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Improving the nutrition of pregnant and breastfeeding mothers and children in low-income households

**NICE public health guidance 11
Improving the nutrition of pregnant and breastfeeding mothers and
children in low-income households**

Ordering information

You can download the following documents from www.nice.org.uk/PH011

- The NICE guidance (this document) which includes all the recommendations, details of how they were developed and evidence statements.
- A quick reference guide for professionals and the public.
- Supporting documents, including an evidence review and an economic analysis.

For printed copies of the quick reference guide, phone NICE publications on 0845 003 7783 or email publications@nice.org.uk and quote N1489.

This guidance represents the views of the Institute and was arrived at after careful consideration of the evidence available. Those working in the NHS, local authorities, the wider public, voluntary and community sectors and the private sector should take it into account when carrying out their professional, managerial or voluntary duties.

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Introduction

The Department of Health (DH) asked the National Institute for Health and Clinical Excellence (NICE or the Institute) to produce public health guidance to improve the nutrition of pregnant and breastfeeding mothers and children in low-income households. In particular, this guidance addresses disparities in the nutrition of low-income and other disadvantaged groups compared with the general population.

The guidance is for NHS and other professionals who have a direct or indirect role in – and responsibility for – the nutrition of pregnant and breastfeeding mothers and pre-school children. This includes midwives, health visitors, dietitians and pharmacists. It also includes those working in local authorities and the community, voluntary and private sectors. In addition, it will be of interest to members of the public.

The guidance complements and supports, but does not replace, NICE clinical guidelines on: antenatal care, diabetes in pregnancy, intrapartum care and postnatal care (for further details, see section 8). It does not give detailed advice on what constitutes a healthy diet. For current dietary advice visit www.eatwell.gov.uk

The Programme Development Group (PDG) has considered the reviews of the evidence, an economic appraisal, stakeholder comments and the results of fieldwork in developing these recommendations.

Details of membership of the PDG are given in appendix A. The methods used to develop the guidance are summarised in appendix B. Supporting documents used in the preparation of this document are listed in appendix E. Full details of the evidence collated, including fieldwork data and activities and stakeholder comments, are available on the NICE website, along with a list of the stakeholders involved and the Institute's supporting process and methods manuals. The website address is: www.nice.org.uk

This guidance was developed using the NICE public health programme process.

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1 Key priorities

This section lists the six recommendations that have been identified as key priorities for implementation, on the basis of these criteria:

- impact on health inequalities
- impact on health of the target population
- balance of risks and benefits
- cost effectiveness
- ease of implementation
- speed of impact.

Healthy Start

Recommendation 4

Who is the target population?

Pregnant women and parents of infants and children under 4 years who may be eligible for the Healthy Start benefit.

Who should take action?

- Primary care trust (PCT) commissioners and managers.
- GPs, midwives, health visitors, obstetricians, paediatricians, and community pharmacists.

What action should they take?

- PCTs should promote the Healthy Start scheme.
- PCTs should ensure an adequate supply of both types of Healthy Start vitamin supplements (for women and for children from 6 months to 4 years) is available for distribution by health professionals when they see pregnant women and parents of children under 4 years.

- PCTs should ensure an adequate supply of Healthy Start application forms is available and that the uptake of Healthy Start benefits is regularly audited.
- Health professionals should advise pregnant women and parents of children under 4 years about the Healthy Start scheme. They should ensure all women who may be eligible receive an application form as early as possible in pregnancy.
- Health professionals should use every opportunity they have to offer those parents who are eligible for the Healthy Start scheme practical, tailored information, support and advice on:
 - how to use Healthy Start vouchers to increase their fruit and vegetable intake
 - how to initiate and maintain breastfeeding
 - how to introduce foods in addition to milk as part of a progressively varied diet when infants are 6 months old.
- Health professionals should offer the maternal Healthy Start vitamin supplement (folic acid, vitamins C and D) to pregnant women who are (or who may be) eligible.
- GPs and health visitors should offer children's Healthy Start vitamin supplements (vitamins A, C and D) to all children aged from 6 months to 4 years in families receiving the Healthy Start benefit.
- Commissioners should consider distributing the maternal Healthy Start vitamin supplement (folic acid, vitamins C and D) to all women who receive Healthy Start benefit for children aged 1– 4 years, particularly those who may become pregnant.
- Community pharmacists should ensure the Healthy Start maternal vitamin supplements are available for purchase by women who are not eligible to receive them free of charge.

Training

Recommendation 1

Who is the target population?

Health professionals and support workers who care for children under 5 years and women who may become – or who are – pregnant.

Who should take action?

Professional bodies, skills councils and others responsible for setting competencies and developing continuing professional development programmes for health professionals, nursery nurses and support workers.

What action should they take?

- Professional bodies should ensure health professionals have appropriate knowledge and skills to give advice on the following:
 - the nutritional needs of women and the importance of a balanced diet before, during and after pregnancy (including the need for suitable folic acid supplements)
 - the rationale for recommending certain dietary supplements (for example, vitamin D) to pregnant and breastfeeding women
 - the nutritional needs of infants and young children
 - breastfeeding management, using the Baby Friendly Initiative (BFI) training as a minimum standard (www.babyfriendly.org.uk)
 - strategies for helping people to change their eating behaviour, particularly by offering practical, food-based advice.

- As part of their continuing professional development, train midwives, health visitors and support workers in breastfeeding management, using BFI training as a minimum standard.

- As part of their continuing professional development, train health professionals, including doctors, dietitians and pharmacists, to promote and support breastfeeding, using BFI training as a minimum standard.

Vitamin D

Recommendation 3

Who is the target population?

Pregnant women and breastfeeding mothers.

Who should take action?

- Dietitians, public health nutritionists, midwives, health visitors, GPs, obstetricians and community pharmacists.
- Manufacturers of goods for pregnant and breastfeeding women.

What action should they take?

- Dietitians and public health nutritionists should educate health professionals about the importance of vitamin D supplements for all pregnant and breastfeeding women.
- During the booking appointment at the beginning of pregnancy, midwives should offer every woman information and advice on the benefits of taking a vitamin D supplement (10 micrograms [μg] per day) during pregnancy and while breastfeeding. They should explain that it will increase both the mother's and her baby's vitamin D stores and reduce the baby's risk of developing rickets.
- Health professionals should take particular care to check that women at greatest risk of deficiency are following advice to take a vitamin D supplement during pregnancy and while breastfeeding. These include women who are obese, have limited skin exposure to sunlight or who are of South Asian, African, Caribbean or Middle Eastern descent.

- Midwives and health visitors should advise all pregnant and breastfeeding women about the availability of suitable vitamin D supplements such as the Healthy Start vitamin supplements. Women who are not eligible for Healthy Start benefit can obtain the vitamin supplement from their local community pharmacy.
- Manufacturers should include information with their products on the importance of vitamin D supplements during pregnancy and while breastfeeding. Relevant products may include pregnancy tests and breast pumps.

(See also NICE clinical guideline 62 on antenatal care at www.nice.org.uk/CG062)

Breastfeeding

Recommendation 7

Who is the target population?

Pregnant women and breastfeeding mothers.

Who should take action?

Commissioners and managers of maternity and children's services.

What action should they take?

- Adopt a multifaceted approach or a coordinated programme of interventions across different settings to increase breastfeeding rates. It should include:
 - activities to raise awareness of the benefits of – and how to overcome the barriers to – breastfeeding
 - training for health professionals
 - breastfeeding peer-support programmes
 - joint working between health professionals and peer supporters
 - education and information for pregnant women on how to breastfeed, followed by proactive support during the

postnatal period (the support may be provided by a volunteer).

- Implement a structured programme that encourages breastfeeding, using BFI as a minimum standard (www.babyfriendly.org.uk). The programme should be subject to external evaluation.
- Ensure there is a written, audited and well-publicised breastfeeding policy that includes training for staff and support for those staff who may be breastfeeding. Identify a health professional responsible for implementing this policy.

(See also NICE clinical guideline 37 on postnatal care at www.nice.org.uk/CG037)

Recommendation 11

Who is the target population?

Pregnant women and new mothers, particularly those who are least likely to start and continue to breastfeed. For example, young women, those who have low educational achievement and those from disadvantaged groups.

Who should take action?

Commissioners and managers of maternity and children's services.

What action should they take?

- Provide local, easily accessible breastfeeding peer support programmes and ensure peer supporters are part of a multidisciplinary team.
- Ensure peer supporters:
 - attend a recognised, externally accredited training course in breastfeeding peer support
 - contact new mothers directly within 48 hours of their transfer home (or within 48 hours of a home birth)

- offer mothers ongoing support according to their individual needs. This could be delivered face-to-face, via telephone or through local groups
 - can consult a health professional and are provided with ongoing support
 - gain appropriate child protection clearance.
- Consider training peer supporters and link workers to help mothers, parents and carers follow professional advice on feeding infants aged 6 months and over. The advice should promote an increasingly varied diet using food of different textures in appropriate amounts (in addition to milk), in response to the baby's needs.

Folic acid

Recommendation 2

Who is the target population?

Women who may become pregnant and women in early pregnancy.

Who should take action?

- PCTs and NHS trusts.
- Directors of public health, planners and organisers of public health campaigns.
- Pharmacists, GPs, hospital doctors and nurses, particularly those working in gynaecology, sexual health, contraceptive and family planning services, fertility clinics and school health services.
- Public health nutritionists and dietitians.
- Manufacturers of goods for women of childbearing age.

What action should they take?

- Health professionals should:

- use any appropriate opportunity to advise women who may become pregnant that they can most easily reduce the risk of having a baby with a neural tube defect (for example, anencephaly and spina bifida) by taking folic acid supplements. Advise them to take 400 micrograms (µg) daily before pregnancy and throughout the first 12 weeks, even if they are already eating foods fortified with folic acid or rich in folate
 - advise all women who may become pregnant about a suitable folic acid supplement, such as the maternal Healthy Start vitamin supplements
 - encourage women to take folic acid supplements and to eat foods rich in folic acid (for example, fortified breakfast cereals and yeast extract) and to consume foods and drinks rich in folate (for example, peas and beans and orange juice).
- PCTs should ensure local education initiatives aimed at health professionals include information on the importance of folic acid supplements. They should provide the maternal Healthy Start vitamin supplements (folic acid, vitamins C and D) for eligible women. They should also ensure women who are not eligible for Healthy Start can obtain the supplements from their local pharmacy.
 - GPs should prescribe 5 milligrams of folic acid a day for women who are planning a pregnancy, or are in the early stages of pregnancy, if they:
 - (or their partner) have a neural tube defect
 - have had a previous baby with a neural tube defect
 - (or their partner) have a family history of neural tube defects
 - have diabetes.
 - Manufacturers should include information with their products on the importance of folic acid supplements before and during pregnancy. Relevant products may include pregnancy tests, sanitary products, contraceptives and ovulation predictor kits.

(See also NICE clinical guideline 63 on diabetes in pregnancy at www.nice.org.uk/CG063 and its antenatal care clinical guideline 62 at www.nice.org.uk/CG062)

2 Public health need and practice

The importance of ensuring mothers and their babies are well-nourished is widely recognised. A pregnant woman's nutritional status influences the growth and development of her fetus and forms the foundations for the child's later health (Gluckman et al. 2005). The mother's own health, both in the short and long term, also depends on how well-nourished she is before, during and after pregnancy (DH 2004a).

A child's diet during the early years also impacts on their growth and development. It is linked to the incidence of many common childhood conditions such as diarrhoeal disease, dental caries and iron and vitamin D deficiencies. It may also influence the risk in adult life of conditions such as coronary heart disease, diabetes and obesity.

Breastfeeding

Current UK policy is to promote exclusive breastfeeding (feeding only breast milk) for the first 6 months. Thereafter, it recommends that breastfeeding should continue for as long as the mother and baby wish, while gradually introducing a more varied diet (DH 2003).

Breastfeeding contributes to the health of both mother and child, in the short and long term. For example, babies who are not breastfed are many times more likely to acquire infections such as gastroenteritis in their first year (Ip et al. 2007; Horta et al. 2007). It is estimated that if all UK infants were exclusively breastfed, the number hospitalised each month with diarrhoea would be halved, and the number hospitalised with a respiratory infection would be cut by a quarter (Quigley et al. 2007).

Exclusive breastfeeding in the early months may reduce the risk of atopic dermatitis (DH 2004a). In addition, there is some evidence that babies who are not breastfed are more likely to become obese in later childhood (DH

2004a; Li et al. 2003; Michels et al. 2007). Mothers who do not breastfeed have an increased risk of breast and ovarian cancers and may find it more difficult to return to their pre-pregnancy weight (World Cancer Research Fund 2007; DH 2004a).

The UK infant feeding survey 2005 (Bolling et al. 2007) showed that 78% of women in England breastfed their babies after birth but, by 6 weeks, the number had dropped to 50%. Only 26% of babies were breastfed at 6 months. Exclusive breastfeeding was practised by only 45% of women one week after birth and 21% at 6 weeks (Bolling et al. 2007).

Three quarters of British mothers who stopped breastfeeding at any point in the first 6 months (and 90% of those who stopped in the first 2 weeks) would have liked to have continued for longer. This suggests that much more could be done to support them. The British figures also contrast with data from Norway, where over 80% of mothers breastfeed for the first 6 months (Lande et al. 2003).

Socioeconomic influences on maternal and child nutrition

Acheson's independent inquiry (1998) recognised the impact of poverty on the health and nutritional status of women and children. In particular, the inquiry highlighted that mothers from disadvantaged groups are more likely than others to give birth to babies with a low birth weight. It also pointed out that breastfeeding is a strong indicator of social inequalities (that is, women who are most disadvantaged are least likely to breastfeed).

The most recent infant feeding survey 2005 (Bolling et al. 2007) confirmed that low maternal age, low educational attainment and low socioeconomic position continue to have a strong impact on patterns of infant feeding. For example, 65% of UK women from managerial and professional occupations were breastfeeding at 6 weeks compared to only 32% of those from routine and manual groups.

Less privileged mothers are also more likely to introduce solid foods earlier than recommended and their children are at a greater risk of both 'growth

faltering' (that is, they gain weight too slowly) in infancy and obesity in later childhood (Armstrong et al. 2003). In addition, average daily intakes of iron and calcium are significantly lower, and rates of dental caries are significantly higher among children from manual groups compared with those from non-manual groups (Gregory et al. 1995).

Women from disadvantaged groups have a poorer diet and are more likely either to be obese or to show low weight gain during pregnancy (Bull et al. 2003; Food Standards Agency 2007; Heslehurst et al. 2007). Mothers from these groups are also less likely to take folic acid or other supplements before, during or after pregnancy (Bolling et al. 2007).

Policy

Following scientific risk assessment by the Committee on Medical Aspects of Food and Nutrition Policy (COMA) and latterly, the Scientific Advisory Committee on Nutrition (SACN), the DH and the Food Standards Agency (FSA) have issued a portfolio of dietary advice for women and children. Of particular note are the COMA reports on: 'Dietary reference values for food energy and nutrients for the UK' (DH 1991) which addresses population dietary requirements throughout the lifecourse; 'Weaning and the weaning diet' (DH 1994a); 'Folic acid and the prevention of disease' (DH 2000); 'Nutritional aspects of cardiovascular disease' (DH 1994b). The latter recommends that by 5 years, children should be eating foods consistent with the recommendations for adults. More recently, advice on salt, oily fish and vitamin D has been updated (SACN 2004a, 2004b, 2007).

In 2000, COMA undertook a scientific review of the Welfare Food Scheme (WFS) which had been in existence in various forms since 1940. WFS provided eligible pregnant women, mothers and children with vouchers for milk or infant formula. COMA also recognised the contribution of benefits in kind made to poor families (Dobson et al. 1994; Dowler and Calvert 1995).

COMA recommended giving pregnant women and those with young children vouchers for a broader range of foods (that is, not just milk or infant formula) (DH 2002). Healthy Start, which replaced WFS in 2006, implemented this and

a range of other measures. An important innovation was its emphasis on the need for health professionals to give participating mothers health and lifestyle advice. This advice has to cover diet during pregnancy, breastfeeding and the importance of fresh fruit, vegetables and vitamins.

Since 1998, initiatives such as Sure Start and children's centres have created more opportunities for multidisciplinary involvement outside traditional healthcare settings. This has led to more local opportunities to offer nutritional advice to mothers and those who care for young children (DH 2004a; DH 2004b; DH 2004c; DfES 2004). The involvement of the whole family will be key: a woman's diet during pregnancy and her views on infant feeding are influenced by many people including her partner, parents, grandparents, friends and peers.

Children's eating behaviour is also influenced by the wider environment. Important factors include: parental food preferences and beliefs; the food they make available for their children; child/parent interactions related to food; the behaviour of other role models; and the media (Jeffrey et al. 2005; St Jeor et al. 2002; Summerbell et al. 2005).

3 Considerations

The PDG took account of a number of factors and issues in making the recommendations.

Service provision

3.1 The PDG acknowledged that everyone should have equal access to services and support. Interventions aimed at improving the health of those living in the poorest circumstances and with the poorest health can only help a relatively small part of the population. They may not be enough to bring these groups closer to the population average – nor to reduce wider social and health inequalities. (Graham and Kelly 2004). Large numbers of people who are not categorised as 'vulnerable' may be relatively disadvantaged in health terms. These disadvantages usually increase, the further people are from the top of

the social scale, so policies and interventions to tackle health inequalities need to extend beyond those with the poorest health.

- 3.2 It is important that universal services (for example, home visiting by health visitors and midwives) are available for all families with infants and young children. A universal service does not imply that every family has the same needs. Some are likely to need more support than others (for example, if the mother or child has a physical or learning disability). Health visitors should be proactive and visit all mothers, parents and carers of infants and pre-school children at home (where possible) to assess their needs. Those with identified needs should receive intensive support (Blair and Hall 2006). The Health in Pregnancy Grant should increase opportunities for contact with a health professional as early as possible in pregnancy so that the support required can be individually assessed.
- 3.3 For each recommendation, a list of 'who should take action' is provided. However, responsibility for implementation often goes beyond those listed, especially where it involves a 'whole systems' or team approach operating within and across the NHS and local authorities (for example, when services are provided by children's centres, children's services or as part of a local area agreement).

Evidence

- 3.4 The guidance draws on a range of data: scientific, systematically derived evidence of effectiveness; context-sensitive evidence on the economic costs and benefits; and evidence from practice including professional opinion and expert judgement (Lomas et al. 2005). The PDG recognised that there is a shortage of controlled studies in a number of key areas. For example, there is a lack of population or intervention studies on how to improve the nutritional status and dietary intake of young children, pregnant and breastfeeding women, and to improve dental health especially among younger children. Much of the existing published work was not carried out in the UK and this needs to be taken into account when considering its

relevance. Where there was little evidence from controlled studies, the PDG considered observational data from UK cohorts and national surveys, coupled with evidence from practice. This was considered a valid and appropriate basis for the recommendations.

3.5 Overall, the evidence suggests that dietary interventions which recognise the specific circumstances facing low-income families, teenage parents and mothers from minority ethnic or disadvantaged groups are likely to be more effective than generic interventions. The evidence often lacked contextual detail and measures of effectiveness were not clearly linked to different socioeconomic, ethnic or vulnerable groups. This made it difficult for the PDG to target recommendations at particular groups. However, it was clear that services need to be accessible and applicable to everyone, including those with learning, physical or other disabilities. The PDG also emphasised the importance of monitoring and evaluating new interventions to broaden the evidence base.

Maternal diet

3.6 Up to 50% of pregnancies are likely to be unplanned, so all women of childbearing age need to be aware of the importance of a healthy diet. Nutritional interventions for women who are – or who plan to become – pregnant are likely to have the greatest effect if delivered before conception and during the first 12 weeks.

3.7 A healthy diet is important for both the baby and mother throughout pregnancy and after the birth. However, 39% of people from low income groups report that they worry about having enough food to eat before they receive money to buy more. Similarly, about a third (36%) report that they cannot afford to eat balanced meals. Overall, one fifth of adults in low income groups report reducing the size of – or skipping – meals. Five per cent report that, on occasion, they have not eaten for a whole day because they did not have enough money to buy food (Food Standards Agency 2007).

3.8 Women who are overweight or obese before they conceive have an increased risk of complications during pregnancy and birth. This poses health risks for both mother and baby in the longer term (Morin 1998). There is also evidence that maternal obesity is related to health inequalities, particularly socioeconomic deprivation, inequalities within ethnic groups and poor access to maternity services (Heslehurst et al 2007).

3.9 One of the biggest challenges when trying to improve the diets of women, children and families is how to help them change their behaviour (rather than just their knowledge and attitudes). The PDG emphasised that a multidisciplinary approach (involving and supporting the families themselves and the wider community) is the most effective option. It is important that the team involved adopts a non-judgemental, informal and individual approach based on advice about food (rather than just nutrients).

3.10 The PDG welcomed the introduction of Healthy Start vouchers to buy fruit and vegetables (as well as milk and infant formula). These are available to pregnant women and families with a child aged under 4 years. Those eligible include people on income support and income-based jobseekers allowance and those with an income of £14,495 a year or less. All pregnant women under 18 also qualify, whether or not they are on benefits.

The Group felt, however, that the vouchers were likely to have a greater impact if their monetary value was increased, and if they could be used in food cooperatives and other community-based food initiatives. Community-based initiatives may offer considerable potential for reaching more eligible families.

3.11 There is a lack of evidence on interventions to reduce the risk of developing food allergies. The PDG noted that many pregnant women restrict the foods they eat due to a suspected food allergy. The DH/FSA recommends that women should seek advice from a

health professional. The PDG agrees that individuals should not cut out food groups without advice from a dietitian, in case they omit important nutrient sources.

Supplements

3.12 The PDG welcomed the fact that Healthy Start provides free vitamin supplements (folic acid with vitamins C and D) specially formulated for pregnant women and free vitamin drops (vitamins A, C and D) for young children. Healthcare professionals need to be aware of both types of Healthy Start vitamin supplements. Maternal supplements are available free to all eligible women who are pregnant or have an infant under 1 year. Children's vitamin drops are available to all eligible infants and children under 4. The PDG noted that if the maternal vitamin supplements were also made available for women with a child between 1 and 4 years, the incidence of neural tube defects (NTDs) and prevalence of rickets could, potentially, be further reduced.

3.13 Maternal Healthy Start vitamin supplements are considerably cheaper than commercially available alternatives. The PDG noted that increasing the availability of these supplements from community pharmacies (and women's awareness of their affordability) would:

- support recommendations on folic acid and vitamin D
- reduce the risk of women taking multivitamin supplements containing vitamin A (which is not recommended during pregnancy).

3.14 Folic acid supplements reduce the risk to the fetus of NTDs such as anencephaly and spina bifida. The DH recommends that women who could become pregnant or who are already pregnant take them daily (400 micrograms [μg]) before conception and throughout the first 12 weeks of pregnancy. Higher doses (5 mg daily) are recommended for those who have had a previous NTD pregnancy or who have a family history of NTD. Higher doses are also recommended for women who

have (or whose partner may have) an NTD and those who have diabetes (DH 2000).

Up to 50% of pregnancies are unplanned, so many women do not start taking folic acid supplements until they realise they are pregnant. Health professionals and others working with women of childbearing age need further training so that they can explain the importance of folic acid and folate. For example, they need to stress that eating folic acid and folate-rich foods is important, but is not enough to reduce the risk of NTDs. Foods fortified with folic acid include: breakfast cereals and yeast extract. Those rich in folate include: peas, beans, lentils and orange juice.

A recent survey of the knowledge and attitudes of low-income women to folic acid supplements showed that many did not understand either the serious nature of NTDs or the role of folic acid supplements in prevention (Food Standards Agency 2007). The authors emphasised the importance of explaining the reasons for recommending dietary and lifestyle change. In the case of folic acid, this includes an explanation of the nature, severity and lifelong consequences of having an NTD.

- 3.15 There have been many reports that rickets is re-emerging in the UK though its prevalence in the population is unknown. Rickets is a clinical marker of poor pre- and postnatal bone health caused by vitamin D deficiency. The plasma concentration of 25 hydroxyvitamin D is widely used to indicate an individual's vitamin D status. A level below 25 nanomoles/litre (nmol/l) indicates risk of vitamin D deficiency. The 'National diet and nutrition survey of British adults' (Ruston et al. 2004) showed that about a quarter of British women aged 19–24 and a sixth of those aged 25–34 are at risk by this criterion.

Dietary sources of vitamin D are limited and the main source is skin synthesis on exposure of the skin to sunlight. However, at UK

latitudes, there is limited sunlight of the appropriate wavelength, particularly during winter. Thus maternal skin exposure alone may not always be enough to achieve the optimal vitamin D status needed for pregnancy. During pregnancy, lack of vitamin D may adversely affect fetal bone mineralisation and accumulation of infant vitamin D stores for their early months of life.

Women and children of South Asian, African, Caribbean and Middle Eastern descent, and those who remain covered when outside, are at greatest risk. However, some white women living at the most southerly latitudes of the United Kingdom are also at risk. Javaid and colleagues (2006) found that the bone mineral mass of children aged 9 correlated significantly with their mothers' vitamin D status during pregnancy.

In 1991, COMA set a reference nutrient intake (RNI) of 10 micrograms (μg) of vitamin D per day for all pregnant and breastfeeding women. It also set an RNI of 7–8.5 micrograms (μg) daily for breastfed babies from 6 months, or earlier if there was increased risk of deficiency due to low maternal status. In most instances, these intakes cannot be met from diet alone: the average intake of women of childbearing age is 2.8 micrograms (μg) per day (Henderson et al. 2003). Thus an intake above RNI can only be guaranteed by taking a vitamin D supplement.

In 2007, the Scientific Advisory Committee on Nutrition (SACN) confirmed that these recommendations should remain unchanged. The DH and the Chief Medical Officer state that: all pregnant and breastfeeding women, breastfed babies from the age of 6 months (or earlier if the mother's vitamin D status in pregnancy was not adequate), formula-fed babies receiving less than 500 ml formula a day and all children aged 1–4 years should receive vitamin D supplements (DH 2005).

The PDG was aware of widespread confusion among health

professionals in relation to this policy and was concerned that the advice was not being followed. There is no evidence that vitamin D supplements at the doses recommended, in addition to what is normally consumed in the diet, are harmful. It was also noted that suitable supplements containing vitamin D are available free to mothers and to children eligible for Healthy Start benefits.

Infant feeding

- 3.16 Women from routine and manual groups are less likely to initiate breastfeeding and more likely to stop early. If exclusive breastfeeding for the first 6 months were actively protected, promoted and supported, the health inequalities experienced by mothers and children in low-income families would be reduced (World Health Organization 2003).
- 3.17 Schemes to promote breastfeeding vary in their effectiveness and occasionally, where they have little effect, may not be good value for money. However, most established peer and professional educational breastfeeding interventions were estimated to be cost effective, even when the resulting health benefits were conservatively estimated. Indeed, if it is accepted that demonstrable health benefits in later life (for example, reduced risk of cardiovascular disease) are causally associated with breastfeeding, then virtually all breastfeeding schemes would be cost effective, and often extremely so.
- 3.18 Mothers who breastfeed need clear and consistent advice on how to maintain their milk supply and how to store expressed breast milk. The PDG hopes that the recommendations on storing expressed breast milk will encourage mothers to breastfeed for longer, especially those who return to work.
- 3.19 In the national 'Infant feeding survey 2005' (Bolling et al. 2007), almost half of mothers who had prepared powdered infant formula in the previous 7 days had not followed the key recommendations for its

3.20 UK dietary recommendations for children aged 6–24 months are, for the most part, based on the 1994 COMA report 'Weaning and the weaning diet' and its subsequent updates (DH 1994a). This process involves a gradual transition from an exclusively milk-based diet to one based, for the most part, on foods other than milk.

Health departments in England, Wales and Northern Ireland recommend that babies should be offered a gradually increasing amount and variety of solid foods, in addition to milk, from 6 months. This should include meat, fish, pulses, vegetables and fruit without added salt or sugar. Introducing solid foods too early or too late is undesirable. National infant feeding surveys have consistently shown that early introduction of solid foods is associated with lower socioeconomic position and educational attainment. The PDG welcomes recent evidence of a significant reduction in the proportion of infants weaned by 4 months: the proportion of mothers giving their babies solids before they are 3 months has more than halved since the revision of national policy (DH 2003). However, inequalities are still evident in this area.

Pre-school children

3.21 The pre-school years are an ideal time to establish the foundation for a healthy lifestyle. Parents are primarily responsible for their child's nutrition during these years, but child care providers also play an important role.

3.22 General dietary guidelines for adults do not apply to children under 2 years. Between 2 and 5 years the timing and extent of dietary change is flexible. By 5 years, children should be consuming a diet consistent with the general recommendations for adults (DH 1994b). It is recommended that the average salt intake for children should not

exceed the following: 1 gram for infants aged 7–12 months; 2 grams for children aged 1–3 years and 3 grams for those aged 4–6 years. This can be achieved if children are given predominantly home-cooked foods (SACN 2004b). The PDG welcomes the practical Caroline Walker Trust guidelines for food provision in childcare settings (such as day-care centres, crèches, childminders and nursery schools) to encourage healthy eating from an early age (Crawley 2006). It also welcomes guidelines which address the specific eating and drinking issues facing children and adults with learning disabilities (Crawley 2007). These include issues related to breastfeeding, weight management, gastrointestinal disorders, swallowing difficulties and oral health.

- 3.23 Generally, children aged 1.5 to 6 years do not eat enough fruit and vegetables (particularly those from lower income and one parent families). However, they do eat a lot of added sugars (Gregory et al. 1995; Gregory et al. 2000). The PDG stressed that pre-school children's diets are still an area of concern and should be addressed.

Weight monitoring

- 3.24 The way a baby's weight is measured and monitored varies considerably, in terms of the type of equipment used, the way data is documented and interpreted, and the way it is communicated to parents. Routine and frequent monitoring of the weight of newborn babies (in their first 2 weeks of life) is important as part of an overall assessment of their needs. However, ongoing weekly weighing is unnecessary for healthy babies who give no cause for concern. The PDG is concerned that existing guidance from the Coventry consensus (Hall 2000) is not widely implemented. This states that unnecessary weighing of older babies may lead to an inappropriate intervention and undermine parents' confidence.
- 3.25 Weight monitoring alone, as currently practised, does not provide information to justify changes in infant feeding practices. Parents may

need advice about infant feeding from a multidisciplinary team.
Effective advice and support will take the parents' views into account.

Training

- 3.26 The PDG noted that some dietary advice given by those responsible for the care of mothers and pre-school children is not evidence-based and that information provided by health professionals is not always consistent. Confusion about national nutrition policy relating to mothers, infants and children needs to be addressed. In addition, women who are preparing for pregnancy need help to understand the long-term consequences on their child's health of poor nutrition during pregnancy. Professionals need training in both these areas so they can offer informed and practical advice on food (not just nutrients). They should also participate in continuing professional development programmes to keep their knowledge up-to-date.
- 3.27 Many of the recommendations have training implications for health professionals. Those offering training in nutrition need to have an appropriate qualification (for example, as a dietitian or a registered public health nutritionist). They must also recognise the importance of communication and inter-personal skills.
- 3.28 Cultural beliefs may prevent people from accepting professional advice. In addition, mothers may be subjected to conflicting and inconsistent advice from health professionals, literature, media sources and product labelling.

4 Recommendations

This document is the Institute's formal guidance on maternal and child nutrition. When writing the recommendations, the Programme Development Group (see appendix A) considered the evidence of effectiveness (including cost effectiveness), fieldwork data and comments from stakeholders. Full details are available on the Institute's website at: www.nice.org.uk/PH011

The recommendations support local implementation of national policy on maternal and child nutrition.

As set out in the scope for the guidance (see www.nice.org.uk/PH011), they do not cover the following areas:

- population-based screening programmes
- complementary therapy approaches
- national maternal and child nutrition policies that are the responsibility of the Department of Health (DH) and the Food Standards Agency (FSA), as advised by the Scientific Advisory Committee on Nutrition. These include policies on population-based dietary recommendations, food safety, the nutritional content of infant formula and the fortification of foods.

The recommendations are relevant for all women who are pregnant (or who may become pregnant), mothers of children aged under 5 and others who care for children aged under 5. They are particularly relevant for pregnant women, mothers and children from low-income and other disadvantaged backgrounds.

The evidence statements that underpin the recommendations are listed in appendix C.

The evidence reviews, supporting evidence statements and economic appraisal are available on the Institute's website at www.nice.org.uk/PH011

The PDG also considered whether a recommendation should only be implemented as part of a research programme, where evidence was lacking.

For the research recommendations and other gaps in the research, see section 6 and appendix D respectively.

Training

Recommendation 1

Who is the target population?

Health professionals and support workers who care for children under 5 years and women who may become – or who are – pregnant.

Who should take action?

Professional bodies, skills councils and others responsible for setting competencies and developing continuing professional development programmes for health professionals, nursery nurses and support workers.

What action should they take?

- Professional bodies should ensure health professionals have the appropriate knowledge and skills to give advice on the following:
 - the nutritional needs of women and the importance of a balanced diet before, during and after pregnancy (including the need for suitable folic acid supplements)
 - the rationale for recommending certain dietary supplements (for example, vitamin D) to pregnant and breastfeeding women
 - the nutritional needs of infants and young children
 - breastfeeding management, using the Baby Friendly Initiative (BFI) training as a minimum standard (www.babyfriendly.org.uk)
 - strategies for changing people's eating behaviour, particularly by offering practical, food-based advice .

- As part of their continuing professional development, train midwives, health visitors and support workers in breastfeeding management, using BFI training as a minimum standard.

- As part of their continuing professional development, train health professionals, including doctors, dietitians and pharmacists, to promote and support breastfeeding, using BFI training as a minimum standard.

Folic acid

Recommendation 2

Who is the target population?

Women who may become pregnant and women in early pregnancy.

Who should take action?

- Primary care trusts (PCTs) and NHS trusts.
- Directors of public health, planners and organisers of public health campaigns.
- Pharmacists, GPs, hospital doctors and nurses, particularly those working in gynaecology, sexual health, contraceptive and family planning services, fertility clinics and school health services.
- Public health nutritionists and dietitians.
- Manufacturers of goods for women of childbearing age.

What action should they take?

- Health professionals should:
 - use any appropriate opportunity to advise women who may become pregnant that they can most easily reduce the risk of having a baby with a neural tube defect (for example, anencephaly and spina bifida) by taking folic acid supplements. Advise them to take 400 micrograms (μg) daily before pregnancy and throughout the first 12 weeks, even if they are already eating foods fortified with folic acid or rich in folate

- advise all women who may become pregnant about a suitable folic acid supplement, such as the maternal Healthy Start vitamin supplements
 - encourage women to take folic acid supplements and to eat foods rich in folic acid (for example, fortified breakfast cereals and yeast extract) and to consume foods and drinks rich in folate (for example, peas and beans and orange juice).
- PCTs should ensure local education initiatives aimed at health professionals include information on the importance of folic acid supplements. They should provide the maternal Healthy Start vitamin supplements (folic acid, vitamins C and D) for eligible women. They should also ensure women who are not eligible for Healthy Start can obtain the supplements from their local pharmacy.
- GPs should prescribe 5 milligrams of folic acid a day for women who are planning a pregnancy, or are in the early stages of pregnancy, if they:
 - (or their partner) have a neural tube defect
 - have had a previous baby with a neural tube defect
 - (or their partner) have a family history of neural tube defects
 - have diabetes.
- Manufacturers should include information with their products on the importance of folic acid supplements before and during pregnancy. Relevant products may include pregnancy tests, sanitary products, contraceptives and ovulation predictor kits.

(See also NICE clinical guideline 63 on diabetes in pregnancy at www.nice.org.uk/CG063 and its antenatal care clinical guideline 62 at www.nice.org.uk/CG062)

Vitamin D

Recommendation 3

Who is the target population?

Pregnant women and breastfeeding mothers.

Who should take action?

- Dietitians, public health nutritionists, midwives, health visitors, GPs, obstetricians and community pharmacists.
- Manufacturers of goods for pregnant and breastfeeding women.

What action should they take?

- Dietitians and public health nutritionists should educate health professionals about the importance of vitamin D supplements for all pregnant and breastfeeding women.
- During the booking appointment at the beginning of pregnancy, midwives should offer every woman information and advice on the benefits of taking a vitamin D supplement (10 micrograms [μg] per day) during pregnancy and while breastfeeding. They should explain that it will increase both the mother's and her baby's vitamin D stores and reduce the baby's risk of developing rickets.
- Health professionals should take particular care to check that women at greatest risk of deficiency are following advice to take a vitamin D supplement during pregnancy and while breastfeeding. These include women who are obese, have limited skin exposure to sunlight or who are of South Asian, African, Caribbean or Middle Eastern descent.
- Midwives and health visitors should advise all pregnant and breastfeeding women about the availability of suitable vitamin D supplements such as the Healthy Start vitamin supplements. Women who are not eligible for Healthy Start benefit can obtain the vitamin supplement from their local community pharmacy.

- Manufacturers should include information with their products on the importance of vitamin D supplements during pregnancy and while breastfeeding. Relevant products may include pregnancy tests and breast pumps.

(See also NICE clinical guideline 62 on antenatal care at www.nice.org.uk/CG062)

Healthy Start

Recommendation 4

Who is the target population?

Pregnant women and parents of infants and children under 4 years who may be eligible for the Healthy Start benefit.

Who should take action?

- PCT commissioners and managers.
- GPs, midwives, health visitors, obstetricians, paediatricians, and community pharmacists.

What action should they take?

- PCTs should promote the Healthy Start scheme.
- PCTs should ensure an adequate supply of both types of Healthy Start vitamin supplements (for women and for children from 6 months to 4 years) is available for distribution by health professionals when they see pregnant women and parents of children under 4 years.
- PCTs should ensure an adequate supply of Healthy Start application forms is available and that the uptake of Healthy Start benefits is regularly audited.
- Health professionals should advise pregnant women and parents of children under 4 years about the Healthy Start scheme. They should

ensure all women who may be eligible receive an application form as early as possible in pregnancy.

- Health professionals should use every opportunity they have to offer those parents who are eligible for the Healthy Start scheme practical, tailored information, support and advice on:
 - how to use Healthy Start vouchers to increase their fruit and vegetable intake
 - how to initiate and maintain breastfeeding
 - how to introduce foods in addition to milk as part of a progressively varied diet when infants are 6 months old.
- Health professionals should offer the maternal Healthy Start vitamin supplement (folic acid, vitamins C and D) to pregnant women who are (or who may be) eligible.
- GPs and health visitors should offer children's Healthy Start vitamin supplements (vitamins A, C and D) to all children aged from 6 months to 4 years in families receiving the Healthy Start benefit.
- Commissioners should consider distributing the maternal Healthy Start vitamin supplement (folic acid, vitamins C and D) to all women who receive Healthy Start benefit for children aged 1–4 years, particularly those who may become pregnant.
- Community pharmacists should ensure the Healthy Start maternal vitamin supplements are available for purchase by women who are not eligible to receive them free of charge.

Diet in pregnancy

Recommendation 5

Who is the target population?

Pregnant women and those who may become pregnant.

Who should take action?

Midwives, obstetricians, GPs, health visitors and dietitians.

What action should they take?

- Early in pregnancy, discuss the woman's diet and eating habits and find out and address any concerns she may have about her diet.
- Provide information on the benefits of a healthy diet and practical advice on how to eat healthily throughout pregnancy. This should be tailored to the woman's circumstances. The advice should include: eat five portions of fruit and vegetables a day and one portion of oily fish (for example, mackerel, sardines, pilchards, herring, trout or salmon) a week.

Obesity

Recommendation 6

Who is the target audience?

Pregnant women who have a pre-pregnancy body mass index (BMI) over 30, and those with a BMI over 30 who have a baby or who may become pregnant.

Who should take action?

Obstetricians, gynaecologists, GPs, midwives, health visitors, nurses, dietitians, those working in contraceptive services or on weight management programmes (commercial or voluntary).

What action should they take?

- Inform women who have a BMI over 30 about the increased risks this poses to themselves and their babies and encourage them to lose weight before becoming pregnant or after pregnancy. Provide a structured programme that:
 - addresses the reasons why women may find it difficult to lose weight, particularly after pregnancy
 - is tailored to the needs of an individual or group

- combines advice on healthy eating and physical exercise (advising them to take a brisk walk or other moderate exercise for at least 30 minutes on at least 5 days of the week)
 - identifies and addresses individual barriers to change
 - provides ongoing support over a sufficient period of time to allow for sustained lifestyle changes.
- Health professionals should refer pregnant women with a BMI over 30 to a dietitian for assessment and advice on healthy eating and exercise. Do not recommend weight-loss during pregnancy.
 - Advise breastfeeding women that losing weight by eating healthily and taking regular exercise will not affect the quantity or quality of their milk.

(See also NICE clinical guideline 62 on antenatal care at www.nice.org.uk/CG062 and NICE clinical guideline 43 on obesity at: www.nice.org.uk/CG043)

Breastfeeding

Recommendation 7

Who is the target population?

Pregnant women and breastfeeding mothers.

Who should take action?

Commissioners and managers of maternity and children's services.

What action should they take?

- Adopt a multifaceted approach or a coordinated programme of interventions across different settings to increase breastfeeding rates. It should include:
 - activities to raise awareness of the benefits of – and how to overcome the barriers to – breastfeeding
 - training for health professionals
 - breastfeeding peer-support programmes

- joint working between health professionals and peer supporters
 - education and information for pregnant women on how to breastfeed, followed by proactive support during the postnatal period (the support may be provided by a volunteer).
- Implement a structured programme that encourages breastfeeding, using BFI as a minimum standard (www.babyfriendly.org.uk). The programme should be subject to external evaluation.
 - Ensure there is a written, audited and well-publicised breastfeeding policy that includes training for staff and support for those staff who may be breastfeeding. Identify a health professional responsible for implementing this policy.

(See also NICE clinical guideline 37 on postnatal care at www.nice.org.uk/CG037)

Recommendation 8

Who is the target population?

Pregnant women and breastfeeding mothers.

Who should take action?

- Commissioners and managers of maternity and children's services.
- PCTs.

What action should they take?

- Ensure health professionals who provide information and advice to breastfeeding mothers have the required knowledge and skills.
- Ensure support workers receive training in breastfeeding management from someone with the relevant skills and experience before they start working with breastfeeding mothers.

- Ensure all those who work in maternity and children's services, including receptionists, volunteers and ancillary staff, are made fully aware of the importance of breastfeeding and help to promote a supportive environment.

Recommendation 9

Who is the target population?

Pregnant women and their partners.

Who should take action?

Midwives, obstetricians, GPs and health visitors.

What action should they take?

- Midwives and health visitors should ensure pregnant women and their partners are offered breastfeeding information, education and support on an individual or group basis. This should be provided by someone trained in breastfeeding management and should be delivered in a setting and style that best meets the woman's needs.
- During individual antenatal consultations GPs, obstetricians and midwives should encourage breastfeeding. They should pay particular attention to the needs of women who are least likely to breastfeed (for example, young women, those who have low educational achievement and those from disadvantaged groups).
- A midwife or health visitor trained in breastfeeding management should provide an informal group session in the last trimester of pregnancy. This should focus on how to breastfeed effectively by covering feeding position and how to attach the baby correctly.

Recommendation 10

Who is the target population?

Breastfeeding mothers.

Who should take action?

Midwives, health visitors, midwifery and health visitor support workers.

What action should they take?

- Ensure a mother can demonstrate how to position and attach the baby to the breast and can identify signs that the baby is feeding well. This should be achieved (and be documented) before she leaves hospital or the birth centre (or before the midwife leaves the mother after a home birth).
- Provide continuing and proactive breastfeeding support at home, recording all advice in the mother's hand-held records.
- Provide contact details for local voluntary organisations that can offer ongoing support to complement NHS breastfeeding services.
- Advise mothers that a healthy diet is important for everyone and that they do not need to modify their diet to breastfeed.
- Do not provide written materials in isolation but use them to reinforce face-to-face advice about breastfeeding.

Recommendation 11***Who is the target population?***

Pregnant women and new mothers, particularly those who are least likely to start and continue to breastfeed. For example, young women, those who have low educational achievement and those from disadvantaged groups.

Who should take action?

Commissioners and managers of maternity and children's services.

What action should they take?

- Provide local, easily accessible breastfeeding peer support programmes and ensure peer supporters are part of a multidisciplinary team.
- Ensure peer supporters:

- attend a recognised, externally accredited training course in breastfeeding peer support
 - contact new mothers directly within 48 hours of their transfer home (or within 48 hours of a home birth)
 - offer mothers ongoing support according to their individual needs. This could be delivered face-to-face, via telephone or through local groups
 - can consult a health professional and are provided with ongoing support
 - gain appropriate child protection clearance.
- Consider training peer supporters and link workers to help mothers, parents and carers follow professional advice on feeding infants aged 6 months and over. The advice should promote an increasingly varied diet using food of different textures in appropriate amounts (in addition to milk), in response to the baby's needs.

Recommendation 12

Who is the target population?

Breastfeeding mothers.

Who should take action?

Midwives, health visitors, paediatric nurses, nurses working in special-care baby and neonatal units, and nursery nurses.

What action should they take?

- Show all breastfeeding mothers how to hand-express breast milk.
- Advise mothers that expressed milk can be stored for:
 - up to 5 days in the main part of a fridge, at 4°C or lower
 - up to 2 weeks in the freezer compartment of a fridge
 - up to 6 months in a domestic freezer, at minus 18°C or lower.
- Advise mothers who wish to store expressed breast milk for less than 5 days that the fridge preserves its properties more effectively than freezing.

- Advise mothers who freeze their expressed breast milk to defrost it in the fridge and not to re-freeze it once thawed. Advise them never to use a microwave oven to warm or defrost breast milk.

Link workers

Recommendation 13

Who is the target population?

Pregnant women and mothers whose first language is not English, their partners and extended family.

Who should take action?

NHS trusts responsible for maternity care and GP surgeries and community health centres.

What action should they take?

- NHS trusts should train link workers who speak the mother's first language to provide information and support on breastfeeding, use of infant formula , weaning and healthy eating.
- Where link workers are not available, ensure women whose first language is not English have access to interpreting services and information in a format and language they can understand.
- NHS trusts should encourage women from minority ethnic communities whose first language is not English to train as breastfeeding peer supporters.

Infant formula

Recommendation 14

Who is the target population?

Pregnant women and mothers.

Who should take action?

- Commissioners and managers responsible for maternity, children's and primary care services.
- GPs, midwives, health visitors and pharmacists.

What action should they take?

- Commissioners and managers should ensure mothers have access to independent advice from a qualified health professional on the use of infant formula. This should include information on the potential risks associated with formula-feeding and how to obtain ongoing advice at home.
- Midwives should ensure mothers who choose to use infant formula are shown how to make up a feed before leaving hospital or the birth centre (or before the mother is left after a home birth). This advice should follow the most recent guidance from the DH ('Bottle feeding' 2006).
- Avoid promoting or advertising infant or follow-on formula. Do not display, distribute or use product samples, leaflets, posters, charts, educational or other materials and equipment produced or donated by infant formula, bottle and teat manufacturers.

(See also NICE clinical guideline 37 on postnatal care at www.nice.org.uk/CG037)

Prescribing

Recommendation 15

Who is the target population?

Hospital doctors, GPs, obstetricians, pharmacists, specialist nurses, dentists and PCT medicine management teams.

Who should take action?

NHS trusts responsible for maternity care and GP surgeries, community health centres, pharmacies and drug and alcohol services.

What action should they take?

- Ensure health professionals and pharmacists who prescribe or dispense drugs to a breastfeeding mother consult supplementary sources (for example, the Drugs and Lactation Database [LactMed] www.toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?LACT) or seek guidance from the UK Drugs in Lactation Advisory Service (www.ukmicentral.nhs.uk/drugpreg/guide.htm).
- Health professionals should discuss the benefits and risks associated with the prescribed medication and encourage the mother to continue breastfeeding, if reasonable to do so. In most cases, it should be possible to identify a suitable medication which is safe to take during breastfeeding by analysing pharmacokinetic and study data. Appendix 5 of the 'British national formulary' should only be used as a guide as it does not contain quantitative data on which to base individual decisions.
- Health professionals should recognise that there may be adverse health consequences for both mother and baby if the mother does not breastfeed. They should also recognise that it may not be easy for the mother to stop breastfeeding abruptly – and that it is difficult to reverse.

Child health promotion

Recommendation 16

Who is the target population?

Parents and carers of infants and pre-school children.

Who should take action?

- NHS trust and PCT commissioners and managers.
- Health visitors, community nursery nurses, the child health promotion programme (CHPP) team and children's centre teams.

What action should they take?

- Commissioners and managers should work with local partners to ensure mothers can feed their babies in public areas without fear of interruption or criticism.
- Health visitors should assess the needs of all mothers, parents and carers with young children. They should provide relevant, early and ongoing support at home for those with the greatest needs, including any that may be the result of a physical or learning disability or communication difficulties.
- Health visitors and the CHPP team should:
 - support mothers to continue breastfeeding for as long as they choose
 - provide mothers and other family members with support to introduce a variety of nutritious foods (in addition to milk) to ensure the child is offered a progressively varied diet from 6 months
 - encourage and support parents and carers to make home-prepared foods for infants and young children, without adding salt, sugar or honey
 - encourage families to eat together and encourage parents and carers to set a good example by the food choices they make for themselves
 - advise parents and carers not to leave infants alone when they are eating or drinking.

Recommendation 17

Who is the target population?

Infants and pre-school children.

Who should take action?

- NHS trust and PCT commissioners and managers.

- GPs, paediatricians, midwives, health visitors and community nursery nurses.

What action should they take?

- As a minimum, ensure babies are weighed (naked) at birth and at 5 and 10 days, as part of an overall assessment of feeding. Thereafter, healthy babies should be weighed (naked) no more than fortnightly and then at 2, 3, 4 and 8–10 months in their first year.
- Ensure infants are weighed using digital scales which are maintained and calibrated annually, in line with medical devices standards (spring scales are inaccurate and should not be used).
- Commissioners and managers should ensure health professionals receive training on weighing and measuring infants. This should include: how to use equipment, how to document and interpret the data, and how to help parents and carers understand the results and implications.
- Ensure support staff are trained to weigh infants and young children and to record the data accurately in the child health record held by the parents.

(See also NICE clinical guideline 55 on intrapartum care at www.nice.org.uk/CG055)

Allergies

Recommendation 18

Who is the target population?

Pregnant women, mothers and their partners who have a family history of allergy (including eczema, asthma and hay fever).

Who should take action?

Midwives, health visitors, GPs, paediatricians, community dietitians and pharmacists.

What action should they take?

- Advise mothers to feed the baby only on breast milk and to continue breastfeeding while introducing solid foods, when the infant is 6 months. For current dietary advice visit www.eatwell.gov.uk
- Advise mothers who choose not to breastfeed that there is insufficient evidence to suggest that infant formula based on partially or extensively hydrolysed cow's milk protein helps to prevent allergies.

Oral health

Recommendation 19

Who is the target population?

Parents and carers of infants and pre-school children.

Who should take action?

Health visitors, GPs, dentists, dental hygienists/assistants, community and day care nursery nurses, home-based child carers and others who work with young children.

What action should they take?

- Encourage parents and carers to:
 - use a bottle for expressed breast milk, infant formula or cooled boiled water only
 - offer drinks in a non-valved, free-flowing cup from age 6 months to 1 year
 - discourage feeding from a bottle from 1 year onwards
 - limit sugary foods to mealtimes only
 - avoid giving biscuits or sweets as treats
 - encourage snacks free of salt and added sugar (such as vegetables and fruit) between meals
 - provide milk and water to drink between meals (diluted fruit juice can be provided with meals – 1 part juice to 10 parts water).

- Discourage parents and carers from:
 - adding sugar or any solid food to bottle feeds
 - adding sugar or honey to weaning (solid) foods
 - offering baby juices or sugary drinks at bedtime.

Pre-school settings

Recommendation 20

Who is the target population?

Parents and carers of infants and pre-school children.

Who should take action?

Nursery nurses, home-based child carers and others working in pre-school day care settings such as nurseries, creches and playgroups.

What action should they take?

- Support breastfeeding mothers by:
 - offering them the opportunity to breastfeed when they wish
 - encouraging them to bring expressed breast milk in a cool bag
 - ensuring expressed breast milk is labelled with the date and name of the infant and stored in the main body of the fridge.
- Implement DH guidance ('Bottle feeding' 2006) on the preparation and use of powdered infant formula to reduce the risk of infection to infants in care settings.

Recommendation 21

Who is the target population?

Infants and pre-school children up to the age of 5 years.

Who should take action?

Teachers, teaching assistants, nursery nurses, home-based child carers and those working in pre-school day care settings such as nurseries, creches and playgroups.

What action should they take?

- Implement a food policy which takes a 'whole settings' approach to healthy eating, so that foods and drinks made available during the day reinforce teaching about healthy eating.
- Take every opportunity to encourage children to handle and taste a wide range of foods that make up a healthy diet by:
 - providing practical classroom-based activities
 - ensuring a variety of healthier choices are offered at mealtimes, and snacks offered between meals are low in added sugar and salt (for example, vegetables, fruit, milk, bread and sandwiches with savoury fillings)
 - ensuring carers eat with children whenever possible.

Family nutrition

Recommendation 22

Who is the target population?

Families with children aged up to 5 years.

Who should take action?

- Commissioning agencies, local authorities, local strategic partnerships, voluntary agencies and local businesses that fund or provide community projects.
- Public health nutritionists and dietitians.

What action should they take?

- Public health nutritionists and dietitians should offer parents in receipt of Healthy Start benefit practical support and advice on how to use the Healthy Start vouchers to increase their intake of fruit and vegetables.
- Provide support (both practical and financial) to develop and maintain community-based initiatives which aim to make a balanced diet more accessible to people on a low income. Examples include: food cooperatives, 'cook and eat' clubs, 'weaning parties' and 'baby cafes'.
- Work with local retailers to improve the way fresh fruit and vegetables are displayed and promoted.

5 Implementation

NICE guidance can help:

- NHS organisations meet DH standards for public health as set out in the seventh domain of ['Standards for better health'](#) (updated in 2006). Performance against these standards is assessed by the Healthcare Commission, and forms part of the annual health check score awarded to local healthcare organisations.
- NHS organisations and local authorities (including social care and children's services) meet the requirements of the government's 'National standards, local action, health and social care standards and planning framework 2005–2008 and the 'Joint planning and commissioning framework for young people children and maternity services 2006'.
- National and local organisations within the public sector meet government indicators and targets to improve health and reduce health inequalities.
- Local authorities fulfil their remit to promote the economic, social and environmental wellbeing of communities.

- Local NHS organisations, local authorities and other local public sector partners benefit from any identified cost savings, disinvestment opportunities or opportunities for re-directing resources.
- Provide a focus for children’s trusts, health and wellbeing partnerships and other multi-sector partnerships working on health within a local strategic partnership.
- NICE has developed tools to help organisations implement this guidance. For details, visit our website at www.nice.org.uk/PH011

6 Recommendations for research

The PDG has made the following recommendations to plug the most important gaps in the evidence.

Recommendation 1

Who should take action?

Research commissioners and funders.

What action should they take?

- Commission research into effective ways of improving the nutritional status of pre-conceptual women, pregnant and breastfeeding women and young children. This should identify effective ways of engaging with women both before and during pregnancy. It should pay particular attention to:
 - teenage parents, low-income families and families from minority ethnic or disadvantaged groups
 - promoting oily fish, vegetable and fruit consumption
 - helping women who may become pregnant, particularly those who are obese, to achieve a healthy body weight prior to pregnancy
 - promoting uptake of folic acid supplements prior to conception and the uptake of vitamin D supplements during pregnancy and while breastfeeding.

- Commission research into how best to encourage and support women to breastfeed exclusively during the first 6 months and how to ensure all women breastfeed for longer.
- Commission research on interventions which reduce the incidence of food allergy among infants and young children, particularly when introducing solid foods.
- Commission research into the acceptability of dietary and lifestyle interventions to improve the vitamin D status of mothers and children aged up to 5 years, particularly those from vulnerable groups. This should also assess the relative contribution made by exposing the skin to ultra-violet light and dietary supplements.
- Commission research into the prevention of early dental caries among children aged up to 5 years, especially those from vulnerable groups. This should focus on children's drinks and snacks.

Recommendation 2

Who should take action?

Research councils, national and local research commissioners and funders, research workers and journal editors.

What action should they take?

- Include as standard in nutritional research and policy evaluation reports :
 - a clear, detailed description of what was delivered, over what period, to whom and in what setting
 - the costs of delivering the intervention
 - measurable and clearly defined health outcomes
 - an estimation of the sample size required to demonstrate, with adequate statistical power, the impact on health
 - differences in access, recruitment and (where relevant data are available) uptake according to socioeconomic and cultural

variables such as social class, education, gender, income or ethnicity

- a description and rationale of the research methods and forms of interpretation used
 - embedded process evaluations that include recipient perspectives (for example, using qualitative techniques such as interviews and focus groups).
- Develop methods for synthesising and interpreting results across studies conducted in different localities, policy environments and population groups.
 - Formulate rigorous and transparent methods for assessing external validity and for translating evidence into practice.

Recommendation 3

Who should take action?

Policy makers, research commissioners and local services.

What action should they take?

- Collect baseline data before implementing local interventions or policy changes that may have an impact on health and ensure evaluation is part of the funding proposal.
- Work in partnership with health authorities, public health observatories or universities to evaluate local initiatives, but allow adequate time for the intervention to take effect. Monitoring and evaluation should always estimate the potential impact on maternal and child health among different social groups.

Recommendation 4

Who should take action?

Policy makers, research funders and health economists.

What action should they take?

As a priority, commission research on the cost-effectiveness of maternal and child nutrition interventions. This includes balancing the cost of primary prevention of nutrition-related ill health against the costs of detecting and treating disease (both short and long term).

Recommendation 5

Who should take action?

Policy makers, research commissioners and local services.

What action should they take?

Commission research into the impact of routine growth and weight monitoring on child health and parenting behaviour.

More detail on all the evidence gaps identified during the development of this guidance is provided in appendix D.

7 Updating the recommendations

NICE public health guidance is updated as needed so that recommendations take into account important new information. We check for new evidence 2 and 4 years after publication, to decide whether all or part of the guidance should be updated. If important new evidence is published at other times, we may decide to update some recommendations at that time.

8 Related NICE guidance

Antenatal care: routine care for the healthy pregnant woman. NICE clinical guideline 62 (2008). Available from: www.nice.org.uk/CG062

Diabetes in pregnancy: management of diabetes and its complications from pre-conception to the postnatal period. NICE clinical guideline 63 (2008). Available from: www.nice.org.uk/CG063

Antenatal and postnatal mental health: clinical management and service guidance. NICE clinical guideline 45 (2007). Available from: www.nice.org.uk/CG045

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Fertility: assessment and treatment for people with fertility problems. NICE clinical guideline 11 (2004). Available from: www.nice.org.uk/CG011

9 Glossary

Diet

In this guidance, the term 'diet' refers to the habitual eating patterns of individuals and groups of people who are not slimming or eating to manage or treat a medical condition.

Dietary reference values (DRVs)

DRVs are a collective term for: reference nutrient intake, estimated average requirement and lower reference nutrient intakes. These terms were introduced into the UK in 1991 to replace the term 'recommended daily

amount'. DRVs reflect the amount of energy and nutrients needed by different groups of healthy people according to their age and gender. For certain nutrients, set increments reflect the increased demands associated with pregnancy and lactation.

Exclusive breastfeeding

Exclusive breastfeeding means an infant receives breast milk only and no other liquids or solids. The only exceptions are drops or syrups containing vitamins, mineral supplements or medicines.

Follow-on formula

Under UK law, follow-on formula may provide the liquid component of a progressively varied diet for healthy infants aged over 6 months.

Food allergy

A food allergy is an adverse reaction. It occurs when the immune system reacts to a particular food. Common allergic reactions include itchy skin or a rash and wheezing or shortness of breath. Severe allergic reactions can be life-threatening. This should not be confused with food intolerance.

Healthy eating

There is no standard definition. However, it is widely accepted that 'healthy eating' means following a diet which is low in fat (particularly saturated fat), sugar and salt, and high in fruit, vegetables and fibre-rich, starchy foods. More details are available from the Food Standards Agency at www.eatwell.gov.uk

Hydrolysed infant formula

Infant formula (see below) containing protein which has been broken down (hydrolysed) either partially or more extensively. Hydrolysed infant formula is more expensive than other infant formula and is usually available on prescription.

Infant formula

Under UK law, infant formula is the term used to describe a food intended to satisfy, by itself, the nutritional needs of infants during the first months of life.

The DH advises that infant formula may be used on its own for the first 6 months.

Low birth weight (LBW)

Low birth weight is defined by the World Health Organization as less than 2500 grams (Kramer 1987).

Mixed feeding

Mixed feeding is the practice of feeding an infant both breast milk and infant formula.

Neural tube defects (NTDs)

The neural tube in the fetus develops into the brain and spinal cord. Neural tube defects occur when the brain, skull and/or the spinal cord and its protective spinal column do not develop properly within the first 4 weeks after conception. The most common NTDs are anencephaly (which results in stillbirth or death soon after delivery) and spina bifida (which may lead to a range of physical disabilities including partial or total paralysis).

Nutritional status

Nutritional status describes an individual's nutritional wellbeing. It is a more comprehensive measure than dietary intake alone as it takes account of body shape and size together with measures of body function.

Postpartum

Postpartum generally refers to the first 6 weeks after the birth of a baby. However, in the review of 'postpartum' women for this guidance, it refers to the first year after the baby's birth.

Recommended daily amounts (RDAs)

RDA is a term that was used in the UK up to 1991. It has been replaced by 'dietary reference values' (see above) but is still sometimes used on food labels.

Recommended dietary allowance (RDA)

RDA is the American equivalent of the UK reference nutrient intake (RNI) – see below. It describes the amount of a nutrient needed to meet the needs of

around 98% of individuals within a population group. Although RDA and RNI do, in theory, meet the needs of similar population groups, the amounts themselves may differ.

Reference nutrient intake (RNI)

RNI is the amount of a nutrient required to meet the needs of around 97% of individuals within a group. RNI for a given nutrient may vary by gender, age and physiological status (examples of the latter include pregnancy and lactation). The RNI is not a minimum target that all individuals need to achieve but the risk of deficiency is minimised if the average population intake exceeds it.

Supplementary feeding

Supplementary feeding means infants who mainly receive breast milk, receive some additional infant formula.

Weaning

Weaning or 'complementary feeding' is the transition from an exclusively milk-based diet to a diet based on solid foods.

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Appendix A: membership of the Programme Development Group, the NICE Project Team and external contractors

The Programme Development Group

PDG membership is multidisciplinary. It comprises researchers, practitioners, stakeholder representatives and members of the public as follows:

Professor Annie Anderson Professor of Food Choice and Director of the Centre for Public Health Nutrition Research, University of Dundee

Kathy Cowbrough Freelance Dietitian, Registered Public Health Nutritionist. Coordinator of the National Network of Dietitians and Nutritionists working in Sure Start Early Years Programmes

Dr Helen Crawley Senior Lecturer Nutrition, University of Kingston

Claire Davis Community Member, Supporter and Tutor with the Breastfeeding Network

Dr Elizabeth Dowler Reader in Food and Social Policy at the University of Warwick, Registered Public Health Nutritionist

Lorna Farr Service Manager, Northumberland, Tyne and Wear NHS Trust. Former Health Visitor and Strategic Health Lead across Sure Start programmes in Newcastle

Janet Fyle Professional Policy Adviser, Royal College of Midwives

Pam Heslop Community Nursery Nurse, Peterborough PCT

Cindy Hutchinson Research Midwife specialising in teenage pregnancy

Dr Wendy Jones Primary Care Pharmacist, Pharmacist Independent Prescriber with a special interest in the safety of drugs in breast milk

Professor Paul Little General Practitioner, Professor of Primary Care Research, University of Southampton

Alison Lloyd Community Member, National Childbirth Trust Antenatal Teacher, Joint Project Coordinator for 'Yummy mummies' (community 'cook and eat' project aimed at low-income and vulnerable pregnant women and families with children under 5 years)

Jenny McLeish Community Member, formerly Policy Officer at the Maternity Alliance

Ruth Moore Development Manager, North Division, National Childminding Association

Professor Richard Watt Professor in Dental Public Health, University College, London

Dr Anthony Williams (Chair) Reader in Child Nutrition and Consultant in Neonatal Paediatrics at St George's, University of London

Expert cooptees to the PDG

Mr Robert Fraser Reader in Obstetrics and Gynaecology, University of Sheffield

Dr Ian Mathers Consultant in Public Health, Heart of Birmingham PCT (meeting 6)

Samantha Montel Policy and Advice Branch, Nutrition Division, Food Standards Agency (meeting 5)

Oma Ramroop Health Visitor, Children's Centre Westminster PCT

Dr Sian Robinson Senior Research Fellow, MRC Epidemiology Resource Centre, University of Southampton

Aparna Srivastava British Dietetic Association Special Interest Group on Black and Minority Ethnic Groups (meeting 5)

Dr Alison Tedstone Head of Nutrition Science Unit, Food Standards Agency
(meeting 4)

NICE Project Team

Mike Kelly

CPHE Director

Tricia Younger

Associate Director

Christine Carson

Analyst

Adrienne Cullum

Analyst

Caroline Mulvihill

Analyst

Susan Murray

Analyst

Karen Peploe

Analyst

Anthony Threlfall

Analyst

Alastair Fischer

Health Economics Adviser

External contractors

External reviewers: effectiveness reviews

Review 1: 'The effectiveness of public health interventions to promote nutrition of pre-conceptual women'. This review was carried out from June–September 2006 by the Mother and Infant Research Unit at the University of

York. The principal authors were: Alison McFadden and Sarah King. The review was updated in January 2008 by the University of York and NICE.

Review 2: 'Review of the effectiveness of interventions to improve the nutrition of pregnant women with a focus on the nutrition of pregnant women in low-income households'. This review was carried out from September 2005–March 2006. A supplementary review was carried out from March–May 2006. Both were conducted by the Mother and Infant Research Unit at the University of York. The principal authors were: Lalitha D'Souza and Sarah King. These two reviews were integrated and revised in November 2007 by NICE.

Review 3: 'The effectiveness of public health interventions to improve the nutrition of postpartum women'. This review was carried out from February–April 2006 by the Mother and Infant Research Unit at the University of York. The principal authors were: Felicia McCormick and Jennifer A Moreton. The review was updated in March 2007 by the University of York and NICE.

Review 4: 'The effectiveness of public health interventions to promote safe and healthy milk feeding practices in babies'. This review was carried out from February–May 2006 by the Mother and Infant Research Unit at the University of York. The principal authors were: Jennifer A Moreton and Sarah King. The review was updated in February 2008 by the University of York and NICE.

Review 5: 'The effectiveness of public health interventions to improve the nutrition of young children aged 6–24 months'. This review was carried out from April–June 2006 by the Mother and Infant Research Unit at the University of York. The principal authors were: Felicia McCormick and Jennifer A Moreton. The review was updated in December 2007 by the University of York and NICE.

Review 6: 'The effectiveness of public health interventions to improve the nutrition of 2 to 5 year old children'. This review was carried out from April–July 2006 by the Mother and Infant Research Unit at the University of York. The principal authors were: Lalitha D'Souza and Sarah King. The review was updated in January 2008 by the University of York and NICE.

Review 7: 'The effectiveness and cost-effectiveness of interventions to promote an optimal intake of vitamin D to improve the nutrition of pre-conceptional, pregnant and postpartum women and children in low-income households'. This review was carried out from April–July 2006 by the National Collaborating Centre for Women's and Children's Health and updated by NICE in December 2007. The principal authors were: Irene Kwan and Paul Jacklin.

Review 8: 'Supplementary evidence review on the effectiveness of public health interventions to improve the nutrition of infants/children aged 6 months to 5 years'. This review was carried out from July–September 2006 by the National Collaborating Centre for Women's and Children's Health and updated by NICE in November 2007. The principal authors were: Irene Kwan and Anuradha Sekhri.

External reviewers: expert reports

'Growth monitoring of infants and young children in the United Kingdom'. This was prepared from September–October 2006 by Magda Sachs and Fiona Dykes from the Maternal and Infant Nutrition and Nurture Unit at the University of Central Lancashire.

'Handling and storage of expressed breast milk'. This was prepared from October–November 2006 by Paul Cook from the Food Hazards and Consumer Protection Branch, Microbiological Safety Division, at the Food Standards Agency.

'Nutrition and breastfeeding'. This was prepared from September–October 2006 by Gail Goldberg from MRC Human Nutrition Research, Cambridge.

External reviewers: cost-effectiveness reviews

'Rapid economic review of public health interventions designed to improve the nutrition of pre-conceptual, pregnant and postpartum women.' This review was carried out from April–July 2006 by the National Collaborating Centre for Women's and Children's Health. The principal authors were: Paul Jacklin, Penny Retsa and Irene Kwan.

'Rapid economic review of public health interventions designed to improve the nutrition of children aged 0–5 years.' This review was carried out from April–July 2006 by the National Collaborating Centre for Women's and Children's Health. The principal authors were: Paul Jacklin, Penny Retsa and Irene Kwan.

The economic appraisal 'Modelling the cost-effectiveness of breastfeeding support' was carried out by the National Collaborating Centre for Women and Children's Health. The principal author was: Paul Jacklin.

Fieldwork

The fieldwork was carried out by SHM Productions.

Appendix B: summary of the methods used to develop this guidance

Introduction

The reports of the reviews and economic appraisal include full details of the methods used to select the evidence (including search strategies), assess its quality and summarise it.

The minutes of the PDG meetings provide further detail about the Group's interpretation of the evidence and development of the recommendations.

All supporting documents are listed in appendix E and are available from the NICE website at: www.nice.org.uk/PH011

The guidance development process

The stages of the guidance development process are outlined in the box below:

1. Draft scope
2. Stakeholder meeting
3. Stakeholder comments
4. Final scope and responses published on website
5. Reviews and cost-effectiveness modelling
6. Synopsis report of the evidence (executive summaries and evidence tables) circulated to stakeholders for comment
7. Comments and additional material submitted by stakeholders
8. Review of additional material submitted by stakeholders (screened against inclusion criteria used in reviews)
9. Synopsis, full reviews, supplementary reviews and economic modelling submitted to the PDG
10. The PDG produces draft recommendations
11. Draft recommendations published on website for comment by stakeholders and for field testing
12. The PDG amends recommendations
13. Responses to comments published on website
14. Final guidance published on website

Key questions

The key questions were established as part of the scope. They formed the starting point for the reviews of evidence and facilitated the development of recommendations by the PDG.

The overarching question was: 'What nutritional interventions are effective in improving the health of pre-conceptual, pregnant and postpartum mothers and children (up to 5 years) and reducing nutrition-related health inequalities?'

The subsidiary questions relating to each intervention/programme studied were:

1. What is the aim/objective?
2. What is the content and how does it influence effectiveness?
3. How does the way that it is carried out influence its effectiveness?
4. Does effectiveness depend on the job title/position of the person delivering the intervention? What are the significant features of an effective leader?
5. How does effectiveness vary according to factors such as the age, sex, class or ethnicity of the target audience?
6. Does the intensity (or length or frequency) of the intervention influence effectiveness or duration of effect?
7. How much does the intervention cost (in terms of money, people, time)?
8. Does the site/setting influence effectiveness?
9. What are the facilitators and barriers to implementation?
10. How acceptable is the intervention to the recipients?
11. What evidence is there on cost effectiveness and does the intervention offer value for money?

These questions were refined further in relation to the topic of each review (see reviews for further details).

Reviewing the evidence of effectiveness

Eight reviews of effectiveness and three expert papers were conducted to inform the development of this guidance.

Identifying the evidence

The following searches were carried out for each effectiveness review, as follows.

Review 1

The following databases were searched for systematic reviews (from 1995 onwards): the Cochrane Database of Systematic Reviews (CDSR), and the Database of Abstracts of Reviews of Effects (DARE), the Health Technology Assessment Database and the Ongoing Reviews Register. A number of websites were also scanned/searched to identify relevant reviews. Where no relevant systematic reviews existed, the following databases were searched for randomised controlled trials (RCTs) (from 1990 onwards): CENTRAL, EMBASE, PsycINFO, CINAHL and MEDLINE. For other types of UK study, the following databases were searched: MEDLINE, EMBASE, CINAHL and PsycINFO.

Review 2

The following databases were searched for systematic reviews (from 1995 onwards): CDSR and DARE. Where no relevant systematic reviews existed, the following databases were searched for RCTs (from 1990 onwards): the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, CINAHL and PsycINFO. For other types of UK study (from 1990 onwards) the following databases were searched: MEDLINE, EMBASE, CINAHL and PsycINFO databases were searched.

Review 3

The following databases were searched for systematic reviews (from 1995 onwards): CDSR, DARE, National Research Register (including CRD Ongoing Reviews), Health Technology Assessment Database, SIGN Guidelines, National Guideline Clearinghouse, National Coordinating Centre

for Health Technology Assessment, HSTAT, the DH Research Findings Electronic Register, TRIP, Clinical Evidence, and Health Evidence Bulletins Wales. The following databases were searched for RCTs and UK studies of other types (from 1990 onwards): CENTRAL, EMBASE, PsycINFO, CINAHL and MEDLINE. A search was also conducted of NICE web pages (published appraisals).

Review 4

The following databases were searched for systematic reviews (from 1995 onwards): CDSR (Issue 2 2006), DARE, the Health Technology Assessment Database and Ongoing Reviews Register. The following databases were searched for RCTs (from 1990 onwards): MEDLINE, EMBASE, CENTRAL, CINAHL and PsycINFO.

Review 5

The following databases were searched for systematic reviews (from 1995 onwards): CDSR, DARE, National Research Register (including CRD Ongoing Reviews), National/Health Technology Assessment Database, SIGN Guidelines, National Guideline Clearinghouse, DH Research Findings Electronic Register, TRIP Clinical Evidence and Health Evidence Bulletins Wales. The following databases were searched for RCTs (from 1990 onwards): CENTRAL, EMBASE, PsycINFO, CINAHL and MEDLINE. In addition, a search was carried out of the National Coordinating Centre for Health Technology Assessment NICE web pages (published appraisals).

Review 6

The following databases were searched for systematic reviews (from 1995 onwards): CDSR, DARE, National Research Register (including CRD Ongoing Reviews), National/Health Technology Assessment Database, SIGN Guidelines, National Guideline Clearinghouse, DH Research Findings Electronic Register, TRIP Clinical Evidence and Health Evidence Bulletins Wales. The following databases were searched for RCTs (from 1990 onwards): CENTRAL, EMBASE, PsycINFO, CINAHL and MEDLINE. In

addition, a search was carried out of the National Coordinating Centre for Health Technology Assessment NICE web pages (published appraisals).

Review 7

The following databases were searched from 1966 to 2006: MEDLINE, EMBASE, CINAHL, CCTR, CDSR, DARE and AMED. The search was not limited by study type, but was restricted to studies in developed countries and published in English language. Reference lists of identified articles were also checked.

Review 8

A non-systematic review was conducted. Studies of corroborative evidence such as surveys, qualitative studies, cohort studies, case-control studies, case-series and expert opinions were identified. The following databases were searched (from 1966 to 2006): MEDLINE, EMBASE, CINAHL, CCTR, CDSR, DARE and AMED. In addition, a 'snowball' search of the internet was carried out and included the websites run by the following: DH, Health Education Authority, MAFF, FCA, DEFRA, WHO and UNICEF. A hand/document search from reference studies and a search of the grey literature was also conducted.

Expert papers

The two expert papers on the safe storage of expressed breast milk and growth monitoring draw on published research in addition to expert opinion.

The expert paper on nutrition and breastfeeding draws on nationally published data from surveys and published scientific evidence on maternal nutrition and breast milk volume and composition.

Further details of the databases, search terms and strategies are included in the review reports.

Selection criteria

Inclusion and exclusion criteria for each review varied and details can be found at www.nice.org.uk/PH011 However, in general:

- Review 1 included: systematic reviews from 1990 onwards, RCTs from 1990 onwards published worldwide in English and non-randomised studies (cohorts, qualitative studies and surveys) conducted from 1990 and published in the UK. It focused on interventions for non-pregnant women of childbearing age who were planning a pregnancy or who might become pregnant. The interventions had to start prior to conception but could continue or stop at any time during the pregnancy.
- Review 2 included: systematic reviews published since 1995; RCTs from 1990 onwards published worldwide in English and non-randomised UK studies from 1990 onwards, with a particular focus on nutrition interventions aimed at low-income women during pregnancy.
- Review 3 included: systematic reviews from 1995 onwards, RCTs from 1990 onwards published worldwide in English, and UK studies of all interventions aiming to improve the nutrition of women during the first year after birth. Studies had to examine women up to 6 weeks after giving birth (postpartum) and living in developed countries, from any socio-economic background. Where data were available, the review also considered interventions on disadvantaged population subgroups.
- Review 4 included: systematic reviews from 1995 onwards, RCTs from 1990 onwards published worldwide in English, and other UK studies. It focused on interventions to:
 - promote the initiation, and increase the duration of, breastfeeding
 - reduce the risk of contamination of feeding equipment
 - ensure breast milk is safely stored and reheated
 - reduce the risks associated with the reconstitution of formula milk.
- Review 5 included: systematic reviews from 1995 onwards, RCTs from 1990 onwards and non-randomised studies conducted in the UK and published from 1990 onwards. It focused on interventions to promote safe

and healthy feeding practices for infants and young children who are moving from an exclusively milk-based diet to solid food.

- Review 6 included: systematic reviews from 1995 onwards published worldwide in English, RCTs from 1990 onwards conducted in developed countries, and other study types conducted in the UK and published from 1990 onwards. It focused on interventions aimed at children aged 2–5 years old, their parents and carers, and staff looking after 2–5 year olds in nurseries and other day care settings.
- Review 7 included: all types of studies conducted in the UK, and systematic reviews and RCTs carried out in developed countries. Only papers published in English between 1966 and 2006 were considered. It focused on interventions promoting vitamin D intake, in line with the Committee on Medical Aspects of Food and Nutrition Policy (COMA) recommendations on vitamin D. The interventions had to be aimed at one of the following:
 - women who were planning a pregnancy, were pregnant or had given birth in the previous year
 - infants and young children (from birth up to age 5 years)
 - vulnerable groups (with a particular emphasis on black and minority ethnic groups).
- Review 8 included: primary studies (cohort and case-control studies, case-series and expert opinions). It focused on corroborative evidence on interventions to improve the nutrition of infants/children aged 6 months to 5 years. (The corroborative evidence related to the process and context of interventions.)

Quality appraisal

Included papers were assessed for methodological rigour and quality using the NICE methodology checklist, as set out in the NICE technical manual 'Methods for development of NICE public health guidance' (see appendix E). Each study was described by study type and graded (++, +, -) to reflect the risk of potential bias arising from its design and execution.

Study type

- Meta-analyses, systematic reviews of randomised controlled trials (RCTs) or RCTs (including cluster RCTs).
- Systematic reviews of, or individual, non-RCTs, case-control studies, cohort studies, controlled before-and-after (CBA) studies, interrupted time series (ITS) studies, correlation studies.
- Non-analytical studies (for example, case reports, case series).
- Expert opinion, formal consensus.

Study quality

- ++ All or most of the criteria have been fulfilled. Where they have not been fulfilled the conclusions are thought very unlikely to alter.
- + Some criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought unlikely to alter the conclusions.
- Few or no criteria fulfilled. The conclusions of the study are thought likely or very likely to alter.

The studies were also assessed for their applicability to the UK.

Summarising the evidence and making evidence statements

The review data was summarised in evidence tables (see evidence tables and the synopsis).

The findings from the reviews were synthesised and used as the basis for a number of evidence statements relating to each key question. The evidence statements reflect the strength (quantity, type and quality) of evidence and its applicability to the populations and settings in the scope.

Economic appraisal

The economic appraisal consisted of two economic effectiveness reviews and an economic appraisal.

Reviews of economic evaluations

The following databases were searched: MEDLINE, EMBASE, CINAHL, CCTR, CDSR, DARE and NHSEED. The search strategy combined relevant terms relating to:

- pre-conceptual, pregnant and postpartum women
- children up to age 5 years.

The search incorporated a sensitive health economics filter and focused on interventions rather than being restricted to outcomes.

In selecting studies for the review, the main exclusion criteria were as follows:

- primary studies set in developing or low-income countries
- studies published before 1990
- papers in a language other than English
- papers not held at the British Library
- abstracts.

A total of 24 articles were included in the pre-conceptual, pregnant and postpartum women review. Nine articles were included in the children 0–5 years review. These were assessed for their methodological rigour and quality using the critical appraisers' checklists provided in appendix B of the ['Methods for development of NICE public health guidance'](#) (see table 3.1). Each study was categorised by study type and graded using a code (++) , (+) or (-), based on the potential sources of bias.

Cost-effectiveness analysis

An economic model was constructed to incorporate data from the reviews of effectiveness and cost effectiveness. The results are reported in: 'Modelling the cost-effectiveness of breastfeeding support'. They are available on the NICE website at: www.nice.org.uk/PH011

Fieldwork

Fieldwork was carried out to evaluate the relevance and usefulness of NICE guidance for practitioners and the feasibility of implementation. It was

conducted with practitioners and commissioners who are involved in primary care, maternity and children's services. This included those working in ante- and postnatal care in hospitals and communities, GP practices, community pharmacies and nutrition and dietetic services in the NHS. It also included those working in children's centres and trusts and in early years and pre-school settings in the public, private and voluntary sectors.

The fieldwork comprised:

- Workshops carried out in Birmingham, Brighton, Derby, East London, Leeds, Lowestoft, Manchester and Plymouth with: health visitors, midwives, maternity services managers, dietitians, public health nutritionists, infant and breastfeeding coordinators, breastfeeding peer-support workers, children's centre managers and coordinators, nursery nurses, managers and cooks at day nurseries, public health coordinators and managers, and 5 a Day coordinators.
- Interviews carried out by telephone with commissioners for children's and family services and a range of professionals including: dentists, pharmacists, GPs, obstetricians, paediatricians, children's services managers and midwives specialising in teenage pregnancies.

The workshops and interviews were commissioned to ensure there was ample geographical coverage. The main issues arising from these 8 workshops and 24 interviews are set out in appendix C under 'Fieldwork findings'. The full fieldwork report is available on the NICE website: www.nice.org.uk/PH011

How the PDG formulated the recommendations

At its meetings held between March 2006 and September 2007, the PDG considered the evidence of effectiveness and cost effectiveness to determine:

- whether there was sufficient evidence (in terms of quantity, quality and applicability) to form a judgement
- whether, on balance, the evidence demonstrates that the intervention is effective or ineffective, or whether it is equivocal
- where there is an effect, the typical size of effect.

The PDG developed draft recommendations through informal consensus, based on the following criteria:

- Strength (quality and quantity) of evidence of effectiveness and its applicability to the populations/settings referred to in the scope.
- Effect size and potential impact on population health and/or reducing inequalities in health.
- Cost effectiveness.
- Balance of risks and benefits.
- Ease of implementation and the anticipated extent of change in practice that would be required.

The PDG also considered whether a recommendation should only be implemented as part of a research programme, where evidence was lacking.

Where possible, recommendations were linked to an evidence statement(s) (see appendix C for details). Where a recommendation was inferred from the evidence, this was indicated by the reference 'IDE' (inference derived from the evidence).

The draft guidance, including the recommendations, was released for consultation in July 2007. At its meeting in September 2007, the PDG considered comments from stakeholders and the results from fieldwork, and amended the guidance. The guidance was signed off by the NICE Guidance Executive in February 2008.

Appendix C: the evidence

This appendix sets out the evidence statements taken from eight reviews and links them to the relevant recommendations (see appendix B for the key to study types and quality assessments). It also lists three expert reports and their links to the recommendations and sets out a brief summary of findings from the economic appraisal.

The eight reviews of effectiveness are:

Review 1: 'The effectiveness of public health interventions to promote nutrition of pre-conceptual women'.

Review 2: 'Review of the effectiveness of interventions to improve the nutrition of pregnant women with a focus on the nutrition of pregnant women in low-income households'.

Review 3: 'The effectiveness of public health interventions to improve the nutrition of postpartum women'.

Review 4: 'The effectiveness of public health interventions to promote safe and healthy milk feeding practices in babies'.

Review 5: 'The effectiveness of public health interventions to improve the nutrition of young children aged 6–24 months'.

Review 6: 'The effectiveness of public health interventions to improve the nutrition of 2 to 5 year old children'.

Review 7: 'The effectiveness and cost-effectiveness of interventions to promote an optimal intake of vitamin D to improve the nutrition of pre-conceptual, pregnant and postpartum women and children in low-income households'.

Review 8: 'Supplementary evidence review on the effectiveness of public health interventions to improve the nutrition of infants/children aged 6 months to 5 years'.

Evidence statement 4.4 indicates that the linked statement is numbered 4 in review 4 ('The effectiveness of public health interventions to promote safe and healthy milk feeding practices in babies'). **Evidence statement 7.4** indicates that the linked statement is numbered 4 in review 7 ('The effectiveness and cost-effectiveness of interventions to promote an optimal intake of vitamin D to improve the nutrition of pre-conceptual, pregnant and postpartum women and children in low-income households'). Where a recommendation was inferred from the evidence, this is indicated by the reference 'IDE' (inference derived from the evidence) below.

Where the PDG has considered other evidence, it is linked to the appropriate recommendation below. It is also listed in the additional evidence section of this appendix.

The reviews and economic appraisal are available on the NICE website (www.nice.org.uk/PH011).

Recommendation 1: evidence statements 1.3, 1.5, 4.29, 4.30, 4.31, 4.32, 4.33, 6.2, 7.1, 7.2, 7.3; IDE

Recommendation 2: evidence statements 1.2, 1.3, 1.4, 1.5; CEMACH 2007; DH 2000; SACN 2006

Recommendation 3: evidence statements 7.1, 7.2, 7.3, 7.4, 7.5; DH 1998; SACN 2007; IDE

Recommendation 4: evidence statements 1.2, 1.3, 1.4, 1.5, 2.2, 2.5, 2.6, 4.14, 4.17, 4.18, 6.1, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5, 8.3; IDE

Recommendation 5: SACN 2004; IDE

Recommendation 6: evidence statements 3.1, 3.2, 3.3, 3.4, 3.5, 3.6; Goldberg 2006; CEMACH 2003; Heslehurst et al. 2007

Recommendation 7: evidence statements 4.1, 4.2, 4.7, 4.8, 4.10, 4.11, 4.12, 4.25, 4.29, 4.30, 4.31, 4.32, 4.33

Recommendation 8: evidence statements 4.1, 4.2, 4.7, 4.10, 4.11, 4.12, 4.22, 4.23, 4.29, 4.30, 4.32, 4.33

Recommendation 9: evidence statements 4.12, 4.15, 4.17, 4.18, 4.21, 4.22, 4.23, 4.32

Recommendation 10: evidence statements 4.4, 4.7, 4.8, 4.10, 4.11, 4.12, 4.13, 4.17, 4.18, 4.25, 4.32, 4.33; Goldberg 2006

Recommendation 11: evidence statements 4.1, 4.2, 4.4, 4.17, 4.18, 4.33, 6.2, 8.8, 8.9

Recommendation 12: evidence statements 4.36, 4.37; Cook 2006

Recommendation 13: evidence statements 4.2, 8.9, 8.10

Recommendation 14: evidence statement 4.35

Recommendation 15: Anderson et al. 2003; IDE

Recommendation 16: evidence statements 5.1, 5.2, 6.1, 6.2, 6.3, 8.6, 8.7; DH 1994

Recommendation 17: Sachs and Dykes 2006; Hall 2000

Recommendation 18: evidence statement 5.6; IDE

Recommendation 19: evidence statements 5.12, 6.10, 6.11, 6.13; DH 1994

Recommendation 20: evidence statement 4.35; Cook 2006

Recommendation 21: evidence statements 6.4, 6.5, 6.6, 6.8, 6.10, 8.7, 8.13

Recommendation 22: evidence statements 6.1, 6.2, 8.12; IDE

Evidence statements

Evidence statement 1.2

One systematic review (+) included studies on interventions and media campaigns conducted in developed countries to promote the uptake of folic

acid supplements using advertising, leaflets and promotional material. It reported that these campaigns were effective in increasing the proportion of women of child-bearing age that regularly take folic acid supplements.

Evidence statement 1.3

A large proportion of women of child-bearing age who are planning a pregnancy or may become pregnant do not regularly take folic acid supplements. Evidence from one systematic review (+), which included 30 studies that reported risk factors for low pre-conception folic acid use, found that low levels of formal education, young maternal age, lack of a partner, immigrant status and unplanned pregnancy are associated with lower odds of using folic acid around the time of conception.

Evidence statement 1.4

Evidence from an RCT (+) based on a southern population in the USA who received brief counselling from a physician about the benefits of folic acid along with free folic acid supplement tablets, found that this was effective in increasing weekly folic acid supplement use.

Evidence statement 1.5

There is evidence from a large survey (+) of health professionals working in England that folic acid advice is not perceived by them as being part of general health advice for women of child-bearing age. The survey also found that many health professionals working in England have gaps in their knowledge about the appropriate dosage and timing of folic acid for women.

Evidence statement 2.2

A non-randomised trial in London (+) compared intervention groups that received multiple episodes of nutrition counselling alone or with two different types of food supplement during the second and third trimester with a control group. It found no significant differences among the groups when measuring maternal weight gain, length of gestation, babies head size or babies length. The study found a small but statistically significant increase in the mean birthweight of babies born to women in all intervention groups combined, compared to women in the control population.

Evidence statement 2.5

One randomised control trial (+) found a statistically significant maternal weight gain among pregnant women recruited into the USA's WIC programme at mid-pregnancy, compared with women in a control population who received no free dietary supplements.

Evidence statement 2.6

One randomised trial (+) of pregnant women attending a welfare clinic in Finland, found that an intervention involving the provision of healthy foods and advice delivered three times during pregnancy improved some nutritional outcome measures. It did not lead to a significant difference in pregnancy outcomes between the intervention and control groups.

Evidence statement 3.1

There is evidence from four RCTs (all -) that diet and exercise programmes are effective in enabling some postpartum women to lose weight gained during pregnancy. This finding is based on US studies of women not noted to be from disadvantaged groups and who appear to be highly motivated to lose weight.

Evidence statement 3.2

There is evidence from two RCTs (both -) that a combination of diet and physical activity results in more effective and preferable weight loss than diet or physical activity alone.

Evidence statement 3.3

There is evidence from an RCT (-) that physical activity as part of a combined diet and physical activity intervention to promote weight loss, is more effective when frequent and regular, than when vigorous and less frequent.

Evidence statement 3.4

There is evidence from two RCTs (both -) that integrated programmes of activity, which support participants in combining diet and regular physical activity in order to promote weight loss in the postpartum period, are more effective than interventions which provide information alone.

Evidence statement 3.5

There is evidence from two RCTs (both -) that the characteristics of programmes which are effective in enabling some women to lose weight in the postpartum period are those which: combine diet and physical activity; include strategies for behaviour change; tailor the intervention to individual or group needs; include some group sessions and written materials; provide ongoing support and contact with programme staff; and are of a sufficient duration to make sustained lifestyle changes.

Evidence statement 3.6

There is evidence from one RCT (-) that short-term weight loss of 1kg a week achieved through a combination of diet plus physical activity in healthy postpartum women has no detrimental effect on milk quantity or quality and does not appear to affect infant weight gain.

A second RCT (-), combining diet and physical activity in healthy postpartum women (BMI 25–30) over a longer time period and resulting in a mean weight loss of 0.5kg a week, did not appear to affect infant weight or length. However the study may not have been sufficiently powered to demonstrate such effects.

Evidence statement 4.1

Three (++) non-randomised control trials evaluated peer support programmes. The interventions included training of peer supporters, antenatal and postnatal support (telephone, home visits group or contact at clinic that was initiated by the peer supporter). The studies found a statistically significant increase in the initiation and/or duration of breastfeeding among women from low income groups who intended to breastfeed.

Evidence statement 4.2

Seven RCTs in a (++) systematic review evaluated peer support programmes. Six studies found that lay support resulted in a significant reduction in the cessation of exclusive breastfeeding, which appeared to be predominately during the first 3 months. However, three of the studies were in countries not considered relevant to NICE reviews and neither of the two contributing UK

studies individually gave significant results. (These two UK studies were of populations containing a mixture of all social classes.)

Seven studies showed a similar but less significant reduction in the cessation of any breastfeeding, but subgroup analysis did not give a significant effect at any time point. Overall, the effect of incorporating an antenatal element of breastfeeding support into a study was not significant but those studies incorporating postnatal support alone significantly reduced the cessation of any breastfeeding up to 6 months.

Six studies using lay support contributed to the analysis and their results were compatible with the conclusion. Similarly, face-to-face support appeared to be more effective than telephone support in preventing the stopping of breastfeeding up to 6 months and all seven studies which used lay support contributed to the analysis.

Evidence statement 4.4

Two (++) RCTs evaluated volunteer breastfeeding counsellors. The first found telephone support instigated by the supporter within 48 hours of hospital discharge significantly increased the duration of any and exclusive breastfeeding at 4, 8 and 12 weeks. This was compared with conventional care in relatively well-educated mothers who were breastfeeding at study recruitment. The other study found that one antenatal visit, at which the offer of postnatal support was made along with a contact card and leaflets, had no effect on breastfeeding initiation or duration rates.

Evidence statement 4.7

Four RCTs (two [++] and two [+]) evaluated health professional support. One (++) RCT included frequent postnatal visits and telephone support from a skilled, knowledgeable midwife and found breastfeeding duration rates increased significantly in women who had planned to breastfeed. One (+) RCT evaluated intrapartum visits in hospital and postnatal home visits with telephone support from a community nurse and peer counsellor. It found this to be effective in increasing the duration of exclusive breastfeeding among minority women on a low income. One (+) RCT evaluated structured support

from a health professional (one intrapartum and postnatal visit, and one phone call). It found no significant increases in breastfeeding rates at 6 weeks in women from the US armed forces. An Australian (++) RCT evaluated a series of structured postnatal home visits for teenage mothers starting at 1 week postnatal that included discussions on infant feeding by a midwife, in addition to routine hospital services. No increases in any breastfeeding rates were demonstrated.

Evidence statement 4.8

Eighteen RCTs in a (++) systematic review evaluated professional support programmes and found them to be effective overall. Twelve studies found that professional support gave a significant reduction in the cessation of 'exclusive' breastfeeding at all time points (except 4 months, for which it was marginally significant). The effect was greatest in the first 3 months.

The overall reduction in the cessation of 'any' breastfeeding found in the 16 relevant studies was not significant, but subgroup analysis found it was significant at 4 and 9 months and only two studies had an antenatal element. Face-to-face support appeared to be more effective than telephone support in preventing the stopping of 'any' breastfeeding up to 6 months. Four studies were set in low income countries not considered to be relevant to NICE reviews.

Evidence statement 4.10

One (+) US-based RCT evaluated the effect of a lactation consultant conducting two educational antenatal visits, weekly antenatal telephone contacts, a hospital intra-partum contact and postnatal home visits. It compared this with standard care for women on low incomes who were primarily Hispanic and black. The study found that the intervention significantly increased breastfeeding duration rates up to 20 weeks.

Evidence statement 4.11

One (+) RCT looked at antenatal breastfeeding education and postnatal lactation support for women who intended to breastfeed. Both these interventions (based in a hospital in Singapore) significantly improved rates of

exclusive breastfeeding up to 6 months after delivery. Participants were chiefly Chinese or Malay. The postnatal support consisted of two one-on-one lactation consultant visits in hospital and was marginally more effective than the antenatal breastfeeding education. This consisted of a 16-minute video which showed correct positioning, latching on, breast care and common problems and an opportunity to talk with a lactation consultant for 15 minutes. (Only postnatal support had a significant effect on breastfeeding rates and then only at 6 weeks after delivery.)

Evidence statement 4.12

Four RCTs (three [+] and one [++]) included trained skilled, knowledgeable health professionals delivering breastfeeding interventions during pregnancy. Of these, one (+) found a group antenatal education specifically on positioning and attachment significantly increased exclusive breastfeeding rates at 6 weeks among low-income women who intended to breastfeed. One (+) included two to four individual antenatal sessions (lasting 10–15 minutes), training of health professionals and early frequent postnatal support that continued throughout the first year in a population of mostly white women on low income. It found a significant increase in the breastfeeding initiation and duration rates up to 2 months postpartum. One (++) included group antenatal education at 24–28 weeks; support in hospital; postnatal contact at 2–3 weeks and 3 months and found no difference in exclusive breastfeeding duration rates in women intending to breastfeed. One (+) included 5–8 home visits lasting up to an hour during the first 2 months with telephone support. Visits were concentrated in the first 2 weeks. The study found a significant increase in breastfeeding duration rates at 2 months postnatal.

Evidence statement 4.13

One (++) RCT evaluated a single, 30 minute, one-to-one discussion and a leaflet on 'breastfeeding and employment' by a midwife or intern. The intervention did not significantly increase exclusive, or any, breastfeeding at 17 weeks postpartum. This study was conducted in France on a relatively affluent group of women.

Evidence statement 4.14

One (++) US-based RCT evaluated a single discussion at registration for the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) (mean 12 minutes) and discharge packs at delivery. The study found breastfeeding duration was highest among mothers who had planned to breastfeed but had low breastfeeding knowledge.

Evidence statement 4.15

A US-based (+/-) RCT compared an antenatal, breastfeeding session (50–80 minutes, led by the researchers) with a single one-to-one breastfeeding session (15–30 minutes) and standard care. It found significantly higher breastfeeding initiation rates in both intervention groups among US black women on low incomes.

Evidence statement 4.17

A (+) systematic review included studies in both developed and underdeveloped countries and older studies that had not been included in the other reviews. The main conclusions were: the most effective interventions in extending duration of breastfeeding combined information, guidance and support and were long term and intensive. During prenatal care, group education was the only effective strategy. During the postnatal period or both periods (antenatal and postnatal), home visits used to identify mother's concerns with breastfeeding, assist with problem solving and involve family members in breastfeeding support, were effective. Individual education sessions were also effective in these periods, as was a combination of two or three of these strategies in interventions involving both periods. Strategies with no effect had no face-to-face interaction, gave contradicting messages or were small-scale interventions.

Evidence statement 4.18

A systematic review (+) included studies of breastfeeding support in developed countries all of which were included in more recent reviews. The main conclusions were that educational programmes were the most effective intervention and had the greatest effect on both initiation and short-term

duration of breastfeeding (up to 3 months). Support programmes conducted by telephone, in person, or both, increased short-term and long-term duration (up to 6 months). Written materials alone did not significantly increase breastfeeding. There was insufficient data to determine whether a combination of education with support was more effective than education alone.

Evidence statement 4.21

One (+) RCT examined a 1-hour group, antenatal, breastfeeding session on positioning and attachment given by a lactation consultant. Most participants were from a low-income group. The study demonstrated significantly higher rates of exclusive breastfeeding at 6 weeks compared to women who received standard antenatal care.

Evidence statement 4.22

One (+/-) Australian RCT evaluated a small, informal group antenatal, breastfeeding session in immigrant Vietnamese woman on low incomes. It found significantly higher breastfeeding initiation and duration rates among women who received the intervention as opposed to a leaflet alone.

Evidence statement 4.23

A Canadian based (+) RCT utilised a single 2.5 hour antenatal breastfeeding workshop designed using Bandura's theory of self-efficacy and adult learning principles at 34+ weeks gestation (with optional attendance by fathers). Using actual workshop attendance, the study found a significant increase in exclusive breastfeeding at 8 weeks postpartum, compared with standard care – but the result was not significant using intention to treat analysis. The study population was relatively well-educated with a reasonable income.

Evidence statement 4.25

One (++) RCT evaluated the effect of an outpatient appointment 2 weeks after the birth with a physician/paediatrician (who had received 5 hours lactation training) on well-educated women on high incomes. The study found significant increases in exclusive breastfeeding at 4 weeks and extended overall duration of breastfeeding.

Evidence statement 4.29

One (+) RCT, one (++) RCT, and one (+) before-and-after study suggest that post-registration or update training for healthcare professionals to increase knowledge or skills in breastfeeding can be effective.

Evidence statement 4.30

Two (+) before-and-after studies evaluated a breastfeeding training programme for hospital health professionals and found a significant increase in breastfeeding duration rates.

Evidence statement 4.31

Two before-and-after studies evaluated the UNICEF Baby Friendly Hospital Initiative (BFI) training for health professionals in hospital settings. One study found significant increases in breastfeeding rates at 6 months, where initial breastfeeding rates were low. The BFI training did not increase breastfeeding rates at hospital discharge, where breastfeeding rates were relatively high. These conclusions are supported by a UK cross-sectional study of BFI-trained health visitors.

Evidence statement 4.32

One (+) RCT evaluated education and support, including: individual education that was given to all women in both groups (mostly white on low incomes); support in the ante-, intra- and postpartum period and into the first year of infancy. This included training of health professionals, daily inpatient visits, a telephone call 48 hours after discharge, lactation clinic at 1 week and lactation consultant present at all health clinics up to 1 year after the birth. Significant increases were found in the initiation and duration of breastfeeding.

Evidence statement 4.33

One (++) before-and-after study conducted among American Indian women, evaluated the adoption of hospital policy and practices which were culture-specific together with a media campaign. The latter included the ten steps in the Baby Friendly Hospital Initiative, a peer-support programme and a public health campaign. The study found a statistically significant increase in breastfeeding initiation rates.

Evidence statement 4.35

A (+) systematic review found the reconstitution of infant formula milk from powder may be associated with errors with a greater tendency to over-concentrate feeds than under-concentrate them.

Evidence statement 4.36

One (+) RCT compared a specific brand of mini-electric breast pump with a specific brand of manual breast pump. No significant differences were found in the volume of milk expressed or its fat content.

Evidence statement 4.37

One (+) RCT compared pumping each breast sequentially with both breasts simultaneously. Women preferred simultaneous pumping which also produced a greater volume of milk. No significant differences were found in milk fat concentrations.

Evidence statement 5.1

There is evidence from one RCT (reported as moderate quality in a [+] systematic review) that intensive home visiting by a health professional significantly improved daily milk intake, self-feeding, fruit or fruit juice and meat intake in children under 3 years, whose mothers were unmarried, low income, black school girls (aged 15–18 years).

Evidence statement 5.2

One study (graded as 'moderate' in a [++] systematic review) found monthly visits by 'community mothers' significantly improved dietary intake of animal protein, non-animal protein, wholefoods, milk, fruit and vegetables in infants under 1 year, from low-income families in Dublin.

Evidence statement 5.6

There is no evidence from a systematic review (++) to support feeding with a hydrolysed formula for the prevention of allergies, compared to exclusive breastfeeding. In high-risk infants who are unable to be completely breast fed, there is limited evidence that prolonged feeding with a hydrolysed formula compared to a cow's milk formula reduces infant and childhood allergy and

infant cow's milk allergy. In view of methodological concerns and inconsistency of findings, further large, well designed trials comparing formulas containing partially hydrolysed whey, or extensively hydrolysed casein with cow's milk formulas are needed.

Evidence statement 5.12

A systematic review (+) based on poor quality studies found evidence that the duration of bottle use beyond age 12 months was not significantly associated with caries risk, though sweetened milk or juice given in a bottle increased the risk of early childhood caries before the age of 6 years.

Evidence statement 6.1

There is evidence from two RCTs (graded as 'moderate' in a [+] systematic review) and two other studies (graded as 'moderate' in a [++] systematic review) that nutrition education interventions that focus on skills development in the mothers of young children can be effective in improving the diets of the family. This is in terms of increasing the amount of fruit and vegetables consumed and in improving the quality and diversity of the diet.

Evidence statement 6.2

There is evidence from two RCTs (graded as 'moderate' in a [+] systematic review) and two other studies (graded as 'moderate' in a [++] systematic review) reported that effective nutrition education programmes aimed at the mothers of young children are those which: are multi-faceted; include 'hands on' skills development; are tailored to the educational level and needs of the mothers and to family resources; include strategies for behaviour change; are intensive and ongoing; and are delivered by nutrition paraprofessionals and/or peer supporters.

Evidence statement 6.3

There is evidence from two studies among low-income mothers, including teenage mothers, (one [+] RCT and one [+] before-and-after study) reported in two systematic reviews (one [++] and one [+]), that interventions based on intensive and regular home visits by health professionals delivering tailored advice are effective in improving the diets of pre-school children.

Evidence statement 6.4

There is evidence from three RCT's (all graded as 'moderate' in a [++] systematic review) reported that educational interventions which provide information through a variety of different media –such as storybooks, videos and audiotapes – can be effective in improving children's knowledge and understanding of healthy eating and their understanding of the relationship between nutrition and health. However, the provision of information alone does not appear to change eating behaviour.

Evidence statement 6.5

There is evidence from two RCT's (one [+] and one graded as 'moderate' in a [++] systematic review) that the more frequently young children taste new or previously disliked foods, the more likely they are to accept those foods. One trial demonstrated that looking at the foods without tasting them was not effective in increasing the acceptance of those foods.

There is evidence from one systematic review (-) and two RCT's (one [+] and one graded as 'moderate' in a [++] systematic review) that interventions which provide the opportunity for children to handle and repeatedly taste foods, are more likely to be successful in changing eating behaviour than interventions that provide information alone.

There is evidence from one non-RCT (graded as 'sound' in a [+] systematic review) which compared five different actions intended to encourage pre-school children to taste new fruits and vegetables. Offering a choice of whether to try the fruit or vegetable was more effective than offering a reward, which was effective only in the short term. An RCT (graded as 'moderate' in a [++] systematic review) also found that the use of rewards was not effective in bringing about dietary change.

Evidence statement 6.6

There is evidence from one RCT (graded as 'moderate' in a [++] systematic review) that foods should be positively presented in interventions which aim to encourage young children to eat healthily. A systematic review (+) concluded that: children consider taste, not health, to be the key influence on food

choice; interventions should promote children's favourite fruit or vegetables, or target the ones they do not like; the emphasis on health messages should be reduced, particularly those concerning future health; and fruit and vegetables should not be promoted in the same intervention.

Evidence statement 6.8

There is evidence from three systematic reviews (one [+], one [-] and one [++]) that classroom-based interventions can be effective in increasing pre-school children's nutrition knowledge and their consumption of particular foods.

Effective interventions appear to be those which are multi-faceted and which include characteristics such as: teaching based on behavioural approaches; teaching levels which are developmentally appropriate; training for teachers in delivering the intervention; activity-based teaching; opportunities to taste and handle foods; and reinforcement of learning from the classroom in the cafeteria and at home by parents.

Evidence statement 6.10

Evidence from a Brazilian study (++) reported in a systematic review (+) found children attending nurseries which restricted the consumption of sugar and who consumed lower amounts of sugar at lower frequencies, had a substantially lower risk of dental caries.

Evidence statement 6.11

A systematic review (+) based on 36 studies, found that the relationship between sugar consumption and caries is weaker in the modern age of fluoride exposure than it used to be, but controlling the consumption of sugar remains a justifiable part of caries prevention.

Evidence statement 6.13

A large US prospective study (+) of 642 children from birth living in a fluoridated water area, found an association between sugared drinks intake at age 1–4 years and dental caries at age 4–7 years – with the highest risk associated with sweetened drinks intake in the first year. Milk had a neutral

association with caries. Total water intake at age 1–4 years was highly protective against dental caries at age 4–7 years. Total non-water drinks consumption in the first year (including cow's milk) was the highest risk factor; while total water consumption was highly protective, suggesting that some of the adverse effect of sugary drinks may be because they reduce consumption of (fluoridated) water.

Evidence statement 7.1

Evidence from seven studies (five [+] RCTs and two [+] studies) show that antenatal vitamin D supplementation is effective in improving the vitamin D status of Asian and white women.

Evidence statement 7.2

No adverse effects were reported in any of the studies considering vitamin D supplementation to mothers or infants.

Evidence statement 7.3

Evidence from one (+) RCT indicates that infants of Asian mothers who received an antenatal vitamin D supplement achieved a higher body weight during the first year after birth than infants of mothers who received no antenatal vitamin D supplement.

Evidence statement 7.4

A (+) non-RCT found that breastfed infants of supplemented (10 ug/day) mothers had higher 25 hydroxy vitamin D levels 6 days after birth than breastfed infants of unsupplemented mothers. Vitamin D levels of all breastfed infants were lower than infants receiving infant formula.

Evidence statement 7.5

Evidence from a (+) RCT suggests that the infants of mothers given supplements during pregnancy (25 ug/day during the third trimester) achieved a higher serum 25 hydroxy vitamin D levels than un-supplemented breastfed infants, at birth and at 4 days of age.

Evidence statement 8.3

A (+) cohort study found that anaemic children aged 5 years whose parents received individual counselling, group nutrition education and WIC food vouchers, achieved a higher mean haemoglobin level when compared with children whose parents who did not receive the intervention, at 6 months follow-up.

Evidence statement 8.6

Evidence from four UK qualitative studies/surveys indicate that the introduction of solid foods is influenced by the mother's perceptions of the baby's needs, cultural beliefs and advice/encouragement from family members and friends. The most common reasons for early introduction of solid foods were the mother's perception that the infant was hungry and not settling (sleeping through the night). Infant weight was perceived as a marker of child health and successful parenting. There is an association between early introduction of solid foods and maternal smoking, non-breastfeeding, male infants and low maternal educational level.

Evidence statement 8.7

The formation of children's food preferences and acceptance patterns are shaped by learning and repeated experience within the social context in which the food is consumed. Evidence from observational studies and surveys suggest that repeated exposure to a target food enhances the acceptance of same, similar and target foods in young infants.

Children's consumption of fruits and vegetables was positively associated with parental consumption of fruits and vegetables.

Women's own weight control attempt may influence their young daughters' emerging ideas, concepts and beliefs about dieting.

Evidence statement 8.8

A (+) UK-based RCT suggests that a peer-support intervention designed to improve infant feeding practices can increase feeding knowledge, confidence in following advice and was valued by recipients and volunteers providing the

intervention. However, the intervention did not positively influence: vitamin C intake from fruits, growth parameters, use of NHS services and medication use among infants.

Evidence statement 8.9

Two UK-based observational studies suggest that specially trained link workers can be effective in helping South Asian families to establish healthy weaning patterns and improve maternal knowledge, which may result in modest changes in children's diets, at least in the short term.

Evidence statement 8.10

Evidence from a UK-based observational study suggests that a community-based campaign to improve child feeding practices and oral health among the Asian children aged under 5 years was well received by the target populations. Long-term outcomes were not reported.

Evidence statement 8.12

Evidence on the effectiveness of Sure Start was not identified. The St Philips Healthy Eating Project, which aimed to help families to develop healthy eating habits in a community setting, was well received and appreciated.

Evidence statement 8.13

There is evidence from two (+) non-RCTs, one controlled before-and-after study and one observational study to suggest that interventions in day-care centres improves the nutritional adequacy of the food provided and is associated with dietary improvements.

Expert reports

Cook P (2006) Handling and storage of expressed breast milk [online]. Available from: www.nice.org.uk/PH011

Goldberg G (2006) Nutrition and breastfeeding [online]. Available from: www.nice.org.uk/PH011

Sachs M, Dykes F (2006) Growth monitoring of infants and young children in the United Kingdom [online]. Available from: www.nice.org.uk/PH011

Additional evidence

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Cost-effectiveness evidence

Two economic reviews were commissioned for this guidance:

- ‘Rapid economic review of public health interventions designed to improve the nutrition of pre-conceptual, pregnant and postpartum women’
- ‘Rapid economic review of public health interventions designed to improve the nutrition of children aged 0–5 years’.

There was a dearth of good quality economic studies relating to the UK and the conclusions from other studies cannot readily be translated to a UK setting. However, where relevant published literature exists, it does indicate that increased breastfeeding rates could produce cost savings by reducing various childhood diseases.

Cost-effectiveness analysis

A model was developed, using data from the published literature, to determine the relationship between breastfeeding and later consequences. It also considered various interventions to increase breastfeeding rates, particularly peer support schemes. Sensitivity analysis was used to investigate how these different scenarios affect cost effectiveness.

Fieldwork findings

Fieldwork aimed to test the relevance, usefulness and the feasibility of implementing the recommendations and the findings were considered by the PDG in developing the final recommendations. For details, go to the fieldwork section in appendix B and www.nice.org.uk/PH011

Fieldwork participants were extremely positive about the recommendations and their potential to help promote maternal and child nutrition. Many stated that the draft recommendations endorsed current best practice.

Participants felt that the guidance could lead to a consistent, standardised approach. They also felt that it will help increase understanding of their various roles in this area among the different professional groups involved. In turn, this could lead to a 'whole system' approach.

Appendix D: gaps in the evidence

The PDG identified a number of gaps in the evidence related to the programme under examination, based on an assessment of the evidence. These gaps are set out below.

1. There is a lack of evidence on the effectiveness of interventions targeting specific socio-economic, ethnic, low-income or vulnerable groups. More evidence is also needed on the differential effectiveness of interventions among these groups – and the effectiveness of different components within each intervention.
2. There is a lack of evidence about the effectiveness and cost effectiveness of interventions to improve the nutrition of mothers and children aged under 5, particularly those from disadvantaged, low-income and minority ethnic groups.
3. There is a lack of good quality economic studies on public health interventions to improve nutrition in the UK.
4. There is a lack of well-designed intervention studies on how to:
 - improve the nutritional status of women before and during pregnancy
 - enable pregnant women who are obese to reduce the associated health risks for both themselves and their babies
 - help postpartum women with their nutritional needs and weight

- help improve iron intake and reduce salt intake among infants and young children
 - balance the benefits of improving vitamin D status and the associated risks of increased exposure to the sun.
5. There is a lack of studies that have adequately measured and validated nutrition levels before and after an intervention. Studies too often rely on self-reported information alone. In addition, few studies include measured dietary change as an outcome measure (many rely on surrogate measures such as the baby's birth weight, which can be affected by confounding.)
 6. There is a lack of intervention studies and evaluations providing process and qualitative data. This is needed so that the effective components of an intervention can be assessed and replicated on a wider scale.
 7. There is a lack of well-designed studies that have evaluated the use of food vouchers to encourage healthy eating.

The Group made five recommendations for research. These are listed in section 5.

Appendix E: supporting documents

Supporting documents are available from the NICE website at

www.nice.org.uk/PH011 These include the following:

- Reviews of effectiveness
 - Review 1: 'The effectiveness of public health interventions to promote nutrition of pre-conceptual women'
 - Review 2: 'Review of the effectiveness of interventions to improve the nutrition of pregnant women with a focus on the nutrition of pregnant women in low-income households'
 - Review 3: 'The effectiveness of public health interventions to improve the nutrition of postpartum women'
 - Review 4: 'The effectiveness of public health interventions to promote safe and healthy milk feeding practices in babies'
 - Review 5: 'The effectiveness of public health interventions to improve the nutrition of young children aged 6–24 months'
 - Review 6: 'The effectiveness of public health interventions to improve the nutrition of 2 to 5 year old children'
 - Review 7: 'The effectiveness and cost-effectiveness of interventions to promote an optimal intake of vitamin D to improve the nutrition of pre-conceptual, pregnant and postpartum women and children in low-income households'
 - Review 8: 'Supplementary evidence review on the effectiveness of public health interventions to improve the nutrition of infants/children aged 6 months to 5 years.'
- Economic reviews
 - 'Rapid economic review of public health interventions designed to improve the nutrition of pre-conceptual, pregnant and postpartum women'
 - 'Rapid economic review of public health interventions designed to improve the nutrition of children aged 0–5 years.'
- Economic analysis/modelling report

- 'Modelling the cost-effectiveness of breastfeeding support.'
- Expert reports
 - 'Growth monitoring of infants and young children in the United Kingdom'
 - 'Handling and storage of expressed breast milk'
 - 'Nutrition and breastfeeding.'
- A quick reference guide (QRG) for professionals whose remit includes public health and for interested members of the public. This is also available from the NHS Response Line (0870 1555 455 – quote reference number N1489).

For information on how NICE public health guidance is developed, see:

- 'Methods for development of NICE public health guidance' available from: www.nice.org.uk/phmethods
- 'The public health guidance development process: an overview for stakeholders including public health practitioners, policy makers and the public' available from: www.nice.org.uk/phprocess