NICE Maternal and Child Nutrition programme

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

November 2007

This review should be read in conjunction with the following reviews:

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 2-5 years old children

In view of the limited evidence identified in the rapid reviews on interventions to improve the nutrition of infants/children aged 6 months to 2 years and 2 years to 5 years, a review of supplementary evidence was conducted, taking a broader view of the existing evidence base. This review should be viewed as supplementary to the previous two reviews. Evidence which has been included in the previous reviews has not been included here.

A review prepared for NICE by

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1. Background

Please see the background sections for the reviews on 6 months to 2 years and 2 years to 5 years. The information included below is specific to this supplementary review and cannot be considered to be a full background assessment to the nutritional issues facing children aged 6 months to 5 years of age.

1.1. Weaning

The aims of weaning are to:

- ensure adequate nutritional for development and growth
- encourage development of healthy and enjoyable eating that will last a lifetime
- minimise possibility of becoming 'fussy eater'
- minimise development of food allergy
- provide food that is safe.

Department of Health

A set of evidence and consensus-based recommendations on infant feeding (Department of Health, 2003) was produced by the Department of Health (DH) in 2003. These recommendations were informed by the Cochrane review (Kramer et al. 2006) and the subsequent revised WHO guidance and the European Union guidance on complementary feeding (see below) (Anonymous. 2005;Cattaneo et al. 2006;Dewey. 2006). The recommendations support the practice of exclusive breastfeeding in the first 6 months and the introduction of solid foods at 6 months. The DH guidance also states that 'all infants should be managed individually so that insufficient growth or other adverse outcomes are not ignored and appropriate interventions are provided'.

WHO

Breastfed children

The WHO published the following ten principles, both evidence-based and consensus-based, to complementary feeding for the breastfed child (Dewey. 2006;World Health Organization. 2002;World Health Organization. 2000) in the first two years of life. The evidence included studies from developing countries and can be adapted to local feeding practices and conditions:

1 Practice exclusive breastfeeding from birth to 6 months of age and introduce complementary foods at 6 months of age (180 days) while continue to breastfeed. The potential health benefits of waiting until 6 months to introduce other foods outweigh any potential risks.

2 Continue frequent, on demand breastfeeding until two years of age or beyond

3 Practice responsive feeding

Feed infants directly and be sensitive to their hunger and satiety cues
Feed slowly and patiently and encourage them to eat, but do not force them
Experiment with different food combinations, tastes, textures and methods of encouragement
Minimise distractions during meals
Feeding times are periods of learning and love – talk to children during feeding

4 Practice safe preparation and storage of complementary foods
5 Amount of complementary food needed
    Start at 6 months of age with small amounts of food and increase the quantity as the child gets older while maintaining breastfeeding
6 Food consistency
    Pureed and mashed and semi-solids at 6 months; 'finger food' at 8 months and children can eat the same type of foods as consumed by the rest of family by 12 months.
    Avoid foods which may cause choking such as nuts and raw carrots
7 Meal frequency
    For the average healthy breastfed infant, complementary foods be provided 2-3 times a day at 6-8 months of age, 3-4 times a day at 9-11 and 12-24 months of age
    Additional nutritious snack may be offered 1-2 times a day
    More frequent meals may be needed if no longer breastfed
8 Nutrient content of complementary foods
    Meat, poultry, fish or eggs should be eaten daily
    Vitamin A-rich fruits and vegetables should be eaten daily
    Avoid tea, coffee and sugary drinks
    Limit amount of juice offered
9 Use of vitamin-mineral supplements or fortified products as needed
    Vegetarian diets should be fortified with supplemented nutrients
10 Feeding during and after illness
    Increase fluid intake during illness, including more breastfeeding and encourage child to eat soft, varied, appetizing food
    After illness, give more food than usual and encourage child to eat more

Non-breastfed children

The WHO also published the following nine principles, both evidence-based and consensus-based, to complementary feeding for the non-breastfed child (Anonymous. 2005). They are based on the 10 guiding principles for complementary feedings of the breastfed child (Dewey. 2006;World Health Organization. 2002;World Health Organization. 2000):

1. Amount of food needed
    Energy needs are approximately 600 kcal/day at 6-8 months, 700 cal/day at 9-11 months, 900 kcal/day at 12-24 months
2. Food consistency - as per WHO guidance on breastfed child
3. Meal frequency and energy density
    Meals should be provided 4-5 times a day with nutritional snacks offered 1-2 times a day
    Meals include milk-only feeds, other foods and combinations of milk feeds and other foods
4. Nutrient content
    Meat, poultry, fish or eggs should be eaten daily and often
    Regular milk products, amount ~200-~500 ml per day
    Suitable milks – full cream, evaporated, fermented and expressed breast milk (heat-treated if necessary)
    Unsuitable milks – condensed, skimmed and semi-skimmed, coffee creamer and soy milk
    Grains and legumes daily if milk and animal source foods inadequate

Adequate fat content - 10-20g added fats or oils
Vitamin A, C, B rich foods and folate
Fortified products or nutrient supplements if needed
Avoid tea, coffee and sugary drinks

5. Use of fortified products or vitamin supplements
   Fortified complementary foods or vitamin-mineral supplements which contain iron, zinc, calcium and vitamin B12 if needed
6. Fluid needs
   Non-breastfed child needs ~400 - ~1200 ml additional fluids a day
   Plain clean water offered to satisfy infant's thirst
7. Feeding during and after illness
   Increase fluid intake during illness and encourage child to eat soft, varied, appetizing food
   After illness, give more food than usual and encourage child to eat more
8. Response feeding – as per WHO guidance on breastfed child
9. Safe preparation and storage – as per WHO guidance on breastfed child

European Union guidance

The European Union published recommendations on infant and young child feeding (birth to aged 3 years)(Cattaneo et al. 2006) to protect, promote and support optimal feeding of infants and young children in different work settings. These recommendations encompassed the contents of the Global Strategy for Infants and the Young Child Feeding (World Health Organization et al. 2003), adopted by the WHO and United Nation agencies, governments, professional organisations and non-governmental organisations. These recommendations are in line with the WHO guiding principles on complementary feeding as described above.

1.2. Children aged 1 - 5

As well as being a time when children are growing quickly and becoming more active, the preschool age (1-5 years) is also a time when children learn about food, which will later establish their food knowledge, and patterns of food acceptance and preferences.

Government advice

Following the advice of the Committee on Medical Aspects of Food and Nutrition Policy (COMA) and latterly the Scientific Advisory Committee on Nutrition (SACN, the Department of Health (DH and Food Standards Agency (FSA) have issued a range of dietary advice for children under 5 years of age. 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 life course, Weaning and the weaning diet (DH 1994) and Nutritional Aspects of Cardiovascular Disease (DH 1994) - which recommends that by 5 years of age, children should be eating a diet consistent with the recommendations for adults. More recently, advice has been issued following SACN's deliberations on vitamin D, the consumption of oily fish and salt. This guidance is included in the *Pregnancy Book* and *Birth to Five*, which are given to women during pregnancy and following birth (respectively), along with a range of other resources available from DH and the FSA.

The Dietary Reference Values for energy and nutrients for children under 5 years of age are shown below.

Estimated average requirements for energy

	MJ/d (kcal/d)	
Age	Boys	Girls
4-6 months	2.29 (690)	2.69 (645)
7-9 months	3.44 (825)	3.20 (765)
10-12 months	3.85 (920)	3.61 (865)
1-3 years	5.15 (1230)	4.86 (1165)
4-6 years	7.16 (1715)	6.46 (1545)

Reference nutrient intake for protein

Age	g/d
4-6 months	12.7
7-9 months	13.7
10-12 months	14.9
1-3 years	14.5
4-6 years	19.7

Reference nutrient intake for vitamins

Age	Thiamin (mg/d)	Riboflavin (mg/d)	Niacin (mg/d)	B6 (mg/d)	B12 (µg/d)	Folate (µg/d)	C (mg/d)	A (µg/d)	D (µg/d)
4-6 months	0.2	0.4	3	0.2	0.3	50	25	350	8
7-9 months	0.2	0.4	4	0.3	0.4	50	25	350	7
10-12 months	0.3	0.4	5	0.4	0.4	50	25	350	7
1-3 years	0.5	0.6	8	0.7	0.5	70	30	400	7
4-6 years	0.7	0.8	11	0.9	0.8	100	30	400	-

Reference nutrient intake for minerals

Age	Calcium (mg/d)	Iron (mg/d)
4-6 months	525	4.3
7-9 months	525	7.8
10-12 months	525	7.8
1-3 years	350	6.9
4-6 years	450	6.1

Salt

The Scientific Advisory Committee on Nutrition (SACN)(Scientific Advisory Committee on Nutrition. 2003) recommends that the daily target average salt intakes for children are: 1 g/day for infants aged 7-12 months; 2 g/day for children aged 1-3 years, 3 g/day for

children aged 4-6 years. SACN also recommends that a reduced salt intake can be achieved if predominantly home-cooked foods are used.

Other UK guidance

In the UK, the Caroline Walker Trust (CWT) has published detailed practical and nutritional guidelines (Crawley. 2006) for food prepared for children (aged under 5 years) in childcare settings (such as day-care centres, crèches, childminders and nursery schools) to encourage healthy eating from an early age. The CWT recommends that clear, nutrient-based standards for under-5s in child care should become a mandatory part of the framework of care offered, similar to those adopted for school lunches across the UK.

The Scottish Executive has published evidence-based nutritional guidance (Scottish Executive. 2006) for providers of childcare for children aged 1-5 years. It applies to a wide range of providers, such as nurseries, playgroups, childminders, toddler groups, crèches, school meal services and family centres.

1.3. Common concerns

Early weaning

Weaning infants is an area which may cause concern for parents. The Infant Feeding Survey 2005 (Bolling et al. 2005) found that only 2% of mothers adhere to the DH advice and wait until 6 months to introduce solids. 51% of mothers (down from 85% in 2000) introduce solids after 4 months of age and the average age for introduction is 19 weeks (up from 15 weeks in 2000). Earlier introduction is associated with younger maternal age, lower social class and education. Women who return to work before 6 months are also likely to introduce solid foods earlier. Women from ethnic minority groups tend to introduce solids later; for example 8 in 10 white women have introduced solids by 5 months compared to 7 in 10 women from ethnic backgrounds. When babies were 4-6 months, mothers were more likely to use commercially produced foods rather than home produced foods. Mothers tended to rely less on commercially produced foods by 8-10 months. The majority of mothers avoided using salt at 8-10 months; those that did not tended to be from lower social groups and ethnic minority backgrounds.

Early introduction of cows milk

The early introduction of cows' milk and large intakes of cows milk (>600ml per day) are associated with an increased risk of iron deficiency in toddlers. The current advice is that while cow's milk can be introduced to the baby's diet from 6 months, it should not be given as the main drink until 12 months. The Infant Feeding Survey (Bolling et al. 2007) found that 40% of mothers had given cow's milk by 8-10 months. While this was usually to mix foods, 6% of mothers used cow's milk as the main drink by this age. There is some evidence that children from Asian backgrounds may be more likely to introduced to cow's milk as the main drink early (by 9 months) and to consume large amounts of cows milk (more than 600ml per day) (Lawson 1998). Other studies have suggested a higher prevalence of IDA in Asian compared to non Asian children in the UK (Lawson 1998).

Overweight and obesity

There has been increasing concern about the prevalence of overweight and obesity in both children and adults. The prevalence of obesity in children (defined as a BMI above the 95th percentile) aged 2-10 years increased from 9.9% in 1995 to 13.7% in 2003 (DH

2005 http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4109410.pdf). The NICE guidance on obesity (2006) highlighted that 1 million children in England will be obese by 2010 if no action is taken. It stated that "there are social inequalities in the prevalence of obesity in children[10] and children with at least one overweight or obese parent are at greater risk of obesity.[37] Children's weight tends to 'track' from childhood to adulthood and children who are overweight or obese are at greater risk of being obese in adulthood. Although obesity in childhood is an important risk factor for adult obesity, the majority of obese adults were not obese children. This suggests that factors throughout the life course have an impact on the development of obesity.[39]" A public service agreement (PSA) target was set in 2004 to halt the year on year rise in obesity in children under 10 by 2010. The 2007 Comprehensive Spending Review includes a new PSA to improve the health and wellbeing of children and young people which commits to reverse long-term trends on childhood obesity and includes action to improving the experience of parents of disabled children with the services they receive (targets set for 2020).

1.4. Current action

In 2000 the Committee on Medical Aspects of Food and Nutrition Policy (COMA) undertook a scientific review of the Welfare Food Scheme (WFS), a system which had, in various forms since 1940, provided eligible pregnant women, mothers and children with vouchers exchangeable for milk or infant formula. Using data from a range of UK sources, particularly the 'National diet and nutrition survey: children aged 1½ to 4½ years' (Gregory et al. 1995), COMA drew attention to a range of adverse nutritional outcomes among women and young children that were associated with lower social class, low income, low maternal age, low educational attainment and minority ethnic group origin. It also recognised the contribution made by benefits in kind to the household economies of poor families (Dobson et al. 1994; Dowler and Calvert 1995).

COMA recommended a number of modifications to the WFS, in particular, ending the provision of vouchers for milk or formula to pregnant women of all ages, and providing a broader range of foods instead (DH 2002). Replacement of the WFS by Healthy Start in 2006 implemented these measures, along with others including an emphasis on health professionals giving health and lifestyle advice, covering diet during pregnancy, breastfeeding and the importance of fresh fruit, vegetables and vitamins for mothers.

Since 2000, other policy measures have influenced the number and nature of settings at local level in which nutritional advice may be offered to mothers and others with responsibility for young children. These include the establishment of Sure Start initiatives and children's centres with increased opportunity for multidisciplinary involvement outside the traditional healthcare setting. National policy is set out in a range of documents including Every Child Matters (2004).Choosing Health (DH 2004) and the national service framework for children, young people and maternity services (DH 2004).

Following the publication of a systematic review on the influence of food advertising on children (reference Hastings) and a further review and consultation by Ofcom, there have been significant legislative changes to food advertising since April 2007. Advertisments for foods which are high in fat, salt and/or sugar (HFSS) are not permitted in or around programmes made for children (including pre-school children), or in or

around programmes that are likely to be of particular appeal to children aged 4-9. From 1 January 2008, HFSS advertisements will not be permitted in or around programmes made for children (including pre-school children), or in or around programmes that are likely to be of particular appeal to children aged 4-15.

1.5. Action in other countries

In the US, the Special Supplementary Programme for Women, Infants and Children (WIC) is a food and nutrition assistance program for low-income pregnant, breastfeeding and post-partum women, infants and children up to 5 years of age. It provides nutrition education, vouchers for supplemental food packages and referrals to other health care and community resources. A standard WIC intervention will include attendance of nutrition education classes once every 2 months and an individual session with a nutritionist once every 6 months.

2. Methods

- Studies were identified through a systematic search according to the protocol for the 6 months to 2 years and 2 years to 5 years reviews but including:
  Studies from developed countries
  All study designs (including cohort studies, case-control studies, case-series, expert opinions etc)
  English language
  1990 onwards
- Studies were also identified through a non systematic 'snowball' search, exploring all avenues, grey lit and web search (including DH, HEA, MAFF, FCA, DEFRA, WHO, UNICEF) for eligible studies (reports, unpublished studies, consensus statements etc)
- To review/appraise potentially eligible studies of lower evidence levels than those appraised by the previous reviews (including any potentially eligible studies from 'excluded studies 'list from the previous reviews)
- To review any studies submitted by the PDG

Topics already considered in previous reviews (breastfeeding, obesity, fruits and vegetables, dental caries, health visitors) were excluded from this supplementary review. The review was to consider any evidence on following areas in particular:

- Optimal intake /requirement of nutrients (salt, zinc, iron, cod liver oil, multivitamins)
- attitudes/beliefs on infant feeding
- Bottle-to-cup transition
- Weaning issues
- Promotion by advertising
- Nutrition policy of day-care centres (preschoolers,≤ 5 years of age)
- Dietary education for toddlers and parents
- Dietary health education for ethnic groups
- General barriers relating to dietary interventions in this population
- Evidence from consensus/expert opinions where no primary studies were available

Evidence presented may be indirect when extrapolated to the UK population. In linking the evidence statements to the making of the recommendations, caution needs to be exercised in considering the level of evidence, applicability and generalisability of this evidence to the UK population.

3. Evidence statements

No	Statements	Grade	Evidence
	Interventions on nutrients supplementation		
	Iron		
1	Evidence from two 1+ RCTs suggest that routine iron supplementation of breastfed infants may benefit those with poor iron status (low haemoglobin) but may present risks for those with normal iron status (normal haemoglobin).	2 RCTs 1+	Domellof et al. 2001; Dewey et al. 2002
2	There is evidence from a 2+ non RCT to suggest that there is no significant difference in the iron and anaemia status of Asian infants aged 6 to12 months whose parents received health promotion, compared with parents who received standard care, at 12 months.	Controlled trial 2+	Griffiths et al. 1995
3	A 2+ 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.	Cohort study 2+	Smith 1986
	Iron-fortified follow-on milks		
4	There is a lack of evidence on the effectiveness of follow on formula compared to standard formula or breastmilk in preventing iron deficiency anaemia. One 1+ RCT based in an inner city area compared infants given follow-on iron-supplemented formula (12 mg iron/l) with infants who, against standard advice, were given pasteurised cows' milk as the main drink from 6 months of age. Compared to cows milk, follow on formula given between 7 to 18 months of age improves iron status and reduces the decline in psychomotor development. There was no effect on growth parameters.	1 RCT 1+	Daly et al. 1996; Williams et al. 1999
	Zinc		
5	Evidence from one 1+ RCT suggests that zinc supplements of 5mg given to breastfed infants daily for 6 months did not have any	1 RCT 1+	Heinig et al. 2006a

	significant effects on growth, development and risk of infections when compared with infants given placebo.		
	Carers' beliefs and attitudes on early weaning		
6	Evidence from four UK qualitative studies/ surveys indicate that the introduction of solid foods is influenced by 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 mothers' 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.	UK surveys and qualitative studies 3	Alder et al. 2004, Anderson et al. 2001, Wright et al. 2004, Daly et al. 1998, Condon et al. 2003
	Issues relating to food intake patterns of young children		
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.	Observational study 3	Birch. 1998Abramovitz and Birch 2000 Wardle 2005
	Weaning interventions to improve feeding practices		
8	A 1+ UK based RCT for the FSA 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	RCT 1+	Watt et al. 2006

	influence vitamin C intake from fruits, growth parameters, use of NHS services and medication use among infants.		
	Weaning support and dietary education for minority ethnic groups		
9	There is evidence from 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.	Observational study 3	Smith et al. 2004 Illett et al 2004
	Oral health – bottle to cup		
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.	Observational study 3	Andrew, 2004
	Interventions relating to Nutrition Education Aimed at Toddlers (NEAT)(US)		
11	Evidence from a 2+ controlled before and after study demonstrates the need to focus on other avenues, such as responsiveness to children's verbal and nonverbal behaviours, in addition to increasing knowledge, to enhance parents' ability to feed toddlers appropriately.	Controlled before and after study 2+	Horodynski et al. 2005
	Interventions relating to Sure Start scheme (UK)		
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.	Evaluation 3	Bournemouth University et al. 2004
	Interventions to improve nutritional adequacy in day-care centres		
13	There is evidence from two 2+ 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.	2 non-RCT (2+), one controlled before and after study	Williams et al. 2002 Bruening et al. 1999 Sangster et al. 1999 Pollard et al. 2001

		(2+) and one observational study (3)	
	Effects of advertising and food promotion on children		
14	Evidence from a 1+ systematic review suggests that food promotion can have an effect on children's food preferences, purchase behaviour and consumption. The majority of food promotion focuses on foods high in fat, sugar and salt and therefore tends to have a negative effect. However, food promotion has the potential to influence children in a positive way, in improving their nutritional knowledge.	1 systematic review 1+	Hastings et al. 2003

4. Results

4.1. Interventions on nutrient and dietary supplementation

Iron

Five studies were identified which considered iron supplementation. Two 1+ RCTs (Domellof et al. 2001; Dewey et al. 2002;) focusing on iron supplements; two 2+ non randomised trials (Griffiths 1995 and Smith 1986) and 1 poor quality (1-) RCT (Childs 1997) promoted the consumption of iron rich foods.

Two 1+ RCTs conducted in two populations, Honduras and Sweden, (Domellof et al. 2001; Dewey et al. 2002;) assessed the effects of iron supplements in breastfed infants from 4 months of age. Growth and morbidity outcomes were also reported (Dewey et al. 2002). The studies suggest that routine iron supplementation of breastfed infants may benefit those with low hgb but may present risks for those with normal hgb. The data from the Swedish RCT are presented here. Healthy infants from aged 4 months, exclusively breastfed and whose mothers intended to breastfeed till at least 9 months were randomised to receive iron supplements (1mg /kg/day) from 4-9 months (Fe 4-9, group 1) (n=31) or placebo 4-6 months and iron from 6-9 months (Fe 6-9, group 2)(n=34) or placebo 6-9 months (Placebo, group 3)(n=36). There was a low prevalence of iron deficiency anaemia in the Swedish infants studied (< 3%). During the study, mothers continued breastfeeding but were permitted to give 'taste portions' of food with little/no iron and later gave complementary food at their own discretion with no influence from investigators on choice of food or extent of breastfeeding. From 4 to 9 months, there was a significant increase in haemoglobin (hgb)(g/L) in group1 when compared with group 3 (+4.5, p=0.002) but not between group 2 and group 3. There was no significant difference in hgb between group 1 and 2. From 4 to 9 months, there was no significant difference in infant weight gain between the 3 groups but the length gain of group 1 and group 2 combined was significantly lower than group 3, the placebo group ($p<0.04$) (Dewey et al 2002). There was a significant difference in the report of diarrhoea (at least one episode during the age interval) between group 1 and group 3 (30% vs. 14%) and between group 2 and group 3 (27% vs. 14%).

The focus of the small, non-randomised trial (Griffiths et al. 1995) by Griffiths et al. (1995) (2+) was on improving intakes of iron-rich foods and vitamin C to prevent anaemia. Participants were 6-12 month old infants of mainly Asian families of low socio-economic status, from general practices in Bolton, UK. Parents of intervention group children received health promotion from a health visitor, with a translator if required, both face-to-face and via written materials presented in appropriate languages, and fortnightly visits until the child was 1 year old. The control group received standard care (not described). Mean haemoglobin, anaemia and diet scores that may favour the intervention group are reported at one year without significance tests. A systematic review by Tedstone (1998) suggested that a larger study would be required to assess whether the results were not simply due to chance.

Smith (1986) (2+) tested the efficacy of individual nutrition counselling of WIC children (below aged 5 years) along with 30 minute nutrition education classes and WIC

vouchers found that haemoglobin concentration of young children improved in the intervention group and was higher than the control group after 6 months ($p<0.05$).

Childs et al. (1997) also focused nutrition education to promote improved intakes of iron-rich foods and vitamin C, alongside good weaning practices, to prevent anaemia. However, attrition rates were high and this was considered a poor quality study (1-). 1000 infants (Asian 75%, Afro-Caribbean and white) from two socio-economically deprived areas of Birmingham (UK) received three home visits from a health visitor (at 3, 6 and 9 months) where specific dietary education in relation to iron intake was given in relevant languages via audiotapes and in written form. The control group received standard nutrition education from their own health visitor. At 18 months no significant differences were found between the groups in rates of anaemia (27.7% in the intervention group and 26.8% in the control group), dietary intakes of iron or growth data.

Iron-fortified follow-on milks

5 RCTs were identified which considered iron fortified follow on milks. However, with the exception of 1 (Daly et al. 1996, Williams 1999) the studies were generally of poor quality (Moffat 1994, Morley 1999, Gill 1997 and Stevens 1995).

A UK RCT (Daly et al. 1996, Williams 1999) compared the haematological and dietary effects of a follow-on iron-supplemented formula milk (12 mg iron/l) with unmodified cows' milk (0.5 mg/l) in a group of inner city toddlers who were already receiving pasteurised cows' milk by 6 months of age. It reported a significantly higher occurrence of anaemia (haemoglobin concentration <110 g/l) in the cows' milk group (n=43) than the follow-on formula group (n=41)(31% vs. 3%, $p<0.007$) at 12 months. At 18 months of age, the follow-on formula group returned to cows' milk and both groups were followed up until 24 months. There was a significantly higher occurrence of anaemia in the cows' milk group than the follow-on formula (33% vs. 2% at 18 months, $p<0.0001$ and 26% vs. 0% at 24 months, $p<0.002$, respectively). Dietary iron intake (mg/day) from milk and solids was low in both groups at recruitment, and decreased significantly in the cows' milk group than the follow-on formula group at 12 months (76 ± 33 vs. 158 ± 54, $p<0.001$) and at 18 months (82 ± 33 vs. 133 ± 41, $p<0.001$) but not at 24 months. Both groups of children grew satisfactorily on both cows' milk and follow-on formula. There were no significant differences in z scores for weight for age, height for age, or weight for height between the two groups throughout the study (no data reported). This study suggests that the provision of a follow-on formula in place of pasteurised cows' milk between 7.8 and 18 months of age was effective in preventing anaemia. Developmental assessments of the children (Williams et al. 1999) using Griffiths scales were similar in the two groups at enrolment. By 24 months, there was a significant decline in the mean Griffiths general quotient scores in the unmodified cow's milk when compared with the iron-supplemented formula milk group (14.7 vs. 9.3, 95% CI 0.4 to 10.4). Replacing unmodified cow's milk with an iron-supplemented formula milk up to 18 months of age in infants from inner city areas may prevent iron deficiency anaemia and reduce the decline in psychomotor development in the second year.

One UK based RCT (Morley et al. 1999) (1-) assessed the effects of iron supplemented formula on infant developmental performance. However, the iron content of the fortified formula used in this study is out of step with current guidance and sub-group analysis only presented. Healthy infants aged 8 months were randomised to unmodified cow's

milk (0.05mg iron/l)(n=166), unfortified formula (0.9mg iron/l)(n=165) or iron-fortified formula (1.2mg iron/l)(n=162). It reported significantly higher serum haemoglobin (g/l) in the group fed iron fortified formula than the group fed unmodified cow's milk or unfortified formula (126 ± 11 [n=40] vs. 119 ± 14 [n=35], p< 0.01; 126 ± 11 [n=40] vs. 120 ± 11 [n=32], p <0.05) at 18 months. There were no significant differences between groups in weight and height or between boys and girls in Bailey mental and psychomotor development index (MDI and PDI) at 18 months..

A small UK RCT (Stevens et al. 1995) (1-) compared the effects of iron-fortified follow-on formula milk (12 mg iron/l) and non fortified follow-on formula milk (no iron) in healthy infants aged 6 -18 months, who were not breastfed. It reported no significant differences between the two groups in haemoglobin (Hgb) and number of infant with anaemia (Hgb <110g/l) at 6, 9, 12, 15 and 18 months. This study suggests that iron added to follow-on milk was not an important source of dietary iron in this infant population. Although stated as being double blind, this method was not tested, the dietary intakes of infants were not known and attrition rates was high.

One double-blind RCT (Moffatt et al. 1994) (1-) in Canada compared the effects of iron-fortified infant formula (12.8 mg iron/l) and regular formula (1.1 mg iron/l) in preventing developmental delay and abnormal behaviour in bottle-fed infants, aged from birth to 2 months, from low income families. The formula used in this trial contained much higher amounts of iron than that used in the UK (5 to 8 mg/l), power calculations were not undertaken and it was unclear whether drop out rates were similar in the intervention and control groups. The authors reported a significantly improved haemoglobin (g/l) and anaemia (%) status in the infants given iron-fortified milk (n=113) when compared with infants given regular milk (n=112) at 15 months (118.6±5.7 vs. 115.1±5.7, p=0.02; 2.6% vs. 10.4%, p=0.05). There was a decline of 6.4 points in psychomotor development index in the regular milk group between 6 and 12 months with a trend towards recovery at 15 months when there was no significant difference between the two groups. Mental development and behaviour were not affected by the intervention in both groups. There was no significant different in weight between the two groups at 15 months.

One multi-centred UK RCT (Gill et al. 1997) (1-) compared the effects of two iron-fortified follow-on milks on the iron and haemoglobin status of bottle-fed infants aged 6 months. Infants were randomly allocated on a ratio of 3:1 to receive either iron-fortified formula (12.3 iron mg/l, Group A)(n=264), or non-fortified formula (1.4 iron mg/l, Group B)(n=85). A convenience sample of infants already receiving cow's milk (0.05 mg iron/l) acted as a control group (Group C, n=57). Due to the lack of a formal control group (convenience sample only) this study was considered 1- quality. The authors reported a significant improvement in serum haemoglobin levels (Hgb in g/l) in Groups A and B when compared with Group C (121.5 vs. 117.7 vs. 111.4; p=0.006) at 15 months. Anaemia (Hgb <110g/l) was found in 11% of infants in Group A, 13% in Group B and 33% in Group C. There was no significant difference in weight or height between the 3 groups at 15 months.

Zinc

Two RCTs were identified which considered zinc supplementation (Heinig 2006a, Walravens 1992), although only one was considered good quality (Heinig 2006a).

A US based double-blind RCT (Heinig et al. 2006a) (1+) compared the effects of zinc supplementation with placebo in breastfed infants. Infants from relatively affluent families were given zinc (5mg/day) at 4 months. This study suggested that zinc supplementation did not affect growth, development or risk of infection and that the dietary intake of these breastfed infants appeared to be adequate. The authors reported significantly higher plasma zinc concentrations in the supplemented group when compared with the placebo group. However, there was no significant difference in mean weight (g) and height (cm) attainment between zinc-supplemented infants and placebo (348 ± 75 vs.: 359 ± 89; 1.48 ± 0.15 vs. 1.48 ± 0.19), and no significant differences between the zinc and placebo groups in dietary intake, illnesses and gross motor development at 10 months.

One European double-blind RCT (Walravens et al. 1992) (1-) assessed the effects of zinc supplementation in breastfed infants aged 4-9 months, most of whom came from low-income immigrant families. However, the lack of power calculations and intention to treat analysis undertaken and the moderately high drop out rate meant resulted in the trial being considered poor quality. The authors reported a significant increase in the length-for-age Z score and weight gain (kg) in breastfed infants given zinc supplement (5 mg daily)(n=25, 15 boys, 10 girls) when compared with breastfed infants given placebo (n=32, 15 boys, 17 girls)(+0.21 vs. ─0.13, p=0.029 and 1.64 vs. 1.28, p=0.047 respectively) at 3 months follow-up. The increase in linear growth (cm) was significant in boys (6.0 vs. 4.6, p=0.02) but not in girls.

Cod liver oil and omega-3 supplements

No good quality studies were identified which assessed cod liver oil or omega 3 supplementation in healthy children.

One small US based RCT (Linday et al. 2004) (1-) compared the effects of cod liver oil and multivitamin-mineral supplements on upper respiratory tract paediatric visits in inner city Latino children, aged 6 months to 5 years, from an inner city area. It reported a significant decrease in the mean number of upper respiratory tract visits over time in children given the supplements (containing both EPA and vitamin A, and selenium-containing chewable multivitamin-mineral)(n=47) and children given no supplement (n=47) at 5-6 months follow-up. The supplements were well tolerated and further research and attention were proposed. However, this study is not considered to be applicable to a UK setting. In addition, the study was considered poor quality due to the reasonably high drop out rate and the inadequate randomisation processes.

4.2. Complementary feeding

Carers' beliefs and attitudes on early weaning

Five good quality UK qualitative studies/ surveys (evidence level 3) were found which investigated carers' belief and attitudes on early weaning (Alder et al. 2004; Anderson et al. 2001; Wright et al. 2004; Daly et al. 1998; Condon et al. 2003). The studies explored cultural and social norms and attitudes around feeding and early weaning. The studies consistently found that early weaning is influenced by the mother's perceptions of the baby's needs (i.e. perceived hunger), cultural beliefs and advice, encouragement from

family members and friends. Infant weight was seen as a marker of child health and successful parenting.

There was a reported association between early weaning and maternal smoking, non-breastfeeding, male infants and low maternal educational level.

A UK qualitative study (Anderson et al. 2001) of self-selected mothers (n=22 primiparous,7 multiparous) of infants aged 8 and 18 weeks explored cultural and social norms and attitudes around 'feeding matters'. It reported that mothers believed that the introduction of solid was baby led and initiated by some physical characteristics (for example, subjective perception of size of the baby) or behavioural action of the infant (for example, chewing hands), indicating hunger. All mothers were aware of the current recommendations but few understand why this should be. The rigid feeding guidelines and advice from health professional created confusion over the importance of good weaning practices. Among the same population group, Alder et al (2004) examined the factors which influenced mothers' decision to introduce solid foods early (<12 weeks, n=133) or late (> 12 weeks, n=205). The early introduction of solids was found to be associated with: young maternal age, male baby, the opinions of the infant's maternal grandmother, living in a deprived area, personal disagreement with the advice, lack of encouragement from friends to wail till the baby was 4 months old and being in receipt of free samples of manufactured food. Early complementary feeding was also influenced by the mother's perceptions of the baby's needs such as 'settling more easily' and 'infant happy and more content' after solids were introduced.

A UK survey (Wright et al. 2004) explored reasons for early weaning (earlier than the 6 months) among parents (n=707). Earlier weaning was associated with agreeing with the statement 'I started solid food because my baby seemed hungry', as well as 'my family and friends told me to'. Predictors of early weaning included male infant, bottle feeding, rapid weight gain at aged 6 weeks and lower socioeconomic status. Professional advice or written materials was not perceived to have a major influence on weaning decision.

A UK survey (Daly et al. 1998) examined milk feeding and weaning practices in infants (aged 0-12 months)(n=100) from a deprived inner city area in Birmingham. The discussion highlighted that weaning practices were handed down from family and friends and were intuitive rather than informed. There was a general reluctance by the mothers to change long-established (flawed) methods of weaning handed down by their own mothers. Advice offered by family and friends had the advantage of being readily available.

A UK focus group study (Condon et al. 2003) of 26 women from Bangladeshi, Pakistani, Somali and Afro-Caribbean backgrounds living in Bristol examined cultural influences on breastfeeding and weaning. There was positive attitude towards breastfeeding among black and Asian mothers who were aware of the nutritional and social benefit. but some introduced canned foods at 4 months in accordance with what they perceived as the British custom and health professional advice

Issues relating to food intake patterns of young children

As well as being a time when children are growing quickly and becoming more active, the preschool age (1-5 years) is also a time when children learn about food, which will

later establish their food knowledge, and patterns of food acceptance and preferences. It has been suggested that a child's unique food preferences are influenced by learning and repeated experience via the process of associative learning and imitation, and is shaped by the social context in which the food is consumed (Birch, 1998). Three studies (two observational studies and one survey – evidence level 3) were identified which investigated these influences in young children (Birch et al, 1998; Abramovitz & Birch, 2000; Wardle et al. 2005).

A US based observational study (Birch et al. 1998) examined the effects of repeated exposure to a target food in enhancing acceptance of the same food and different food among breastfed and formula-fed infants aged 4-7 months (n=39). It reported that exposure to the target food once a day for 10 days significantly increased the infant's intake of the target food. Same, similar and different food intake also increased two-fold with target food exposure.

A further US based study (Abramovitz & Birch 2000) explored concepts about dieting in girls aged 5 years (n=197) and their parents. Girls whose mothers reported current or recent dieting were more than twice as likely to have ideas about dieting, suggesting that mother's dieting behaviour is a source of young girls' idea, concepts and beliefs about dieting.

A UK survey (Wardle et al. 2005) examined the relationship between parental control over feeding and children's fruit and vegetable intake. The participants (n=564) were parents of nursery school children aged 1-6 years. More parental control was significantly associated with less frequency of children's fruit and vegetable consumption ($p<0.01$). Children's consumption of fruits and vegetables was positively associated with parental consumption of fruits and vegetables and negatively correlated with neophobia, suggesting that interventions aimed at increasing children's intake of fruits and vegetables would be well advised to target parents' eating habits and feeding practices.

An additional 4 non UK based studies (Gerrish 2001, Hammond 1998, Byrne 2002, Fisher 1999a) were identified but there were considered poor quality.

A small US before and after study (Gerrish et al. 2001) (1-) compared the effects of exposure to flavour variety on food acceptance in bottle-fed infants (aged 4 months) already given cereals for 4 months. Infants fed either carrots (n=16) or a variety of vegetables (n=16) ate significantly more of the carrots than infants fed only potatoes (n=16) after the exposure periods of 9 consecutive days. The variety group also consumed significantly more chicken than did the carrot group, suggesting that exposure to a variety of vegetables can facilitate the acceptance of novel food.

A Canadian before-and-after study (Hammond et al. 1998) (1-) assessed the effects of an early childhood nutrition education program on kindergarten children's familiarity with and stated willingness to eat test foods throughout the year. The education program consists of 4 steps: food introduction activity, cooking, journal keeping and communication between parents and children. Pre- and post-intervention analyses showed significant increase in familiarity with foods introduced over time in the intervention group (n=67) and control group (n=56) but no significant increase in stated willingness to eat introduced foods in either group. Significantly more parents in the intervention group than control group reported that their child had mentioned exposure to a food at school when requesting it at home. An associated study (Hammond et al.

1994) reported that kindergarten teachers who delivered the program highly valued the initiative.

A small US before and after study (Byrne et al. 2002) (1-) investigated the effects of children's books on preschool children's attitudes and behaviours relating to unfamiliar vegetable. Preschool children (aged 3-5 years) were read a book modified to give a positive message about a novel vegetable (kohlrabi) (n=29), or a negative message (n=29) or control (n=28). There were significantly more children willing to taste the vegetable in the group exposed to a positive message, when compared with the group exposed to a negative message or control group after the intervention. However, the willingness to taste the vegetable was already high at baseline in the positive message group.

A US observational study (Fisher et al. 1999a) (2-) assessed the effects of restricted access to snack food (high parental control attempts over children's eating) on the eating behaviour of children's aged 3-5 years (n=31). Before-and after analyses showed that the restricted food elicited more positive comments about it, more request for it and more attempts to get it than the control food. Within the restricted setting, restricted access increased their subsequent selection and intake of that food.

Interventions on weaning to improve feeding practices

Peer support

A UK based RCT for the FSA (Watt et al. 2006)
[to add to reference: Copies available on request. See FSA website http://www.foodstandards.gov.uk/science/research/researchinfo/nutritionresearch/foodacceptability/n09programme/n09projectlist/n09016/] compared the effect of a peer support intervention on infant feeding practices. Although the intervention did not result in improvements in children's vitamin C intake from fruit - the primary outcome – the authors did report that there was a significant increase in knowledge in infant feeding practices and confidence in following advice from health professionals in mothers receiving peer support compared with control.
Women were recruited in baby clinics in deprived areas of Camden and Islington when their infants were 10 weeks old and allocated to the peer support (n=157) or standard professional care (n=155). Local mothers offering peer support were volunteers, who received training to provide the support and monthly home visits were offered over a 9 month period. The support included advice on feeding practices, affordability and access to recommended foods and, if appropriate, encourage women to seek relevant help from appropriate agency when problems were identified. The support offered by the volunteers was designed to complement the advice provided by health professionals. At 6 months follow-up, there was no significant difference in the number of mothers introducing solids when infants were 21-30 weeks old between the intervention (n=130) and the control group (n=133). Mothers in the peer support group were significantly more knowledgeable about when bottle feeding should be discouraged (at 12 months), and more confident in following health professionals' advice on how to fed their child. The process evaluation showed high levels of satisfaction about the intervention among the intervention group and the volunteers. At 18 months follow-up, there was no significant difference in vitamin C intake, heights and weights, use of NHS services or medication use between infants in the peer support group (n=104) and the control group (n=108),

but consumption of fruits and vegetables increased in children in the intervention group, who were less likely to be using a bottle than those in the control group.

Weaning support and dietary education for minority ethnic groups

Two UK studies were identified which targeted minority ethnic groups; a level 2+ uncontrolled before and after study (Ilett et al. 2004) and a level 3 observational study (Smith et al. 2004). Both studies suggest that trained link workers can be effective in helping South Asian families establish healthy weaning patterns.

Illet et al (Ilett et al. 2004) assessed the effects of an intensive, home-based programme of dietary education to mothers to improve the diet of toddlers of Pakistani origin, living in Bradford. These children were found to have haemoglobin of 8.0 -10.9 g/dl at 13 months check-up and were offered iron therapy. Their mothers were offered the dietary education, delivered in 6 one-hour visits over 12 weeks, by a native-speaking link worker who was supervised by the health visitor. The health education message consisted of a 'Weaning File' providing advice on weaning, use of feeding cups, food preparation and hygiene, iron-rich foods and avoiding salt and sugar. At 3 months after the intervention, it reported improved maternal knowledge of anaemia, increased frequency of iron and vitamin C rich foods consumption and feeding practices such as use of cups and finger foods, and reduction in cow's milk consumption and difficult eating behaviour. The personalised, home-based and culturally acceptable nature of the intervention was well received and valued by the mothers caring for young children and who might not manage to leave their homes. This study suggests that mothers of Pakistani origin gained knowledge and changed their children's diet following diet health education programme. The study demonstrated the value of a home-based programme delivered by a trained link worker to this group, which has difficulty in accessing clinic-based services. There was no control group and objective outcome measures. (See Tables A and B)

Smith et al (Smith et al. 2004) evaluated the use of link workers in providing weaning support to South Asian families in Luton. Two link workers, traditionally acted as interpreters for health professionals, received intensive training by health visitors to be competent to visit clients (n=30 families of Pakistani origin with infants aged up to 3 months) in their own homes to offer appropriate weaning advice. Support was provided to the link-workers throughout the intervention, including monthly discussion, role-play, case-studies, individual mentorship and reflective learning.

The weaning message focused on the importance of offering infants a varied diet, on food texture, using a cup, highchair, finger foods and the social aspects of feeding. At 1 year, 92% of the families given the weaning intervention reported giving their infants a varied diet, and 100% of children were using drinking cups and finger feeding. The study suggests that specially trained link-workers can be effective in helping Asian families to establish healthy weaning patterns. There was no control group.

Oral health: Bottle to cup

Two studies were identified - a level 3 observational study (Andrew 2004) and a poor quality (2-) (before and after study (Koelen et al. 2000) - which aimed to reduce the practice of giving older infants and children drinks in a feeding bottle;

A UK based observational study (Andrew. 2004) evaluated a public health campaign (Beakers for bottles), based on the Bradford 'Bottle Amnesty' of 1994, to improve child feeding practices and oral health among the Asian populations in Huddersfield. The target populations were all families with children under 5 years old. The campaign event lasted 5 days and was based at a local community centre. The objectives were to address and reduce the practice of giving babies any drinks other than milk or water in a feeding bottle; to encourage parents to swap bottles for beakers when the children reached 6 months old; to raise awareness of the damage sugar can do to children's teeth and to encourage proactive and regular contact with the dental service. The event was a collaborative effort, utilising peer health educators to assist with translation of posters and leaflets into Urdu and Punjabi and an interpreter, health visitor and oral healthy workers were available during the campaign. The event was advertised with flyers inserted in a free paper delivered to every home in the area. Posters in English, Urdu and Punjabi with a bright coloured logo 'Beakers for bottles' were put up in local shop and community centres. The offer of free beakers and toothbrush and paste was advertised as an incentive for people to attend the event.

The evaluation showed that 40% of the attendees were from the South Asian community. Over 80% scored the event highly and 30% requested contact regarding future public health events. Many people discarded their old bottles and were given feeding cups. No negative comments were recorded. Problems identified included communication difficulties between health professionals (not specified) and cups were reported to be more suitable for older children in addition to the lidded beakers for younger infants. No long-term outcomes were reported such as increased use of beakers or dental caries were assessed and no follow-up evaluation of the campaign was identified. It is not clear if the discarding of feeding bottles and giving of feeding cups had any effect on the increased use of feeding cups after the campaign. Therefore, while this study provides useful data on the likely receptiveness of a target population, the effectiveness of the intervention remains unclear.

A poor quality (2-) before-and-after study with no control group (Koelen et al. 2000) evaluated the effects of a national oral health campaign (Bottle it up – take a cup), aimed at reducing dental caries in primary teeth by reducing baby bottle use and switching to the drinking cup from 9 months upwards. The target population was parents of children aged 0 to 4 years, with a specific focus on parents of children aged 9 to 18 months. Target groups also included various intermediary groups such as child health teams, day-care centres, dentists and community youth workers.

The campaign materials, also available in Arabic and Turkish and pre-tested among various target groups, developed to transmit the message included fact files, posters, tear-off pads and support materials that could be used during discussions with parents.

Evaluation of the process and outcomes using questionnaires (intermediaries; n=16 organisations pre-test; 40 post-test) and interviews (parents, n=127 pre-test, 102 post-test) was conducted 18 months after the campaign. Distribution of materials was reported to be ineffective due to incomplete and out-of-date mailing lists. The materials were well accepted and used by the intermediaries. About 46% of parents had seen the poster. However, some groups such as day-care centres displayed the poster but did not consider health education as part of their task. Dentists played a more extensive role

than anticipated. Some of the problems encountered were adjusted to determine and inform continuation of the programme.

After the campaign, there was a significant increase in the attitudes among the intermediaries towards the switch from bottles to cup between 9-12 months (80% post-campaign vs. 32% pre-campaign, p <0.01) and in their intention to structure the consultation and consider more frequently to be their task to 'stimulate the use of a cup' (5% vs. 21%). After the campaign, parents were more aware nursing caries (60% vs. 78%%, P<0.05) and more parents received this information 'through health education' (47% vs. 14%, p<0.000). The bottles were used less after the campaign (64% vs. 88%, p<0.001) and the switch from bottle to feeding cup before 12 months made more often (88% vs. 72%, p<0.10). This campaign is ongoing at a national level throughout the Netherlands.

4.3. Dietary health education

Interventions relating to Sure Start scheme (UK)

Only one study was identified which considered the UK based Sure Start scheme to promote the physical, intellectual and social development of young children - an evaluation of the St Philips Healthy Eating Project (Bournemouth University. 2004). Evidence on the effectiveness of the Sure Start scheme was not identified.
The St Philips Healthy Eating Project is one of the 524 individual Sure Start schemes which bring together early education, childcare, health and family support. The project aims to help families develop healthy eating habits and strengthening families and communities. Multi-choice or single-choice meals were provided once a month, at the end of the Toddler Group sessions. Food was prepared by volunteers and provided parents/carers and their children with a nutritious and healthy meal. Parents' and carers' views were positive about the project. Dietary outcomes were not assessed. However, the project provided opportunities to eat together in a social setting where children could see what other children were eating and learn to eat with others and table manners. Families also learnt about new ideas of healthy eating and trying out new recipes.

Interventions relating to Nutrition Education Aimed at Toddlers (US)

A US controlled before-and-after study (Horodynski et al. 2005) assessed the effects of the Nutrition Education Aimed at Toddlers (NEAT) program on carers of toddlers aged 1-3 years from rural low-income families. NEAT aims to improve carer-toddler mealtime interaction by empowering carers to become responsive to the child's verbal and nonverbal behaviours, enabling the child to clearly communicate hunger, fullness and eating preferences, thus developing the child's ability to self-regulate his food intake, crucial to the development of healthy life-long eating habits. The NEAT lessons were designed to increase caregiver's awareness and knowledge of healthy eating and feeding practices in relation to their toddlers' development. It reported a significant increase in knowledge scores concerning toddler feedings in the intervention group (n=43) when compared with the control group (n=53). There was no significant difference between the 2 groups in measures of child /parent mealtime behaviours (such as TV watching during observed meals).This study demonstrates the need to focus on

other avenues, in addition to increasing knowledge, to enhance parents' ability to feed toddlers appropriately.

A previous, poor quality (2-) pilot study among the same intervention group (Horodynski et al. 2004) reported no significant differences between the intervention group (n=19) and the control group (n=19) in their appropriate/correct knowledge about feeding toddlers, positive attitudes about feeding toddlers, feeding practices/behaviours with toddlers 6 months after the intervention. Appropriate feeding practices were not followed in practice from data on 24-hour dietary recall.

Interventions relating to the Special Supplemental Nutrition Program for Women, Infants and Children (WIC, US)

Five studies (McGarvey et al. 2004, Siega-Riz et al. 2004, Birmingham et al. 2004, Carroll et al. 1996, Dundas et al. 2004) were identified which considered the US based Special Supplemental Nutrition Program for Women, Infants and Children (WIC). All were considered to be of poor quality (level 2-).
A non-RCT (McGarvey et al. 2004) assessed the effects of the WIC program to promote 6 targeted parental behaviours to prevent obesity in children served by the WIC. A state-specific Fit WIC childhood overweight prevention program was developed to promote 6 key messages: (1) increase physical activity, (2) monitor mealtime behaviour, (3) limit household television viewing, (4) drink water instead of sweetened beverages, (5) consume 5 fruits or vegetables daily, and (6) increase family activities to promote fitness. The intervention adopted a 3-pronged approach, involving educational groups, staff reinforcement and community reinforcement. The participants were WIC parents with children aged 2-4 years. At 1 year, there was a significant higher increase from baseline in reported frequency of active play with the child (p=0.009) and in frequency of offering the child water (p=0.005) among the Fit WIC parents (n=185) when compared with parents who received standard WIC intervention.
A secondary data analysis of a nationally representative cross-sectional survey conducted by USDA in 1994 to 1996 and 1998 (Siega-Riz et al. 2004) evaluated nutrient, food intake, and snacking behaviour of preschoolers (aged 2-5 years) by participation in the WIC program. Among WIC participants (n=792), the prevalence of snacking was significantly lower when compared with non participants (n=1647)(68% vs. 72%, p = 0.01). In the very low income group, WIC had a beneficial effect on the intake of fat, carbohydrates, added sugar, and fruit from the total diet as well as on added sugar from snacks. These were independent of food stamp participation.

A before-and-after study (Birmingham et al. 2004) evaluated a five-a-day recipe booklet for use with mothers (n=225) having a child enrolled in WIC. The intervention included discussion of the health benefits provided by fruits and vegetables, a description of the Market Basket Booklet format (e.g. produce selection, storage, and preparation; Kid's Corner recipes; seasonal availability of fruits and vegetables) and a personalized booklet to tailor the presentation of the booklet to the food preferences of the client and other household members. At 2 months, WIC mothers (n=167) reported feeling more confident about choosing good quality fresh produce (70%) and storing fruits and vegetables properly (68%), and also felt that it was easier to include fruits and vegetables in their family's meals (74%). Many mothers reportedly served more fruits and vegetables to their families after receiving the booklet. Barriers to food and vegetable consumption identified by parents included long preparation/cooking time and costs.

A before and after qualitative study (Carroll et al. 1996) evaluated the effects and acceptability of an interactive multimedia nutrition education computer application in knowledge, attitude, and behavioural intentions among a high-risk, low-income women (n=697) receiving services from the WIC program. At 4-6 weeks after the intervention, 93% of interviewed clients reported positive feelings about self-directed and self-paced learning using the multimedia system to learn. Positive changes included changing women's intentions to nurse their new infants, using of lists at the grocery store, avoiding going to the store hungry, not permitting children to eat in front of the television, asking people who give children "junk" food to stop, reducing fat in cooked foods, avoiding using food as a reward, not putting an overweight child on diet, understanding the impropriety of selling, giving away, or returning WIC foods to the store or accepting and using rain checks, the proper use of WIC foods, increasing the desire to quit smoking, learning that the craving for a cigarette will pass, and recognizing the risks of household smoke to children. There were some negative comments from 7% of the clients who were dissatisfied by the "nonhuman" nature of the intervention. Many nutritionists and aides reported that using this technology has a positive impact; some lack of staff acceptance appeared to limit its use.

A before and after study (Dundas et al. 2004) with a quantitative and non-experimental study design assessed the effects of the WIC program on the eating behaviours of preschool children (n=91). After 6 months, there was a significant increase from baseline in the meat, fruit and vegetable components of the HEI score (Healthy Eating index)(13.4%, 13% and 30% respectively), indicating a positive impact of the WIC program.

Interventions relating to the Special Turku Coronary Risk Factor Intervention Project (STRIP)(Finland)

Three follow-up studies to the STRIP project assessed the effects of individualised dietary counselling in reducing fat intake in children, started at the child's age of 8 months. (Rask-Nissila et al. 2000;Rask-Nissila et al. 2002, Talvia et al. 2006) (also see Lagstrom 1997 in the 2-5s review). All were considered poor quality (1-) and the intervention was not considered applicable to the UK as it advised a much lower fat intake than is currently recommended to children under 5 years of age in the UK. Children were randomised to dietary counselling (n=540) or usual health education (n=522). At 5 years follow-up (Rask-Nissila et al. 2000;Rask-Nissila et al. 2002), intake of saturated fatty acids was markedly reduced, age-related increase in serum cholesterol concentrations was diminished with normal neurological development, similar to that of the control group. At 10 years follow-up (intervention group n=289; control group n=268; 46% drop out rate)(Talvia et al. 2004), the reduced intake of saturated fatty acids continued with out disadvantageous dietary effects, but the 2:1 goal for unsaturated – saturated fat ratio was not reached. At 11 years follow-up (Talvia et al. 2006), male children in the nutritional counselling group consumed more vegetables than did the control ($p<0.001$). Mother's consumption correlated with the consumption with their daughters and sons, whereas father's consumption correlated only with the consumption of their sons, suggesting that effective interventions to increase fruits and vegetables consumption in children should focus on the whole family, not just the child.

4.4. Interventions to improve nutritional adequacy in day-care centres

Four studies (three 2+ and evidence level 3 observational study) were identified which investigated interventions to improve nutritional adequacy in day-care centres (Bruening et al. 1999; Sangster et al. 1999; Pollard et al. 2001; Williams et al. 2002). Two studies were conducted in the US (Bruening et al. 1999, Williams et al. 2002) and two in Australia (Sangster et al. 1999, Pollard et al. 2001) . The studies suggest that interventions in day care centres improves the nutritional adequacy of the food provided and is associated with dietary improvements.

The US based Child and Adult Food Program (CACFP) is a federal program, which reimburses child-care institutions that serve nutritious food to children in day-care centres, especially in low-income areas. A cohort study (Bruening et al. 1999) (level 2+) evaluated the effects of CACFP on the diets of children aged 3-5 years by comparing a group of children who attended a day-care centre that participated in the CACFP with a group of children who attended a day-care centre but brought all meals and snacks from home (n=20) . It reported significantly higher mean daily intake of vitamin A, riboflavin and calcium in the CACFP participating children than non-participating children. CACFP participating children consumed more servings of milk and vegetables and fewer servings of fats/sweets than non-participating children. At 6 months follow-up, there was no significant difference in weight-for-height status and dental caries between the two groups but children participating in CACFP had significantly fewer days of illness then children from the non-participating centre (median 6.5 vs. 10.5, $p<<0.05$).

Another US based non-RCT study (Williams et al. 2002) (level 2+) assessed the effects of the Head Start Program on preschool menus and children's dietary intake. The Head Start Program, a 3 year preschool cardiovascular risk reduction and comprehensive health education program, was designed to modify the preschool environment in relation to the fat content of preschool meals and snacks, involving training of the cooks in planning menu, recipe development, food purchasing and food preparation. Children (aged 2-5 years) participating in this study were mainly from low-income and minority background. Six preschool centres (n=374 children) received an intervention of food service modification and two control centres (n= 254 children) did not. At 2 years, there was a significant decrease in the consumption of saturated fat from preschool meals in the children given the intervention compared with the control children. Total caloric intake was adequately maintained for both groups. Analysis of the menus and recipes over the 2 year period showed a significant decrease in saturated fat content in the intervention preschools compared with the control preschools. Total fat content of menus also decreased significantly in intervention preschools compared with controls.

An Australian controlled before-and-after study (Sangster et al. 1999) (level 2+) assessed the effects of day care centres involved in the Good Food for Children program (GFFC) on menu planning. The GFFC involved assessment of centres' menus and developing workshops for childcare staff. It reported significant pre- and post-intervention improvements in the nutritional adequacy of centre menus in the centres enrolled in GFFC (n=40) (an increase of 45% and 21% in number of centres with adequate serving of dairy foods and bread/cereals respectively, and an increase of 36% in the number of centres that diluted fruit juice before serving). The control centres (n=19) showed no significant improvement.

Another Australian based observational study (Pollard et al. 2001) (level 3) evaluated the impact of the Start Right–Eat Right Award scheme to improve nutrition and food service standards in child care centres. The components in achieving the award included aspects of nutrition training, food service planning, safe food handling and menu planning by centre coordinators and cooks. There was a high level of satisfaction from child care centres that had received the award and positive feedback included: improved knowledge in nutrition, food service, hygiene and health issues. Eighty percent of the centres made change to their menus as a result of participating in the scheme, in increasing servings of milk meat and in variety of food served.

4.5. Effects of advertising and food promotion on children

One good quality (1+) systematic review (Hastings et al. 2003) was identified which assessed the effects of food promotion on children's food knowledge, preferences and behaviour. The review (n= 31) included experimental and observational studies on children aged 2 to 18 years in developed and developing countries.. The review concluded that food promotion can have and is having an effect on children, particularly in the areas of food preferences, purchase behaviour and consumption. Most studies uncover an effect that will be harmful. However, there is evidence that promotion can have a beneficial effect. Food promotion has the potential to influence children in a positive way.

The review identified seven studies which found that exposure to food promotion had an influence on, or was significantly associated with, the specific purchase-related behaviour measured in each study (for example, sales, household purchase).

Furthermore, eleven studies investigated the effects of exposure to food promotion on children's food consumption behaviour. Overall the studies provide evidence of an effect of food promotion on consumption behaviour. Effects were sometimes inconsistent and were not found in all the studies, but were found in sufficient studies to suggest that food promotion influences children's food consumption. Studies suggest that food promotion or television viewing significantly influences children's food behaviour and diet independently of other factors known to influence children's food behaviour and diet. However there is little evidence to show whether the influence of food promotion on children's food behaviour and diet is greater or lesser than that of other factors.

Studies that have considered the influence of food advertising on nutritional knowledge provide modest evidence of an effect of food advertisements on children's nutritional knowledge. Four of the identified studies found that exposure to food promotion had a significant impact on, or was associated with, differences in nutritional knowledge.

Fourteen studies suggested, on balance, that food promotion influences children's brand and product preference. Six of the nine high- and medium-quality studies found that promotion had significant effects on children's product and brand preferences and children were more likely to choose foods with high fat, salt or sugar than alternative 'healthy' products after viewing food adverts.

A further, though poor quality, US controlled before-and-after study (Hindin. et al 2004) (2-) evaluated the effects of television advertising on their children's food request, via a

media literacy nutrition education curriculum for “Head Start” parents (n=35) of children aged 3-6 years. The media literacy nutrition education curriculum aims to help parents to comprehend the effects of advertising, appreciate the benefits of talking and analysing food adverts with young children, develop skills to evaluate food advertisements by reading food labels and demonstrate the ability to analyse and talk about food commercials with their children. Parents acted as their own controls. It reported that parents who received the intervention changed behaviours, attitudes, self-efficacy, values, outcome expectations in terms of talking with their children about television food commercials, responding to their children’s requests for food advertised on television, and reading food labels to counter claims made by television advertising.

Table A: Sub-questions

Intervention studies to improve nutrition of young children aged 6 months to 5 years

Reference	How do structure and content of intervention influence effectiveness	Does effectiveness vary by gender, age, ethnicity, religious practices, social/professional group receiving or delivering the intervention, including specific issues when working with predominantly home-based ethnic minority groups	Does effectiveness vary by site/setting or intensity/duration of intervention	What are the views of those receiving and delivering the intervention	Are there barriers to replication of effective intervention
(Andrew. 2004)	Event took place in Community Centre The event was a collaboration between health visitors, Health authority and Oral Health Promotion Department of Calderdale and Kirklees Health Authority. It utilised peer health educators to assist with translation of posters and leaflets into Urdu and Punjabi. A rota was designed to ensure that an interpreter, health visitor and oral healthy workers were available every day. The event was advertised with flyers inserted in a free	The target populations were all families Asian with children under 5 years old in Huddersfield	Not reported	Attendance 40% of the attendees were from the South Asian community Over 80% client's scored the event highly 30% requested contact regarding future public health events Many people discarded their old bottles and were given feeding cups No negative comments were recorded.	Problems identified included: Communication difficulties between health professionals (not specified) Cups were reported to be more suitable for older children in addition to the lidded beakers for younger infants No translator available for Bosnian families who did not speak English The continued use of a bottle over a year may encourage over consumption of

	paper delivered to every home in the area. Posters in English, Urdu and Punjabi with a bright coloured logo 'Beakers for bottles' were put up in local shop and community centres. The offer of free beakers and toothbrush and paste was advertised as an incentive for people to attend the event.				cow's milk, leading to iron deficiency anaemia should be addressed in future campaigns.
(Birmingham et al. 2004)	1) Informed consent 2) Brief discussion of the health benefits provided by fruits and vegetables and a description of the Market Basket Booklet format (e.g. produce selection, storage, and preparation; Kid's Corner recipes; seasonal availability of fruits and vegetables) 3) Personalizing the booklet, allowed the WIC personnel to tailor the presentation of the booklet to the food preferences of the client and other household members. 4) of the intervention included the client setting a goal to try a new fruit or a vegetable,	The target populations were mothers (mostly white) having a child enrolled in the WIC program	Not reported	1) Booklets helpful, excellent appearances and Kids' recipes 2) Highly acceptable	1) Short exposure 2) Long food preparation time 3) Fresh fruits and vegetables more expensive than canned /frozen alternatives

	or a recipe from the book				
(Bournemouth University et al. 2004)	Events took place in the community centre Part of the Sure Start Project which brings together early education, childcare, health and family support. The project aims to help families develop healthy eating habits and strengthening families and communities. Multi-choice or single-choice meals were provided once a month, at the end of the Toddler Group sessions. Food was prepared fresh by volunteers and provided parents/carers and their children with a nutritious and healthy meal.	The target populations were families with toddlers	Not reported	Well received by parents and volunteers For parents/carers/grandparents: 1) support of other parents/carers/grandparents 2) sitting /eating together 3) relaxed environment 4) Time out for parents/carers 5) opportunity to socialise 6) potential queries to be answered about bringing up children by talking to someone else For the children: 1) Can see what other children are eating 2) Enjoyed the meals 3) Learning to eat with others/table manners For the families: 1) Eating together at home 2) Trying out new recipes 3) New ideas for healthier eating 4) Parents socialise together away from project 5) Opportunity to attend a short church service at Xmas and Easter	Drop in attendance
(Bruening et al. 1999)	The Child and Adult Care Food Program (CACFP) is a federal food program which reimburses child care	The target populations were child care centres with predominantly black children from low income families	Not reported	Not reported	Not reported

	institutions that serve nutritious food to children				
(Carroll et al. 1996)	An interactive multimedia nutrition education computer application (CD-ROM, speakers, audio unit and touch-screen monitor in kiosks) Components: 1) Introduction to WIC 2) Breastfeeding information 3) Smoking cessation techniques 4) Healthy eating habits 5) Good shopping habits	The target populations were mothers (mostly white) having a child enrolled in the WIC program The WIC is a food and nutrition assistance program for low-income pregnant, breastfeeding and post-partum women, infants and children up to age 5 years. It provides nutrition education, vouchers for supplemental food packages and referrals to other health care and community resources. A standard WIC intervention will include attendance of nutrition education classes once every 2 months and an individual session with a nutritionist once every 6 months.	Not reported	Client acceptance of kiosk use was favourable. 93% of interviewed clients reported positive feelings about using multimedia system to learn. Many nutritionists and aides reported that using this technology has a positive impact; some lack of staff acceptance appeared to limit its use.	Lack of staff acceptance appeared to limit its use
(Childs et al. 1997)	Home visits by health visitors Specific health education information involved: Promotion correct use of breast milk or fortified infant feeds during the 1st baby's 1st year, to	The target populations were Asian families from inner city with new born infants Home visits by health visitors	Not stated	46% completed the study	Understanding of cultural practices and economic constraints Influence of advice from other family members

	encourage good weaning diets containing appropriate intake of iron rich foods and vit C Strategy: Face-to-face Use of audiotapes Relevant language Discussion encouraged Culturally appropriate leaflets 20 families visited during study period to ensure education materials have been received and understood				Group rather than individual focus Involvement of family members
(Dundas et al. 2004)	Delivered at WIC clinics	The target populations were children on the WIC program	Not reported	Not reported	Continuity of nutrition information and reinforcement
(Hammond et al. 1998)	K program took place at kindergarten schools Objectives of K program: Identification of and experiences of food, complementing the developmental stage of most kindergarten-aged children Components of program K: 1). Food introduction - explored with their	The target population was kindergarten children (mean age 5 years), >70% of Canadian/British/English origin	Not reported	Teacher's views: 1).K program viewed positively by teachers 2). The 'Cooking' component was rated as the most important and enjoyable 3). Time constraints 4). Preference to teach nutrition incidentally	Introduced foods not reflective of children's cultural heritage Small no. of introduced foods Children's recall of names of non-introduced foods – deficiency in retrieving 'episodic' memory in children 7 months after the

	hands 2). Cooking- hands-on multi-sensory exploration of the food introduced 3). Journals - describe their experience 4). Stickers and 'I Tried it!' Class Club activities- to encourage dialogue between themselves and their parents At least 8 foods to be introduced				intervention Teachers: Organisational time requirements for the program
(Hindin et al. 2004)	Media literacy nutrition education curriculum Components of 4-week curriculum: 1) Session one: learning about TV food commercials 2) Session two: Analysing food products advertised on TV 3) Session three: Truth in advertising 4) Session four: Talking to your child about TV food commercials	The target populations were parents of children aged 3 to 6 years	Not reported	1) High attendance (incentive of a certificate and $100) 2) Intervention helpful and useful 3) Satisfaction with workshop leader	Payment to participants
(Horodynski et al. 2004)	The 90-minute NEAT lessons delivered by trained paraprofessional nutrition instructors. Classes taught to group of 4-5 participants, using discussion, video, hands-on learning activities, later joined by	The target populations were carers of children aged 1- 3 years, from low-income, rural areas	Not reported	1) Participants enjoyed food preparation, liked the information on food safety and learn about foods and how much to give toddlers, enjoyed meeting new people and having focused time with their kids	Insufficient classes to allow more time for cooking, information and sharing

	toddlers in food tasting, simple food preparation and family eating time.			2) Found most useful: appropriate serving sizes and tasting different foods	
(Horodynski et al. 2005)	Components: 1) 4 weekly group-based (4-5 participants) nutrition lessons (90 mins long) - discussion, videotapes, hands-on activities 2) 18 individually structured activities Children later joined parents in activities: food tasting food preparation and family eating time Reinforcement provided by home visitors over 6 months. This included areas such as childe development, feeding, nutrition, parenting and prolonged toddler feeding, self-regulation and positive toddler-parent feeding interaction	The target populations were low income parents of toddlers aged 11-25 months	Not reported	Well appreciated by the participants – help them to learn ways to better feed their children	Frequency, timing and number of reinforcement activities may need to be improved Staff attrition 'Juggling' with home visits due to vacation, illness and program constraints (e g, completion of mandatory weekly assessment and missing appointments)
(Ilett et al. 2004)	1) Dietary education programme message (Weaning File): Weaning at 4 and 7 months Introduction of a cup at 6 months Food hygiene and storage use of family foods Food preparation such	1) The target population was mothers of Pakistani Muslim origin, with babies aged 13 months 2) Native-speaking link worker	Home-based	1) valued by mothers who are housebound due to caring for young children 2) Link workers did not get full attention of mothers who was always busy with the little children	Influence of grandmothers in shaping opinion and accepting advice on health education

	as pureeing Avoiding salt and sugar healthy eating iron-rich foods 2) Encourage iron consumption and Vit C-rich foods Reduce excessive intake of cow's milk Encourage completion of the course of iron Use of follow-on milk not recommended 3) Where relevant Encourage use of cup for drinking Improve maternal diet Improve mealtime behaviour and dental hygiene Cookery demonstration where appropriate				
(Koelen et al. 2000)	1) Materials developed to transmit the message included fact files, posters, tear-off pads and support materials that could reinforce each other and which intermediaries could use in their communication with parents. 2) The message was 'Bottle it up – take a cup! From 9 months onwards'. These materials, available in	1) The target population was parents of children aged 0 to 4 years, with a specific focus on parents of children aged 9 to 18 months 2) Target groups also included primary intermediary groups (Child Health Clinic teams, day-care centres, playgroup attendants); secondary intermediaries (dental hygienists) and tertiary intermediaries	1) Child Health Clinics 2) Dentists played a more extensive role than anticipated.	1) health professionals changed their attitude in advice towards the switch from bottles to feeding cups 2) About 46% of parents aware of campaign 3) increase 'switch' to feeding cups at 12 months	1) Distribution of materials ineffective 2) Day-care centres, playgroup attendants did not consider health education as part of their task

	Arabic and Turkish, were pre-tested among various target groups to ensure optimal clarity, comprehensibility and eye-catching quality. 3) The campaign was introduced to the intermediaries 9 months before the campaign and at when the campaign was launched. There was a press release for health journals, magazines and newspapers, a press conference at the official start and a commercial for television 4) Slide show on health education available	(Community Youth Dental Service workers, dental hygienists and dentists, health shops and children's hospital wards)			
(McGarvey et al. 2004)	Delivered at clinics The Fit WIC intervention components: 1) increase physical activity 2) monitor mealtime behaviour 3) limit household television viewing 4) drink water instead of sweetened beverages 5) consume 5 fruits or vegetables daily, and 6) increase family activities to promote fitness.	The target populations were WIC parents of children aged 2-4 years (Hispanic participants were overrepresented in the intervention group)	Staff at the intervention site were more efficient in contacting parents for follow-up than were staff at the comparison site, who had to be reminded several times of the importance of contacting parents for follow- up data.	Not reported	Cultural differences in response to preschool child obesity prevention programs

(Rask-Nissila et al. 2000;Rask-Nissila et al. 2002) (Talvia et al. 2004;Talvia et al. 2006)	See Lagstrom 1997 (York Rapid review)				
(Sangster et al. 1999)	Major strategies of GFFC: 1) Assessment of centre's menus with individual feedback to centres 2) Advice on development of policies 3) Workshops for child care staff to improve nutrition knowledge and skills Improvement of training and support for child care cooks 4) Provision of nutritional information for parents 5) Inter-sectoral collaboration with government departments responsible for child care to improve legislation and guidelines relating to food in child care	The target populations were administrators and workers in long day care centres	Not reported	Not reported	Not reported
(Siega-Riz et al. 2004)	The WIC is a food and nutrition assistance program for low-income pregnant, breastfeeding and post-partum women, infants and	The target populations were WIC parents of children aged up to 5 years	Not reported	Not reported	Not reported

	children up to age 5 years. It provides nutrition education, vouchers for supplemental food packages and referrals to other health care and community resources. A standard WIC intervention will include attendance of nutrition education classes once every 2 months and an individual session with a nutritionist once every 6 months.				
(Smith et al. 2004)	Intensive training and support Two link workers were trained by health visitors to be competent to visit clients in their own homes to offer appropriate weaning advice, using discussions, case-studies and role play to cover issues of safe working in the community, confidentiality, accountability, role boundaries, record keeping and communication skills relating to the delivery of the weaning intervention. Monthly meeting and	The target populations were families of Pakistani origin with infants aged up to 3 months	Not reported	Mothers' views on the offering of weaning advice and support from link workers: Overall positive: Health visitors' views: 1) Reservations about the use of 'unqualified' workers 2) May lead to 'losing touch with clients' Link workers' views 1) Independent working 2) Job satisfaction	1) Mothers' cultural beliefs that expect advice should come from a professionally qualified person, either a health visitor or a doctor 2) health professionals' perception of de-skilling

	discussion of issues relating to weaning, also debates and individual mentorship, particularly in debriefing following home visits Reflective learning on home visits encouraged in either English or Urdu Aide memoir at every visit Key weaning message: 1. Food texture - thicker and soft lumps 2. 2-3 meals a day. Breast or formula milk may be reduced 3. Using a cup, including formula milk 4. Use of high chair 5. Ready for finger food? 6. Social aspects of feeding Consent sought from Asian families, involving translation into Urdu and explanation to husbands and family Intervention monthly, delivered at the women's homes until the baby was 12 months old Weaning leaflets in				

	Urdu and English				
(Watt et al. 2006)	Peer support components: 1). Local volunteers trained to provide non-judgmental support and practical assistance on infant feeding, esp. weaning practices 2). Police and safety checks of volunteers 3). Home-based support offered over 9 months till infants 12 months old Volunteers providing peer support (n=27) Peer support structure: 1). Monthly home visits 2). Advice and support offered on: affordability and access to recommended foods, practical support, offering a listening ear 2) Ongoing training, designed to complement the advice provided by health professionals Peer support contents: 1). Encourage and support mothers in breastfeeding 2). Develop mothers' nutritional knowledge on foods and especially fruits (increasing variety of weaning foods etc) 3). Develop mothers'	The target population was mothers of infants aged from 10 weeks to 18 months, living in London Minority ethnic groups: 50% Lone parent: 28% Disadvantaged: 67%	Mean no of visits received by mothers: 5.1	Mothers opinions of intervention: 1) Rated good/excellent: (> 50%) 2) More knowledgeable and confident in following recommendations on infant feeding Volunteers' opinions of intervention: 1) Active nature of training prepared them well for the intervention and was appreciated 2) Gained confidence 3) Needed more support in dealing with women from different cultures whose English is not 'great' 4) Too long a gap between receiving training and active volunteering 5) Challenge in maintaining and arranging appointments with mothers	1) Selection of vit C as primary outcome not ideal as vit C levels are variable in fruits 2) First time mothers should be targeted 3) Group support rather than individual support may be more effective 4) Contamination due to intervention in a community setting

	cooking skills 4). Develop mothers' budgeting skills 5). Provide appropriate information about better access to food 6), Advise on practical ways of introducing and encouraging the child to eat a varied diet 7). Encourage ways of accessing professional support and advice 8). Particular emphasis on selection of appropriate weaning foods, drinks for infants and best options for feeding methods 9). Use of existing leaflets and recipes 10). Monitoring forms to log activities after each visit Training of volunteers: 1). A volunteer coordinator to provide support and assistance, to match volunteers to mothers, accompanying volunteers at first home visits 2). Support volunteers on an ongoing basis 3). Regular group meetings for continued training and sharing of experiences 4). Administration of travel and child care				

	expenses 5). Collating information from monitoring forms				
(Williams et al. 2002)	Healthy Start: Food service modification + nutritional education on CVD risk reduction in preschool children Aims: 1) to increase children's health awareness and knowledge 2) to provide children with ample opportunity to practice positive health behaviours through stories and poems, games, crafts and creative play, hands-on demonstrations, interactive discussions and investigative observations Food service modification: 1) One-day training of cooks in menu planning, recipe development, food purchasing and preparation 2) Gradual increased offering of fruits and vegetables, breads, grains and decreased total and saturated fat content in school meals due to alteration in food preparation techniques	The target populations were preschoolers aged under 5	Duration 2 years	Not reported	Not reported

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Appendix A – Search Strategy

A. Systematic search: strategy (PubMed and SIGLE [Grey Literature])

1. INFANT/
2. infan$.tw.
3. CHILD, PRESCHOOL/
4. (baby or babies).tw.
5. (child$ adj5 pre?school).tw.
6. toddler$.tw.
7. or/1-6
8. NUTRITION/
9. CHILD NUTRITION/
10. INFANT NUTRITION/
11. NUTRITIONAL REQUIREMENTS/
12. nutrition$.tw.
13. or/8-12
14. exp DIET/
15. exp FOOD/
16. (fruit$ or vegetable$).tw.
17. FOOD HABITS/
18. FOOD PREFERENCES/
19. SODIUM, DIETARY/
20. (salt or sugar) adj3 reduc$).tw.
21. IRON, DIETARY/
22. exp DIETARY SUPPLEMENTS/
23. (vitamin$ or mineral$) adj3 supplement$).tw.
24. exp VITAMINS/
25. exp TRACE ELEMENTS/
26. or/ 14-25
27. exp FOOD HYPERSENSITIVITY/
28. DENTAL CARIES/

29. "ROOT CARIES"/
30. TOOTH EROSION/
31. TOOTH DEMINERALIZATION/
32. TOOTH LOSS/
33. CARIOGENIC AGENTS/
34. exp CARIOSTATIC AGENTS/
35. or/ 28-34
36. BREASTFEEDING/
37. WEANING/
38. or/36-37
39. or/ 13,26-27,35,38
40. and/ 7,39
41. PUBLIC HEALTH/
42. PROGRAM DEVELOPMENT/
43. EDUCATION/
44. PATIENT EDUCATION/
45. HEALTH EDUCATION/
46. HEALTH PROMOTION/
47. COUNSELING/
48. COMMUNICATION/
49. MASS MEDIA/
50. MULTIMEDIA/
51. TELEVISION/
52. RADIO/
53. AUDIOVISUAL AIDS/
54. CD-ROM/
55. ADVERTISING/
56. PAMPHLETS/
57. exp LEGISLATION/
58. or/ 41-56
59. and/ 40,58
60. limit 59 to yr="1990 - 2006"
61. limit 60 to english language

B. Snowball search: mixed strategy (non-systematic):

- web search [websites of organisation's websites such as DH, HEA, MAFF, FCA, DEFRA, WHO, UNICEF]
- hand/document search from reference lists of included studies,
- papers (published and unpublished) submitted by CPHE team and PDG

C. Checked studies excluded by York team for possible inclusion

Appendix B – Excluded Studies List

Excluded studies	***Reasons for exclusion***
1. Chapter 6. Nutrition education for pregnant women and caretakers of infants. *Journal of Nutrition Education* 1995; 27: (6) 329-38. **(29812)**	Considered by York Team: breastfeeding
2. Chapter 3. Nutrition education for preschool children. *Journal of Nutrition Education* 1995; 27:(6)291-7. **(3714)**	Review: some studies were since assessed individually
3. The prevention and treatment of childhood obesity. *Effective Health Care* 2002; 7:(6) 1-11. **(29776)**	Considered by York Team obesity
4. Adair PM, Pine CM, Burnside G *et al.* Familial and cultural perceptions and beliefs of oral hygiene and dietary practices among ethnically and socio-economicall diverse groups. *Community Dental Health* 2004; 21: (1 Suppl) 102-11. **(29814)**	Considered by York Team: dental caries/oral health
5. Alarcon PA, Lin LH, Noche M, Jr. *et al.* Effect of oral supplementation on catch-up growth in picky eaters. *Clinical Pediatrics* 2003; 42: (3)209-17. **(29765)**	Study conducted in developing countries (the Philippines)
6. Alsada LH, Sigal MJ, Limeback H *et al.* Development and testing of an audio-visual aid for improving infant oral health through primary caregiver education. *Journal (Canadian Dental Association)* 2005;	Considered by York Team: dental caries/oral health

71:(4)241-241h. **(29815)**	
7. Bader JD, Rozier RG, Lohr KN *et al.* Physicians' roles in preventing dental caries in preschool children: a summary of the evidence for the U.S. Preventive Services Task Force. *American Journal of Preventive Medicine* 2004; 26: (4)315-25. **(29816)**	Considered by York Team: dental caries/oral health
8. Beake S, McCourt C, Rowan C *et al.* Evaluation of the use of health care assistants to support disadvantaged women breastfeeding in the community. *Maternal and Child Nutrition* 2005; 1: (1) 32-43. **(29818)**	Considered by York Team: breastfeeding
9. Benis MM. Are pacifiers associated with early weaning from breastfeeding? *Advances in neonatal care: official journal of the National Association of Neonatal Nurses* 2002; 2: (5)259-66. **(29819)**	Population ≥ 3 months
10. Bish B, Regis K, and Gottesman MM. Patient education. Educating parents about portion sizes for preschoolers. *Journal of Pediatric Health Care* 2005; 19 :(1) 54-9. **(29822)**	Non-intervention study
11. Black MM and Teti LO. Promoting mealtime communication between adolescent mothers and their infants through videotape. *Pediatrics* 1997; 99: (3) 432-7. **(29823)**	Related to parenting issues
12. Blair Y, Macpherson LM, McCall DR *et al.* Glasgow nursery-based caries experience,	Considered by York Team:

before and after a community development-based oral health programme's implementation. *Community Dental Health* 2004; 21: (4) 291-8. **(29824)**	dental caries/oral health
13. Bleakney GM and McErlain S. Infant feeding guidelines: An evaluation of their effect on health professionals' knowledge and attitudes. *Journal of Human Nutrition and Dietetics* 1996; 9: (6)437-50. **(29825)**	Considered by York Team: breastfeeding
14. Blinkhorn AS, Gratrix D, Holloway PJ *et al.* A cluster randomised, controlled trial of the value of dental health educators in general dental practice. [see comment]. *British Dental Journal* 2003; 195: (7) 395-400. **(29329)**	Considered by York Team: dental caries/oral health
15. Borzekowski DLG and Robinson TN. The 30-second effect: an experiment revealing the impact of television commercials on food preferences of preschoolers. *Journal of the American Dietetic Association* 2001; 101: (1) 42-6. **(29826)**	Study included in Hastings 2003
16. Bourcier E, Bowen DJ, Meischke H *et al.* Evaluation of strategies used by family food preparers to influence healthy eating. *Appetite* 2003; 41: (3) 265-72. **(29658)**	Populations aged 5-12 years; 13-17 years
17. Bruerd B and Jones C. Preventing baby bottle tooth decay: eight-year results. *Public Health Reports* 1996; 111: (1)63-5**. (29827)**	Considered by York Team: dental caries/oral health
18. Carruth BR and Skinner JD. Mothers' sources of information about feeding their	Non-intervention study

children ages 2 months to 54 months. *Journal of Nutrition Education* 2001; 33: (3) 143-7. **(29830)**	
19. Centre for Reviews and Dissemination. Effectiveness of interventions to promote healthy eating in preschool children aged 1 to 5 years: a review (Structured abstract). *Database of Abstracts of Reviews of Effects* 2006; (2). **(29833)**	Already included by York Team
20. Centre for Reviews and Dissemination. Family-based interventions for childhood obesity: a review (Provisional record). *Database of Abstracts of Reviews of Effects* 2006; (2). **(29832)**	Already included by York Team
21. Centre for Reviews and Dissemination. The effectiveness of community interventions to increase fruit and vegetable consumption in people four years of age and older (Structured abstract). *Database of Abstracts of Reviews of Effects* 2006; (2). **(29831)**	Already included by York Team
22. Charlton JS and Williams HC. Giving early solids to infants: May be harmful [7]. *British Medical Journal* 1993; 307: (6901) 444. **(29834)**	Non-intervention study
23. Chestnutt IG, Murdoch C, and Robson KF. Parents and carers' choice of drinks for infants and toddlers, in areas of social and economic disadvantage. *Community Dental Health* 2003; 20: (3) 139-45. **(29835)**	Non-intervention study

24. Chomitz VR, Collins J, Kim J *et al.* Promoting healthy weight among elementary school children via a health report card approach. *Archives of Pediatrics and Adolescent Medicine* 2003; 157: (8) 765-72. **(29659)**	Population aged ≥5 years
25. Cockroft JE, Durkin M, Masding C *et al.* Fruit and vegetable intakes in a sample of pre-school children participating in the 'Five for All' project in Bradford. *Public Health Nutrition* 2005; 8: (7) 861-9. **(29836)**	Non-intervention study
26. Cooke LJ, Wardle J, Gibson EL *et al.* Demographic, familial and trait predictors of fruit and vegetable consumption by pre-school children. [see comment]. *Public Health Nutrition* 2004; 7 :(2) 295-302. **(29838)**	Non-intervention study
27. Coutts A. Nutrition and the life cycle 2: infancy and weaning. [29 refs]. *British Journal of Nursing* 2208; 9: (21) 2205-6. **(29839)**	Non-intervention study
28. Daniels LA, Franco B, and McWhinnie J. An assessment of the potential of Family Day Care as a nutrition promotion setting in South Australia. *Nutrition and Dietetics: Journal of the Dietitians Association of Australia* 2003; 60: (1)30-7**. (29844)**	Non-intervention study
29. Davies GM, Worthington HV, Ellwood RP *et al.* An assessment of the cost effectiveness of a postal toothpaste programme to prevent caries among five-year-old children in the North West of England. *Community*	Considered by York Team: dental caries/oral health

Dental Health 2003; 20:(4)207-10. **(29338)**	
30. Davies GM, Duxbury JT, Boothman NJ *et al.* A staged intervention dental health promotion programme to reduce early childhood caries. *Community Dental Health* 2005; 22: (2) 118-22. **(29845)**	Considered by York Team: dental caries/oral health
31. Dixon LB, McKenzie J, Shannon BM *et al.* The effect of changes in dietary fat on the food group and nutrient intake of 4- to 10-year-old children. *Pediatrics* 1997; 100: (5) 863-72. **(29846)**	Population aged ≥5 years
32. Ekman A and Persson B. Effect of early dental health education for Finnish immigrant families. *Swedish Dental Journal* 1990; 14: (3) 143-51. **(29849)**	Considered by York Team: dental caries/oral health
33. Fawzi WW, Herrera MG, Nestel P *et al.* A longitudinal study of prolonged breastfeeding in relation to child undernutrition. *International Journal of Epidemiology* 1998; 27: (2) 255-60. **(29850)**	Considered by York Team: breastfeeding
34. Fiore P, Castagnola E, and Merolla R. Effect of nutritional intervention on physical growth in children at risk of malnutrition. *International Pediatrics* 2002; 17: (3)179-83. **(29851)**	Sick children
35. Fitzgibbon ML, Stolley MR, Dyer AR *et al.* A community-based obesity prevention program for minority children: rationale and study design for Hip-Hop to Health Jr.	Non-intervention study

Preventive Medicine 2002; 34: (2) 289-97. **(29852)**	
36. Flynn MAT, Hall K, Noack A *et al.* Promotion of healthy weights at preschool public health vaccination clinics in Calgary: An obesity surveillance program. *Canadian Journal of Public Health* 2005; Revue Canadienne de Sante Publique. 96: (6) 421-6. **(29853)**	Non-intervention study
37. Freeman R, Oliver M, Bunting G *et al.* Addressing children's oral health inequalities in Northern Ireland: a research-practice-community partnership initiative. *Public Health Reports* 2001; 116: (6) 617-25. **(29854)**	Considered by York Team: dental caries/oral health
38. Fuller C, Keller L, Olson J *et al.* Patient education. Helping preschoolers become healthy eaters. *Journal of Pediatric Health Care* 2005; 19: (3)178-82. **(29855)**	Non-intervention study
39. Gibbons K, Graham V, Marraffa C *et al.* 'Filling the gap' -- children aged between two and four years: sources of nutrition information used by families and childcare staff. *Australian Journal of Nutrition and Dietetics* 2000; 57: (4) 208-14. **(29856)**	Non-intervention study
40. Gijsbers B, Mesters I, Knottnerus JA *et al.* Factors influencing breastfeeding practices and postponement of solid food to prevent allergic disease in high-risk children: Results from an explorative study. *Patient Education and Counseling* 2005; 57: (1) 15-	Considered by York Team: breastfeeding

21. **(29857)**	
41. Giovannini M, Riva E, Banderali G *et al.* Feeding practices of infants through the first year of life in Italy. *Acta Paediatrica* 2004; 93: (4) 492-7. **(29858)**	Considered by York Team: breastfeeding
42. Graham V, Gibbons K, Marraffa C *et al.* 'Filling the gap' -- children aged two years or less: sources of nutrition information used by families and maternal and child health nurses. *Australian Journal of Nutrition and Dietetics* 1999; 56: (4) 209-14. **(29859)**	Non-intervention study
43. Hackett AF, Gibbon M, and Mercer A. An evaluation of a healthy eating project for the promotion of dental health. *International Journal of Health Promotion and Education* 2003; 41: (3) 84-90. **(29860)**	Considered by York Team: dental caries/oral health
44. Hamilton FA, Davis KE, and Blinkhorn AS. An oral health promotion programme for nursing caries. *International Journal of Paediatric Dentistry* 1999; 9: (3) 195-200. **(29861)**	Considered by York Team: dental caries/oral health
45. Hammer LD, Bryson S, and Agras WS. Development of feeding practices during the first 5 years of life. *Archives of Pediatrics and Adolescent Medicine* 1999; 153: (2)189-94. **(29862)**	Patterns of feeding: Non-intervention study
46. Harrison RL and Wong T. An oral health promotion program for an urban minority population of preschool children. *Community Dentistry and Oral*	Considered by York Team: dental caries/oral health

Epidemiology 2003; 31: (5) 392-9. **(29863)**	
47. Heino T, Kallio K, Jokinen E *et al.* Sodium intake of 1 to 5-year-old children: the STRIP project. The Special Turku Coronary Risk Factor Intervention Project. *Acta paediatrica (Oslo, Norway:* 2000; 1992) 89: (4) 406-10. **(29738)**	Considered by York Team: STRIP
48. Horne PJ, Tapper K, Lowe CF *et al.* Increasing children's fruit and vegetable consumption: a peer-modelling and rewards-based intervention. *European Journal of Clinical Nutrition* 2004; 58: (12) 1649-60. **(29654)**	Population aged 5-7 years
49. Huon GF, Wardle J, and Szabo M. Improving children's eating patterns: intervention programs and underlying principles. *Australian Journal of Nutrition and Dietetics* 1999; 56: (3)156-65. **(29868)**	Non-intervention study
50. Khakaoo GA and Lack G. Introduction of solids to the infant diet. *Archives of Disease in Childhood* 2004; 89: (4) 295. **(29359)**	Non-intervention study
51. Knai C, Pomerleau J, Lock K *et al.* Getting children to eat more fruit and vegetables: a systematic review. [56 refs]. *Preventive Medicine* 2006; 42: (2) 85-95. **(29871)**	Considered by York Team: fruit and vegetables
52. Lanigan JA, Bishop JA, Kimber AC *et al.* Systematic review concerning the age of introduction of complementary foods to the healthy full-term infant. *European Journal of Clinical Nutrition* 2001; 55: (5) 309-20.	Rejected by PDG: new UK/WHO policy guidance

(29770)	
53. Lapinleimu H, Jokinen E, Myyrinmaa A *et al.* Individualized dietary counselling of families: serum cholesterol concentration and growth of children aged 7-13 months. *Acta paediatrica (Oslo, Norway:* 1994; 1992) 83: (4) 383-8. **(29874)**	Considered by York Team: STRIP
54. Lawrence HP, Romanetz M, Rutherford L *et al.* Effects of a community-based prenatal nutrition program on the oral health of Aboriginal preschool children in northern Ontario. *Probe* 2004; 38: (4) 172-82. **(29875)**	Considered by York Team: dental caries/oral health
55. Lewis J and Pollard C. Use of vocational education and training to increase the capacity of industry to improve nutritional health. *Health Promotion Journal of Australia* 2002; 13: (3) 197-200. **(29876)**	Non-intervention study: evaluation of course conternt
56. Lowe CF, Horne PJ, Tapper K *et al.* Effects of a peer modelling and rewards-based intervention to increase fruit and vegetable consumption in children. *European Journal of Clinical Nutrition* 2004; 58: (3) 510-22. **(29878)**	Considered by York Team: fruit and vegetables
57. More J. Toddler diets: who gives advice and where do they get their information and training? *The Journal of Family Health Care* 2005; 15: (4) 105-6. **(29881)**	Non-intervention study
58. Naven LM and Macpherson LMD. Process evaluation of a Scottish pre-fives toothpaste	Considered by York Team:

distribution programme. *International Journal of Health Promotion and Education* 2006; 44: (2) 71-7. **(29882)**	dental caries/oral health
59. Newell SA, Huddy AD, Adams JK *et al.* The Tooty Fruity Vegie project: Changing knowledge and attitudes about fruits and vegetables. *Australian and New Zealand Journal of Public Health* 2004; 28: (3) 288-95. **(29883)**	Population aged ≥5 years
60. Nix ST, D'Agostino IC, Strobino BA *et al.* Developing a computer-assisted health knowledge quiz for preschool children. *Journal of School Health* 1999; 69: (1) 9-11. **(29884)**	Non-intervention study: validity testing
61. O'Neil M and Clarkson H. "Reaching families with young children": a community dental health project for preventing early childhood caries. *Probe* 2002; 36: (4) 145-8. **(29885)**	Considered by York Team: dental caries/oral health
62. Passehl B, McCarroll C, Buechner J *et al.* Preventing childhood obesity: establishing healthy lifestyle habits in the preschool years. *Journal of Pediatric Health Care* 2004; 18: (6) 315-9. **(29886)**	Non-intervention study
63. Phillips F. Nutrition and pre-school children. *Nutrition Bulletin* 2004; 29: (1) 64-6. **(29887)**	Non-intervention study
64. Pine CM, McGoldrick PM, Burnside G *et al.* An intervention programme to establish regular toothbrushing: understanding	Considered by York Team: dental caries/oral health

parents' beliefs and motivating children. *International Dental Journal* 2000; Suppl Creating A Successful: 312-23. **(29888)**	
65. Piwoz EG, Huffman SL, and Quinn VJ. Promotion and advocacy for improved complementary feeding: can we apply the lessons learned from breastfeeding?[see comment][erratum appears in Food Nutr Bull. 2003 Jun;24(2):239]. [72 refs]. *Food and Nutrition Bulletin* 2003; 24: (1) 29-44. **(29889)**	Non-intervention study
66. Pollard CM, Lewis JM, and Miller MR. Food service in long day care centres--an opportunity for public health intervention. *Australian and New Zealand Journal of Public Health* 1999; 23: (6) 606-10. **(29890)**	Populations: caterers of daycare centres
67. Reed DB. Focus groups identify desirable features of nutrition programs for low-income mothers of preschool children. *Journal of the American Dietetic Association* 1996; 96: (5) 501-3. **(29893)**	Already included by York team
68. Reilly JJ and Wells JC. Duration of exclusive breast-feeding: introduction of complementary feeding may be necessary before 6 months of age. [25 refs]. *British Journal of Nutrition* 2005; 94 :(6)869-72. **(29894)**	Considered by York Team: breastfeeding
69. Sakashita R, Inoue N, and Kamegai T. From milk to solids: A reference standard for the transitional eating process in infants and preschool children in Japan. *European Journal of Clinical Nutrition* 2004; 58:	Non-intervention study

(4)643-53. **(29896)**	
70. Salo P, Viikari J, Hamalainen M *et al.* Serum cholesterol ester fatty acids in 7- and 13-month-old children in a prospective randomized trial of a low-saturated fat, low-cholesterol diet: the STRIP baby project. Special Turku coronary Risk factor Intervention Project for children. *Acta paediatrica (Oslo, Norway:* 1999; 1992) 88:(5)505-12. **(29897)**	Considered by York Team: STRIP
71. Salo P, Seppanen-Laakso T, Laakso I *et al.* Low-saturated fat, low-cholesterol diet in 3-year-old children: effect on intake and composition of trans fatty acids and other fatty acids in serum phospholipid fraction-The STRIP study. Special Turku coronary Risk factor Intervention Project for children.[see comment]. *Journal of Pediatrics* 2000; 136 :(1) 46-52. **(29898)**	Considered by York Team: STRIP
72. SanGiovanni JP, Berkey CS, Dwyer JT *et al.* Dietary essential fatty acids, long-chain polyunsaturated fatty acids, and visual resolution acuity in healthy fullterm infants: A systematic review. *Early Human Development* 2000; 57: (3) 165-88. **(29899)**	Non-intervention study
73. Schoetzau A, Gehring U, and Wichmann H-E. Prospective cohort studies using hydrolysed formulas for allergy prevention in atopy-prone newborns: A systematic review. *European Journal of Pediatrics* 2001; 160: (6) 323-32. **(29902)**	Considered by York Team: allergy
74. Schoetzau A, Gehring U, Franke K *et al.*	Considered by York Team:

Maternal compliance with nutritional recommendations in an allergy preventive programme. *Archives of Disease in Childhood* 2002; 86: (3) 180-4. **(29903)**	allergy
75. Smith SC and Kalina L. Evaluation of the Kids' Shop Smart tour. *Canadian Journal of Dietetic Practice and Research* 2004; 65: (1) 10-4. **(29905)**	Populations aged ≥5 years
76. Taneja S, Bhandari N, Bahl R *et al.* Impact of zinc supplementation on mental and psychomotor scores of children aged 12 to 18 months: A randomized, double-blind trial. *Journal of Pediatrics* 2005; 146: (4) 506-11. **(29908)**	Study conducted in developing country: India
77. Tuttle CR and Dewey KG. Determinants of infant feeding choices among Southeast Asian immigrants in northern California. *Journal of the American Dietetic Association* 1994; 94: (3) 282-6. **(29909)**	Non-intervention study
78. Valaitis R, Hesch R, Passarelli C *et al.* A systematic review of the relationship between breastfeeding and early childhood caries. *Canadian Journal of Public Health* 2000; 91: (6) 411-7. **(29910)**	Considered by York Team: breast feeding and oral health
79. Verrall T and Gray-Donald K. Impact of a food-based approach to improve iron nutrition of at-risk infants in northern Canada. *Preventive Medicine* 2005; 40: (6) 896-903. **(29911)**	Sick children at risk

80. Verrall T, Napash L, Leclerc L *et al.* Community-based communication strategies to promote infant iron nutrition in northern Canada. *International Journal of Circumpolar Health* 2006; 65: (1) 65-78. **(29912)**	Sick children: at risk of IDA
81. Wardle J, Cooke LJ, Gibson EL *et al.* Increasing children's acceptance of vegetables; a randomized trial of parent-led exposure. *Appetite* 2003; 40: (2) 155-62. **(29913)**	Considered by York Team: fruits and vegetables
82. Warren JM, Henry CJ, Lightowler HJ *et al.* Evaluation of a pilot school programme aimed at the prevention of obesity in children. *Health Promotion International* 2003; 18: (4) 287-96. **(29782)**	Populations aged 5-7 years
83. Weaver M, Poehlitz M, and Hutchison S. 5 a day for low-income families: evaluation of an advertising campaign and cooking events. *Journal of Nutrition Education* 1999; 31: (3) 161-9. **(29915)**	Parents of children: age unknown
84. Weinstein P, Harrison R, and Benton T. Motivating parents to prevent caries in their young children: one-year findings. *Journal of the American Dental Association: JADA* 2004; 135: (6) 731-8. **(29916)**	Considered by York Team: dental caries/oral health
85. Weyant RJ. Seven systematic reviews confirm topical fluoride therapy is effective in preventing dental caries. *Journal of Evidence-Based Dental Practice* 2004; 4: (2)129-35. **(29917)**	Considered by York Team: dental caries/oral health

86. Williams CL, Squillace MM, Bollella MC *et al.* Healthy Start: a comprehensive health education program for preschool children. *Preventive Medicine* 1998; 27: (2) 216-23. **(29919)**	Non-intervention study
87. Williams PL, Innis SM, Vogel AMP *et al.* Factors influencing infant feeding practices of mothers in Vancouver. *Canadian Journal of Public Health* 1999; Revue Canadienne de Sante Publique. 90: (2) 114-9. **(29921)**	Non-intervention study
88. Winkler G, Noller B, Waibel S *et al.* BeKi--an initiative for nutrition education in childrenin the federal state of Baden-Wurttemberg: description, experiences, and considerations for an evaluation framework. *Sozial- und Praventivmedizin* 2005; 50:(3)151-60. **(29922)**	Non-intervention study
89. Ziegler P, Hanson C, Ponza M *et al.* Feeding Infants and Toddlers Study: meal and snack intakes of Hispanic and non-Hispanic infants and toddlers. *Journal of the American Dietetic Association* 2006; 106: (1) Supplement-23. **(29923)**	Non-intervention study

Preschoolers supplementary review: excluded studies list from grey literature search

Reference List

Excluded studies	***Reasons for exclusion***
1. Carlisle D. Five-a-day. *Health Development Today* 2003; (13) 24-6. **(29787)**	Not intervention study
2. Carpenter M, Noguera A, University of Warwick *et al.* The picture emerging from the puzzle; the third and final healthy Foleshill evaluation report. 2004. **(5060)**	Reference only
3. Warren JM, Henry CJK, Lightowler HJ *et al.* Evaluation of a pilot school programme aimed at the prevention of obesity in children. *Health Promotion International* 2003; 18: (4) 287-96. **(29782)**	Considered by York team: obesity

Additional studies suggested by stakeholders

Reference List

Excluded studies	***Reasons for exclusion***
Hakanen M et al 'Development of overweight in an atherosclerosis prevention trial starting in early childhood. The STRIP study' Int J Obesity 2006 30: 618 – 626.	The study was appraised but was excluded. The PDG felt that this study was inappropriate in this instance as it advised a much lower fat intake than is currently recommended to children under 5 years of age in the UK.
Walravens PA et al 'Linear Growth of low income preschool children receiving a zinc supplement' Am J Clin Nutr 1983; 38: 195-9	Published pre-1990. A more recent paper by Walravens (1992) included.
Moy RJD 'Prevalence, consequences and prevention of childhood nutritional iron deficiency: a child public health perspective' Clin Lab Haem 2006, 28:291-298	Non systematic review
Idjradinata P, Watkins WE, Pollitt E 'Adverse effect of iron supplementation on weight gain of iron replete young children' Lancet 1993; 343: 1252-5	Outside the remit of the review (based in a developing country (Indonesia)).
Engelmann MDM et al Meat Intake and Iron Status in Late Infancy: An intervention study' J Paed Gastro & Nutr 1997; 26: 26-33.	Outside remit of supplementary review considers iron content of meat per se)

Additional studies removed after discussion with PDG – outside remit or too poor quality

Reference List

Excluded studies	***Section removed from and reason for exclusion***
Savage, S. H., Reilly, J. J., Edwards, C. A., & Durnin, J. V. G. 1998, "Weaning practice in the Glasgow longitudinal infant growth study", *Archives of Disease in Childhood*, 79(2) pp.153-156	Carers beliefs – poor quality
McDougall, P. 2003, "Weaning: parents' perceptions and practices", *Community Practitioner*, 76(1) pp.25-28	Carers beliefs – poor quality
Sarwar, T. 2002, "Infant feeding practices of Pakistani mothers in England and Pakistan", *Journal of Human Nutrition and Dietetics*, 15(6) pp.419-428	Carers beliefs – poor quality
Rote, S. 1996, "Traditional and modern Asian weaning patterns in Britain", *British Journal of Community Health Nursing*, 1(2) pp.81-86	Carers beliefs – poor quality
Crocetti, M., Dudas, R., & Krugman, S. 2004, "Parental beliefs and practices regarding early introduction of solid foods to their children", *Clinical*	Carer's beliefs – non UK qualitative

Pediatrics, 43(6) pp.541-547	
Kwavnick, B. S., Reid, D. J., Joffres, M. R., & Guernsey, J. R. 1999, "Infant feeding practices in Ottawa-Carleton: the introduction of solid foods", *Canadian Journal of Public Health*, 90(6) pp.403-407	Carer's beliefs – non UK qualitative
Bronner, Y. L., Gross, S. M., Caulfield, L., Bentley, M. E., Kessler, L., Jensen, J., Weathers, B., & Paige, D. M. 1999, "Early introduction of solid foods among urban African-American participants in WIC.", *Journal of the American Dietetic Association*, 99(4) pp.457-461	Carer's beliefs – non UK qualitative
Ford, R. P., Schluter, P. J., & Mitchell, E. A. 1995, "Factors associated with the age of introduction of solids into the diet of New Zealand infants. New Zealand Cot Death Study Group", *Journal of Paediatrics and Child Health*, 31(5) pp.469-472	Carer's beliefs – non UK qualitative
Heinig, M. J., Follett, J. R., Ishii, K. D., Kavanagh-Prochaska, K., Cohen, R., & Panchula, J. 2006b, "Barriers to compliance with infant-feeding recommendations among low-income women", *Journal of Human Lactation*, 22(1) pp.27-38	Carer's beliefs – non UK qualitative

Baughcum, A. E., Burklow, K. A., Deeks, C. M., Powers, S. W., & Whitaker, R. C. 1998, "Maternal feeding practices and childhood obesity: A focus group study of low-income mothers", *Archives of Pediatrics and Adolescent Medicine*, 152(10) pp.1010-1014	Carer's beliefs – non UK qualitative
Bentley, M., Gavin, L., Black, M. M., & Teti, L. 1999, "Infant feeding practices of low-income, African-American, adolescent mothers: an ecological, multigenerational perspective", *Social Science and Medicine*, 49(8) pp.1085-1100	Carer's beliefs – non UK qualitative
Crawford, P. B., Gosliner, W., Anderson, C., Strode, P., Becerra-Jones, Y., Samuels, S., Carroll, A. M., & Ritchie, L. D. 2004, "Counseling Latina mothers of preschool children about weight issues: suggestions for a new framework", *Journal of the American Dietetic Association*, 104(3) pp.387-394	Carer's beliefs – non UK qualitative
Black, M. M., Dubowitz, H., Hutcheson, J., Berenson-Howard, J., & Starr, R. H., Jr. 1995, "A randomized clinical trial of home intervention for children with failure to thrive", *Pediatrics*, 95(6) pp.807-814	Failure to thrive outside remit

Wright, C. M., Callum, J., Birks, E., & Jarvis, S. 1998, "Effect of community based management in failure to thrive: randomised controlled trial", *British Medical Journal*, 317(7158) pp.571-574	Failure to thrive outside remit
Raynor, P., Rudolf, M. C., Cooper, K., Marchant, P., & Cottrell, D. 1999, "A randomised controlled trial of specialist health visitor intervention for failure to thrive", *Archives of Disease in Childhood*, 80(6) pp.500-506	Failure to thrive outside remit
Damron, D., Langenberg, P., Anliker, J., Ballesteros, M., Feldman, R., & Havas, S. 1999, "Factors associated with attendance in a voluntary nutrition education program.[see comment]", *American Journal of Health Promotion*, 13(5) pp.268-275	Barriers to nutritional health – poor quality and non UK
White, J. 2003, "Barriers to eating 'five-a-day' fruit and vegetables", *Community Practitioner*, 76(10) pp.377-380	Barriers to nutritional health – poor quality
Edward, H. G. & Evers, S. 2001, "Benefits and barriers associated with participation in food programs in three low-income Ontario communities", *Canadian Journal of Dietetic Practice and Research*, 62(2) pp.76-81	Barriers to nutritional health – poor quality and non UK