance by heating, especially vitamin C. Dietary vitamin deficiencies may occasionally be due to giving the infant an unsuitable diet for its age by too early or too late introduction of mixed feeding or, alternatively, the toddler may exhibit bizarre food preferences and aversions which lead to a limited diet.

7.2.3 *Rickets.* Rickets is a disease of childhood caused by a deficiency of vitamin D. The chief source of vitamin D is from the action of ultra-violet radiation (UVR), usually from summer sunlight, on the uncovered skin. When there has been little exposure to UVR during the summer months, the vitamin D status of infants and young children may become low in winter especially if dietary sources are also poor (para 7.2.1, 7.2.2).

7.2.4 The introduction of vitamin D supplements under the Welfare Food Scheme in the early 1940s was associated in the following years with an almost complete abolition of nutritional rickets. The steady general decline in rickets was for a while halted in the late 1960s and early 1970s, when a number of

cases appeared from among immigrant families, mainly Asian.[88,89] There is now evidence that rickets in this group has declined with adequate vitamin D supplementation.[90,91]

7.2.5 *Vitamin supplementation. The Working Party recommends that the Government should continue to make supplementary vitamins for infants and young children available under the Welfare Food Scheme* (section 9.7). The daily dose should be 5 drops which will contain approximately:

vitamin A	200 μg
vitamin C	20 mg
vitamin D	7 μg

We recommend that vitamin supplementation should be given to infants and young children aged from six months up to at least 2 years and preferably 5 years. We are aware that many professionals advise giving vitamin drops from the age of one month and we would support this practice, particularly if there is any doubt whatsoever about the vitamin intake of the infant at this time.

7.2.6 The vitamin drops supplied through the Welfare Food Scheme are formulated to contain the minimum of excipients compatible with the microbiological safety and the stability of the product. Use of flavouring is justified because of the unpleasant taste of the unflavoured product.

7.3 Iron and trace elements

7.3.1 Iron stores at birth are roughly proportional to body weight. The stores become depleted (as indicated by a low serum ferritin level) after about six months in breastfed babies and somewhat earlier in bottle fed babies unless the formula they receive is fortified with iron. The selection of weaning foods may therefore determine whether these low iron stores progress to frank iron deficiency[92] and its complications which, apart from anaemia, may also include impairment of psychomotor function and defects in cellular immunity.[93]

7.3.2 *Dietary sources of iron.* Iron deficiency may be prevented at this stage by the consumption of foods which contain iron in a form which is available for ready absorption from the gastro-intestinal tract, of these, red meat is the best source. Cereals and legumes also contain iron but it is poorly absorbed. Availability is increased if fish, meat, poultry or a substantial source of vitamin C is consumed at the same meal. Egg and spinach are rich in iron but it is mostly unavailable.[93]

7.3.3 *Iron supplementation.* An alternative strategy for the prevention of iron deficiency at this age is the use of iron fortified foods but the question of bioavailability remains important. Infant formulas or follow-up milks which are fortified with ferrous sulphate and vitamin C are apparently effective in preventing iron deficiency anemia[94] and they can act as a "safety net"

as the infant proceeds from a suckling's diet to family foods (para 6.1.2).[95] Iron fortified cereals are often used as one of the first weaning foods. Their exact role in the prevention of iron deficiency is unclear.[96] A third option is the use of iron supplements in the form of drops as with vitamin supplements (para 7.2.5). Poor compliance and the risk of toxicity from accidental ingestion by the child or a sibling are potential problems. For infants who are no longer breastfeeding, the continued use of an iron and vitamin C fortified infant formula or follow-up milk throughout infancy provides a simple and safe way of ensuring an adequate supply of available iron. For infants who are still breastfeeding the best approach to preventing iron deficiency in later infancy is unclear. Foods which contain available iron (para 7.3.2) should be given and, since there is some evidence that solid foods given close to a breastfeed can inhibit iron absorption,[92] there may be an advantage in giving solid food at a separate meal from a breastfeed.

7.3.4 *Trace elements.* An intake of trace elements including zinc,[97] copper and selenium is essential but the precise amounts have not been defined in this country.[98] In normal breastfed infants or those receiving infant formulas, there is little evidence of clinical deficiencies. No cases of clinical selenium deficiency have been described in Britain in children on ordinary diets. Copper deficiency has been noted in ill or very premature babies, but there is no evidence that clinical problems occur in normal term babies. Zinc in human milk is readily bio-available and this compensates for its low concentration. Prenatally acquired hepatic stores of zinc may be important supplements to dietary intake during the pre-weaning period since total zinc stores fall during this period. No cases of either zinc or copper deficiency have been detected in several recent surveys.[99] Zinc deficiency has been described as part of the rare inherited disorder acrodermatitis enteropathica; human milk is effective in treating acrodermatitis which does not occur in breastfed babies.

7.4 The nutrition of infants born pre-term

7.4.1 Infants born pre-term are nutritionally disadvantaged in comparison with infants born at term because they have missed the period of maximum transfer of energy and nutrients from mother to fetus during the last months of pregnancy. During this time fetal stores are laid down which will provide a safeguard in case of later periods of deficient intake. In addition the immaturity of the gut of the pre-term infant may reduce the efficiency of absorption. The special nutritional needs of this group of infants is outside the scope of this report. However the majority of infants who have been born pre-term will move towards similar patterns of infant feeding as they pass their full term gestational age. There is no quantified information about their nutritional needs during infancy and young childhood. If they are to "catch-up" with the growth of their conceptual cohort it is very important to ensure a diet which is adequate in energy and protein. Additional vitamins and minerals may also be needed to make good the lack of a boost from the mother just before term especially vitamin A and certain of the B group as well as calcium, iron, copper and zinc.

7.5 Cultural and social dietary preferences

7.5.1 There is a rich variety of traditional diets.[100,101] Ethnic minority groups frequently prefer the diet of their country of origin; they are familiar with its preparation and they like it. There may be problems during the weaning period if the cultural tradition is inappropriate to the conditions in the UK.[101,102] Mothers may be unsure which locally available foods are suitable for infants. Mothers seeking *halal* meat products may buy only those infant foods which contain no meat at all such as puddings and custards. This type of diet, if used to the exclusion of other foods for long periods during the toddler age, is not sufficiently nutritious.

7.6 Unconventional diets

7.6.1 An unconventional diet may be adopted for ethical or religious reasons or for food faddism, as well as for medical reasons. Diets adopted for religious or ethical reasons may exclude food of animal origin to a variable extent. Vegans[103] are vegetarians whose diet totally excludes food derived from animals, other vegetarians[104] eat some animal products but exclude red, or all, meats. While there is much room for manoeuvre in the older child, the capacity for alternative diets in the infant is small. Well informed vegetarians and vegans offer satisfactory diets to their children but less knowledgeable parents who give an extreme diet of their own devising may be responsible for nutritional disorders in their children.

7.6.2 Diets which exclude certain foods because they are believed to be antigenic are considered below. Other exclusion diets are adopted for medical and metabolic reasons such as the exclusion of gluten, phenylalanine, etc. They require expert paediatric dietetic advice.

7.7 Allergy and hypersensitivity

7.7.1 Asthma, eczema, rhinitis and gastrointestinal disturbances have all been described in some infants as clinical manifestions of allergic reactions to food.[105] Hypersensitivity to cow milk protein in infancy can lead to gastrointestinal symptoms and failure to thrive which in a few cases may be life threatening. Allergic urticaria is occasionally seen, and very rarely anaphylaxis, very soon after milk feeding.[106] That food allergy is a factor in these and other clinical syndromes is not in doubt, but its exact incidence is not known. There has probably been a degree of over diagnosis of all the conditions described above, and other less specific conditions, such as infantile colic, have also been ascribed to food allergy without generally accepted confirmatory evidence.

7.7.2 The management of symptoms that are presumed to result from hypersensitivity to food must be based on commonsense and care not to do more

harm than good. It has been suggested, but not confirmed, that the incidence of allergic disease is reduced, particularly in babies of allergic parents, if the infants are fully breastfed for six months. The mother's diet may contribute allergens through her milk[107] but the clinical implications and benefit of dietary exclusion have not been convincingly demonstrated.

7.7.3 When a baby is suffering from a clinical disorder which is thought to be due to a food allergy, dietary manipulation may be helpful. In principle, diets should not be restricted without good cause. Parents should also know that apparently allergic phenomena have a variable natural history which is influenced by psycho-social factors. Soya protein isolate based infant formulas are sometimes used as an alternative to a cow milk based infant formula, but these may themselves stimulate atopic disease. For the potentially allergic child who comes from an atopic family, it is reasonable to avoid the early and indiscriminate introduction of foods that are commonly considered allergenic such as fresh cow milk, egg, wheat, nuts, and citrus fruits. As the child gets older a greater diversity of foods may be introduced until an unrestricted diet can be achieved.[105]

7.7.4 If dietary restriction is being considered, a dietitian's expert advice is essential. If, for instance, cow milk is withdrawn from the diet of an infant, this loss of nutrients must be made good from another source, and this is not always easy within the limitations of an infant diet. A dietitian can also supply milk-free recipes for the weaning stage. In less expert hands there is a real danger that dietary restriction may cause nutritional deficiencies.

7.8 Dental health

7.8.1 There has been much reduction in dental disease in children.[108] At least three factors may have contributed: a reduction in the exposure to sucrose of the teeth of young children, improved oral hygiene, and systemic or topical fluoride.

7.8.2 Nevertheless dental caries is still a problem. In 1983 48 per cent of 5 year olds had had decay.[108] Sucrose promotes caries and particularly so when the teeth are bathed in a solution by often repeated ingestion. Sucrose is ingested from a wide range of everyday foods, confectionery and from syrup based children's drinks as well as from medicines. The cariogenic effect of reservoir and dipped dummies was highlighted in the COMA "Report on cariogenic foods"[109] and these extreme practices are now largely gone. Sucrose has often been used to sweeten medicines for children and it is now urged that alternative non-cariogenic bulk or intense sweeteners should be used instead.[110]

7.8.3 *Fluoride and fluoride supplements.* Epidemiological studies have shown that when the domestic water supply contains 1 ppm (part per million) fluoride (100 μg flouride per 100 ml water), the incidence or dental caries is

reduced by 50 to 60 per cent. The Royal College of Physicians recommended the fluoridation of water supplies in the United Kingdom[111] and this has been achieved in some areas. The Health Departments have drawn attention to the Water (Fluoridation) Act 1985.[112,113,114] This Act removes any doubts about the legality of existing fluoridation schemes. It provides that District Health Authorities may apply to a statutory water undertaker for fluoridation of the water supplies in its area after certain publicity and consultation procedures.

7.8.4 The daily fluoride intake approved by the Dental Health Committee of the British Dental Association for infants from two weeks to two years of age is 0.25 mg.[115] Human milk and infant formulas contain very low concentrations of fluoride. Artificially fed infants in fluoridated areas can satisfy their requirements for fluoride from the water used to reconstitute powdered feeds. In areas where the concentration of fluoride in the drinking water is less than 0.3 ppm, satisfactory reduction in the prevalence of caries can be achieved by fluoride supplementation.[116] Information about the concentration of fluoride in the local drinking water can be obtained from the local water undertaker. In the United Kingdom, supplements for infants are available as drops or tablets which provide 0.25 mg fluoride. To avoid unnecessarily high intakes of fluoride which can cause mottling of the enamel it is important for health professionals giving advice to remember that fluoride may be available to the infant from more than one source. It is the total daily intake of 0.25 mg which is important and it should not be exceeded.

7.9 *Water*

7.9.1 Infants drink about 150 ml of water per kilogramme of body weight per day in the early months of life and this decreases to about 100 ml per kilogramme per day in later infancy. These amounts vary considerably both in the same individual and from child to child. Most of the water is taken as part of the feed.

7.9.2 A clean and microbiologically safe water supply is such an important prerequisite for the avoidance of diarrhoeal diseases that the World Health Organisation has made this provision a major priority.[117] In the United Kingdom, the vast majority of households can depend on a public water supply that is safe, in microbiological and all other respects, for the purposes of infant feeding. In some areas, water supplies contain a relatively high concentration of nitrate. In some homes, lead pipes may give rise to an undesirable concentration of lead in the water, or the use of water softeners may increase the sodium concentrations. Water for human consumption should always be taken where possible from the rising main (usually the kitchen "cold water" tap); where a water softener has been installed, water for consumption is best taken from the unsoftened supply. The quality of small private supplies is often less reliable than the public supply, and water from private supplies is not always suitable for the purposes of infant feeding.

7.9.3 *Nitrate.* The use of water with an excessively high nitrate content is one of the causes of methaemoglobinaemia in infants.[118] Where the concentration in the public supply exceeds 50 mg/l nitrate ion, water undertakers are obliged to inform the health authorities and professions in the affected area so as to encourage monitoring for infantile methaemoglobinaemia. The clinical condition arising from this is known as "well water methaemoglobinaemia" and it is rare in Britain.[119,120,121] Water with a concentration greater than 100 mg/l nitrate ion is not suitable for the purpose of infant feeding.

7.9.4 *Lead.* The possibility of adverse effects from lead, when ingested in small amounts over a long period, remains controversial.[122] Concern has focussed in particular on the relationship between exposure to lead in childhood and neuropsychological development.[123] A guideline value of 50 μg/l lead in water has been proposed as a level which "does not result in any significant risk to the health of the consumer"[124] and this is the same as the maximum acceptable concentration, in running water, set in the European Communities Directive on the quality of water intended for human consumption.[125] In 1982, the Government Departments advised that "where a person—particularly a child—is confirmed as having a blood lead level over 25 μg/100 ml, his or her environment should be investigated for sources of lead and steps taken to reduce exposure".[126,127,128] More recently, an international expert committee proposed a "provisional tolerable weekly intake" from all sources of 25 μg lead per kg body weight for children and infants.[129]

7.9.5 Unacceptable concentrations of lead in water may be found in houses with plumbing systems which contain lead in areas where the water supply is plumbosolvent. Such supplies are typically soft acidic waters, but some hard waters are also able to liberate lead. The extent of the problem has been reduced by the chemical treatment of plumbosolvent waters. In a household where there is still contamination, the concentration of lead in water drawn from a cold tap for consumption, including infant feeding, can be reduced substantially by first running a wash-basin full of water to be used for other purposes. In order to avoid unnecessary waste of water, it is advisable first to discuss the local situation with the Water Authority. Where these simple measures fail to reduce the levels of lead concentration in water, lead piping in the house may need to be replaced.

7.9.6 *Sodium.* An excessive intake of sodium in infancy is undesirable because it may lead to hypernatraemia (para 8.4.1).[7] Modern infant formulas contain relatively low levels of sodium and hypernatraemia is no longer a clinical problem. The recommended upper limit for sodium in a prepared infant formula feed is 35 mg/100 ml feed[7] and a feed made up with water which has a high sodium content may exceed this limit. It is for this reason that water which has been artificially softened using a salt-regenerated ion exchange water softener or water which has been repeatedly boiled should not be used for the reconstitution of infant feeds.

7.9.7 *Bottled water.* With important exceptions, bottled water is required to conform to the same standards as the public water supply. One of the excep-

tions is bottled water whose label includes the words "natural mineral water"; this may contain high concentrations of substances such as carbon dioxide, sodium, nitrate, fluoride and sulphate, and therefore may be unsuitable for the purposes of infant feeding. In normal circumstances there is no advantage in using bottled water in preference to tap water. There may be temporary reasons for using bottled water, such as a holiday in an area where the water supply may be uncertain; mothers should be reminded that bottled water should be boiled before preparing infant formula feeds.

8. Eating for future health

8.1 Introduction

8.1.1 There is now general acceptance that the balance of evidence links dietary components with the pathogenesis of a number of diseases particularly those of the cardiovascular system that cause much adult mortality and morbidity in Britain. Furthermore, changes in the national diet are recommended to the general population as part of an officially promoted public health programme[130,131] designed to reduce the incidence of ischaemic heart disease (coronary heart disease), stroke and hypertension.

8.1.2 Government advice follows dietary recommendations made by a number of expert bodies particularly those presented in the COMA report "Diet and cardiovascular disease".[6] The recommendations which this Working Group considered are those that refer to reductions in the consumption of fat and saturated fatty acids, and to the advice that the intakes of simple sugars and of common salt should be kept within moderate limits.

8.1.3 These recommendations are similar to, although somewhat less stringent than, those of some other national and international bodies.[132,133,134,135] All embrace the important principles that dietary modification should apply to the general population and should not be restricted to people with increased risk of heart disease, and that the adoption of the guidelines earlier rather than later in life is likely to produce maximal benefit.

8.1.4 Nevertheless, infants have been specifically exempted from these COMA guidelines, and the recommendations as to fat have been modified for children under 5 years. At the same time there have been advocates of the full adoption of moderate fat, sugar and salt diets during infancy and young childhood and uncertainty has arisen.[136]

8.1.5 *The young infant.* The diet of the unweaned infant whose sole source of nourishment is human milk or an infant formula is very different from that recommended for children and adults for the prevention of cardiovascular disease. (sections 3.4, 4.2) Infants taking human milk or infant formula have fat (50 per cent) as the main source of energy together with simple sugars, usually lactose. This diet contains neither fibre nor complex carbohydrates. Sodium intake is however low and obesity is rarely a problem with these diets.[137]

8.1.6 In young infants the total fat, lipoprotein and fatty acid profile of the blood is significantly associated with the lipid content of the diet.[138] The

extent to which the lipid content of the blood and tissues of the young infant is influenced by genetic factors or is predictive of lipid status in later life is uncertain. However, any reduction in the amount of total fat in the diet will deprive the infant of an important energy source, and there is as yet little reason to suppose that the fatty acid content of human milk or of currently available infant formulas determines the pathogenesis of cardiovascular disease.

8.1.7 Similar considerations apply to the high carbohydrate content of human milk and of infant formulas particularly those that contain lactose as the sole carbohydrate source. Simple sugars in the normal diet of the young infant do not appear to be harmful although it is important to avoid the misuse of sucrose or of solutions containing cariogenic sugars.

8.1.8 *Weaning and the diets of young children.* The change from the diet of the young infant to one in which only 35 per cent of food energy should be derived from fat with a contribution of only 15 per cent from saturated fatty acids, and in which fibre-rich foods containing complex fibre-rich carbohydrates are preferred to simple sugars, is an important aspect of the weaning process. Undesirable styles of eating and drinking should be discouraged, and feeding practices should foster the adoption of healthy dietary habits.

8.1.9 Unfortunately there is little quantitative knowledge about the diets of toddlers and pre-school children in Britain although it is clear that most young children are offered a wide range of foods[139] (section 5.4). Canadian[140], French[141] and Swedish[142] studies do suggest that some toddlers have excessive intakes of fat of which an unduly high proportion consists of saturated fatty acids.

8.1.10 *We recommend that the diets of British pre-school children should be surveyed so as to provide quantitative analyses of the nutrients consumed by children between the ages of 2 and 5 years.*

8.1.11 The preliminary report[143] of the nationwide dietary survey of British school children is generally reassuring about the overall adequacy of the diets consumed by 10 year olds and by 14 year olds, although the proportion of energy from fat was on average in excess of the recommended 35 per cent and about a quarter had fat intakes above 40 per cent.

8.1.12 The main recommendations in "Diet and cardiovascular disease" concern fat, simple sugars, and common salt. These recommendations have been examined by the Working Group in relation to current knowledge about the diets of young children. Recommendations as to smoking cigarettes and to alcohol consumption are less directly relevant to children.

8.1.13 Individuals or groups whose diets already meet the recommendations will have no need to alter their dietary habits nor should the recommendations be applied to groups of the population in which the putative benefits are offset by actual or strongly predictable disadvantages.

8.2 Fat

8.2.1 The argument that urges dietary modification for all children as an important approach to the primary prevention of atherosclerotic coronary heart disease depends on observations that lesions which may be precursors of atherosclerosis can be demonstrated post-mortem in the aorta and coronary arteries of children[144,145] and that blood lipid profiles indicative of a greater than average risk of heart disease can be identified at an early age. In addition the dietary relation to the pathogenesis of atherosclerosis should be independent of other risk factors affecting adults rather than young children such as smoking, high blood pressure, obesity, excessive consumption of alcohol and lack of exercise.

8.2.2 From the evidence available to us milk and dairy products seem to be major sources of energy, fat, protein, calcium and zinc in the diet of many older infants and young children. A similar proportion of the total dietary intake of energy and of these same nutrients comes from meat, fish and eggs. Children who habitually consume large quantities of milk and dairy products, fried foods, fatty meat and manufactured foods with a high fat content are almost certain to exceed the recommended amounts of total dietary fat and of saturated fatty acids.

8.2.3 However, there are wide variations in individual diets and many infants and young children are inconsistent in their food preferences and eating habits. There are also variations in nutritional requirements particularly for energy. The currently recommended intakes for this age group may be set too high for energy and some nutrients, and we are pleased to note that a review of the UK recommendations is being undertaken.

8.2.4 Deliberate restriction of total fat and saturated fatty acids by changing from whole fat milk, yogurt, butter and cheese to lower fat varieties must, unless compensated for, result in reductions of energy and nutrient intake with potentially adverse effects on growth and development. It is mainly for this reason that the substitution for whole cow milk by lower fat milk is not recommended for children under the age of 2 years. For children above this age semi-skimmed milk and other reduced-fat dairy products may be introduced into the diet but will have little advantage if the energy deficit is offset by increased consumption of other fatty foods.

8.2.5 We note the inclusion, without reported harmful effects, of semi-skimmed milk in the diets of two year old children surveyed in Sweden[142] and in Canada[146] and we are aware that this practice is not unknown in Britain. We endorse the recommendations in "Diet and cardiovascular disease",[6] but we consider that in the light of currently available evidence it is reasonable to introduce semi-skimmed milk into the diet of children between the ages of 2 to 5 years provided that the diet as a whole is adequate (para 6.1.3).

8.3 Sugar and artificial sweeteners

8.3.1 The COMA report "Diet and cardiovascular disease"[6] recommends that the consumption of simple sugars in the British diet should not be increased. In relation to other carbohydrates it recommends that fibre-rich complex carbohydrates should be used to replace energy dense fatty foods and simple sugars when the intake of these is reduced as part of the implementation of their recommendations.

8.3.2 Preference for sweet-tasting foods and drinks appears to be an innate human attribute demonstrable even in premature infants.[147] Lactose is a sugar found only in mammalian milk and it may well have physiological functions in addition to being a main source of energy for the infant (para 3.4.4). It has not, however, been shown that physiologically important differences in growth and development and in gastro-intestinal functions occur between young infants given lactose dominant feeds and those who are fed on formulas that contain no, or negligible amounts of, lactose. Young infants may have difficulty in digesting and absorbing complex carbohydrates[148] and cannot cope with bulky food of low energy density.

8.3.3 When solids are introduced, regulation of sugar consumption is desirable so as to reduce the risk of dental caries (para 7.8.2) and possibility of obesity. Desirable feeding practices include the prudent selection of foods, caution in the adding of sugar to foods on the plate and avoidance between meals of food and drink which is rich in added sugars.

8.3.4 The replacement of sugar by artificial sweeteners in foods, drinks, and medicines may also minimise any adverse effects from an unduly high sugar intake but they may well reinforce the liking for sweet foods. The artificial sweeteners in current use have been approved as safe. Even so, we endorse the principle that foods intended for consumption by infants and young children should contain only those additives which can, on the most stringent criteria, be shown to be essential on technological grounds.

8.4 Salt

8.4.1 Compositional guidelines for infant formulas and for follow-up milks give limits for sodium content. The main reason for setting an upper limit is that an excessive sodium intake in young infants is associated with the dangers of hypernatraemia.[7] Once the kidney of the developing infant is able to deal with larger quantities of sodium in the diet, concern shifts to the putative role of sodium in the pathogenesis of hypertension.[149]

8.4.2 The COMA report "Diet and cardiovascular disease"[6] recommends moderation in the intake of common salt. It points out that most of the UK population consume needlessly high amounts of salt and there might be advantage in some reduction from current levels.

8.4.3 We agree that high blood pressure is a major risk factor, either alone, or with others such as obesity and smoking, in the pathogenesis of coronary heart disease, stroke and hypertensive renal disease.[150] However, evidence that salt-related hypertension has its origins in childhood or that infants and children, whose blood pressure is in the upper range, can reliably be predicted to become hypertensive in later life (tracking) is not convincing.

8.4.4 A small but significant relationship between sodium intake and blood pressure has been shown in infants.[151] Other widely quoted work showed that in a particular genetic strain of young rats arterial blood pressure was consistently influenced by sodium intake[152] but extrapolation of these findings to human infants should be undertaken with considerable caution. Nevertheless there may be infants who are genetically sensitive to elevation of blood pressure in response to sodium intakes with which the majority of infants (and adults) cope without apparent difficulty.[150]

8.4.5 The Working Group believes that an abrupt change from the low sodium intakes of infants fed on human milk or infant formula to the high salt intakes found in some mixed diets is undesirable. Further, we agree with statements in "Diet and cardiovascular disease"[6] that moderation should be exercised in the consumption of common salt at all ages.

8.5 Complex carbohydrates and dietary fibre

8.5.1 Complex carbohydrates, particularly those found in fibre-rich foods, are recommended in "Diet and cardiovascular disease" as valuable alternatives to fat. We endorse these views with the reservation that fibre-rich complex carbohydrates are not readily digested by young infants and may impair the availability of some nutrients.

8.5.2 Cereal products are often introduced as one of the first baby foods and, as such, form a useful source of energy in the diversifying diet of the weanling. Foods containing fibre-rich carbohydrates such as bread, vegetables and fruit have an important place in the diet of the toddler particularly those young children who are ready and willing to participate in family meals. However, these foods tend to be bulky and may also contain components such as phytates that impair the absorption of nutritionally important minerals[153] and vitamins.[154,155] Deliberate efforts to enforce high-fibre diet on infants and young children can result in failure to thrive.

9. Education, welfare and health care support

9.1 Education before pregnancy

9.1.1 Lifelong impressions of infant feeding can be formed in childhood through watching younger siblings or other children feeding at the breast or from a bottle. The fact that families are now often limited to one or two children and that the extended family is more scattered reduces the opportunity for such observations in infant feeding practice.

9.1.2 The 1975 OPCS survey examined the father's attitude and found that it had a marked influence on the mother's choice of feeding method. *We recommend that infant feeding should be included as part of the education in child care taught to both girls and boys* at school.[156] The unique and irreplaceable advantages of breastfeeding as compared to bottle feeding should be made clear. At the same time the opportunity can be taken to portray breastfeeding as a natural function which is enjoyable and convenient.

9.1.3 Responsible education about bottle feeding does not need to undermine the overriding principle that breastfeeding is superior. The importance of hygiene and the proper preparation of an infant feed by careful reading of the instructions should be taught from an early age.

9.2 Education during pregnancy

9.2.1 By the time of her first pregnancy many influences will have contributed to the woman's attitude to infant care.[39] Each woman varies in the extent to which she is prepared to accept guidance from any of a variety of health professionals, the child's father, close family members of either sex, friends, or whether she is responsive to peer group and public pressure. It is likely that a substantial proportion of pregnant women consider that their choice about infant feeding method has firmly been made. For these mothers factual information and advice must contribute to the mother's confidence and it must be consistent. For other mothers who have not yet made a choice between breastfeeding and bottle feeding the superiority of breastfeeding will need to be explained as part of the education in preparation for parenthood during the ante-natal period.

9.2.2 An unhurried discussion of the options for feeding followed by positive encouragement with consistent advice from all medical and nursing advisers are essential to build the mother's confidence. Lay organisations who are

concerned with infant feeding have built up good relationships with professional advisers in many parts of the country. They are able to make a valuable contribution to the support for the parents during the period of pregnancy and early child care (Appendix 1). These groups should be encouraged.

9.3 Education and support after birth

9.3.1 Even after the baby is born there may be some mothers who remain undecided about how to feed their babies. Those who have long-term reservations about breastfeeding may still be encouraged to breastfeed for a short while. All mothers should be aware of how to prepare feeds with infant formula using hygienic techniques and careful measuring of the constituents. Demonstration in the post natal ward of the preparation of infant formula feeds should not imply that bottle feeding is superior to or as good as breastfeeding and great care should be taken that these demonstrations do not contravene the principles of the WHO code (Section 2.3).

9.3.2 *We recommend that further research is needed about the best ways to inform and advise parents about breastfeeding and about infant formula feeding at all stages of pregnancy.*

9.4 Education of health professionals

9.4.1 Education in infant feeding and in nutrition for trained nurses, health visitors, and midwives and those in training, and for under-graduate and post-graduate doctors, needs to be expanded and improved. Consistency of advice is essential. This may be achieved by following district feeding programmes or by so scheduling the mother's care that she receives continuous care from individual professionals before and after delivery.

We urge that the training in infant feeding, which is given to all health professionals concerned with the care of the mother and her baby, should be reviewed and improved as necessary.

9.5 Education for special groups

9.5.1 All women are entitled to the types of support discussed above. However, those who are concerned with the care of a mother and her new baby must take account of the particular obstacles to some women's acceptance of the usual forms of education. Parents may not speak English[157] or they may be unfamiliar with this country's health services; they may be disadvantaged by ignorance or personal difficulties. These mothers can be helped with specially devised educational material. Some mothers need a great deal of assistance as provided, for instance, at the Radford Family Centre in Nottingham.[158]

9.6 Educational materials

9.6.1 Educational material for the general public is available in leaflets and in other written form which may extend to the size of substantial books.[159,48] There are videos and there have been televised series about child care. The Pregnancy Book produced by the Health Education Council in 1984[160] does not give adequate advice about infant feeding.

9.6.2 Much excellent information about infant feeding has been produced by commercial sources and is widely disseminated by the media. Any advice or instruction about infant formulas produced by manufacturers and distributors of these products should comply with the FMF Code of Practice for the Marketing of Infant Formulae in the UK (Para 4.4.3). We do not wish to discourage the responsible participation of industry and the media in promoting good practice. We are also of the opinion that health professionals could improve their communication skills regarding infant feeding in a number of ways and that there remains a need for written information which has been independently produced.

9.7 Welfare Food Scheme

9.7.1 The Welfare Food Scheme provides that families who qualify for certain welfare benefits receive, free of charge, milk[161] and vitamin supplements for expectant mothers and for children up to the age of 5 years. The Scheme also enables NHS maternity and child health clinics and welfare food distribution centres to make infant formulas and vitamin supplements available to the general public at competitive prices. Details of the Scheme are set out in Appendix 2 which explains the changes to the current provisions that will take place when the 1986 Social Security Act comes into effect.

9.7.2 *The Working Party recommends that the Welfare Food Scheme should be continued.*

9.8 Nutritional surveillance

9.8.1 *We recommend that regular assessment of nutritional status should be an essential part of health surveillance of all infants.* Clinical inspection of the baby remains the most important means of assessing the nutritional status and general wellbeing. Serial weight measurements, ideally without clothes, will provide a good general means of assessing an infant's nutritional progress. If serial observations are plotted on standard weight charts early indication of failure to thrive or of obesity may be picked up.

9.8.2 Skill is needed in the interpretation of growth curves especially during infancy. Many infants grow rapidly during the first 3 months of life which is followed by a diminished rate of growth. This pattern is most commonly found in breastfed infants who are neither given complementary feeding nor

introduced to solids before 5 to 6 months. Standard growth charts now in use, which were constructed from data assembled when infant feeding practices differed from those currently advised, should not be used as inflexible standards.[162] However, serial weight recordings of an individual infant that drift markedly from the centile channel that appears to be established for that child should prompt further enquiry into the child's health and nutritional status.

9.9 Health care support

9.9.1 "Maternity care in action"[163] is the report from the Maternity Services Advisory Committee to the Secretaries of State for Social Services and for Wales. In Scotland the report "Shared care in obstetrics" which is a report from the National Medical Consultative Committee deals with similar matters.[164] These guides to good practice concern all aspects of maternity care and include sections relevant to infant feeding. The reports describe a continuum of care for new mothers and their babies and they stress the importance of good communications with the mother and between health professionals at the time of change in the provision of care. The parents should know where they can get help and advice both during and after the postnatal period, as and when the need arises, and how they can make the best use of child health services.

9.9.2 *We recommend that there should be greater continuity of care between the professional advisers concerned with the care of the mother and her baby and that these arrangements should be flexible to meet individual need.*

10. Recommendations

Infant feeding in the UK

1. We recommend that national surveys of infant feeding practice be continued (para 2.2.5).

2. We recommend that the Health Departments' circulars issued in 1983 "International Code of Marketing of Breast Milk Substitutes" should be updated and re-issued (para 2.3.2).

3. We recommend that all concerned with the marketing of infant formula in this country should comply with the FMF code (paras 2.3.2, 4.4.3, 9.3.1, 9.6.2).

Breastfeeding

4. The Working Group reaffirms its earlier view that breastfeeding provides the best infant nutrition. We recommend that the Government Health Departments should encourage all healthy mothers to breastfeed their babies (para 3.1.1).

5. In view of the lack of increase and the marked social class gradient in the prevalence of breastfeeding the Working Group recommends the search for new ways of encouraging breastfeeding especially in those sections of the community where it is shown to be low (para 3.6.1).

6. We recommend that all parents have the opportunity for a discussion with an informed person about infant feeding during the antenatal period (para 3.7.1).

7. We recommend that those responsible for the care of the mother who intends to breastfeed and her baby encourage the practices associated with successful initiation of breastfeeding including early breastfeeding after birth, on-demand feeding, "rooming-in" of mothers and babies, and the avoidance of complementary feeds or fluids of any sort (section 3.8).

8. We are concerned that breastfeeding has not yet gained complete social acceptance as the usual way of feeding babies. We urge social, community, educational, commercial and other concerns to take a positive approach to this matter (para 3.13.1).

9. We recommend that women in the UK known to be HIV antibody positive or those at high risk who have not been serologically tested should be discouraged from breastfeeding (section 3.15).

Infant formulas and bottle feeding

10. We accept that, in the present climate of opinion about infant feeding, some mothers will choose to give infant formula feeds from birth and that the majority of infants will have received infant formula by the age of 4 weeks. We recommend that parents receive advice about infant formulas and about the preparation of feeds (paras 4.4.1, 9.1.3, 9.3.1).

11. The Working Group recommends that samples of infant formula should not be given to mothers (para 4.4.3).

12. We recommend that all infant formulas marketed in the UK should meet acceptable compositional standards and that they should be distinctively marked so as to enable identification by the purchaser (para 4.5.5).

Weaning

13. Very few infants will require solid foods before the age of three months but the majority should be offered a mixed diet not later than the age of 6 months. We recommend accordingly (para 5.2.3).

14. We recommend that breastfeeding or feeding with infant formula can, with advantage, be continued to at least the end of the first year as part of a mixed diet (para 6.1.1).

15. We recommend that fully skimmed cow milk, because of its low energy density and vitamin A content, is not suitable in the diet of the under 5 year old. Semi-skimmed milk may, in certain circumstances, be included in the diet of the child of over 2 years (para 6.1.3).

16. All non-human milk should be pasteurised before being given to infants and young children (para 6.1.6).

Dietary supplements

17. We recommend that infants should receive vitamin supplements, as advised (para 7.2.5).

The pre-school child

18. We recommend that the diets of British pre-school children should be surveyed so as to provide quantitative analyses of the nutrients consumed by children between the ages of 2 and 5 years (para 8.1.10).

Education, welfare, nutritional surveillance, health care support

19. We recommend that infant feeding should be included in the education of both girls and boys from an early age (para 9.1.2).

20. We recommend that further research is needed about the best ways to inform and advise parents about breastfeeding and about infant formula feeding at all stages of pregnancy (para 9.3.2).

21. We recommend that the training in infant feeding, which is given to all health professionals concerned with the care of the mother and baby, should be reviewed and improved as necessary (para 9.4.1).

22. We recommend that the benefits provided through the Welfare Food Scheme should continue to be available (paras 7.2.5, 9.7.2).

23. We recommend that regular nutritional surveillance should be an essential part of care for all babies (para 9.8.1).

24. We recommend that there should be greater continuity of care between the professional advisors of the mother and baby (para 9.9.2).

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Appendix 1

Voluntary Organisations that provide support for breastfeeding

In the 1985 OPCS survey of infant feeding practices 5 per cent of all mothers had been in touch with a voluntary organisation after the baby's birth. Voluntary breastfeeding support groups provide information, support and advice about all aspects of breastfeeding. Many mothers find it particularly valuable to receive informal help from other women who have experienced childbirth and breastfeeding themselves. There are local support groups and some members receive special training as councellors. The central address of the main groups are listed below.

National Childbirth Trust
9 Queensborough Terrace
Bayswater
London W2 3TB
Tel: 01 221 3833

or

National Childbirth Trust
Stockbridge Health Centre
1 India Place
Edinburgh H3 5EH
Tel 031 225 9191

La Leche League
Breastfeeding Help and Information
BM 3424
London WC1V 6XX
Tel: 01 242 1278

Association of Breastfeeding Mothers
131 Mayow Road
London SE26
Tel 01 778 4769

Appendix 2

Welfare Food Scheme

The Welfare Food Scheme was introduced in 1940 to ensure that expectant mothers and young children were properly nourished. The Scheme was retained after the war on the advice of the then Standing Committee on Nutritional Problems and it has continued to the present day.

A. Current provisions

Expectant mothers and children under 5 years in families that receive Supplementary Benefit, Family Income Supplement or who have a low income are entitled to milk and vitamin supplements free of charge as follows:

—*Welfare milk*. 7 pints or 8 half litres of liquid milk per week. Infants under one year may receive instead 900 grammes per week of an approved brand of infant formula.

—*Vitamin supplements*. 90 tablets containing vitamins A, D and C every 13 weeks during pregnancy and a total of 225 of the same tablets during breastfeeding. Children under 5 years get 2 bottles of drops containing vitamins A, D and C every 13 weeks.

(Breastfeeding mothers may elect to take their baby's entitlement of infant formula in the form of liquid milk to drink themselves.)

Liquid welfare milk means whole or semi skimmed liquid cow milk. Liquid welfare milk is available from any liquid milk supplier.

B. Future provisions

—*Welfare milk and vitamins*. When the 1986 Social Security Act comes into effect the current Supplementary Benefit group will become the Income Support group and the current Family Income Supplement and low income groups will be largely subsumed into the Family Credit group. Mothers and children from Income Support families will continue to receive welfare milk and vitamins free of charge. Family Credit families will not receive welfare milk and vitamins but will get a cash increase instead.

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Dd289658 1/88 C80 G443 10170

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