NICE Maternal and Child Nutrition programme

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

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A review prepared for NICE by:

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A 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 was also commissioned by NICE. This supplementary review was conducted by the National Collaborating Centre for Women's and Children's Health and should be read in conjunction with this review.

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1. Executive Summary

A National Diet and Nutrition Survey (NDNS) conducted in 1994, found that 16% of 1.5 to 4.5 year olds in Britain ate more than the daily recommended intake of salt and sugar, and they did not have enough fruit, vegetable and iron rich foods (Gregory et al. 1995). In the sample of over 1,500 children, 16% were anaemic and 17% had active tooth decay (Gregory et al. 1995; Hinds et al. 1995). A survey (ALSPAC) of 3 year old children in the South West of England in 1996 found that their diets were adequate in most nutrients (Emmett et al. 2001). Observed differences in intake between ASLPAC and NDNS pre-schoolers are probably due to socio-economic differences. This indicates the need to focus interventions at socially disadvantaged groups.

Pre-schoolers' diets need to improve not only for the sake of their current nutritional status but also to reduce their chances of developing obesity and chronic non-communicable diseases in later life.

Factors influencing healthy eating in young children are familial factors, location, and the nature of foods available (Gregory et al. 1995). Food preference, developed during the early years and strongly influenced by family, is an important determinant of healthy eating in young children. However, the media, particularly television, can overshadow family influences. These factors need to be taken into consideration when planning and implementing interventions designed to encourage healthy eating.

1.1. Review question

What public health interventions delivered in home and community settings are effective in improving nutrition-related health and well-being among 2-5 year old children?

1.2. Key questions

This rapid review sought to answer five key questions:

1) What is the effectiveness of public health interventions delivered at home, in nurseries, playschools, crèches and other pre-school settings that aim to promote healthy eating (i.e. increasing fruit and vegetable intake, reducing excess salt intake, and reducing the intake of artificially sweetened soft drinks and chocolates/sweets) in pre-school children?
2) What interventions effectively promote the uptake of recommended vitamin and micronutrient supplements?
3) What is the effectiveness of dietary strategies that aim to reduce the risk of food allergies and intolerance, and the effectiveness of interventions that promote this advice?
4) What is the effectiveness of interventions that aim to prevent diet-related dental caries, tooth loss and dental erosion in pre-school children?
5) What is the effectiveness of dietary strategies that aim to increase the intake of iron rich foods and reduce the rate of iron deficiency anaemia among pre-schoolers?

The search was conducted in April 2006 using a stepped approach. Initially, a worldwide search was conducted to identify potentially relevant systematic reviews

from 1995 onwards, followed by randomised controlled trials from 1990 onwards conducted in developed country settings, and other study types conducted in the UK and published from 1990 onwards. A total of 9544 citations were independently screened by two reviewers, and full paper copies of 43 systematic reviews, 55 randomised controlled trials and twelve UK studies of any type were obtained and also independently assessed. In total, 16 studies met the inclusion criteria (eight SRs and eight RCTs). There were a total of six corroborative UK studies included in the review (reported in seven papers).

Five systematic reviews (Ciliska 1999 (2+), Contento 1995 (2-), Elkan 2000 (2+), Tedstone 1998 (2++), Thomas 2003 (2+)) and six RCTs (Bannon and Schwartz 2006 (1-), Blom-Hoffman 2004 (1-), Cottrell 2005 (1-), Lagstrom 1997 (1-), Lumeng and Hillman 2007 (1-), Wardle 2003 (1+)) examined the effectiveness of strategies to promote healthy eating in pre-schoolers. The SR by Tedstone et al. (1998) was the most relevant as it covered both the age-group and interventions of interest, although it addressed the same education-type interventions for children, parents or day-care staff as Ciliska et al. (1999) and Contento et al. (1995). There are some overlaps in the three reviews.

Five of the studies in the review by Ciliska et al. (1999), all graded of moderate quality by the reviewer, were relevant to children aged less than 5 years. Four of the studies (2 RCTs (Cox 1996, Havas 1998), a non-randomised CT (Del Tredici 1988) and a cohort study (Koblinsky 1992)) evaluated interventions for low-income mothers of young children (all over 4 years) delivered by paraprofessionals and/or peer supporters over a period of 3-6 months. These included newsletters, workshops, demonstrations, hands-on activities, small group discussions and home visits and covered food preparation, healthy food choices, changing cooking styles to decrease fat intake and increase fruit and vegetable intake, meal planning and food shopping skills. The interventions were successful in increasing family intake of fruit and vegetables. A cohort study of schoolchildren (Graves 1982; Shannon 1982) aged from kindergarten (under 5 years) to 12 years found that a 9 week nutritional curriculum with school cafeteria posters and activity sheets for children gave a significant increase in children's intake of specific vegetables. Successful interventions were tailored to the existing knowledge, skills and family resources of participants, gave clear messages, were intensive and longer and incorporated behavioural theories and had a greater effect when baseline nutritional knowledge was low.

The (2-) SR by Contento et al. (1995) included 23 randomised and non-randomised studies (all in the US) that evaluated the effectiveness of nutritional education (often to parents) for preschool children (from two years to approximately five years of age). Most of the studies of nutritional education were based on information dissemination or the knowledge-attitude-behaviour model. Intervention settings included nursery schools, preschools, day care centres, homes and a laboratory setting. Studies were not quality graded although they were only included in the review if they met certain quality criteria. No information on the socio-economic status of the participants was included. Contento summarised the results for six different types of intervention: the impact of parental involvement on children's nutritional knowledge and behaviour; the effect of nutritional education on families with children; measurement of children's knowledge after nutritional education; the effect of nutritional education on children where knowledge, attitude and behaviour were measured; behavioural interventions affecting food and nutritional behaviour; and effect of public service announcements and television advertisements on preschool children's food choices. Nutritional education for pre-school children was found to be more effective when behavioural approaches were used as opposed to a didactic approach, the teaching level was

appropriate for the age of the child, and food-based activities were used, which preferably involved food tasting. Seven studies in the Contento SR (Birch 1980a, Birch 1980b, Birch and Marlin 1982, Birch 1984, Birch 1987, Harper 1975, Stark 1986) evaluated behavioural interventions to alter children's preferences and food acceptance behaviours. Food acceptance was enhanced by repeated exposure to food, peer and adult modelling, positive emotional tone in the social context when foods are offered, if foods were tasted in addition to being seen, and with the appropriate use of rewards.

The SR (2++) by Tedstone et al. (1998) was of the effectiveness of promotion interventions for healthy eating among 1-5 year old children and included 14 studies evaluating healthy eating programmes aimed at pre-school children in classroom and home settings, and programmes targeting parents, carers and preschool day-care staff. Tedstone et al. graded nine studies of moderate quality (5 RCTs (Essa 1988, Gorelick and Clark 1985, Lawatsch 1990, Peterson 1984, Singleton 1992), 1 non-randomised CT (Koblinsky 1992), 1 before-after study (James 1992) and 2 experimental studies (Birch 1984, Birch 1987) and one before-after study of moderate/good quality (Lee 1984). One study was conducted in the UK (James 1992), the remaining in the US. Participants were reported to be from low-income families in one of these studies (Koblinsky 1992). The principal limitation with the included studies was that while knowledge and attitudes towards healthy eating were measured, behaviour change of pre-school children was not measured in all studies. The healthy eating programmes were more effective in promoting knowledge and attitudes about healthy eating when food tasting and parents were involved, and when delivered in a classroom compared to the home. However, this was not always effective in changing children's behaviour

Two RCTs in the Tedstone SR showed that traditional teaching methods in a classroom setting for children aged 3-5 years such as story telling, games, puzzles, songs, art activities and food preparation significantly increased nutritional knowledge level among children ($p<0.001$ to $p<0.05$) (Gorelick and Clark 1985, Lawatsch 1990). The usual classroom teacher was trained to use the Californian State University nutrition education kit, which included lesson plans, resource material and support information, in the RCT by Gorelick and Clark (1985). The intervention, two classroom activities per week for 6 weeks, increased nutritional knowledge ($p<0.01$) but younger children (aged 3 years) performed less well than older children. The RCT by Lawatsch et al (1980) used two interventions with traditional children's stories with either a benefit or threat approach. Although both interventions gave higher nutritional knowledge scores, the benefit approach was more effective ($p<0.05$) and gave a higher score for choice of vegetable snacks ($p<0.05$). One RCT used non-traditional teaching methods. The viewing of ten 20-minute videos on healthy eating with nutritional themes specially prepared from popular children's TV programmes, which were shown to children in kindergarten classes on consecutive days, increased knowledge ($p<0.05$) but not food (snack) choice in the participant group (Peterson 1984).

Two experimental RCTs in the Tedstone SR used behaviour modification interventions in children aged 2-5 years in a preschool setting. Birch et al. (1984) used inducement by reward twice weekly for 4 weeks to encourage children to drink beverages they had previously refused, which was not effective in bringing about dietary change and in fact the reverse was true. The second study (Birch et al. 1987) used repeated exposure to novel foods (5, 10 or 15 times) over 30 days where children could either look at or taste food. Taste exposure frequency was related to increased consumption of novel foods ($p<0.05$) but not visual exposure frequency.

Three studies in the Tedstone SR involved parents in the educational process (Essa 1988, Lee 1984, Singleton 1992). Two studies were of predominately white middle income families (Essa 1988, Lee 1984). The RCT by Essa et al. (1988) evaluated a preschool nutritional educational programme with and without home activities undertaken by parents delivered by a trained pre-school teacher twice weekly for 10 weeks to 3-4 year-old children. Parents were given an introductory information and discussion session and home support activity packs. The programme was effective in increasing children's nutritional knowledge ($p<0.001$) but more effective with parental involvement ($p<0.05$). A before-after study (Lee 1984) evaluated an 8-week nutritional educational programme (15-20 min/day) comparing education delivered at home by parents or in school by teachers for 3-5 year-old children. Parents and teachers had similar training. The nutritional knowledge of the children improved in both groups but the teacher taught intervention was more effective. The RCT by Singleton et al. (1984) evaluated a 4-week parent-led home based nutrition education programme including audiotapes (2/week), a picture book for the child and a guide for parents aimed at a low fat and healthy diet for children aged 4-7 years. The intervention improved children's understanding of health and nutrition as related concepts ($p<0.001$).

Two studies in the Tedstone SR targeted parents or carers (James 1992, Koblinsky 1992). A before-after study (James 1992) examined the effect of healthy eating promotion on carers (mothers) in a combined primary care and home setting. Two hospital dietitians trained health visitors and GPs (5 half day seminars) to use the results of a 7-day diet diary to tailor advice and set realistic objectives for inner city mothers on a low-income to improve the diet of their children aged 1-4 years. Health visitors also visited mothers for 16-20 weeks to provide advice and support. Mother's organisation skills improved ($p<0.01$) for meal planning, eating as a family and regular meals and there was an overall improvement in their children's diets ($p<0.01$) with more frequent consumption of fruit, vegetables and protein containing iron. A cohort study (Koblinsky 1992) evaluated a nutritional education intervention for low income mothers on the Head Start programme (nutrition and feeding the preschool child, meal planning and preparation, food shopping skills) in three centres in New York and two centres in Maryland. Controls followed the usual Head Start programme. The intervention included 13 weekly easy-to-read nutrition newsletters and 4 workshops over 2 months (2hrs each, 2 weeks apart) including presentations, hands-on activities, small group discussion and food demonstrations. Incentives to attend included food vouchers and free babysitting. There were significant improvements in mothers' nutrition related behaviour in Maryland in the quality ($p<0.01$) and diversity ($p<0.05$) of their children's diet, with increased intake of dairy foods ($p<0.01$), vegetables ($p<0.01$) and bread and grains ($p<0.05$). The intervention was less successful in New York where there was lower active participation which led only to intentions to reduce both sugar ($p<0.01$) and salt intake ($p<0.05$).

Wardle et al. (2003) conducted an RCT (quality rating 1+) in the UK to evaluate the effectiveness of a parent-led intervention asking children aged 2-6 years to taste a previously disliked vegetable daily for 14 days in order to increase young children's acceptance of vegetables. Participants were predominantly well-educated, motivated middle-class white mothers. The intervention group showed greater increases in liking, ranking and consumption of the target vegetable than controls.

A SR (2+) by Thomas et al. (2003) concerning healthy eating in children aged 4-10 years contained two ('medium' quality) relevant studies (Hendy 1999, Wardle 2003). A quasi-experimental American study by Hendy et al. (1999) was a study of predominantly low income white pre-school children's acceptance of four new fruits and vegetables presented during three preschool lunches on consecutive days. The

effectiveness of five different teacher actions was assessed: simple exposure (control), reward, modelling, insisting and choice. Reward, insisting and choice-offering were more effective than simple exposure for the no. of fruits and vegetables sampled ($p<0.001$), the no. of meals when they were sampled ($p<0.004$) and the total number of bites ($p<0.002$) Insisting produced fewer bites than choice-offering. Teacher modelling was ineffective compared to simple exposure. Choice–offering appeared more successful than reward-offering, which was only effective on a short term basis. The two studies contributed to several of the authors conclusions: children consider taste, not health, to be a key influence on food choice; promote children's favourite fruit or vegetables *or* target the ones they do not like; reduce the emphasis on health particularly future health; do not promote fruit and vegetables in the same intervention.

A SR by Elkan et al. (2000) (rating 2+) examined the effectiveness of domiciliary health visiting. Elkan et al. quality scored these studies using an adapted Reisch quality scale, on which 0 indicated the worst possible and 1 the best. One US RCT by Gutelius (1997, Reisch quality score 0.59 (moderate)) was of adequate quality and evaluated intensive home visits (n=19, minimum of 1 hour) by a primary care paediatrician or nurse from 7 months pregnant till age 3 years to unmarried low-income African American schoolgirls (15-18 years). Additionally, 16 group events, usually discussion sessions, were arranged for 1 year and infants were given 8-16 mg iron daily for at least the first year of life. At ages 24 months and 36 months more infants in the intervention than in the control group had >1 fruit or fruit juice serving/day ($p<0.05$) and at 24 months more infants in the intervention group were self-feeding ($p<0.05$).

A small US pilot cluster-randomised RCT (Bannon and Schwartz 2006 (1-)) of 5 year-old low income mainly white children in three kindergarten classes, where children watched three different videos, found both the children who watched a gain-framed video and those who watched a loss-framed video were more likely to select a post-test healthy snack (an apple vs. animal crackers) 15 minutes after watching the videos. The effect for the loss-framed video was significant ($p<0.05$) whereas that for the gain-framed video was only marginally significant ($p<0.06$). The gain-framed video gave a positive health message for apples, the loss-framed video showed negative health messages for not eating fruit and the control video had no health messages or fruit consumption.

No systematic reviews or RCTs were found that evaluated the promotion of uptake of recommended vitamin and mineral supplements for 2-5 year old children.

One 2+ systematic review (Tricon 2006) and two papers from the same Australian RCT (1+), the CAPS study (Peat 2004, Marks 2006) provided evidence for dietary strategies that reduce the risk of food allergies and intolerance and interventions that promote this advice. The SR by Tricon et al. contained two relevant RCTs but the reviewers did not give studies quality gradings. The SR contained two papers from the CAPS study (Mihrshahi 2003, Peat 2004) giving a total of three papers for the CAPS study. The CAPS study provided evidence that dietary supplementation with omega-3 fatty acids daily from age 6 months reduced wheezing at age 18 months and reduced atopic cough at age 3 years ($p=0.003$) in children at high risk of atopy but the prevalence of wheeze, eczema and atopy was not significantly different in the intervention and control groups at age 5 years. The RCT by Bede at al. (2003) in the Tricon SR found that supplementation with 200/290 mg magnesium citrate per day had a beneficial association on bronchodilator use in children aged 4-16 years with mild to persistent bronchial asthma.

A recently published UK guideline (SIGN 2005) on the prevention and management of dental decay in the pre-school child (based on a systematic review of relevant studies) provided level 2+ evidence of moderately strong associations between higher risk of dental caries and the consumption of free sugars and sugared drinks. This review also provided evidence that bulk sweeteners such as polyols may be cariostatic. The SIGN review contained four studies of sufficient quality (Burt and Pai 2001, Lingstrom 2003, Marshall 2003/Levy 2003, Rodrigues and Sheiham 2000). A Brazilian study (Rodrigues and Sheiham 2000, graded 2++ by reviewer) found children attending nurseries with guidelines which restricted sugar intake had decreased risk of caries and a lower overall intake of sugar (at home and at nursery). A SR of 36 mostly cross-sectional studies by Burt and Pai (2001, graded 2+ by reviewer) found a weak to moderate association between sugar consumption and dental caries, which was weaker in the presence of fluoridation. A large US prospective study of children living in a fluoridated area (Marshall 2003/Levy 2003, graded 2+ by reviewer) gave evidence of an association between sugared drinks intake at age 1-4 years and dental caries at age 4-7 years, particularly intake during the first year. Total water intake was highly protective suggesting that an adverse effect of sugary drink consumption might be reduced by intake of (fluoridated) water. A SR of 18 trials of chewing gums and sweets containing polyols (Lingstrom 2003, graded 2+ by reviewer) found insufficient evidence that polyols prevented dental caries but evidence that they were non-cariogenic. Twelve of the studies in the Lingstrom SR were of replacement of sucrose by sorbitol or xylitol. Only two trials were in children aged 2-5 years.

Limited evidence was found relating to dietary strategies aiming to increase the intake of iron rich foods and reduce iron deficiency anaemia in pre-schoolers. One US RCT (Shah 2003, quality rating 1-) provided evidence that uptake of iron by 3-6 year old children from a standard meal including apple juice was not different from uptake from the meal by the same children when it included orange juice. A before-after study (James 1992, graded moderate by reviewer) in the Tedstone SR (2++) examined the effect of healthy eating promotion on carers (mothers) in a combined primary care and home setting (see above). There was an overall improvement in their children's diets ($p<0.01$) which included more frequent consumption of protein containing iron.

1.3. Conclusions

This rapid review provides moderately strong evidence on which to base recommendations for public health strategies *to improve knowledge and attitudes towards healthy eating* among pre-school children and their parents, and to prevent dental caries. The strategies described in this rapid review can be implemented in the UK; most of these are education, advice and counselling programmes. The health visiting team who review a child's progress between 2 and 3 years are in a good position to provide individualised advice and counselling to parents of young children. Following this, immunisation appointments between 3 and 5 years, and school entry checks between 4 and 5 years offer similar opportunities. Pre-schools, crèches, Sure Start/Children centre nurseries and day-care centres for young children offer opportunities for delivering both individual and group interventions.

However, evidence upon which to base policy and practice *to improve the nutritional well-being of pre-school children*, particularly children from low-income families is more limited. Interventions for parents of young children whether from professionals, paraprofessionals or trained peer supporters, were successful in improving children's

diet where they were intensive, incorporated behavioural theories, gave a clear message and were tailored to educational level and family resources. Interventions for children aged 2-5 years were successful in improving children's acceptance of novel or previously disliked foods if they included behavioural approaches, avoided a didactic approach, used food-based activities, used repeated exposure, included food tasting and offered choice rather than simple exposure. Any further research will need to measure behaviour change in the short and long term. Research is needed into the impact of food advertising on food choices made by pre-school children and their parents, the impact of widening choice in the range of confectionery marketed in shops and supermarkets for young children, the effectiveness of programmes such as Five-a-Day, printed information such as Birth to Five, and the effectiveness of the re-structured welfare food programme: Healthy Start. It is further recommended that more primary research is needed relevant to public health interventions which would enable families to provide a healthy diet to young children

There was evidence for two dietary strategies that reduced the risk of allergies. Dietary supplementation with omega-3 fatty acids from age 6 months reduced wheezing at age 18 months and atopic cough at age 3 years in children at high risk of atopy. Supplementation with magnesium citrate reduced bronchodilator use in children aged 4-16 years with mild to persistent bronchial asthma.

Limited evidence was found for interventions preventing diet-related caries in pre-school children. One study found children attending nurseries with guidelines which restricted sugar intake in both frequency and amount had decreased risk of caries and a lower sugar intake. Another study found the consumption of free sugars and sugared drinks by pre-school children was associated with later dental caries but the risk was reduced in the presence of fluoridation. Drinking fluoridated water was highly protective against dental caries. There was insufficient evidence that the replacement of sucrose by polyols in chewing gum and sweets prevented dental caries but they may be cariostatic.

1.4. References to included papers, and methodology check-list

1.4.1. Systematic reviews and RCTs examining interventions to promote healthy eating in young children

	Reference	Methodology checklist rating[1]
	Systematic reviews	
1	Ciliska D, Miles E, O'Brien MA, Turl C, Tomasik HH, DonovanU, Beyers J. (1999) The effectiveness of community interventions to increase fruit and vegetable consumption in people four years of age and older: Ontario: Public Health Research Education and Development Program, Effective Public Health Practice Project, 45 (March).	2+

[1] Methodology checklist rating was based on quality criteria for SR's / RCTs

2	Contento I, Balch GI, Bronner YL, Lytle LA, Maloney SK, Olson CM, Swadener SS. (1995). The effectiveness of nutrition education and implications for nutrition education policy, programs and research: a review of research. *Journal of Nutrition Education* 27(6): 277-418	2-
3	Elkan R, Kendrick D, Hewitt M, Robinson JJA, Tolley K, Blair M, Dewey M, Williams D, Brummell K. (2000). The effectiveness of domiciliary health visiting: a systematic review of international studies and a selective review of the British literature. *Health Technology Assessment* 4(13): 1-339	2+
4	Tedstone AE, Aviles M, Shetty PS, Daniels LA. (1998) Effectiveness of interventions to promote healthy eating in preschool children aged 1 to 5 years: a review. London: Health Education Authority, 65.	2++
5	Thomas J, Sutcliffe K, Harden A, Oakley A, Oliver S, Rees R, Brunton G, Kavanagh J. (2003) Children and healthy eating: a systematic review of barriers and facilitators. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.	2+
	Randomised controlled trials	
6	Bannon K, Schwartz MB (2006) Impact of nutrition messages on children's food choice: Pilot study. *Appetite* 46, 124-129.	1-
7	Blom-Hoffman J, Kelleher C, Power TJ, Leff SS. (2004) Promoting healthy food consumption among young children: Evaluation of a multi-component nutrition education program. *Journal of School Psychology* 42: 45-60.	1-
8	Cottrell L, Spangler-Murphey E, Minor V, Downes A, Nicholson P, Neal WA. (2005) kindergarten cardiovascular risk surveillance study: CARDIAC-Kinder. *American Journal of Health Behaviour* 29(6): 595-606.	1-
9	Lagstrom H, Jokinen E, Seppanen R, Ronnemaa T, Viikari J, Valimaki I, Venetoklis J, Myyrinmaa A, Niinikoski H, Lapinleimu H, Simell O. (1997) Nutrient intakes by young children in a prospective randomised trial of a low-saturated fat, low-cholesterol diet: The STRIP Baby Project. *Archives of Pediatrics and Adolescent Medicine* 151(2): 181-8.	1-
10	Lumeng JC, Hillman KH (2007) Eating in larger groups increases food consumption. *Archives of Disease in Childhood* 92: 384-387.	1-
11	Wardle J, Cooke LJ, Gibson L, Sapochnik M, Sheiham A, Lawson M. (2003) Increasing children's acceptance of vegetables; a randomized trial of parent-led exposure. *Appetite* 40: 155-162.	1+

1.4.2. Systematic review and RCT of interventions to promote the uptake of dietary advice to reduce food allergies and intolerance

	Reference	Methodology checklist rating
	Systematic review	
12	Tricon S, Willers S, Smit HA, Burney PG, Devereux G, Frew AJ, Halken S, Host A, Nelson M, Shaheen S, Warner JO, Calder PC.	2+

	(2006) Nutrition and allergic disease. *Clinical and Experimental Allergy Reviews*, 6, 117-188.	
	One RCT reported in two papers	
13a	Peat JK, Mihrshahi S, Kemp AS, Marks GB, Tovey ER, Webb K, Mellis CM, Leeder SR. (2004) Three-year outcomes of dietary fatty acid modification and house dust mite reduction in the Childhood Asthma Prevention Study. *Journal of Allergy & Clinical Immunology* 114(4): 807-13.	1+
13b	Marks GB, Mihrshahi S, Kemp AS, Tovey ER, Webb K, Almqvist C, Ampon RD, Crisafulli D, Belousova EG, Mellis CM, Peat JK, Leeder SR. (2006) Prevention of asthma during the first 5 years of life: a randomised controlled trial. *Journal of Allergy & Clinical Immunology* 118(1): 53-61.	1+

1.4.3. Systematic reviews of interventions to prevent diet-related caries

	Reference	Methodology checklist rating
14	Burt BA (2006) The use of sorbitol- and xylitol-sweetened chewing gum in caries control. *Journal of the American Dental Association* 137: 190-196.	2-
15	SIGN (2005) Prevention and management of dental decay in the pre-school child. In: Guideline no.83: *SIGN* page 44	2+

1.4.4. RCT of interventions to promote the uptake of iron rich foods

	Reference	*Methodology checklist rating*
16	Shah M, Griffin IJ, Lifschitz CH, Abrams SA. (2003) Effect of orange and apple juices on iron absorption in children. *Archives of Pediatrics & Adolescent Medicine* 157(12): 1232-6.	1-

Current NICE Grading Scheme

From: NICE (2004). *Guideline Development Methods. Information for National Collaborating Centres and Guideline Developers*. London: National Institute for Clinical Excellence (NICE). www.nice.org.uk

Table 7.1 Levels of evidence for intervention studies. Reproduced with permission from the Scottish Intercollegiate Guidelines Network; for further information, see 'Further reading'.

Level of evidence	Type of evidence
1^{++}	High-quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1^{+}	Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
1^{-}	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias*
2^{++}	High-quality systematic reviews of case–control or cohort studies High-quality case–control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal
2^{+}	Well-conducted case–control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal
2^{-}	Case–control or cohort studies with a high risk of confounding bias, or chance and a significant risk that the relationship is not causal*
3	Non-analytic studies (for example, case reports, case series)
4	Expert opinion, formal consensus
*Studies with a level of evidence '–' should not be used as a basis for making a recommendation (see section 7.4)	

Grading of evidence

++	All or most of the quality criteria have been fulfilled Where they have been fulfilled the conclusions of the study or review are thought *very unlikely* to alter
+	Some of the criteria have been fulfilled Where they have been fulfilled the conclusions of the study or review are thought *unlikely* to alter
-	Few or no criteria fulfilled The conclusions of the study are thought *likely or very likely* to alter

Source: NICE, 2004

2. Evidence statements

1 There is evidence from two RCT's (Cox et al 1996; Havas et al 1998 both graded 'moderate' quality by reviewer) and two other studies (Del Tredici et al 1988; Koblinsky et al 1992 both graded 'moderate' quality by reviewer) reported in two systematic reviews (Ciliska et al 1999; 2+; Tedstone 1998 2++) that nutrition education interventions that focus on skills development in the mothers of young children can be effective in improving the diets of the family in terms of increasing the amount of fruit and vegetables consumed and in improving the quality and diversity of the diet.

2 There is evidence from two RCT's (Cox et al 1996; Havas et al 1998 both graded 'moderate' quality by reviewer) and two other studies (Del Tredici et al 1988; Koblinsky et al 1992 both graded 'moderate' quality by reviewer) reported in two systematic reviews (Ciliska et al 1999;2+; Tedstone 1998 2++), that effective nutrition education programmes aimed at the mothers of young children are those which: are multi-faceted; include 'hands on' skills development; are tailored to the educational level and needs of the mothers and to family resources; include strategies for behaviour change; are intensive and ongoing; and are delivered by nutrition paraprofessionals and/or peer supporters.

3 There is evidence from two studies among low income mothers, including teenage mothers, (a 1+ RCT (Gutelius et al 1977) and a + before and after study (James et al 1992)) reported in two systematic reviews (Tedstone et al 1998 2++; Elkan et al 2000 2+), that interventions based on intensive and regular home visits by health professionals delivering tailored advice are effective in improving the diets of preschool children.

4 There is evidence from three RCT's (Lawatsch et al 1990; Singleton et al 1992; Peterson et al 1984, all graded 'moderate' quality by reviewer) reported in one systematic review (Tedstone et al 1998 2++) that educational interventions which provide information through a variety of different media such as storybooks, videos and audiotapes can be effective in improving children's knowledge and understanding of healthy eating and their understanding of the relationship between nutrition and health. However the provision of information alone does not appear to change eating behaviour.

5 There is evidence from two RCT's (Wardle et al 2003 1+; and Birch et al 1987 graded 'moderate' quality by reviewer and reported in a systematic review by Tedstone et al. 1998 2++) that the more frequently young children taste new or previously disliked foods, the more likely they are to accept those foods. Birch et al (1987) demonstrated that looking at the foods without tasting them was not effective in increasing the acceptance of those foods.

There is evidence from one systematic review (Contento et al 1995 2-) and two RCT's (Wardle et al 2003 1+ and Birch et al 1987 graded 'moderate' quality by reviewer and reported in a systematic review by Tedstone et al. 1998 2++) that interventions which provide the opportunity for children to handle and repeatedly taste foods, are more likely to be successful in changing eating behaviour than interventions that provide information alone.

There is evidence from one non-RCT (Hendy et al 1999 graded 'sound' by reviewer in a systematic review by Thomas et al, 2003 2+) which compared five different actions intended to encourage pre-school children to taste new fruits and vegetables.

Offering a choice of whether to try the fruit or vegetable was more effective than offering a reward, which was effective only in the short term. An RCT (Birch et al 1984 graded 'moderate' quality by reviewer in Tedstone et al 1998 2++) also found that the use of rewards was not effective in bringing about dietary change.

6 There is evidence from one RCT (Lawatsch et al 1990 graded 'moderate' quality in a systematic review by Tedstone et al. 1998 2++) that foods should be positively presented in interventions which aim to encourage young children to eat healthily. A systematic review (Thomas et al 2003 2+) concluded that children consider taste, not health, to be the key influence on food choice, that interventions should promote children's favourite fruit or vegetables, or target the ones they do not like; reduce the emphasis on health messages, particularly those concerning future health and should not promote fruit and vegetables in the same intervention.

7 There is evidence from two RCT's (Singleton et al 1992 graded 'moderate' quality by reviewer in a systematic review by Tedstone et al. 1998 2++ and Wardle 2003 1+) that parent- led interventions can be effective in improving pre-school children's nutrition knowledge and eating behaviours.

However while there is evidence from one before and after study (Lee et al 1984 graded as 'moderate' quality by reviewer in Tedstone et al. 1998 2++), that interventions are more effective when delivered by teachers than by parents. There is further RCT evidence (Essa et al 1988 graded 'moderate' quality by reviewer Tedstone et al. 1998 2++) which demonstrates that parental reinforcement of teacher–led learning enhances the overall effectiveness of the intervention. Three out of four of these studies were conducted in white middle class families.

8 There is evidence from three systematic reviews (Ciliska et al 1999 2+; Contento et al 1995 2 -; Tedstone et al 1998 2++) that classroom based interventions can be effective in increasing pre-school children's nutrition knowledge and their consumption of particular foods.

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

9 There is evidence from one RCT (Peat et al 2004 1+) that supplementing children's diets daily with omega 3 fatty acids and restricting omega 6 fatty acids significantly reduced atopic cough at 3 years of age. However there was no significant effect on the incidence of asthma, eczema or non-atopic cough . An earlier assessment of the same RCT (Mihrshahi et al 2003 not quality graded in a systematic review by Tricon et al 2006 2+) found a beneficial association with wheezing at 18 months. Follow up (Marks et al 2006 1+) at age 5 years found the prevalence of asthma, wheeze, eczema and atopy did not differ for the dietary or control groups.

There is evidence from an RCT (Bede et al. 2003 not quality graded,and reported in a systematic review by Tricon et al 2006 2+) that supplementation with 200/290 mg of magnesium citrate for 12 weeks in children aged 4-16 years with mild to persistent bronchial asthma resulted in a beneficial association on bronchodilator use.

10 Evidence from a Brazilian study (Rodrigues and Sheiham 2000 2++)reported in a systematic review by SIGN 2005 2+) found children attending nurseries which restricted the consumption of sugar and who consumed lower amounts of sugar at lower frequencies, had a substantially lower risk of dental caries.

11 A systematic review (Burt and Pai 2001 2+ reported in a systematic review by SIGN 2005 2+) based on thirty-six studies, found that the relationship between sugar consumption and caries is weaker in the modern age of fluoride exposure than it used to be, but controlling the consumption of sugar remains a justifiable part of caries prevention.

12 A systematic review (Lingstrom et al 2003 2+ reported in a systematic review by SIGN 2005 2+) examining confectionery containing polyols found that although polyols were non-cariogenic there was insufficient evidence that polyols prevented dental caries.

13 A large US prospective study (Marshall et al 2003/Levy et al 2003 2+ reported in a systematic review by SIGN 2005 2+) of 642 children from birth living in a fluoridated water area found an association between sugared drinks intake at age 1-4 y and dental caries at age 4-7 y with the highest risk associated with sweetened drinks intake in the first year. Milk had a neutral association with caries. (Marshall et al 2003) Total water intake at age 1-4 y was highly protective against dental caries at age 4-7 y (Levy et al. 2003). Total non-water drinks consumption in the first year (including cow's milk) was the highest risk factor; while total water consumption was highly protective, suggesting that some of the adverse effect of sugary drinks may be because they reduce consumption of (fluoridated) water.

3. Background

3.1. How good are the diets of children aged 2-5?

General dietary guidelines for healthy eating are outlined in the 1994 COMA report *Nutritional Aspects of Cardiovascular Disease* (Department of Health, 1994). The report states that "The dietary and other recommendations for adults do not apply to children below the age of 2 years, for whom adequate energy intake for growth remains paramount. Between the ages of 2 and 5 years a flexible approach to the timing and extent of dietary change should be taken. We recommend that by the age of 5 years children should be consuming a diet consistent with the recommendations for adults in this report."

The National Diet and Nutrition Survey (NDNS) of children aged 1.5 to 4.5 (Gregory et al. 1995) found that children generally had low intakes of fruit and vegetables (particularly children from lower income and one parent families) and high intakes of added sugars (18.7%). Similar results were found for children aged 4-6 years of age in the NDNS for 4-18 year olds (Gregory et al. 2000). Based on the results of the NDNS, priorities for dietary change in this age group have been summarised as follows (Scottish Executive, 2006):

Increased consumption of:

- Iron rich foods
- Fruit and vegetables (variety and quantity)
- Starch rich foods
- Foods rich in non starch polysaccharides (fibre; but not to a high enough level which may lead to a reduced energy intake)
- Foods rich in unsaturated fatty acids (replacing saturated fatty acids)

Decreased consumption of:

- Foods high in sugar
- Foods high in salt
- Foods rich in saturated fatty acids
- Tea

3.2. Why target children aged 2-5 to promote healthy lifestyles?

It is well recognised that the preschool years are critical for physical and emotional development as well as being important for learning attitudes and practices related to healthy lifestyles (Fitzgibbon et al. 2002). The rationale for targeting young children is provided by research, for example, that indicates that eating habits worsen as children progress through to their teens. One study (Campbell & Crawford, 2001) found that children aged 6 were much more likely than children aged 12 to eat breakfast and to eat fruit and vegetables on a daily basis, whereas children aged 12 were more likely than children aged 6 to eat chips and sugared fizzy drinks on a regular basis (Finn et al. 2002). Thus the ideal time to establish a foundation for lifelong healthy habits is during the preschool years. Parents are primarily responsible for their child's nutrition and activities but child care providers also play an important role.

In Scotland, guidance on *Food choices for children aged 1-5 years in early education and childcare settings* (Scottish Executive, 2006) has recently been published and

highlights that “Good nutrition in the early years is vital. Children’s early experiences of food play an important part in shaping later eating habits, and good eating habits support healthy growth and development. Giving positive messages about food in the early years setting will also help to stress the importance of a good diet to children’s families.”

The CMO report “*At least five a week”* (Department of Health, 2004a) emphasises the importance of a life course approach to the promotion of physical activity. The nature of activity, impacts and benefits are different at different life stages. Although the major impacts in terms of morbidity and mortality are not generally seen until middle to older age, exposure to risk through inactivity begins in childhood. Activity in childhood can be important in maintaining optimal body weight and reducing the risk of adult obesity as well as influencing attitudes to activity. Children who emerge from their school years feeling confident about their physical skills and who have had positive experiences of physical activity are more likely to develop into active adults.

Parents and carers

The family environment has a tremendous influence on a child’s development, their eating and activity habits, and predisposition to overweight (Birch and Davison, 2001; Jeffrey et al. 2005; Oliveria et al. 1992). Children’s eating behaviours are influenced by the family food environment, including parental food preferences and beliefs; children’s food exposure; role modelling; media exposure and child/parent interactions around foods (Jeffrey et al. 2005; St Jeor et al. 2002; Summerbell et al. 2005). The nutrient quality of the diets of 2-5 year old children is influenced by the eating patterns of their parents (Bar et al. 1998). Similarities within families are documented in relation to eating and exercise behaviour and body weight (Birch and Davison, 2001). This clustering of family characteristics suggests the value of the family as a critical unit upon which prevention and intervention strategies can be developed.

3.3. Previous assessment of effective interventions

Diet

The Health Education Authority (HEA) published a review of the effectiveness of interventions to promote healthy eating in preschool children aged 1 to 5 years (Tedstone et al. 1998). The review found that while most studies demonstrated some positive effect on nutrition knowledge the impact on eating behaviour was less frequently assessed and the outcome was variable. There was no data to evaluate long term effectiveness on knowledge or behaviour. The review concluded that there was insufficient evidence to predict the form of successful healthy eating interventions that are likely to be effective at improving the nutritional well being of UK preschool children. It also concluded that there was a pressing need for good quality research to aid the development of intervention programmes to address the nutritional and dietary problems common in this group.

3.4. Existing policy in England

- DH, DCSF and DCMS have a joint target to halt the year on year rise in obesity among children under 11 by 2010.
- Healthy Start replaced the Welfare Food Scheme from 2005; pregnant women (including all pregnant women under 18), breastfeeding mothers and young children in low income families are eligible for vouchers that can be

exchanged for fresh fruit and vegetables, milk and infant formula. A communications campaign to help these families improve their diets and wider health and make effective use of the vouchers and a communications programme for health professionals is planned.
- The Birth to Five book is distributed to all parents and carers. This includes information on diet and activity.

Children's NSF

Standard 1 of the National Service Framework for Children (Department of Health, 2004b) focuses on Promoting Health and Well-being, Identifying Needs and Intervening Early.

The Standard focuses on the Child Health Promotion Programme (CHPP) which replaces the Child Health Surveillance Programme and includes:

2-3 years	The health visiting team responsible for reviewing a child's progress and ensuring that heath and developmental needs are being addressed. The health visitor will exercise professional judgement and agree with the parent how this review is carried out. It could be done through early years provider or the general practice or by offering a contact in a clinic, home, by phone or email etc. Use is made of other contacts with the primary care team (e.g. immunisations, visits to the GP etc).
3-5 years	Immunisations. Review of general progress and delivery of key messages about parenting and health promotion
4-5 years	Review at school age entry includes check of height and weight.

The CHPP is delivered by multi-agency child and family support services. The NSF states that more intensive and targeted health promotion and surveillance should also be offered where particular community needs are identified. It is highlighted that the provision of new targeted services, using the new flexibilities in primary care contracting in areas of poverty and deprivation will provide more opportunities for health promotion, early identification and intervention. The NSF also highlights that people looking after children such as child minders and nursery staff are in an excellent position to identify children whose development falls outside the norm. Improved training will enhance their contribution. Health visitors will have a key role in working with early years staff to raise awareness and understanding of children's health and development needs and provide a referral point for further assessment. Health professionals provide parents with advice and support on the growth of their children.

Children in early years learn about health, personal, social and emotional development, physical development, creative development and communication, language and literacy, using the Birth to Three Matters framework at the foundation stage curriculum.

Additional action outlined in Choosing Health (Department of Health, 2004c*):*

- Department of Health will work with local authorities to establish 2500 children's centres by March 2008, initially in the 20% most disadvantaged wards. They will bring together, among other things, preventative services.
- Parents can access information and advice on their children's health through the e-Gov website and telephones lines and through links to Health Direct.

- The Sure Start unit will be put in place by late 2005. This will include a training programme; guidance for early years practitioners focusing on changing patterns of parental behaviour that influence the physical health of children to age 5; a community parental support project.
- Home Start - 9/10 local authorities to have by 2006/7, providing a home visiting programme with trained volunteers to support parents and families under stress in caring for and nurturing children during their early years.
- Department of Health will work with broadcasting and advertising sectors on way to help drive down levels of child obesity. Ofcom to consult on proposals on tightening the rules on broadcast advertising, sponsorship and promotion of food.

3.5. References

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4. Methodology

4.1. Literature Search

Identifying literature was conducted using two distinct methods. First, a systematic search was conducted. Second, papers submitted by members of the Programme Development Group (PDG) and registered stakeholders were considered. Both methods are described below.

Julie Glanville and Dave Fox (Centre for Reviews and Dissemination, University of York) conducted the literature searches using a combined strategy developed from the draft strategies for infants (6-24 months), and preschool children (2 years to 5 years) in February/March 2006, with input from the MCN-CC review team (SEK). Initially, a scoping search was undertaken in order to direct and refine the final search strategy.

All of the searches were conducted using a stepped approach to identify relevant systematic reviews (SRs), randomised controlled trials (RCTs) and non-randomised studies (cohorts, qualitative studies and surveys). A worldwide search of a number of databases was conducted to identify relevant systematic reviews (from 1995 onwards). Secondly, a worldwide search for randomised controlled trials (RCTs) was conducted (from 1990 onwards). Finally, the search included any type of study – but this search focused on studies from the UK published from 1990 onwards.

Studies not published in English were excluded from the review. Julie Glanville updated the searches in January 2007. As part of the NICE consultation process, stakeholders were invited to submit evidence for consideration for this review and throughout the guidance development process papers were also submitted for consideration by members of the NICE Programme Development Group, including health economics papers A detailed report of the processes, databases and search terms used in this rapid review is presented in Appendix C.

Citations identified by the two literature searches are shown in the table below:

	SRs	RCTs	UK studies	Totals
April 2006	693	5937	1681	8311
January 2007	189	894	150	1233
Totals	882	6831	1831	9544

These were independently screened by two reviewers, and full paper copies of 43 systematic reviews, 55 randomised controlled trials and twelve UK studies of any type thought to be potentially relevant for this review for preschool children were obtained and also independently assessed.

Either reference titles, abstracts or papers for the PDG/stakeholder papers were screened by both the MCN-CC review team and NICE from June to August 2007. All papers found to be potentially relevant were obtained and screened by the MCN-CC team and those that met the inclusion criteria were included in the review. After screening by both the MCN-CC review team and NICE from June to August 2007, five papers were identified from these sources as potentially relevant of which two were found to meet the inclusion criteria. One paper (Lumeng and Hillman 2007) was added to the list of included papers (Appendix A) and one paper was added to the list of non-RCT UK corroborative studies (Ofsted 2006). The three excluded PDG and

stakeholder papers from the list of five potentially relevant papers were added to the list of excluded papers (Appendix B).

Sixteen studies were finally included in the 2-5 years review (8 SRs, 8 RCTs (reported in 9 papers)). In addition, six corroborative UK studies (reported in seven papers) have been summarised.

4.2. Selection of Studies for Inclusion

4.2.1. Participants

To be included in the review, the studies had to examine interventions aimed at children aged 2-5 years old, or their parents/carers, or staff at kindergarten, nurseries or day-care centres. Where data were available the review considered areas of deprivation including inner city areas, children from black and minority ethnic groups and children of mothers below the age of 18 years. Studies of children for whom normal care was inappropriate were excluded from the review.

4.2.2. Interventions

The review included all public health type interventions that aimed to improve nutritional well-being of pre-schoolers, such as:

- Dietary advice / counselling / education targeting children
- Interventions to deliver dietary advice / counselling / education / supplementation
- Media campaigns
- Interventions to improve relevant nutrition knowledge among parents and practitioners

4.2.3. Outcomes

Various outcomes were included depending on the intervention examined. These included:

- Intake of fruit, vegetables, iron rich foods
- Intake of protein- and calcium-rich foods
- Nutrient status, for example iron status
- Incidence of dental decay
- Incidence of food-related allergies
- Intake of salt, sugar, artificially sweetened soft drinks
- Change in weight
- Development of diabetes, hypertension, heart disease in adult life

Two reviewers independently screened titles and abstracts identified in the literature search. Full paper copies of 43 systematic reviews, 55 RCTs and twelve UK studies were obtained and independently assessed for inclusion by two reviewers. Any disagreements regarding whether or not a paper met the inclusion criteria was achieved by consulting a third reviewer. A list of excluded studies with reasons for exclusion is presented in Appendix B.

4.2.4. Study design

- Systematic reviews that include studies from developed countries
- RCTs conducted in developed country settings only
- Cohorts[2], qualitative studies and surveys (only those conducted in the UK)

[2] *Only cohort studies >5 years will be included*

4.3. Quality Appraisal

All of the studies that met the inclusion criteria were critically appraised by two reviewers in accordance with criteria described in NICE (2006). A study was graded using a code '++', '+' or '-', based on the extent to which the potential sources of bias had been minimised. If there was any discrepancy in a grade given to a study by the two reviewers, the opinion of a third reviewer was sought. The NICE criteria and the methodology checklist used in this review are presented in Appendix D. It is noted that these grades reflect the quality of the author's *reporting* of their study.

4.4. Study categorisation

For each of the five research questions, the included studies are presented by type of intervention.

4.5. Assessing applicability

Each included study was assessed to determine its applicability to UK settings. Notes on applicability are presented in the data extraction tables. In addition, a search was conducted for non-randomised UK studies from 1990 onwards to identify additional relevant studies.

Relevant data were extracted from UK studies and are presented in a table within the text of this report.

4.6. Synthesis

Due to heterogeneity of design among the studies, a narrative synthesis was conducted.

5. Summary of Findings

From the 9544 titles and abstracts identified in the literature search for both reviews (infants aged 6-24 months, and preschool children aged 2-5 years), full paper copies of 43 SRs, 55 RCTs and twelve UK studies were obtained as potentially relevant for the 2-5 year review.

In addition, as part of the NICE consultation, a number of papers were identified as being of potential interest by stakeholders and by members of the NICE Programme Development Group in 2007. After screening by both the MCN-CC review team and NICE, five papers were identified as potentially relevant. One paper met the inclusion criteria for RCTs in the review (Lumeng and Hillman 2007). One UK study provided corroborative evidence of interest although it did not include specific relevant interventions and is therefore briefly described in this review (Ofsted 2006). The other papers have not been described in this review. The final totals for included corroborative UK studies therefore became six corroborative UK studies (reported in seven papers). The three excluded PDG and stakeholder papers from the list of five potentially relevant papers were added to the list of excluded papers (Appendix B).

In total, 16 studies met the inclusion criteria (eight SRs and eight RCTs (reported in 9 papers)). In addition, six corroborative UK studies (reported in seven papers) have been included; these studies have not been data extracted, but their key points have been summarised in tables below. Full references of the included studies are listed in Appendix A. Citations and reasons for exclusion are listed in Appendix B.

5.1. Key question 1:

What is the effectiveness of public health interventions delivered at home, in nurseries, playschools, crèches and other pre-school settings that aim to promote healthy eating (i.e. increasing fruit and vegetable intake, reducing excess salt intake, and reducing the intake of artificially sweetened soft drinks and chocolates/sweets) in pre-school children?

Five SRs and six RCTs were identified in the literature search that addressed this question. The SR by Tedstone et al. (1998) is the most relevant in that it covers the age-group and the intervention of interest, although it addressed the same education-type interventions as the SRs by Ciliska et al. (1999) and Contento et al. (1995). Between the Contento and Tedstone SRs, the differences in the included studies were due to the search strategy dates. The Tedstone search was from 1984 to 1996. All the pre-1984 studies are in Contento. Ciliska's search was from the year of inception of databases to 1998. There are some overlaps. Studies in the Contento, Tedstone and Ciliska SRs were largely educational – either for children, parents or day-care staff. One study was common to the Ciliska, Contento and Tedstone SRs (Koblinsky 1992) and seven other studies were included in both the Tedstone and Contento SRs (4 RCTs (Byrd-Bredbenner 1993, Essa 1988, Gorelick and Clark 1985, Lawatsch 1990), one before-after study (Lee 1984) and 2 experimental studies (Birch 1984, Birch 1987). Tedstone et al. categorised Koblinsky et al. 1992 as a non-RCT but the other two reviews described the study as a cohort study, similarly Tedstone et al. categorised Lee et al. 1984 as a before-after study whereas Contento et al. described it as a RCT and Tedstone et al. describe Birch et al 1984 as an experimental study and Contento as a RCT.

A SR by Ciliska et al. (1999) provided level 2+ evidence of the effectiveness of promotion interventions to increase fruit and vegetable intake in children aged 4

years and over, and their families. This review included 15 studies. Studies were graded for quality by the reviewers as 'strong, moderate or weak'. Five of the studies [one RCT (Cox 1996), two non-randomised CTs (Del Tredici 1988, Havas 1998), and two cohort analytical studies (Koblinsky 1992; Graves 1982/Shannon 1982)] were relevant to children less than five years old. All five studies were graded of 'moderate' quality by the reviewers. There were three US programmes targeting low-income families and one intervention targeting young children directly (Graves 1982/Shannon 1982), also conducted in the US. The former three US programmes aimed to increase fruit and vegetable intake, but did not specifically measure preschool children's intakes. Two evaluation studies were of the Expanded Food and Nutrition Education Programme (EFNEP), a US programme that involved paraprofessionals working with low-income women in their homes or in small neighbourhood groups (Cox 1996, Del Tredici 1988). The programme tailored all lesson activities, food preparation and practices to the existing knowledge, skills and family resources of participants. The earlier non-randomised CT of the EFNEP programme (Del Tredici 1988) studied 633 low-income mothers of young children in California. Over a 6 month period the women were visited approximately eight times, each visit lasting approximately 80 minutes. The EFNEP group experienced a significant rise in fruit and vegetable consumption from 2.6 to 3.7 servings/day (p<0.001). A RCT (Cox 1996) evaluated an enhanced EFNEP programme in Virginia involving 9 usual EFNEP lessons plus 9 lessons on reduction in cardio-vascular risk based on the health belief model, addressing lifestyle factors, healthy food choices, changes in cooking styles to decrease fat and increased intake of fruit and vegetables. At the end of six months there were significantly increased daily intakes of fruit from 1.5 to 2.6 servings/day (p<0.002) and vegetables from 0.9 to 1.6 servings/day p<0.05) in the family. Also included in the Ciliska SR (1999) was an evaluation of the US Head Start programme (Koblinsky 1992) (cohort study). The intervention involved 13 weekly newsletters and four workshops of 2 hours each placed 2 weeks apart with presentations, hands-on activities, small group discussion and food demonstrations. Topics included nutrition and feeding of pre-schoolers, meal planning/ preparation, and food shopping skills for mothers. Newsletters/workshops used the first language of the participants (for example - Spanish) if indicated. Koblinsky et al. (1992) studied a cohort of Head Start participants in three centres in New York and two centres in Maryland. The Maryland centres, but not the New York centres, showed an increase in fruit consumption from 1.9 to 2.7 servings/day (p<0.05), vitamin C rich fruit from 0.3 to 0.67 servings/day (p<0.05), and dark green vegetables from 0.27 to 0.58 servings/day (p<0.05). One trial (Havas 1998) studied the effectiveness of the Special Supplemental Nutrition Programme for Women, Infants and Children (WIC) at 16 US sites over a two year period. WIC is a multi-faceted programme consisting of peer education and mailed educational material. WIC resulted in a significantly greater increase in fruit and vegetable consumption in the WIC group compared to the control group (p=0.002). Women who were white, aged <30 years, high school graduates, non-smokers and not working reported greater increases in fruit and vegetable consumption. The EFNEP, Head Start and WIC studies targeted mothers of young children; the specific effect on the diet of children aged 2-5 years is unclear.

Two papers (Graves 1982; Shannon 1982) (cohort study) in the Ciliska SR reported on the effects of a 9 week nutritional education curriculum for children from kindergarten to Grade 6. Nutritional activities were carried out in the cafeteria with posters and student activity sheets. Authors reported a significant increase in consumption of carrots, broccoli, spinach (p<0.05) and green beans (p<0.01). Nutritional knowledge and attitude to eating also improved. Ciliska et al. (1999) noted that the characteristics of effective interventions for promotion of fruit and vegetable consumption are: they are based on behavioural theories, provide a

structured framework for implementation and evaluation, use clear messages, provide longer and more intensive interventions, and have a greater effect when baseline nutrition knowledge and intake is low.

Strength and applicability of evidence

Two RCTs and two other studies in the Ciliska SR (1999, 2+) evaluated interventions for mothers of young children (over 4 years), including, food preparation demonstrations, instruction on selecting, buying, meal planning, cooking, preserving and food safety, diet and lifestyle, delivered by paraprofessional (nutritionist) and/or peer supporters over a period of 3-6 months (Cox 1996 (RCT), Del Tredici 1988 (RCT), Koblinsky 1992, Havas 1998 (RCT). (All graded 'moderate' quality by the reviewers.) They found significant increases in family's fruit and vegetable consumption.

The interventions worked well when tailored to the educational levels of women and family resources, when messages were clear, when the intervention was intensive rather than brief, and when behavioral theories were incorporated.

A cohort study of school children (Graves 1982/Shannon 1982, graded 'moderate' quality by reviewers) in the Ciliska SR (1999, 2+) including kindergarten (under fives) to 12 years found a 9-week curriculum, cafeteria posters and activity sheets were effective in increasing the consumption of specific vegetables in all children and knowledge about vegetables in younger children.

A SR by Contento et al. (1995) (quality rating 2-) included 23 randomised and non-randomised studies that evaluated the effectiveness of nutritional education (often to parents) for preschool children (from two years to approximately five years of age). Most of the studies of nutritional education were based on information dissemination or the (modified) knowledge-attitude-behaviour (KAB) model. All were conducted in the US. The intervention settings included nursery schools, preschools, day care centres, homes and a laboratory setting. Studies were generally included in the review if they met certain quality criteria though some were included if they had promising approaches even if they had limitations. Only 25% of the identified studies met the inclusion criteria. Individual study quality grades were not given. No information on the socio-economic status of the participants was included in the SR. Contento summarised the results for six different types of intervention: the impact of parental involvement on children's nutritional knowledge and behaviour; the effect of nutritional education on families of children in Head Start; measurement of children's knowledge after nutritional education; the effect of nutrition education on children where knowledge, attitude and behaviour were measured; behavioural interventions affecting food and nutrition behaviour; and effect of public service announcements and television advertisements on preschool children's food choices. Six studies evaluated the impact of nutrition education on knowledge, attitudes and behaviour in children. Three of four studies demonstrated improved knowledge, although there were inconsistent effects for attitude and behaviour. Three studies had positive outcomes for behaviour (Byrd-Bredbenner 1993; Community Research Centre 1990; Lawatsch 1990), and three did not (Berenbaum 1986; Davis, 1983; Hunsley 1982). Of the three with positive outcomes, the interventions involved food-based activities (not specified (Byrd-Bredbenner 1993, Community Research Centre 1990)) or modified popular fairy tales to teach about vegetables (Lawatsch 1990). The Student Parent Educator Administrator Children (SPEAC) Preschool Nutrition Education

Project in Minneapolis US 1979-1980 integrated the USDA Child Care Food Programme into the education curricula and selected child care programme activities including food-based activities for 7 months (Community Research Centre 1990) whereas the intervention for the observational study by Byrd-Bredbenner et al. (1993) in 65 classrooms across the US within Head Start was food-based activities for 6 weeks. The SPEAC programme led to a significant increase in children's preference for fruit, vegetables and dairy foods. Children aged 2-5 years in the Head Start classrooms were less likely to refuse food and more likely to request low-sugar snacks (Byrd-Bredbenner 1993). The RCT by Lawatsch et al. (1980) used two interventions with fairy tales with either a benefit or threat approach. Although both interventions gave higher nutritional knowledge scores, the benefit approach was more effective and gave a higher score for choice of vegetable snacks.

Seven studies in the Contento SR evaluated behavioural interventions to alter children's preferences and food acceptance behaviours. Food acceptance was enhanced by repeated exposure to food (Birch and Marlin 1982, Birch 1987), peer and adult modelling (Birch 1980a, Birch 1980b, Harper 1975), positive emotional tone in the social context when foods are offered (Birch 1980b, Birch 1984 (graded of moderate quality in Tedstone 1998), if foods were tasted in addition to being seen (Birch 1987), and with appropriate use of rewards (Birch et al 1980b, Stark 1986). Short-term increases in consumption of healthy snacks were observed in the study by Stark et al. (1986) with the use of rewards (praise and stickers).

Five studies in the Contento SR evaluated the impact of parental involvement on children's knowledge and behaviour. One study demonstrated that mothers have a great impact on children's knowledge and food selections (Klesges 1991) and another (Anliker 1990) that positive nutritional messages from parents have a greater impact than negative messages and have a greater impact on nutritional knowledge when they are more specific and more frequent. Three studies assessed the effect of parental involvement in nutritional education and found that school-based education was more effective (Lee 1984 (RCT)) but that parental involvement gave mutual reinforcement, particularly when it was given at home (Essa 1988 (RCT)). Home-only education needs to involve intense activities that parents and children can do together (Singleton et al 1992 (RCT)).

The Contento SR identified three studies where nutrition education in day care settings involving appropriate curricula which were activity based resulted in at least moderate increases in children's nutritional knowledge but the effect on food intake was not measured (Gorelick and Clark 1985 (RCT), Turner and Evers 1987 (RCT), Hendricks 1989).

Three studies in the Contento SR showed positive outcomes in families resulting from nutritional education in the Head Start programme (Gunn and Stevenson 1985 (RCT), Koblinsky 1987, Koblinsky 1992). The RCT by Gunn and Stevenson used workshops, lectures, newsletters, festivals and exercise activities for 9 months which led to a significant increase in the variety of food consumed by the family and a decreased fat intake. For Koblinsky et al. (1987) trained nutrition volunteers working with parents led to improvements in meal planning, food preparation and eating habits and for Koblinsky et al. (1992) 13 weeks of newsletters and workshops for mothers led to a significantly more diverse diet, with more higher quality and more servings of nutritious foods than the control group.

One study in the Contento SR demonstrated the effectiveness of positive adult evaluative comments in association with low-sugar TV food advertisements and pro-

nutritional public service announcements on preschool children's food choices, including reduced consumption of snacks containing sugar at preschool (Galst 1980).

Contento (1995) concluded that the following elements appear to have contributed to the effectiveness of nutrition education interventions - involvement of parents/families; a behaviourally focused approach targeting preschool children's behaviours without didactic teaching; the use of developmentally appropriate learning experiences; food-based activities (e.g. tasting parties, food preparation, vegetable and fruit gardens); activity-based teaching strategies (e.g. art projects, songs, role playing, stories, puppets, puzzles).

Strength and applicability of evidence
A large SR (2-) by Contento et al. (1995) included some studies relating to children attending nursery school, preschool, child care facilities (day care) and the home. The interventions included nutritional education, parental involvement and behaviour. Nutritional education for pre-school children was found to be more effective when behaviour approaches are used without didactic teaching, the teaching levels are developmentally appropriate, food based activities including food tasting and activity based teaching strategies are used. For example, food acceptance was enhanced by repeated exposure to food, peer and adult modelling, positive emotional tone when foods are offered, and appropriate use of rewards.

A SR by Elkan et al. (2000) (rating 2+) examined the effectiveness of domiciliary health visiting. Elkan et al. quality scored these studies using an adapted Reisch quality scale, on which 0 indicated the worst possible and 1 the best. Two RCTs and one non-RCT were included that examined young children's diet as an outcome (Gutelius 1977; Barker and Anderson 1988, Barker 1994 (non-RCT)). In the US RCT by Gutelius (1997, Reisch quality score 0.59 (moderate)) first-born infants with single low-income African American schoolgirl mothers received nineteen home visits (by a primary care paediatrician or nurse) from when a woman was seven months pregnant and during the first three years of the infant's life (n=49) (with nine, six and four visits in the 1st, 2nd and 3rd years, respectively), compared to no home visits (n=48). Additionally, 16 group events, usually discussion sessions, were arranged for 1 year and infants were given 8-16 mg iron daily for at least the first year of life. At 24 months and 36 months more infants in the intervention than in the control group had >1 fruit or fruit juice serving/day ($p<0.05$) and more infants in the intervention group were self-feeding at age 24 months ($p<0.05$). Barker and Anderson (1988) (Reisch quality score 0.46 (borderline)) and Barker et al. (1994) (Reisch quality score 0.46 (borderline)) evaluated the effectiveness of monthly visits by Health Visitors in children three to 27 months old, living in the UK. Both studies used the Child Development Programme developed at the Early Childhood Development Unit, Bristol. Outcomes included the percentage of children with nutritional intakes less than 50% of the RDA, and the percentage with an adequate diet. No statistical tests were reported for these studies, and the results were inconsistent. Elkan et al. concluded that this evidence may be subject to bias, and that overall, there was insufficient evidence to provide any conclusions regarding the impact of home visiting on pre-school children's diet.

Strength and applicability of evidence

An RCT by Gutelius et al. (1977) (Reisch quality score 0.59 (moderate)) included in the Elkan et al. (2000) SR evaluated intensive home visits (n=19, minimum of one hour) by a paediatrician or nurse to unmarried, low-income, black school girls (15-18 years) from 7 months in pregnancy to 3 years. Additionally, sixteen discussion sessions were held and 8-16 mg Fe administered daily for ≥1st year of life. The intervention significantly improved daily milk intake, self-feeding, daily dietary intake of fruit and fruit juice at 24 and 36 months ($p<0.05$), and meat intake at 6 months ($p<0.05$).

A SR by Tedstone et al. (1998) provided level 2++ evidence of the effectiveness of promotion interventions for healthy eating among 1-5 year old children. Studies were graded for quality from poor to good and were excluded if there was not thought to be 'sufficient rigour to ensure the validity of the results', although some poorly executed studies were included if they were 'based on the setting and type of intervention which are relevant to the UK population'. This review includes 14 studies (6 RCTs (Byrd-Bredbenner 1993 (poor/moderate), Essa 1988 (moderate), Gorelick and Clark 1985 (moderate), Lawatsch 1990 (moderate), Peterson 1984 (moderate), Singleton 1992 (moderate)), 1 non-randomised CT (Koblinsky 1992 (moderate)), 4 before-after studies (James 1992 (moderate), Lee 1984 (moderate/good), Smith 1986 (moderate/poor), Turner 1987 (poor/moderate)), 1 cohort study with a comparison group (Roberts-Gray 1989 (poor)) and 2 other experimental studies (Birch 1984 (moderate), Birch 1987 (moderate)) evaluating healthy eating programmes aimed at pre-school children in classroom and home settings, and programmes targeting parents, carers and preschool day-care staff. One study was conducted in the UK (James 1992), the remaining in the US. In three studies (Byrd-Bredbenner 1993, Koblinsky 1992, Smith 1986) participants were reported to be from low-income families; other studies either did not report socio-economic status, or participants were from middle to high income groups. In the RCT by Smith et al. (1986) the intervention group were enrolled in a WIC programme and the control group were matched for sex, age and race but not enrolled in WIC. The principal limitation with the included studies was that while knowledge and attitudes towards healthy eating were measured, behaviour change of pre-school children was not measured in all studies. Long term effects of interventions were not measured. The authors of the review concluded that there was insufficient evidence to predict a format for healthy eating interventions that are likely to improve nutritional well-being among preschoolers.

Ten studies (Birch 1984 (moderate) & 1987 (moderate), Byrd-Bredbenner 1993 (poor/moderate), Essa 1988 (moderate), Gorelick and Clark 1985 (moderate), Lawatsch 1990 (moderate), Lee 1984 (moderate/good), Peterson 1984, (moderate), Singleton 1992 (moderate), Turner 1987 (poor/moderate)) evaluated the promotion of healthy eating targeting children in pre-school, day-care settings and the home. Three RCTs showed that traditional teaching methods such as story telling, games, puzzles, songs, art activities and food preparation significantly increased nutritional knowledge level among children ($p<0.001$ to $p<0.05$) (Byrd-Bredbenner 1993, Gorelick and Clark 1985, Lawatsch 1990). Some details of the three RCTs are given above (in the SR by Contento et al.). The intervention in the Head Start classrooms (N=1000, age 4-5 years) for the study by Byrd-Bredbenner et al. (1993) included all the traditional teaching methods described. Attitudes towards eating nutritious foods and eating new foods significantly increased, $p<0.05$ and $p<0.002$, respectively, but not attitude towards eating vegetables. The traditional fairy stories used in the interventions for the RCT by Lawatsch et al. (1980) were: 'Little Red Riding Hood',

'The Three Little Pigs' and 'The Three Bears' read with a benefit or threat approach and the control group were not read the stories. The different interventions took place over 3 consecutive days and with four preschool classes (children aged 3.5-5.25 years, N=103) and used two interventions with fairy tales with either a benefit or threat approach. Only the benefit approach improved selection of vegetables ($p<0.05$) and it was more effective overall ($p<0.05$). The RCT by Gorelick and Clark (1985) in preschool classes at different schools (N=187) evaluated the Californian State University nutrition education kit, which included lesson plans, resource material and support information. The usual classroom teacher was trained to use the kit and the intervention consisted of two classroom activities per week for 6 weeks. The intervention group had increased nutritional knowledge after the intervention ($p<0.01$) but younger children (aged 3 years) performed less well than older children.

Two studies in the Tedstone SR used non-traditional teaching methods. The viewing of ten 20-minute videos on healthy eating, shown on consecutive days, increased knowledge ($p<0.05$) but not food (snack) choice in the participant group (Peterson 1984, RCT (moderate)). Six kindergarten classes were randomised (N=106) and the videos on healthy eating and nutritional themes were specially prepared from popular children's TV programmes. Computers were as effective as traditional teaching methods (Turner 1987, (before-after study, poor/moderate)) but the community setting was more effective than the experimental setting in the University ($p<0.05$). There were four groups of preschoolers, n = 11 to 18, based at two community and one university preschools. Two groups used traditional story telling and puppets and two groups used a computer based education package delivered by a researcher in the presence of a teacher. Group sessions were for 4-6 children and lasted for 15 minutes.

Two experimental RCTs in the Tedstone SR used behaviour modification interventions. Birch et al. (1984) (moderate) used inducement by reward twice weekly for 4 weeks to encourage children aged 3-5 years to drink beverages they had previously refused in a preschool setting. Promotion based on reward was not effective in bringing about dietary change and in fact the reverse was true. There was reduced consumption in the intervention group (n=31) compared to the control group (n=7) who received no rewards, $p<0.01$. The second study (Birch 1987 (moderate)) used repeated exposure to novel foods (5, 10 or 15 times) over 30 days where children aged 23-30 months could either look at or taste food (N=45). Taste exposure frequency was related to increased consumption of novel foods ($p<0.05$) but not visual exposure frequency. Visual food preference was related to both frequency of taste and visual exposure, $p<0.05$ and $p=0.02$, respectively.

Three studies in the Tedstone SR involved parents in the educational process (Essa 1988, Lee 1984, Singleton 1992). One RCT in the Tedstone SR (Essa 1988 (moderate)) evaluated a preschool nutritional educational programme with and without home activities undertaken by parents carried out at three preschools (N=60). The programme was delivered by a trained pre-school teacher twice weekly for 10 weeks to 3-4 year-old children from predominately white, middle income families. Parents were given an introductory information and discussion session and home support activity packs. The programme was effective in increasing children's nutritional knowledge ($p<0.001$) but more effective with parental involvement ($p<0.05$).

A before-after study (Lee 1984 (moderate/good)) evaluated an 8-week nutritional educational programme (15-20 min/day) comparing education delivered at home by parents or in school by teachers for 3-5 year-old children from predominantly white

middle income families with parents in skilled occupations (N=60). Parents and teachers had similar training but were taught separately. The nutritional knowledge of the children improved in both groups but the teacher taught intervention was found to be more effective. In the parent-taught group alone, the age of the child was positively related to the test score, $p<0.02$. An RCT in the Tedstone SR (Singleton 1984 (moderate)) evaluated a 4-week parent-led home based nutrition education programme (Hearthrob) that included audiotapes (2/week), a picture book for the child and a guide for parents aimed at a low fat and healthy diet for children aged 4-7 years (N=60). The intervention improved children's understanding of health and nutrition as related concepts ($p<0.001$).

The remaining four studies in the Tedstone SR targeted parents or carers (James 1992, Koblinsky 1992, Smith 1986, Roberts-Gray 1989). One before-after study (James 1992 (moderate)) examined the effect of healthy eating promotion on carers (mothers) in combined primary care and home settings (N=44). James et al. (1992) evaluated an intervention in which two hospital dietitians trained health visitors and GPs (5 half day seminars) to use the results of a 7-day dietary diary to tailor advice and set realistic objectives for inner city mothers on a low-income to improve the diet of their children aged 1-4 years. Health visitors also visited mothers for 16-20 weeks to provide advice and support with a mean of 8-9 hours teaching required. Mother's organisation skills improved ($p<0.01$) with meal planning, eating as a family and regularity in meals commonly reported, and an overall improvement was observed in children's diets ($p<0.01$) with more fruit, vegetable and protein containing iron consumption. Two studies examined the impact of welfare programmes on healthy eating (Koblinsky 1992, Smith 1986). A cohort study (Koblinsky 1992 (moderate)) evaluated a nutritional education intervention for low income mothers on the Head Start programme (nutrition and feeding the preschool child, meal planning and preparation, food shopping skills) in three centres in New York (N=41 mothers) and two centres in Maryland (N=48 mothers). Controls followed the usual Head Start programme. The intervention included 13 weekly easy-to-read nutrition newsletters and 4 workshops over 2 months (2 hours each, 2 weeks apart) including presentations, hands-on activities, small group discussion and food demonstrations. There were incentives to attend including food vouchers and free babysitting. In Maryland the intervention led to significant improvements in mothers' nutrition related behaviour and the quality ($p<0.01$) and diversity ($p<0.05$) of the foods eaten by their children, with increased intake of dairy foods ($p<0.01$), vegetables ($p<0.01$) and bread and grains ($p<0.05$). The intervention was less successful in New York where there was lower active participation which led only to intentions to reduce both sugar ($p<0.01$) and salt intake ($p<0.05$). Smith et al. (1986, moderate/poor), a before-after study, tested the efficacy of individual nutrition counselling (30 minutes) of parents of anaemic WIC children aged <5 years (n=25) (haemoglobin <11 g/L) accompanied by 30 minute nutrition education classes aiming to improve the diet particularly for iron, calcium, protein and vitamins A and C, including meal preparation and planning and the importance of the child-parent relationship. The control group were anaemic children not enrolled in WIC but matched for age, sex and race (n=25). The haemoglobin concentration of the children improved in the intervention group and was higher than the control group after 6 months ($p<0.05$).

Tedstone et al. (1998) included one cohort study with a randomised control group of an intervention for day-care staff. Training in the form of a half day workshop on menu-planning for day-care meal providers at 24 day care centres (Roberts-Gray 1989 (poor)) had no effect on improving menu planning. The aim of the Texas Nutrition and Education Programme was to improve the quality of the meals and snacks provided. The controls were 30 day centres where staff did not attend a workshop.

Strength and applicability of evidence

A SR (2++) examined healthy eating programmes targeting 1-5 year old children in the home, pre-school or day-care (Tedstone et al. 1998). Programmes were more effective in promoting knowledge and attitudes about healthy eating when food tasting and parents were involved, and when delivered in a classroom compared to the home. However, this was not always effective in changing children's behaviour.

Two RCTs in the Tedstone SR evaluated interventions in children aged 3-5 years in a classroom setting. The first (Lawatsch et al. 1990, graded moderate quality by reviewer) used children's stories and found two approaches, 'threat' or 'benefit', were both effective in improving attitude and increasing knowledge of eating vegetables but the 'benefit' approach was more successful overall $p<0.05$.
The other RCT (Gorelick and Clark 1985, graded moderate quality by reviewer) evaluated 2 classroom activities per week for 6 weeks from the usual teacher who received extra training as well as resource materials and found older children had increased nutritional knowledge but younger children (age 3) performed less well. All children were mainly white from diverse socioeconomic backgrounds.

An RCT (Peterson et al. 1984, graded moderate quality by reviewer) in the Tedstone SR evaluated an intervention aimed at children aged 5-6 years. Ten specially prepared 20 min videos on healthy eating and nutritional themes derived from popular TV programmes were shown on consecutive days. The videos improved nutrition knowledge and understanding but had no effect on snack choice.

Two RCTs in the Tedstone SR evaluated the effect of behavioural modification interventions in children aged 2-5 years in a preschool setting on acceptance of novel or previously refused foods. Birch et al. (1984) (graded moderate quality by reviewer) used inducement by reward twice weekly for 4 weeks to encourage children to drink beverages they had previously refused. Promotion based on reward was not effective in bringing about dietary change.
The second study (Birch et al. 1987, graded moderate quality by reviewer) used repeated exposure (5, 10 or 15 times) over 30 days where children could either look at or taste food. Taste exposure frequency was related to increased consumption of novel foods ($p<0.05$) but not visual exposure frequency. Visual food preference was related to both frequency of taste and visual exposure.

One RCT in the Tedstone SR (Essa et al. 1988, graded moderate quality by reviewer) evaluated a preschool nutritional educational programme with and without home activities undertaken by parents. The programme was delivered by a trained pre-school teacher twice weekly for 10 weeks to 3-4 year-old children from predominately white, middle income families. The programme was effective in increasing children's nutritional knowledge ($p<0.001$) but more effective with parental involvement ($p<0.05$).

A before-after study in Tedstone SR (Lee et al. 1984, graded moderate quality by reviewer) evaluated an 8-week nutritional educational programme (15-20 min/day) comparing education delivered at home or in school for 3-5 year-old children from predominantly white middle income families with parents in skilled occupations. Nutritional knowledge of the children, improved in both groups but the teacher taught intervention was found to be more effective.

An RCT in the Tedstone SR (Singleton et al. 1984, graded moderate quality by reviewer) evaluated a 4-week parent-led home based nutrition education programme that included audiotapes, a picture book and a guide for parents aimed at a low fat

and healthy diet for children aged 4-7 years. The intervention improved children's understanding of health and nutrition as related concepts ($p<0.001$).

A before-after study in the Tedstone SR (James et al. 1992, graded moderate quality by reviewer) evaluated an intervention in which two hospital dietitians trained health visitors and GPs (5 half day seminars) to use the results of a 7-day diet diary to tailor advice and set realistic objectives for inner city mothers on a low-income to improve the diet of their children aged 1-4 years. Health visitors also visited mothers for 16-20 weeks to provide advice and support. The study found a significant improvement in children's diets ($p<0.01$); fruit, protein and foods containing iron were eaten more frequently and the mother's organisational skills (shopping, meal planning, eating as a family and regular meals) more commonly reported.

A cohort study (Koblinsky et al. 1992, graded moderate quality by reviewer) in the Tedstone SR evaluated a nutritional education intervention for mother's on the Head Start programme (nutrition and feeding the preschool child, meal planning and preparation, food shopping skills, incentives to attend, food vouchers, free babysitting). The intervention included 13 weekly easy-to-read nutrition newsletters and 4 workshops over 2 months (2hrs each, 2 weeks apart) presentations, hands-on activities, small group discussion and food demonstrations. The study found weekly newsletters and workshops for two months led to significant improvements in mothers' nutrition related behaviour and the quality and diversity of the foods eaten by their children. The intervention was less successful with lower active participation which led only to intentions to reduce both sugar and salt intake.

A SR (2+) by Thomas et al. (2003) concerning healthy eating in children aged 4-10 years contained two ('medium' quality) relevant studies (Hendy 1999, Wardle 2003). The review used four methodological criteria developed for the EPPI-Centre Health Promotion and if a study met all four criteria it was classified as 'sound', studies were therefore categorised as 'high', 'medium' or 'unsound'. The RCT by Wardle et al. (2003) is considered separately in this NICE review. The American study by Hendy et al. (1999, quality graded as 'sound') was a quasi-experimental study of sixty four 'mostly low income' mainly white pre-school children's acceptance of four new fruits and vegetables presented during three preschool lunches on consecutive days. The effectiveness of five different teacher actions was assessed: Simple exposure (no teacher action – control); Reward (a special dessert if 2 foods were tried; candy to take home if all 4 foods were tried); Modelling (teacher put foods on her plate and eats ≥2 bites and also said "I like to try new foods"); Insist that children try one bite; Choice (teacher asks 'Do you want any of this?'; answer 'yes' or 'no'). A factorial analysis of variance (2 genders and 5 teacher actions) found the teacher's actions significantly affected: the no. of foods sampled ($p<0.001$), the no. of meals during which foods were sampled ($p<0.004$) and the total no. of bites ($p<0.002$). Paired comparisons showed that reward, insisting and choice-offering were more effective than simple exposure. Insisting produced fewer bites than choice-offering. Teacher modelling was ineffective compared to simple exposure. There was no gender difference for new food acceptance. The two studies contributed to several of the authors conclusions: children consider taste, not health, to be a key influence on food choice; promote children's favourite fruit or vegetables *or* target the ones they do not like; reduce the emphasis on health particularly future health; do not promote fruit and vegetables in the same intervention.

Wardle et al. (2003) conducted an RCT (quality rating 1+) in the UK to evaluate the effectiveness of parent-led exposure to vegetables to increase young children's acceptance of vegetables. Participants in this UK RCT were 143 children aged 2-6

years and their principal care giver. The mean age of the children was 53.2 months. Ninety-five percent of the caregivers were mothers, 74% were white and 68% had left full-time education aged 21 or over. Mean age of the care-givers was 36.4 years. The interventions were 'exposure' to a previously disliked vegetable daily for 14 days (n=50), compared to 'information' about 'five-a day' recommendations plus healthy eating advice (n=48), and a control group (n=45). Greater increases in liking, ranking and consumption of the target vegetable occurred in the exposure group than in either of the other two groups. Only the exposure group showed a significant increase across all three outcomes. Parents in the 'Exposure' group were generally enthusiastic but criticised the intervention for its duration - 14 exposure group subjects failed to complete a minimum 10 of the 14 tasting sessions. The authors concluded that a parent-led exposure-based intervention involving daily tasting of a vegetable could improve children's acceptance of vegetables.

Strength and applicability of the evidence

A single 1+ RCT (Wardle et al. 2003) found a parent-led intervention asking children aged 2-6 years to taste a previously disliked vegetable for 14 days increased young children's acceptance of vegetables. Study participants were predominantly well-educated, motivated middle class white mothers, who were not working.

A 2+ SR (Thomas et al. 2003) related to barriers and facilitators of children's consumption of fruit and vegetables included one 1+ RCT (Wardle et al. 2003) and one non-RCT (Hendy et al. 1999; quality graded as 'sound') of children aged 4-5 years. These studies contributed to some of the resulting conclusions: children consider taste, not health, to be a key influence on food choice; interventions should promote children's favourite fruit or vegetables or target the ones they do not like; reduce the emphasis on health messages particularly those concerning future health; and do not promote fruit and vegetables in the same intervention.

The non-RCT (Hendy et al. 1999) was of acceptance of 4 new fruits and vegetables at 3 pre-school lunchtimes and compared the effectiveness of 5 teacher actions, including reward, modelling, insisting the child tried one bite, choice offering and a control of simple exposure. Reward, insisting and choice-offering were more effective than simple exposure in encouraging the trying of a number of fruits and vegetables ($p<0.001$), the number of meals when they were sampled ($p<0.004$) and the total number of bites taken ($p<0.002$). Choice-offering appeared more successful than reward offering which was effective only on a short term basis.

A small pilot cluster-randomised RCT (Bannon and Shwartz 2006 (1-)) of fifty low income mainly white American children in three kindergarten classrooms (mean age = 5.0 years), where children watched three different videos, found both the children who watched a gain-framed video and those who watched a loss-framed video were more likely to select a post-test healthy snack (an apple vs. animal crackers) 15 minutes after watching the videos. The effect for the loss-framed video intervention was significant whereas that for the gain-framed video was only marginally significant. The gain-framed video gave a positive health message for apples, the loss-framed video showed the negative health messages for not eating fruit and the control video had no health messages or fruit consumption. There were no differences between pre- and post-test scores for healthy or 'liked' foods.

Strength and applicability of the evidence

A US pilot RCT (1-) (Bannon and Schwartz 2006) showed three different videos to mainly white 5 year-old children in 3 kindergarten classes: the first with a gain-framed message and the second with a loss-framed message for eating apples and the third control video with a scene not related to eating. Both interventions increased the choice of an apple for a snack and the result was significant for the loss-framed video intervention, $p<0.05$, but was only marginally significant for the gain-framed video, $p<0.06$. Children had their snack 15 min after watching the videos.

One RCT (Blom-Hoffman 2004) (quality rating 1-) conducted in the US evaluated the effectiveness of a 5 week multi-component nutrition education programme on fruit and vegetable consumption for children in a pre-school setting – both classroom and lunchroom. The intervention was based on a '5-a-day' gaol and consisted of a curriculum with 10 detailed lesson plans delivered via co-teaching with a classroom teacher and a school psychology doctoral student; a home component with a newsletter for parents/carers with information to reinforce the classroom messages; and a lunchtime component where classroom assistants asked children to identify fruit and vegetables and praise and give stickers to children who ate fruit and vegetables. Participants were African American children from low income families in 6 kindergarten and first grade classes at an urban under-resourced elementary school (N=91). Children in the intervention group demonstrated significantly more knowledge compared with controls ($p<0.0001$) immediately after the intervention and these gains were maintained at 1 month. There were no significant differences in vegetable consumption between intervention and control groups. The classroom intervention was implemented as planned and it resulted in changes in knowledge. However, the lunchroom intervention was not properly implemented. This may be one reason for lack of change in behaviour.

An RCT by Cottrell et al. (2005) (quality rating 1-) conducted in the US compared the effectiveness of information packs relating to diet and exercise, and pedometer use, on a sample of five year old white children and their parents living in rural West Virginia, USA, in the CARDIAC-Kinder study, a kindergarten cardiovascular risk surveillance study. The only socio-economic information reported was the number of years parents had been educated, which was on average, approximately 15 years. In the intervention group, both children and one of their parents received a pedometer and a daily step log. In addition, the parent received physical activity and diet recommendations (based on the recent 'American on the Move' recommendations 2004) designed to reduce overweight in adults and children, specifically to increase their daily steps by 2000 and to reduce their caloric intake. They also received information on ways to increase exercise, particularly steps. Children in the control group were provided with a pedometer and daily step log but not parents, and parents received a different type of information pack providing age appropriate diet and exercise guidelines for kindergarten children (further details were not specified). One third of the children in the study were overweight or at risk for being over weight (BMI $\geq 85^{th}$ percentile) – those in the intervention group also received information on how to reduce their calorific intake. There was a high drop out rate in this study, such that only 50 completed the study questionnaires (24 in the intervention group, and 26 in the control group) out of 203 who completed baseline questionnaires. The authors reported results for the 50 participants, and observed that at 4 weeks, children in the intervention group recorded significantly more weekly steps on average ($p<0.04$), and consumed significantly fewer sweets ($p<0.05$) than the control group. Differences were not significant between the groups for average fruit, vegetable, meat or bread intake. Parents of children in the intervention group reported significant increases in their encouragement to engage in physical activity

compared to the control group ($p<0.05$), however, both groups reported increases in children's physical activity and enjoyment in activity.

Lagstrom et al. (1997) (quality rating 1-) reported results from the Special Turku Coronary Risk Factor Intervention Project (STRIP) conducted in Finland. This was a trial undertaken to reduce children's exposure to the known environmental atherosclerosis risk factors through dietary counselling. In this study, 1062 children attending well-baby clinics were randomised. Socio-economic status of the children was not reported. Loss to follow-up at age 4 years was 30%. The intervention was provided to families by a paediatrician, nutritionist and nurse at child health clinics, starting when the child was seven months old, continuing 1-3 monthly until the child was 2 years old and thereafter twice yearly until the child was 5 years old. The intervention included individualised counselling that focused on the child's diet, aiming to modify their dietary fat composition towards a 1:1:1 ratio (polyunsaturated: monounsaturated: saturated fatty acids) in order to reduce intake of saturated fats and cholesterol whilst supplying adequate amounts of energy. Specific details of the advice given included: to use skimmed milk after age 1 year and supplement the child's diet with rapeseed oil, vegetable oil or soft margarine to replace the dairy fat ; to use oil or soft margarine for cooking instead of butter; ample vegetables, fish twice a week from age 1 year. The aim was also for protein and carbohydrate intakes as a percentage of energy of 12-15% and 55-58%, respectively. The control group received standard care i.e. they met the same team twice a year with no detailed input on dietary fats. Mothers were taught how to record their child's food consumption, and outcomes were dietary intakes. Children in the intervention group were found to have consumed less fat and less cholesterol at 2, 3 and 4 years than children in the control group ($p<0.001$ for all). In addition, children in the intervention group had a significantly higher polyunsaturated fat intake and a significantly lower saturated fat intake at ages 2, 3 and 4 years than controls ($p<0.001$ for all). Intakes of carbohydrates and protein of children in the intervention group as % energy intake were higher than those of children in the control group ($p<0.001$ at 2 and 3 years). There were no significant differences in total energy intake at any age.

Lumeng and Hillman (2007) (1-) performed a cross-over study to investigate whether children consumed more when eating in a larger group (n=9) than in a smaller group (n=3). Fifty-four children aged 2.5-6.5 years (mean 4.2 years) attending a university preschool in Michigan, USA participated. Sixty eight percent of the children were boys and 74% were white. The amount of biscuit (Graham cracker) eaten by children in small and large groups was the main outcome. (Graham crackers, similar to digestive biscuits, were originally made from unsifted and coarsely ground flour but many modern versions are made of refined bleached white flour.) Each child had fasted for at least 1.5 hours before the snack session. Children in large groups ate more (24.8g (95% CI 20.9 to 28.7) vs. 21.2g (95% CI 17.3 to 25.1)) but this was not statistically significant ($p=0.21$). In the analysis by length of snack, there was no effect of group size on amount eaten for short snacks (less than 11.4 minutes). However, during longer snacks (11.4 minutes or longer) large group size increased the amount eaten (34.5 [SD16] g vs. 26.5 [SD13.8] g, $p=0.02$). In larger groups, children started eating more rapidly, socialised less and ate at a slightly faster rate. After controlling for snack duration children ate slightly more in larger groups than in smaller groups (24.8 [SD15.9] g vs. 21.2 [SD13.4] g, $p=0.03$).

5.1.1. Sub questions

Table 1. Sub-questions for studies on healthy eating

Reference	How does the structure and content of the intervention influence effectiveness?	Does effectiveness vary by gender, age, ethnicity, religious practices or social/ professional group of those receiving or delivering the intervention?	Does effectiveness vary with site/ setting or intensity/ duration of the intervention?	What are the views of those receiving and delivering the intervention?	Is there evidence of unintended or harmful effects?	Are there barriers to replication of effective interventions?
Ciliska 1999	Interventions effective in increasing fruit and vegetable consumption: -give clear messages about fruit and vegetables; -incorporate behavioural theories and goals; -provide a consistent framework for implementation and evaluation -provide longer, more intensive interventions rather than 1-2 contacts -have a greater impact on those whose knowledge/intake was lower at baseline. Effective nutrition education about fruit and vegetables for low-income mothers of young children needs to: - be tailored to existing knowledge,	Peer education about fruit and vegetable consumption aimed at mothers of young children may work better if they are < 30 years of age, high school graduates, married, not working and non-smokers	Not clear	Not reported	No	Replicating EFNEP type interventions requires more resources – staff, money, time. These may be barriers?

Reference	How does the structure and content of the intervention influence effectiveness?	Does effectiveness vary by gender, age, ethnicity, religious practices or social/ professional group of those receiving or delivering the intervention?	Does effectiveness vary with site/ setting or intensity/ duration of the intervention?	What are the views of those receiving and delivering the intervention?	Is there evidence of unintended or harmful effects?	Are there barriers to replication of effective interventions?
	skills and family resources - include both information and food preparation skills - nearer their homes, frequent and sustained Peer educators or trained lay workers can be effective in delivering nutrition education to mothers.					
Contento 1995	See conclusions (summarised above)	Not reported	Not reported	The authors recommended the following: 1) Curricula and materials for preschool children need to be evaluated 2) Longer time frames for the educational programmes must be used 3) Further research on the effects of nutrition knowledge and attitudes/preferences on eating habits must be conducted 4) Further studies are needed of	None reported	Costs of implementing nutrition education programmes in various settings

Reference	How does the structure and content of the intervention influence effectiveness?	Does effectiveness vary by gender, age, ethnicity, religious practices or social/ professional group of those receiving or delivering the intervention?	Does effectiveness vary with site/ setting or intensity/ duration of the intervention?	What are the views of those receiving and delivering the intervention?	Is there evidence of unintended or harmful effects?	Are there barriers to replication of effective interventions?
				families and children at risk for nutritional problems		
Elkan 2000	Home visiting consisting of nutrition counselling or advice in addition to information on child development is effective.	There is some evidence from Gutelius 1977 that intensive home visiting by paediatricians or nurses was effective in improving the diets of the children (up to 36 months) of young (15-18 years) unmarried black girls from low income communities		Not clear	No (as far as the 4 studies of children's diets go)	Finding a way of getting low-income women to make themselves available at home on a regular basis for any length of time; Building rapport with the women/children
Tedstone 1998	<u>Promotion for children</u> Training of usual teachers is an important component of effective programmes. Lesson plans, special resources and support information for teachers important. Designated classroom time once to twice each week is effective. Nutrition	Interventions more effective among groups that were better educated, married, employed. Parent led interventions were conducted mainly among middle income, white families,In some cases in families where mothers were not working.	Classroom interventions are effective; home interventions are effective; classroom interventions may be more effective than home; combined classroom and home interventions work well	Not clear	None	No.

Reference	How does the structure and content of the intervention influence effectiveness?	Does effectiveness vary by gender, age, ethnicity, religious practices or social/ professional group of those receiving or delivering the intervention?	Does effectiveness vary with site/ setting or intensity/ duration of the intervention?	What are the views of those receiving and delivering the intervention?	Is there evidence of unintended or harmful effects?	Are there barriers to replication of effective interventions?
	education activities using games, puzzles, songs, art activity and food preparation or story telling using traditional children's stories; or video programmes specially produced for children with healthy eating and nutritional themes; or interactive computer teaching programme; or audiotape series accompanied by picture book for child and guidebook for parent for use at home. Benefit messages work better than threat messages. Reward system does not work if reward is withdrawn. Food tasting more effective than only looking at foods.					

Reference	How does the structure and content of the intervention influence effectiveness?	Does effectiveness vary by gender, age, ethnicity, religious practices or social/ professional group of those receiving or delivering the intervention?	Does effectiveness vary with site/ setting or intensity/ duration of the intervention?	What are the views of those receiving and delivering the intervention?	Is there evidence of unintended or harmful effects?	Are there barriers to replication of effective interventions?
	Classroom teaching promotion is more effective than home promotion. <u>Promotion for parents</u> Education focussing on childhood nutrition, meal planning, shopping and food preparation through 2 hour workshops and weekly newsletter in English or first language of parent; Importance of child-parent relationship stressed.					
Thomas 2003	The 2 relevant studies used different approaches. Wardle 2003 is considered below. For Hendy 1999, reward, insisting and choice-offering by teachers were more successful than simple exposure or teacher modelling in encouraging children to try	No	Not relevant to study by Hendy et al 1999		No	It appears that the approach taken by a teacher to encouraging children to try new foods is important and therefore suitable training is essential

Reference	How does the structure and content of the intervention influence effectiveness?	Does effectiveness vary by gender, age, ethnicity, religious practices or social/ professional group of those receiving or delivering the intervention?	Does effectiveness vary with site/ setting or intensity/ duration of the intervention?	What are the views of those receiving and delivering the intervention?	Is there evidence of unintended or harmful effects?	Are there barriers to replication of effective interventions?
	new foods. Choice-offering was the most successful intervention. Overall the authors concluded that interventions should: 1. either promote children's favourite fruit or vegetables or ones they don't like; 2. not promote fruit and vegetables in the same intervention; 3. reduce the emphasis on health messages					
Bannon and Schwartz 2006	Only one suitable classroom was available so the videos were shown on successive days. This was a pilot study.	No	Experimenters observed that their presence may have affected the children's snack choice. All the children in the gain-framed video group had a pre-preference for animal crackers not apples.	Not known	No	No
Blom-Hoffman 2004	Based on 5-a-day goal 10 detailed lesson plans 2 sessions/week delivered by	No	No	Acceptable to children, teachers and assistants	No	Extra support to teachers when delivering classroom intervention

Reference	How does the structure and content of the intervention influence effectiveness?	Does effectiveness vary by gender, age, ethnicity, religious practices or social/ professional group of those receiving or delivering the intervention?	Does effectiveness vary with site/ setting or intensity/ duration of the intervention?	What are the views of those receiving and delivering the intervention?	Is there evidence of unintended or harmful effects?	Are there barriers to replication of effective interventions?
	teachers who were supported by resarchers Newsletters were brief, for parents to follow at home, re-enforced classroom messages, design pre-determined by parents Paraprofessional assistants in the lunch room asked children to identify fruit/veg, praised children for eating fruit/veg and gave away 5-a-day stickers for thise who did.					
Cottrell 2005	Details on the information provided to parents was not sufficiently reported. It is unclear what differences may have influenced effectiveness, although parents in the intervention group received a pedometer as well as their children.	Not reported	The intervention was only 4 weeks – there were no significant differences in the average number of child steps reported during the first 3 weeks of the programme.	Only 5% of parents reported that it was difficult to remember to wear pedometers. The most frequently cited barriers to completing the study included having little time to record steps and decreased novelty for using the pedometers.	No	The intervention was home-based and therefore cost-effective, although pedometers would be an additional cost.
Lagstrom 1997	Attrition from child health	Not reported	Not reported	Not reported	None known to be harmful	An intervention with this

Reference	How does the structure and content of the intervention influence effectiveness?	Does effectiveness vary by gender, age, ethnicity, religious practices or social/ professional group of those receiving or delivering the intervention?	Does effectiveness vary with site/ setting or intensity/ duration of the intervention?	What are the views of those receiving and delivering the intervention?	Is there evidence of unintended or harmful effects?	Are there barriers to replication of effective interventions?
	clinics among families not enrolled in the study would give an indication of effectiveness of structure but is not reported Focus on dietary fats was narrow, specific and measurable, and focus on prevention of CHD in their child likely to motivate parents, so content of this intervention likely to enhance effectiveness				are reported. Energy intake was not significantly different in the intervention and control groups.	structure could be delivered in UK child health clinics if staff time were allocated to it Priority in the UK for content of such an intervention would need careful consideration and might not be dietary fats only
Lumeng and Hillman 2007	Classrooms were grouped by age. Individual class teachers chose the drinks to be consumed with the snacks – milk, juice or water, which were the same in both conditions	No	Children in larger groups (9) ate more than those in smaller groups (3), socialised less and started eating more rapidly.	Not known	No	The snack used was a cracker (similar to a UK digestive biscuit (more information provided in Evidence Tables) A healthier snack e.g. fruit would be preferable.
Wardle 2003	Effective interventions are those that have food tasting as well as information giving	Not clear	The number of exposures required to change behaviour is important – 10-15 daily exposures effective	Yes, children enjoyed the tasting procedure Parents felt that 2 weeks' daily exposure was too long	No	Funding may be a barrier

5.1.2. Corroborative evidence

Three studies (reported in four papers) were identified in the UK literature that address the above question.

Table 2. Corroborative evidence for promotion of healthy eating

Reference	Key points for practice development in UK settings
Scottish Executive 2006	• Children should be offered a variety of foods and repeatedly introduced to new foods from an early age • Meal times and snack times need to be planned, with time-tables in place, and supervised by staff to ensure every child's needs are met • Enough time to be given to children. For example 15 minutes for snack time and 30 minutes for a main meal • Encourage social skills at organised meal times • Avoid television and noise at mealtimes • Clear encouragement for making healthy food choices to re-enforce healthy eating messages • Follow Five-a-Day guidance on fruit and vegetable intake • Wholegrain bread, cereals and pulses to be included in meals • Menu planning to include the above, guided by nutrient intake guidance for pre-schoolers (see report) and introduce variety (see suggested 10 day menu in this report) • Partnership working is important – parents, guardians, staff and children to be involved • Nutrition policy at local level needed – document aims with regard to food and drink; write down what needs to be said to children regarding food, drink; write down policy regarding poor eaters, sweets/chocolate consumption; policy document to be in public domain • Staff to receive training • Monitoring and evaluation according to standards set for early education and child care settings
Lowe 2004; Horne 2004	• Before-after study in three UK primary schools in North Wales, Oxfordshire and Manchester of children aged 4-11 years • Video films featuring heroic peers (the Food Dudes) showing main characters enjoying healthy foods and receiving rewards (e.g. stickers, pencils, erasers) for eating the foods themselves is effective in increasing fruit and vegetable intake among pre-schoolers when these foods are freely available

Ofsted 2006	• A survey of 110 childcarers in England February 2005, including 64 childminders and 46 day-care providers • The majority of childcarers were satisfactory or better in providing a healthy balanced diet. Seventy four per cent of childminders and 64% of day-care providers were good or outstanding, 26% and 31%, respectively, were adequate. Four % day-care providers and no childminders were inadequate/did not meet the National standards for under 8s day care and childminding minimum. • Most childcarers placed an emphasis on home-cooked nutritious food using fresh ingredients. (Only 6 childcarers (6 day-care providers) used off-site caterers and 2 of them did not consistently provide healthy food.) Most carers providing a full meal service had a planned programme of meals but only 3 used nutritionists or other food experts to devise a healthy eating programme. • Many carers said they had adapted practice to give 5-a-day, particularly sessional care providers where snacks were previously biscuits. • The better providers helped children understand the value of healthy food and encouraged them to try new foods. Most childcarers talked of using low levels of salt, sugar and fats and limited use of processed foods. Forty % placed a high importance on food quality but 10% did not use their knowledge and offered sweets, crisps and biscuits as snacks and trips to fast food chains as treats. • Twelve childcarers had participated in healthy eating initiatives. • Good providers worked with parents to plan meals that met parental preferences and children's individual needs. Most providers sought parent's permission before trying different foods with children. Nine providers spoke about working with parents to overcome eating difficulties. Good providers would work with parents on their providing suitable snacks or meals whereas weaker providers would not tackle parents or feel it their responsibility to do so. Weaker providers were poor at recording and using information on dietary requirements and making their staff aware of food intolerances or allergies. • Ofsted recommended making food attractive, cutting up food into manageable sizes and serving the right size portions but acknowledged that weaker providers did not do so.

5.2. Key question 2

What interventions effectively promote the uptake of recommended vitamin and micronutrient supplements?

No SRs, RCTs or other studies were found in the worldwide literature search that addressed this question.

5.3. Key question 3

What is the effectiveness of dietary strategies that aim to reduce the risk of food allergies and intolerance, and the effectiveness of interventions that promote this advice?

One SR and one RCT were identified in the literature search that addressed this question. Two papers were identified from the same Australian study (the CAPS study) (Peat 2004, Marks 2006) and the SR also contained two papers from the CAPS study (Mihrshahi 2003, Peat 2004) giving a total of three papers for the CAPS study.

Tricon et al. (2006) carried out a SR (2+) to identify associations between diet and allergic diseases, including nutritional supplementation used to prevent asthma or allergy, which identified two RCTs: a Hungarian RCT (Bede 2003) and an Australian RCT with two publications (Mihrshahi 2003, Peat 2004), and one SR (Thien 2002) which included children aged 2-5 years. The reviewers gave no quality grades to individual studies but gave more weight in the interpretation of evidence to studies with strong study characteristics. One RCT (Bede 2003) of eighty nine children aged 4-16 years with mild to persistent bronchial asthma found supplementation with 200/290 mg magnesium citrate per day for 12 weeks (290 mg/day at age <7 year; 200 mg/day at age 7 years) had a beneficial association on bronchodilator use. The Cochrane review by Thien et al. (2002) only contained one study, an RCT by Nagakura, (2000) but the age range for participants in this study was 4-17 years This RCT found an improved peak flow and reduced asthma medication with n-3 PUFA supplementation. However, the overall conclusions of the review based on a total of nine RCTs were: there was little evidence to recommend supplementation or modification of intake of n-3 PUFAs to improve asthma control but there were no resulting harmful effects; there was no consistent effect on the forced expiratory volume in 1 second, peak flow rate, asthma symptoms, asthma medication use or bronchial hyper-reactivity.

The CAPS study (Childhood Asthma Prevention Study) of children with a family history of atopy (Mihrshahi 2003, Peat 2004, Marks 2006) examined the effectiveness of dietary fatty acid modification on the incidence of asthma. Six hundred and sixteen pregnant women were randomised to four intervention groups. Socio-economic status of participants was not reported, although 71% of parents were Australian born and 46% had tertiary education. The interventions were daily dietary supplementation with omega-3 fatty acids with restriction of omega-6 fatty acids versus placebo, and house dust mite allergen avoidance versus standard advice. The dietary intervention group (n=159) was supplemented with 500 mg tuna fish oil capsules, containing 184 mg n-3 PUFA to add to the child's food once daily from age 6 months, and provided with canola-based oils and spreads low in n-6 and high in n-3 fatty acids for use in food preparation with no house dust mite reduction; the placebo dietary supplements (n=149) group was provided with capsules containing 83% MUFA oils with oils and margarines rich in n-6 fatty acids for use in food preparation, also with no house mite reduction. (There was no supplementation before age 6 months if the child was breastfed but the capsule contents were added to formula if the infant was formula fed.) The two remaining groups had placebo dietary supplementation plus active house mite reduction (n=155) or both the dietary intervention and active house dust mite reduction (n=153). All participants received advice on simple cleaning, vacuuming, dusting and maintaining adequate ventilation. The house mite reduction intervention was intensive. Follow-up for asthma, cough, wheeze, eczema, and atopy to inhaled and ingested allergens was at 18 months (loss to follow-up, 10%) (Mihrshahi 2003), 3 years (loss to follow-up, 15%) (Peat 2004) and 5 years (loss to follow-up, 16%) (Marks 2006). Omega-3 PUFA supplementation was found to have a beneficial association for wheezing at 18 months (Mihrshahi 2003) and atopic cough at 3 years ($p<0.003$) (Peat 2004) but there were no significant effects for the other outcomes. For the dietary intervention at age 3 years there was a reduction in mild cough of 7.1% and of moderate cough of 4.1% ($p=0.03$). However, when stratified by atopy, there was a significant 10% (95% CI, 3.7 to 16.4%) reduction in atopic cough (mild or moderate cough with at least 1 positive skin prick test) by diet ($p=0.003$; number needed to treat, 10) but a negligible 1.1% (95% CI -7.1 to 9.5%) absolute reduction in non-atopic cough. At age 3 years the ratio of omega-6 to omega-3 fatty acids in plasma was significantly lower in the active dietary intervention group (5.8 vs. 7.4, $p<0.0001$) providing confirmation of

adherence to the intervention. At age 5 years the prevalence of asthma, wheezing, eczema or atopy did not differ between the dietary intervention groups ($p>0.1$).

No significant interaction between the interventions was observed. At age 3 years the house dust mite allergen avoidance intervention reduced sensitisation to house dust mite only ($p<0.05$). For the house dust mite avoidance intervention at age 5 years there were similarly no differences in the prevalence of asthma, wheezing or atopy ($p>0.1$) but the prevalence of eczema was marginally higher in the house dust mite avoidance intervention group ($p=0.06$).

Strength of evidence

An RCT (Bede et al. 2003, no quality grade) in a 2+ SR (Tricon et al. 2006) evaluated 200/290 mg of magnesium citrate supplementation (for 12 weeks) in children aged 4-16 years with mild to persistent bronchial asthma and found a beneficial association on bronchodilator use.

A single Australian 1+ RCT (Peat et al. 2004) in children with a family history of atopy studied two interventions, omega-3 fatty acid supplement daily from 6 months and house dust mite reduction (advice on cleaning, ventilation and allergen-impermeable mattress covers and children's bedding washed in an acaricidal detergent before birth and at 3-monthly intervals) were studied against placebo in a 2x2 design (CAPS study). The dietary intervention was associated with a significant (p 0.03) reduction in the prevalence of atopic cough at three years of age. However, there was no significant effect on the incidence of asthma or eczema and a negligible effect on the prevalence of cough in non-atopic children.

The same RCT (CAPS study) in a 2+ SR (Tricon et al. 2006) made an earlier assessment of the effect of the dietary intervention of n-3 PUFA supplementation at age 18 months and found a beneficial association with wheezing (Mihrshahi et al. 2003).

The CAPS 1+ RCT followed-up at age 5 years found that the prevalence of asthma, wheeze, eczema, or atopy did not differ for the dietary intervention and control groups ($p>0.1$) (Marks et al. 2006).

5.3.1. Sub questions

Table 3. Sub questions for strategies to promote allergy prevention advice

Reference	How does the structure and content of the intervention influence effectiveness?	Does effectiveness vary by gender, age, ethnicity, religious practices or social/ professional group of those receiving or delivering the intervention?	Does effectiveness vary with site/ setting or intensity/ duration of the intervention?	What are the views of those receiving and delivering the intervention ?	Is there evidence of unintended or harmful effects?	Are there barriers to replication of effective interventions?
Peat 2004 Marks 2006 (Mihrshahi 2003 In Tricon 2006)	Both the dietary and house mite dust interventions were comprehensive and clear cut. The dietary intervention would be easy to follow but the house dust mite intervention would have been very taxing.	Not reported	Not reported	Not reported, though compliance with both interventions stated to be good	None apparent	The interventions were designed to be suitable for public health campaigns that could be taken up widely by the community. No barriers other than cost of the capsules apparent for the dietary intervention.

Corroborative evidence was not found that addressed this question.

5.4. Key question 4

What is the effectiveness of interventions that aim to prevent diet-related dental caries, tooth loss and dental erosion in pre-school children?

Two SRs were identified that address this question (Burt 2006 (2-) and SIGN 2005 (2+)).

The narrative SR by Burt 2006 (2-) examined the use of polyol-sweetened chewing gums in controlling dental caries and only identified one study of pre-school children (Autio 2002). This before-after study found that chewing xylitol-sweetened gum 3 times/day for 3 weeks significantly reduced salivary mutans streptococci counts.

SIGN 2005 is a recently published (November 2005) national clinical guideline conducted by the Scottish Intercollegiate Guidelines Network (SIGN) and therefore directly applicable to the UK. It aimed to provide guidelines for the prevention and management of dental decay in the pre-school child including those relating to dietary factors. This guideline incorporated an extensive search of the literature, and presents levels of evidence from 1++ to 4 (the latter being "expert opinion") and grades of recommendations as guidelines from A to C. In SIGN 2005 there is a chapter covering diet and nutrition in which three sections contained study results relevant to this review: "Free sugars and dental caries", "Other foodstuffs and caries"

and “Sugar substitutes”. Limited data were reported from the individual studies, but have been summarised as follows[2]. Studies relevant to children aged 6-24 months are included in the NICE review for 6-24 month-old children and were from two sections of the SIGN review: “Milk feeding and caries” and “Free sugars and dental caries”. Six studies in the SIGN review were relevant to this review of 2-5 year olds. These were two SRs (Burt and Pai 2001, Lingstrom 2003), no RCTs and four studies of other design (Gibson and Williams 1999, Hallett 2002, Marshall 2003/Levy 2003, Rodrigues and Sheiham 2000) of which four studies were graded levels 1 or 2 by the SIGN reviewers (Burt and Pai 2001, Lingstrom 2003, Marshall 2003/Levy 2003, Rodrigues and Sheiham 2000).

The following three sections summarise the results from the studies in the SIGN review that are relevant to this review of nutrition interventions in children aged 2-5 years.

5.4.1. Free sugars in food/fluids

Free sugars in food

- A Brazilian study in the SIGN review compared low socio-economic metropolitan three year-old children in nurseries with (12 nurseries, 245 children) and without (17 nurseries, 265 children) guidelines that restricted or did not restrict the consumption of sugar (Rodrigues and Sheiham 2000, graded 2++ for quality by reviewer). After controlling for various factors, children attending nurseries with restricted intake of sugar had a decreased risk of caries. The twenty nine nurseries participated in a before-after study with follow-up after 1 year including dental examinations and dietary assessment of sugar intake at nursery and at home. Loss to follow-up was 22%. The odds ratio for caries for children attending nurseries without guidelines was 3.6 which was also related to higher daily frequency and weight of sugar intake at nursery, total overall daily frequency of sugar intake (at home and at nursery), past history of caries, use of fluoride and tooth brushing habits. Children with a sugar intake of >32.6 g per day at nursery were 2.99 times more likely to have an increment in caries than those with an intake of <32.6 g per day.
- A SR of 36 mostly cross-sectional studies in the SIGN review found a weak to moderate association between sugar consumption and dental caries, which was weaker in the presence of fluoridation (Burt and Pai 2001, graded 2+ for quality by reviewer). The SR excluded 33 studies on the basis of quality. Of the remaining included papers: two studies showed a strong, 16 studies a moderate, and 18 studies a weak to no, relationship between sugar consumption and caries. Of the 36 included studies, 22 studies were of permanent dentition and 14 studies of primary dentition. Seven of 23 cross-sectional studies; and seven of twelve cohort studies were of primary dentition; and the one case-control study was of permanent dentition. The majority of the studies showing a moderate or strong relationship were those of primary dentition i.e. 11 of the 14 studies of primary dentition.
- However Gibson and Williams (1999, graded 3 for quality by reviewer, in the SIGN review) in a large UK cross-sectional study concluded that regular tooth

[2] Of the studies included in the guideline, only those which may be applicable to young children have been summarised in this rapid review. The guidelines included additional recommendations based on the clinical experience of the guideline development group. These have not been summarised in this rapid review.

brushing (twice a day) with a fluoride toothpaste may have a greater impact on caries prevention in young children than restricting sugary foods (see below).

Relevant SIGN guideline: Parents and carers should be advised that foods and confectionery containing free sugars should be minimised, and if possible, restricted to meal times (Grade B).

Free sugars in fluids

- A large US prospective study of 642 children from birth living in a fluoridated water area (Marshall 2003/Levy 2003, graded 2+ by reviewer, in the SIGN review) (Iowa Fluoride Study) found an association between sugared drinks intake at age 1-4 y and dental caries at age 4-7 y with the highest risk associated with sweetened drinks intake in the first year. Milk had a neutral association with caries. Drinking 100% fruit juice also had an association with caries risk but to a lesser extent than sweetened drinks. Logistic regression models for beverage consumption at 1, 2, 3, 4 and 5 years and for 1 through 5 years for caries risk at ages 4-7 y years showed: children with zero intake of regular beverages from powder at 1 year, zero intake of regular soda pop at 2 and 3 years, and zero intake of sugar-free beverages from powder at 5 years had a decreased risk of caries; high intakes from beverages from powder at 4 and 5 years and for 1 through 5 years and regular pop at 5 years and for 1 through 5 years had an increased risk of caries; and low intake of 100% juice at 5 years decreased caries risk. Inadequate or low intakes of nutrients increased caries risk (e.g. vitamins B12, C and D, riboflavin, copper) except for vitamin E. Children with caries had lower median intakes of milk at ages 2 and 3 years than children without caries and; similarly, higher median intakes of regular (sugared) soda pop at 2, 3, 4 and 5 years; higher regular beverages from powder at 1, 4 and 5 years; and higher total sugared beverages at 4 and 5 years than those without caries (Marshall 2003). Total water intake at age 1-4 y was highly protective against dental caries at age 4-7 y (Levy 2003). Total non-water drinks consumption in the first year (including cow's milk) was the highest risk factor; while total water consumption was highly protective, suggesting that some of the adverse effect of sugary drinks may be because they reduce consumption of (fluoridated) water.
- A large cross-sectional study of Australian children in north Brisbane in a school setting aged 4-6 years (N=3375) (graded 3 by reviewers) found an increased risk of caries at age <6 years associated with sweetened bottle content (OR 4.29, 95%CI 2.90, 6.38), sleeping with a bottle (OR 1.73, 95%CI 1.49, 2.00) and sipping from the bottle during the day (OR 1.58, 95%CI 1.35, 1.84) (Hallett 2002 in SIGN review). Increased risk of caries was also related to ethnicity other than Caucasian (OR 1.99, 95%CI 1.37, 2.88), language other than English (OR 1.97, 95%CI 1.35, 2.86) and single parent status (OR 1.93, 95%CI 1.47, 2.52).
- The association between sweetened drinks and caries was reduced in a large UK cross-sectional study of 1450 British preschool children aged 1.5-4.5 years in 1992/3 (graded 3 by reviewers) which adjusted for social class and tooth brushing (Gibson and Williams 1999 in the SIGN review), however bottle use or fluoride exposure was not specifically examined. The National Diet and Nutrition Survey (NDNS) of children aged 1.5 to 4.5 years classified children into four groups according to social class and tooth brushing habit and determined associations between caries and intake of biscuit and cakes,

sugar confectionery, chocolate confectionery, soft drinks and % energy from non-milk extrinsic sugars using 4-day weighed diet records. The strength of the association between social class and caries was twice that between toothbrushing and caries and almost three times that between sugar confectionery and caries. (Other dietary variables were not significant.) The association between sugar confectionery and caries was only significant for those children who did not brush their teeth ≥2 times per day. Tooth brushing had a stronger impact in children in non-manual families compared to manual families. Household expenditure on confectionery was only associated with caries in children from manual families. Gibson and Williams concluded that regular tooth brushing (twice a day) with a fluoride toothpaste may have a greater impact on caries prevention in young children than restricting sugary foods.

Relevant SIGN guidelines: Parents and carers should be advised that drinks containing free sugars, including natural fruit juices, should be avoided between meals. Water or milk may be given instead (grade C).

5.4.2. Other foodstuffs

- Experimental evidence in the SIGN review suggested that cheese may be protective against caries but all three relevant studies were conducted in older children (age 7-9 years) or adults.
- There was no clear evidence on the consumption of other foods and the development of caries but whole fruit consumption did not appear to be cariogenic when eaten at normal levels.

Relevant SIGN guideline: Parents and carers should be advised that cheese is a good high energy food for toddlers as it is non-cariogenic and may be actively protective against caries (Grade C).

5.4.3. Sugar substitutes – bulk sweeteners, (polyols, e.g. xylitol)

- The SIGN review concluded that xylitol may be cariostatic.
- A SR of 18 randomised or clinical trials with at least 2 years follow-up examining chewing gums and sweets containing polyols found insufficient evidence that polyols prevented caries (Lingstrom 2003, graded 2+ by reviewer in the SIGN review). There was additional evidence that polyols are non-cariogenic. The interventions for the included trials all involved the substitution of sucrose with sugar substitutes or the addition of protective foods to chewing gum. The evidence for the use of sorbitol or xylitol or invert sugar was inconclusive. Adding calcium phosphate or dicalcium phosphate dihydrate to chewing gum had no preventive effect. Only two controlled clinical trials included children aged 2-5 years and both were graded C (limited value as evidence) by Lingstrom et al. A Swedish clinical trial of partial substitution of sucrose in the diet of preschool children age 3 years by invert sugar (N=151) gave a 17% reduction in caries after 2 years follow-up but the significance of the result was not given (Frostell 1981). (Loss to follow-up was 20%.) The second trial in children aged 3-12 years was of replacement of sucrose in candy by sorbitol (N=535) and gave a 45% reduction in caries after 3 years follow-up but had a loss to follow-up of 52% (Banoczy 1981). There were 12 studies in all of replacement of sucrose in candy or chewing gum by sorbitol or xylitol.

Relevant SIGN guideline: Parents and carers should be advised that confectionery and beverages containing sugar substitutes are preferable to those containing sugars (Grade B).

No other interventions were reported in the SIGN guideline that specifically targeted healthy eating with the aim of reducing caries.

Strength of evidence

A recently published UK guideline (SIGN 2005) (2+) included two relevant SRs (graded 2+ by reviewers) and two other studies (graded 2+ and 2++ by reviewers).

Evidence from a single Brazilian study (Rodrigues & Sheiham 2000, graded 2++ by reviewer) found children attending nurseries which restricted the consumption of sugar and who consumed lower amounts of sugar at lower frequencies had a substantially lower risk of dental caries.

A systematic review based on thirty-six studies (Burt & Pai 2001, graded 2+ by reviewer) found the relationship between dental caries and sugar consumption in the modern era is now lower than in the past due to widespread fluoride exposure.

A systematic review (Lingstrom et al. 2003, graded 2+ by reviewer) examining chewing gum and sweets containing polyols found insufficient evidence that polyols prevented dental caries but evidence that they were non-cariogenic.

A large US prospective study of 642 children from birth living in a fluoridated water area (Marshall et al. 2003/Levy et al. 2003, graded 2+ by reviewer) found an association between sugared drinks intake at age 1-4 y and dental caries at age 4-7 y with the highest risk associated with sweetened drinks intake in the first year. Milk had a neutral association with caries (Marshall et al. 2003). Total water intake at age 1-4 y was highly protective against dental caries at age 4-7 y (Levy et al. 2003). Total non-water drinks consumption in the first year (including cow's milk) was the highest risk factor; while total water consumption was highly protective, suggesting that some of the adverse effect of sugary drinks may be because they reduce consumption of (fluoridated) water.

5.4.4. Corroborative evidence

Three studies were identified in the UK literature that addressed the above question.

Table 4. Corroborative evidence for promotion of oral/dental health

Reference	Key points for practice development in UK settings
Crawford 1999	• Breadstick provision as a healthy mid-morning snack in Manchester primary schools (low fat, low salt, sugar free, also low cost, long shelf-life, easy storage, no litter, popular with children)
McKeown 2003	A practical, clear, informative oral health resource pack (information) for Health Visitor to be used to advise parents of young children about the health of their teeth containing the following items was found by Health Visitors in Northern Ireland to be practical, useful, clear and informative: • Index cards with relevant oral health information for client groups according to age (ante-natal care, 8 week, 7 months and 18 months visit, plus general oral health) • Series of photographs and X-Rays illustrating caries and tooth development • A copy each of *Scientific Basis of Dental Health Education* and *Nutrition and Dental Health Guidelines for Professionals* • Copies of leaflets[3] re-enforcing oral health messages for distribution during home visits
Hackett 2003	• Tempting Tots programme delivered a knowledge based programme reviewing the relationship between diet and dental health in St Helen's and Knowsley near Liverpool (a cluster-non-randomised trial). • Practical suggestions were given for snack and meal times • Children and carers were encouraged to try a variety of foods • Uncontroversial health messages • Programmes lasted half a day and were delivered at reception class or nursery • Evaluation by food intake questionnaires for the child completed by the carer 2 weeks before and 2 months after the session found significant changes for 5 foods: brown bread, baked potatoes, fresh fruit, sugar on food and fizzy drinks. Nutritional and dental health knowledge improved in the carers with an inverse relationship to socio-economic status. • Carers thought the session was enjoyable and useful

5.5. Key question 5

What is the effectiveness of dietary strategies that aim to increase the intake of iron rich foods and reduce the rate of iron deficiency anaemia among pre-schoolers?

One cross-over RCT (Shah 2003) (quality rating 1-) conducted in the US compared iron absorption in 25 children aged 3-6 years who drank either orange or apple juice with a standard meal. The ethnicity of the 21 participants who completed the study was 67% white, 24% Hispanic and 10% African American but socio-economic status was not reported. The intervention was either apple juice or orange juice with an identical meal on consecutive days in random order. The meals were labelled with different stable iron isotopes (3 mg) on successive days, either iron-57 or iron-58. The order in which the 2 juices were given was randomised as was the isotope used to label each juice. Apple juice contains far less ascorbic acid than orange juice: the

[3] Oral health messages mentioned in the paper were not described in detail

authors quoted 1mg/L vs. 30 mg/L, respectively, for the actual juices used. The outcome was iron absorption from the two meals measured from red blood cell incorporation 14 days later. Median iron absorption from the meal ingested with apple juice was 7.17% (mean ± SD, 9.48% ± 9.68%), and median iron absorption from the meal ingested with orange juice was 7.78% (9.80% ± 6.66%; p=0.44). The authors concluded that iron was absorbed well from meals containing either apple juice or orange juice.

There were two relevant before-after studies in the Tedstone SR which targeted parents or carers (James 1992, Smith 1986). These studies have been considered under Key Question 1. The study by James et al. (1992 (graded moderate quality by reviewer) examined the effect of healthy eating promotion on carers (mothers) in combined primary care and home settings (N=44). Two hospital dietitcians trained health visitors and GPs (5 half day seminars) to use the results of a 7-day dietary diary to tailor advice and set realistic objectives for inner city mothers on a low-income to improve the diet of their children aged 1-4 years. Health visitors also visited mothers for 16-20 weeks to provide advice and support with a mean of 8-9 hours teaching. There was an overall improvement in the children's diets ($p<0.01$) with increased intake of protein containing iron. Smith et al. (1986, graded moderate/poor for quality by reviewer) tested the efficacy of individual nutrition counselling (30 minutes) of parents of anaemic WIC children aged <5 years (n=25) (haemoglobin <11 g/L) along with 30 minute nutrition education classes aiming to improve the diet particularly for iron, calcium, protein and vitamins A and C. The control group were anaemic children not enrolled in WIC but matched for age, sex and race (n=25). The haemoglobin concentration of the children improved in the intervention group and was higher than the control group after 6 months ($p<0.05$).

A RCT by Gutelius et al. (1997, graded of moderate quality by reviewer) in the Elkan SR (2+) evaluated intensive home visits by a primary care paediatrician or nurse from 7 months pregnant till age 3 years to unmarried low-income African American schoolgirls with additional group events for 1 year. The infants were also given 8-16 mg iron daily for at least the first year of life but no details of the iron status or iron intake of the infants was reported before or after the intervention.

No corroborative evidence was found.

6. Overview and Discussion

Recent studies have shown that pre-school children in the UK, particularly those from low-income families have higher intakes of extrinsic sugars and salt in their diets and they do not have enough fruit and vegetables. The rate of anaemia among children in this age group needs to be lowered, and dietary strategies are needed to reduce the risk of allergies.

This rapid review identified a relatively large body of studies that evaluated the effectiveness of interventions to promote healthy eating among pre-school children. In contrast, there was limited evidence that addressed strategies to prevent dental caries, reduce the risk of allergies, increase the intake of iron-rich foods or reduce anaemia. No studies met the inclusion criteria for vitamin and mineral supplementation. There were no studies of interventions that specifically addressed the problem of high salt intake but reduction in salt intake was specifically mentioned in one US cohort study of the Head Start programme as one aspect of 'healthy eating' (Koblinsky 1992).

Based on the literature, it appears that nutrition education interventions directed at pre-school children and their parents are effective in improving *knowledge* and *attitudes* to healthy eating. Not all studies examined *behaviour*. There were no differences in the results of interventions directed at low-income families compared to affluent families.

The literature search did not identify any studies, except one, that evaluated the provision of fruit or vegetables along with nutrition education or advice with the exception of behavioural studies. It is recommended that further research is undertaken to see if multi-faceted interventions such as this may be effective. This type of evidence would also be useful to aid the development of the Healthy Start programme.

This rapid review provides moderately strong evidence on which to base recommendations for public health strategies *to improve knowledge and attitudes towards healthy eating* among pre-school children and their parents. The strategies described in this rapid review can be implemented in the UK; most of these are education, advice and counselling programmes. The health visiting team who review a child's progress between 2 and 3 years are in a good position to provide individualised advice and counselling to parents of young children. Following this, immunisation appointments between 3 and 5 years, and school entry checks between 4 and 5 years offer similar opportunities. Pre-schools, crèches, Sure Start/Children Centre nurseries and day-care centres for young children offer opportunities for delivering both individual and group interventions.

The evidence upon which to base policy and practice *to improve the nutritional well-being of pre-school children*, particularly interventions for children from low-income families is more limited but this discussion will concentrate on identifying the characteristics of interventions that do affect children's dietary intake. Interventions for parents of young children whether from professionals, paraprofessionals or trained peer supporters, were successful in improving children's diet where they were intensive, incorporated behavioural theories, gave a clear message and were tailored to educational level and family resources. Interventions for children aged 2-5 years were successful in improving children's acceptance of novel or previously disliked foods if they included behavioural approaches, avoided a didactic approach, used

developmentally appropriate methods, used food-based activities, used repeated exposure, included food tasting and offered choice rather than simple exposure. It is apparent that suitable training is required for these interventions to be effective.

The interventions for children identified which evaluated the effect on food intake as opposed to nutritional knowledge appeared to concentrate on and be most effective in increasing intake of fruit and vegetables or 'healthy' snacks. Most of the successful interventions were aimed at middle class children or a socio-economically diverse population of children.

The interventions for parents of young children which were effective in changing dietary intake generally had a wider remit to increase the diversity and nutritional quality of the family diet, reduce fat and sugar intake, and increase fruit and vegetable intake. The successful interventions were predominately aimed at low income families. Several studies also aimed to improve food buying, meal planning, cooking and preparation, food safety and lifestyle (predominately by increasing physical exercise) and one study encouraged infant self-feeding. Any future interventions could also include encouragement to eat family meals prepared in the home.

A large Finnish study (Lagstrom 1997) (quality rating 1-) with a narrow focus was specifically undertaken to reduce children's exposure to the known environmental atherosclerosis risk factors through dietary counselling. The intervention included individualised counselling that focused on the child's diet, aiming to reduce intake of saturated fats and cholesterol whilst supplying adequate amounts of energy and was provided to families by a paediatrician, nutritionist and nurse at child health clinics from age 7 months to 5 years. In this study mothers kept records of their child's food consumption. The intervention was successful in reducing the children's fat intake and increasing their percentage energy intakes of carbohydrate and protein, though loss to follow-up was high. The narrow focus of the study may have contributed to its success. Another US RCT had a narrow focus to reduce overweight in parents and children (Cottrell 2005) (quality rating 1-) where in the intervention group one parent and their five year-old child were given a daily step log and a pedometer and diet and physical activity recommendations, particularly to increase step exercise. Only children in the control group were given a daily step log and a pedometer and the advice given to control group parents was only for kindergarten children. Children in both groups increased their physical activity and enjoyment in physical activity but the increase in activity was significantly higher in the intervention group with parental participation and the intervention group children consumed significantly fewer sweets but there were no other significant dietary differences. The drop out rate for this RCT was also high.

One UK before-after study in inner city Bristol was successful in improving children's diets and appears to have met most of the criteria suggested for a successful intervention (James 1992 in the Tedstone 1998 SR, graded 'moderate' quality by reviewer). Two hospital dietitians trained health visitors and GPs to use the results of a 7-day diet diary to tailor advice and set realistic objectives for single mothers on a low-income to improve the diet of their children aged 1-4 years. The health visitors also visited mothers to provide advice and support. Mother's organisation skills also improved. Another UK before-after study (Horne 2004/Lowe 2004) used a peer modelling and reward based intervention for primary school children which increased the fruit and vegetable intake of 4-7 year-olds. The children were shown six video adventures featuring heroic peers (the Food Dudes) who enjoyed eating fruit and vegetables. A selection of differing fruit and vegetables were then presented just before mid-morning break and at lunchtime over the 16 days of the intervention.

The behavioural studies which aimed to increase nutritional knowledge or attitude towards healthy eating in preschool children additionally provided positive evidence for peer and adult modelling and positive emotional tone from adults. One study found that a healthy eating programme for children aged 1-5 years given in the classroom was more effective in increasing children's nutritional knowledge compared to the same programme given at home by the parents (Lee 1984 in Tedstone 1998) but other studies have found that parental involvement in nutritional education either at home or at school can improve nutritional knowledge (Essa 1988, Singleton 1992 in Tedstone 1998 SR). It cannot be assumed that interventions in the classroom will be more effective than those at home in changing children's behaviour. An RCT by Wardle et al. (2003) with a simple parent-led intervention was successful in increasing children's acceptance of previously disliked vegetables. A behavioural study found that children's snack intake was affected by group size (Lumeng and Hillman 2007) implying that certain interventions may be more appropriate at home and others in a classroom.

The SR by Thomas et al. (2003) concluded that interventions aimed at preschool children should promote the children's favourite fruit or vegetables or target the ones that they do not like; and reduce the emphasis on health messages. A non-RCT in the Thomas SR (Hendy 1999) found offering a choice for eating new fruits or vegetables was more effective than offering a reward, which was only effective on a short-term basis but both were more effective than simple exposure, insisting or teacher-modelling. Three behavioural studies in the SR by Contento et al. (1995) also assessed the effect of offering a reward with conflicting results: one found as above that offering a reward for choosing a healthy snack only had a temporary positive effect (Stark 1986); another study found that offering a reward or positive adult attention positively improved food choice (Birch 1980b); and the third study found that offering a reward decreased the likelihood of consumption of a disliked beverage (Birch 1984). The reward offered in the study by Hendy et al. was candy for eating fruit or vegetables which appears to be a self-defeating intervention if the overall aim is to encourage healthy eating. A classroom intervention (Lawatsch 1990 in the Tedstone 1998 SR (graded moderate quality by reviewer)) where children's stories were told with two approaches 'threat' or benefit' to improve attitude to eating vegetables found both were effective but overall the 'benefit' approach was more successful. Conversely, a pilot RCT (Bannon and Schwartz 2006 (1-)) found both videos with a gain-framed or with a loss-framed message for eating a healthy snack (an apple) shown to 5 year-old children in kindergarten classes increased the likelihood of choosing an apple when compared to controls. Controls were shown a video not related to eating. The result was significant ($p<0.05$) for the loss-framed video and only marginally significant for the gain-framed video ($p<0.06$). However intake was not measured in this study just choice of snack.

Any further research will need to measure behaviour change in the short and long term. Research is needed on the impact of food advertising on food choices made by pre-school children and their parents, the impact of widening choice in the range of confectionery marketed in shops and supermarkets for young children, the effectiveness of campaigns such as Five-a-Day, printed information such as Birth to Five, and the effectiveness of the re-structured welfare food programme: Healthy Start. It is further recommended that more primary research is needed relevant to public health interventions which enable families to provide healthy diets for pre-school children

The one SR (Tricon 2006) that was identified of the effectiveness of dietary strategies to reduce the risk of allergies included the CAPS study (Mihrshahi 2003, Peat 2004,

Marks 2006), which demonstrated that supplementation with omega-3 fatty acids (tuna fish oil capsules) of children with a family history of atopy from age 6 months had a beneficial association with wheezing at age 18 months and atopic cough at age 3 years but no significant beneficial effect at age 5 years. The Tricon SR also included a Cochrane review by Thien et al. (2002) based on a total of nine RCTs which conversely concluded that there was little evidence to recommend supplementation or modification of intake of n-3 PUFAs to improve asthma control. However, the Thien review only contained one relevant study for children aged 2-5 years but the age range for the RCT was 4-17 years (Nagakura 2000). This study found an improved peak flow and reduced asthma medication with n-3 PUFA supplementation. No specific dietary strategies that reduced the risk of food allergy and intolerance were identified.

Limited evidence was found for interventions preventing diet-related caries in pre-school children. A recently published UK guideline (SIGN 2005) on the prevention and management of dental decay in the pre-school child (based on a systematic review of relevant studies) provided level 2+ evidence but provided little detail of included studies. One study found children attending nurseries with guidelines which restricted sugar intake had decreased risk of caries and a lower sugar intake (Rodrigues and Sheiham 2000, graded 2++ for quality by reviewer) but the study was carried out in Brazil. The study found a higher caries incidence in children with a sugar intake of >32.6 g per day at nursery than those with an intake of <32.6 g per day. The sugar intake of pre-school children in the UK is probably higher than that of Brazilian children (Gregory 1995, Emmett 2002). The consumption of free sugars (Burt and Pai 2001, SR graded 2+ for quality by reviewer) and sugared drinks (Marshall 2003/Levy 2003, graded 2+ by reviewer) by pre-school children was associated with later dental caries but the risk was reduced in the presence of fluoridation. Fourteen of the 36 mainly cross-sectional studies included in the SR by Burt and Pai (2001) were of primary dentition but no details were given of the ages of the participants. The prospective study by Marshall et al. (2003) and Levy et al. (2003) was carried out in a fluoridated water area. Drinking fluoridated water from age 1 year to age 4 years was highly protective against dental caries therefore drinking drinks other than water increased caries risk (Levy 2003). Drinking milk had a neutral association with caries. Drinking 100% fruit juice also had an association with caries risk but to a lesser extent than sweetened drinks. An SR by Lingstrom (2003, SR graded 2+ by reviewer) concluded there was insufficient evidence that the replacement of sucrose by polyols in chewing gum and sweets prevented dental caries but that they may be cariostatic. Only two of the included trials were of children aged 2-5 years and they were both graded of limited value by Lingstrom and had high losses to follow-up: one found a reduction in caries with partial replacement of sucrose in the diet by invert sugar (Frostell 1981); and the other, a reduction in caries with replacement of sucrose in candy by sorbitol (Banoczy 1981). Two of the non-RCT UK studies identified for this review were concerned with the provision of healthy snacks. The SIGN review concluded that there was no evidence that whole fruit consumption was cariogenic and advocated the use of cheese as a non-cariogenic snack but there were no relevant studies for pre-school children. Since milk is non-cariogenic, provision of mid-morning milk for pre-schoolers may be a useful option. The third non-RCT UK cluster trial (Hackett 2003) for carers of children in reception or nursery classes in the Liverpool area was of a half day educational session, ‘Tempting Tots’, carried out in the company of the children. The programme reviewed the relationship between diet and dental health giving uncontroversial messages, practical suggestions for snacks and meals and encouragement to try a variety of foods. The carers enjoyed following the course with the children and it was successful in improving the diet of the children and the knowledge of their carers.

Four studies of dietary strategies aiming to increase the intake of iron rich foods and/or reduce the rate of iron deficiency anaemia among pre-schoolers were identified. There was one cross-over RCT (Shah 2003) (1-) of a dietary strategy that aimed to reduce the rate of iron deficiency anaemia among pre-schoolers, which found that iron was absorbed well from meals containing either apple juice or orange juice. The authors thought iron absorption may have differed with the two juices since apple juice contains far less ascorbic acid than orange juice. However apple juice contains large quantities of malic acid (4 g/L in the juice used) compared to negligible amounts in orange juice. The overall pH of both juices is very similar (~3.5) and therefore similar iron absorption from the two meals would have been expected. An American before-after study in the SR by Tedstone et al. (1998) (Smith1986, graded moderate/poor quality by reviewer) tested the efficacy of individual nutrition counselling (30 minutes) of parents of anaemic WIC children aged <5 years with nutrition education classes aiming to improve the diet particularly for iron, calcium, protein and vitamins A and C. The haemoglobin concentration of children improved in the intervention group and was higher than the control group after 6 months ($p<0.05$). The UK before-after study of single mothers of children aged 1-4 years in inner city Bristol by James et al. (1992, graded of 'moderate' quality by reviewer) included in the Tedstone SR, which examined the effect of healthy eating promotion in combined primary care and home settings, gave an overall improvement in their children's diets, which included an increased intake of protein containing iron. A further RCT by Gutelius et al. (1997, graded of moderate quality by reviewer) in the Elkan SR (2+) evaluated intensive home visits by a primary care paediatrician or nurse to unmarried low-income African American schoolgirls with additional group events. The infants were additionally given a daily iron supplement for at least the first year of life but no details of the iron status or iron intake of the infants was reported in the Elkan review. Three studies therefore incorporated strategies to increase iron intake into interventions with a broader overall aim to improve the diet, two of which used individual nutritional counselling.

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Emmett P, Rogers I and Symes C. (2002) Food and nutrient intakes of a population of 3-year-old children in the South West of England. Public Health Nutrition 5: 55-64.

Hinds K, Gregory JR. (1995) National Diet and Nutrition Survey: Children aged 1.5 to 4.5 years. Vol. 2. Report of the Dental Survey. London: HMSO.

Gregory JR, Collins JL, Davies PSW, Hughes J and Clarke P. (1995) National Diet and Nutrition Survey: Children aged 1.5 to 4.5 years. Vol 1. Report of the Diet and Nutrition Service. London: HMSO

Ransley JK, Greenwood DC, Cade JE, Blenkinsop S, Schagen I, Teeman D, Scott E, White G, Schagen I. (2007) Does the school fruit and vegetable scheme improve children's diet? A non-randomised controlled trial. Journal of Epidemiology and Community Health 61: 699-703.

APPENDIX A: Included studies

Systematic Reviews

Burt BA (2006) The use of sorbitol- and xylitol-sweetened chewing gum in caries control. *Journal of the American Dental Association*, vol 137 pp 190-196.

Ciliska D, Miles E, O'Brien MA et al. (1999) The effectiveness of comminuty interventions to increase fruit and vegetable consumption in people four years of age and older. Ontario: Public Health Research Education and Development Program, Effective Public Health Practice Project, 45 (March).

Contento I, Balch GI, Bronner YL et al. (1995) The effectiveness of nutrition education and implications for nutrition education policy, programs and research: a review of research. *Journal of Nutrition Education* 27(6): 277-418.

Elkan R, Kendrick D, Hewitt M et al. (2000) The effectiveness of domiciliary health visiting: a systematic review of international studies and a selective review of the British literature. *Health Technology Assessment* 4(13): 1-339.

SIGN (2005) Prevention and management of dental decay in the pre-school child: A national clinical guideline. Scottish Intercollegiate Guidelines Network 83, November (www.SIGN.ac.uk).

Tedstone A, Aviles M, Shetty P and Daniels L. (1998) Effectiveness of interventions to promote healthy eating in preschool children aged 1 to 5 years: a review. London*:* Health Education Authority, 65.

Thomas J, Sutcliffe K, Harden A et al (2003) Children and healthy eating: a systematic review of barriers and facilitators. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

Tricon S, Willers S, Smit HA et al (2006) Nutrition and allergic disease. *Clinical and Experimental Allergy Reviews*, 6, 117-188.

Randomised Controlled Trials (eight trials reported in nine papers)

Bannon K & Schwartz MB (2006) Impact of nutrition messages on children's food choice: Pilot study. *Appetite* 46, 124-129.

Blom-Hoffman J, Kelleher C, Power TJ et al. (2004) Promoting healthy food consumption among young children: Evaluation of a multi-component nutrition education program. *Journal of School Psychology* 42: 45-60.

Cottrell L, Spangler-Murphey E, Minor V et al. (2005) A kindergarten cardiovascular risk surveillance study: CARDIAC-Kinder. *American Journal of Health Behaviour* 29(6): 595-606.

Lagstrom H, Jokinen E, Seppanen R et al. (1997) Nutrient intakes by young children in a prospective randomised trial of a low-saturated fat, low-cholesterol diet: The STRIP Baby Project. *Archives of Pediatrics and Adolescent Medicine* 151(2): 181-8.

Lumeng JC, Hillman KH (2007) Eating in larger groups increases food consumption. *Arch. Dis. Child*. Vol 92, pp 384-387.

Marks GB, Mihrshahi S, Kemp AS et al. (2006) Prevention of asthma during the first 5 years of life: a randomised controlled trial. *Journal of Allergy & Clinical Immunology* 118(1): 53-61.

Peat JK, Mihrshahi S, Kemp AS et al. (2004) Three-year outcomes of dietary fatty acid modification and house dust mite reduction in the Childhood Asthma Prevention Study. *Journal of Allergy & Clinical Immunology* 114(4): 807-13.

Shah M, Griffin IJ, Lifschitz CH et al. (2003) Effect of orange and apple juices on iron absorption in children. *Archives of Pediatrics & Adolescent Medicine* 157(12): 1232-6.

Wardle J, Cooke LJ, Leigh Gibson E et al (2003) Increasing children's acceptance of vegetables; a randomized trial of parent-led exposure. *Appetite* 40, 155-162.

APPENDIX B: Excluded studies

Systematic reviews excluded

Systematic Reviews	*Reasons for exclusion*
AHRQ (2005) Effects of Omega-3 Fatty Acids on Child and Maternal Health. In: AHRQ Evidence Report no.118.	i) Not related to supplements
Anderson JW, Johnstone BM, Cook-Newell ME (1995) Meta-analysis of the effects of soy protein intake on serum lipids. New England Journal of Medicine. 333 (5):276-282.	i) Sick children
Angermayr LCC (2004) Iodine supplementation for preventing iodine deficiency disorders in children. In: The Cochrane Database of Systematic Reviews: Reviews 2004 Issue 2 John Wiley & Sons, Ltd Chichester, UK DOI: 10.1002/14651858.CD003819.pub2.	i) Not promotion of supplements
Baumgartner M, Brown CA, Exl BM et al. (1998) Controlled trials investigating the use of one partially hydrolyzed whey formula for dietary prevention of atopic manifestations until 60 months of age: an overview using meta-analytical techniques. *Nutrition Research* 18 (8):1425-1442.	Review - includes study by RK Chandra (work discredited)
Berry D, Sheehan R, Heschel R et al. (2004) Family-based interventions for childhood obesity: a review. Journal of Family Nursing. 10 (4):429-449.	i) Obesity
Berry D, Sheehan R, Heschel R et al. (2004) Family-based interventions for childhood obesity: a review. Journal of Family Nursing. 10 (4):429-449.	i) Obesity
Brown KH, Peerson JM, Rivera J et al. (2002) Effect of supplemental zinc on the growth and serum zinc concentrations of prepubertal children: a meta-analysis of randomized controlled trials. American Journal of Clinical Nutrition. 75 (6):1062-1071.	i) Children age >5 years
Brunton G, Harden A, Rees R et al. (2003) Children and physical activity: a systematic review of barriers and facilitators.101.	i) Not related to diet
Butryn ML, Wadden TA (2005) Treatment of overweight in children and adolescents: does dieting increase the risk of eating disorders. International Journal of Eating Disorders. 37 (4):285-293.	i) Obesity
Campbell K, Waters E, O'Meara S et al. (2001) Interventions for preventing obesity in childhood: a systematic review. Obesity Reviews. 2 (3):149-157.	i) Obesity
Eysenbach G, Powell J, Englesakis M et al. (2004) Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions. Bmj.1166-1170.	i) No studies on diets of young children
Gepkens A, Gunning-Schepers LJ (1996) Interventions to reduce socioeconomic health differences: a review of the international literature. European Journal of Public Health. 6 (3):218-226.	i) Not diet
Gera T, Sachdev HP (2002) Effect of iron supplementation on incidence of infectious illness in children: systematic review. Bmj.1142-1144.	i) Not promotion of supplementation
Grotto I, Mimouni M, Gdalevich M et al. (2003) Vitamin A supplementation and childhood morbidity from diarrhea and respiratory infections: a meta-analysis. Journal of Pediatrics. 142 (3):297-304.	i) Not promotion of supplementation
Institute for Clinical Systems Improvement (2005) Treatment of obesity in children and adolescents. Bloomington, MN: Institute	i) Obesity

for Clinical Systems Improvement (ICSI).28.	
Kay EJ, and Locker D. (1997) Effectiveness of oral health promotion: a review. London, Health Education Authority Kay EJ, and Locker D. (1998) A systematic review of the effectiveness of health promotion aimed at improving oral health. Community Dental Health 15 (3): 132-144	Excluded after consultation with NICE. Most included studies involved oral hygiene. Those that aimed to alter sugar intake did not report caries as an outcome variable.
Krishna S, Balas EA, Boren SA et al. (2002) Patient acceptance of educational voice messages: a review of controlled clinical studies. Methods of Information in Medicine. 41 (5):360-369.	i) Not children up to 5 years
Lacour M, Zunder T, Restle A et al. (2004) No evidence for an impact of selenium supplementation on environment associated health disorders: a systematic review. International Journal of Hygiene and Environmental Health. 207 (1):1-13.	i) Not children up to 5 years
Malik, V. S., M. B. Schulze, et al. (2006). Intake of sugar-sweetened beverages and weight gain: a systematic review. American Journal of Clinical Nutrition 84(2): 274-88.	i) Physical outcomes only – weight gain
Martins S, Logan S, Gilbert R (2001) Iron therapy for improving psychomotor development and cognitive function in children under the age of three with iron deficiency anaemia. In: The Cochrane Database of Systematic Reviews: Reviews 2001 Issue 2 John Wiley & Sons, Ltd Chichester, UK DOI: 10.1002/14651858.CD001444.	i) Sick children
Panpanich RGP (1999) Growth monitoring in children. In: The Cochrane Database of Systematic Reviews: Reviews 1999 Issue 4 John Wiley & Sons, Ltd Chichester, UK DOI: 10.1002/14651858.CD001443.	i) Not diet
Pignone MP, Phillips CJ, Lannon CM et al. (2001) Screening for lipid disorders: systematic evidence review.93.	i) Screening
Poustie VJ, Smyth RL, Watling RM (1999) Oral protein calorie supplementation for children with chronic disease. In: The Cochrane Database of Systematic Reviews: Reviews 1999 Issue 3 John Wiley & Sons, Ltd Chichester, UK DOI: 10.1002/14651858.CD001914.	i) Sick children
Ramakrishnan U, Aburto N, McCabe G et al. (2004) Multimicronutrient interventions but not vitamin A or iron interventions alone improve child growth: results of 3 meta-analyses. Journal of Nutrition. 134 (10):2592-2602.	i) Country
Sachdev HP, Gera T, Nestel P (2005) Effect of iron supplementation on mental and motor development in children: systematic review of randomised controlled trials. Public Health Nutrition. 8 (2):117-132.	i) Not promotion of supplementation
Shepherd J, Harden A, Rees R et al. (2002) Young people and healthy eating: a systematic review of research on barriers and facilitators.165.	i) Children older than 5 years
SIGN (2005) Management of obesity in children and young people. In: Guideline no.69 p.26.	i) Obesity
Simons-Morton DG, Mullen PD, Mains DA et al. (1992) Characteristics of controlled studies of patient education and counseling for preventive health behaviors. Patient Education and Counseling. 19 (2):175-204.	i) No studies on diets of young children
Summerbell C, Waters E, Edmunds LD et al. (2005) Interventions for preventing obesity in children. In: The Cochrane Database of Systematic Reviews: Reviews 2005 Issue 3 John Wiley & Sons, Ltd Chichester, UK DOI: 10.1002/14651858.CD001871.pub2.	i) Obesity
Tang JL, Armitage JM, Lancaster T et al. (1998) Systematic review of dietary intervention trials to lower blood total	i) Outcome not among those listed for these 2

cholesterol in free-living subjects. Bmj.1213-1220.	reviews
Thomas H, Ciliska D, Micucci S et al. (2004) Effectiveness of physical activity enhancement and obesity prevention programs in children and youth.252.	i) Obesity
University of York, N. H. S. Centre for Reviews Dissemination (1997) The prevention and treatment of obesity. Effective Health Care. 3 (2):1-12.	i) Obesity
University of York, N. H. S. Centre for Reviews Dissemination (2002) The prevention and treatment of childhood obesity. Effective Health Care. 7 (6):1-8.	i) Obesity

Randomised controlled trials excluded

RCTs	*Reasons for exclusion*
Alarcon PA, Lin LH, Noche M, et al. (2003) Effect of oral supplementation on catch-up growth in picky eaters. Clinical Pediatrics. 42 (3):209-17.	i) Outcome is catch-up growth
Aoki T, Kojima M, Adachi Jet al. (1992) Effect of short-term egg exclusion diet on infantile atopic dermatitis and its relation to egg allergy: a single-blind test. Acta Dermato Venereologica. Supplementum. 176:99-102.	i) Sick children
Bartholomew JB, Jowers EM (2006) Increasing frequency of lower-fat entrees offered at school lunch: an environmental change strategy to increase healthful selections. *Journal of the American Dietetic Association* 106(2): 248-52.	i) Elementary school children (age > 5 years) ii) Not UK
Becker A, Watson W, Ferguson A et al. (2004) The Canadian asthma primary prevention study: outcomes at 2 years of age. Journal of Allergy & Clinical Immunology. 113 (4):650-6.	i) Outcomes not reported separately for dietary intervention
Birmingham B, Schultz JA, Edlefsen M (2004) Evaluation of a five-day recipe booklet for enhancing the use of fruit and vegetables in low-income households. *Journal of Community Health: The Publication for Promotion and Disease Prevention* 29(1):45-62.	i) Not an RCT ii) Outcomes not related to pre-school children, only attitudes and behaviours of mothers iii) Not UK
Bourcier E, Bowen DJ, Meischke H et el. (2003) Evaluation of strategies used by family food preparers to influence healthy eating. *Appetite* 41(3): 265-72.	i) Survey ii) Not UK
Briley ME, Jastrow S, Vickers J et al. (1999) Dietary intake at child-care centres and away: Are parents and care providers working as partners or at cross-purposes? *Journal of the American Dietetic Association* 99(8):950-4.	i) Not RCT ii) Not UK iii) No intervention
Bruening KS, Gilbride JA, Passassante MR, et al. (1999) Dietary intake and health outcomes among young children attending 2 urban day-care centres. *Journal of the American Dietetic Association* 99(12):1529-35.	i) Not RCT ii) Evaluates effectiveness of a nutritious meal provided at a day care centre iii) Not UK
Burks, K. and S. Jones (2005). The Canadian asthma primary prevention study: Outcomes at 2 years of age. *Pediatrics* 116(2): 537.	i) Multifaceted intervention
Cameron, F. L., L. T. Weaver, et al. (2006). Dietary and social characteristics of children with severe tooth decay. *Scottish Medical Journal* 51(3): 26-29.	i) Cross-sectional study ii) Children aged 3-11 years
Cason, K. L. (2001). Evaluation of a preschool nutrition education program based on the theory of multiple intelligences. Journal of Nutrition Education 33(3): 161-164	i) Before-after study
Childs F, Aukett A, Darbyshire Pet al. (1997) Dietary education and iron deficiency anaemia in the inner city. *Archives of*	i) Children aged <2 years ii) Children diagnosed wth

Disease in Childhood 76(2):144-7.	anaemia
Chomitz VR, Collins J, Kin J et al. (2003) Promoting healthy weight among elementary school children via a health report card approach. *Archives of Pediatrics & Adolescent Medicine* 157(8): 765-72.	i) Children aged >5 years
Christofides, A., Schauer, C., Sharieff, W. and Zlotkin, S. H. (2005) Acceptability of micronutrient sprinkles: A new food-based approach for delivering iron to First Nations and Inuit children in Northern Canada. Chronic Dis Can, 26(4), 114-20.	i) Not supplements
Cox DR, Skinner JD, Carruth BR et al. (1997) A Food Variety Index for Toddlers (VIT): development and application. Journal of the American Dietetic Association. 97 (12):1382-6; quiz 1387-8.	i) Not an RCT
Deaves DM. An assessment of the value of health education in the prevention of childhood asthma. *Journal of Advanced Nursing. 1993* 18(3):354-63.	i) Children diagnosed with asthma ii) Not RCT iii) Assesses existing provision of health education for secondary prevention of asthma
Dixon LB, Tershakovec AM, McKenzie J et al. Diet quality of young children who received nutrition education promoting lower dietary fat. *Public Health Nutrition* 3(4):411-416.	i) Children had elevated LDL cholesterol
Dollahite J, Hosig KW, White KA et al. Impact of school-based community intervention programme on nutrition knowledge ad food choices in elementary school children in rural Arkansas Delta. *Journal of Nutrition Education* 30(5): 289-301.	i) No outcome data reported for ≤5 year old children
Emond A, Pollock J, Deave T et al. (2002) An evaluation of the First Parent Health Visitor Scheme. *Archives of Disease in Childhood* 86(3):150-7.	i) Children <2 years of age
Entwistle N. An innovative strategy to promote oral health in schoolchildren. *Journal of the Royal Society of Health* 114 (6): 311-313.	i) Not appropriate for pre-school children – requires purchasing of drink.
Eriksen K (2003) Effect of a fruit and vegetable subscription in Danish schools. *Public Health Nutrition* 6(1) 57-63	i) Children aged >5 years
Faith, M. S., E. Rose, et al. (2006). Co-twin control designs for testing behavioral economic theories of child nutrition: Methodological note. International Journal of Obesity 30(10): 1501-1505	i) Methodological paper
Fisher JA, Birch LL (1999) Restricting access to palatable foods affects children's behavioural response, food selection, and intake. *American journal of Clinical Nutrition* 69(6):1264-72.	i) quasi-experimental design ii) Not UK
Flinterman, A. E., A. C. Knulst, et al. (2006). Acute allergic reactions in children with AEDS after prolonged cow's milk elimination diets. *Allergy* 61(3): 370-4.	i) Not an RCT ii) Dutch study iii) children aged 2-10 years
Flodmark, C. E., C. Marcus, et al. (2006). Interventions to prevent obesity in children and adolescents: a systematic literature review. *International Journal of Obesity* 30(4): 579-589.	i) No relevant outcomes (Follow-up for STRIP study Lagstrom 1997)
Frankova, S. (2006). Attitudes towards food, development of body image and personality of lean and heavy preschool children. *Homeostasis in Health and Disease* 44(1-2): 77-79.	i) No intervention ii) Cross-sectional study
Galloway AT, Fiorito LM, Francis LA, Birch LL (2006) 'Finish your soup': Counterproductive effects of pressuring children to eat on intake and affect. *Appetite* 46 318-323	i) US study, not an RCT
Gibson L (1995) Patient education: effects of two teaching methods upon parental retention of infant feeding practices. *Pediatric nursing*. 21 (1):78-80.	i) No child outcomes

Gonzalez-Richmond Ja Naranjo-Banda A (2004) Effect of an integrated nutrition -primary health care package on nutritional status of children. *Nutrition Research*. 6:1275-1280.	i) Country (Mexico)
Guthrie C, Rapoport L, Wardle J (2000) Young children's food preferences: a comparison of three modalities of food stimuli. *Appetite*. 35 (1):73-77.	i) No RR outcomes
Hakanen, M., H. Lagstrom, et al. (2006). Development of overweight in an atherosclerosis prevention trial starting in early childhood. The STRIP study. *International Journal of Obesity* 30(4): 618-26.	i) No relevant outcomes
Harrison HL, MacNab AJ, Duffy DJ (2006) Brighter smiles: service learning, inter-professional collaboration and health promotion in a First Nations community. *Canadian Journal of Public Health* May-June, pp 237-240	i) Canadian study, not an RCT ii) No relevant outcomes
Horne PJ, Tapper K, Lowe CF et al. (2004) Increasing children's fruit and vegetable consumption: a peer-modelling and rewards based intervention. *European Journal of Clinical Nutrition* 58(12):1649-60.	i) Children aged >5 years UK study – this intervention was included in the rapid review from the Lowe 2004 paper (third author on this paper)
Horodynski, M. A. and Stommel, M. (2005) Nutrition education aimed at toddlers: An intervention study. *Pediatric Nursing* 31(5), 364.	i) Not an RCT
Isolauri E, Arvola T, Sutas Y et al. (2000) Probiotics in the management of atopic eczema. *Clinical & Experimental Allergy*. 30 (11):1604-10.	i) Sick children
Kaitosaari, T., T. Ronnemaa, et al. (2006). Low-saturated fat dietary counseling starting in infancy improves insulin sensitivity in 9-year-old healthy children: the Special Turku Coronary Risk Factor Intervention Project for Children (STRIP) study. *Diabetes Care* 29(4): 781-5.	i) Long-term outcomes not relevant to this review
Kattelmann KK, Ho M, Specker BL (2001) Effect of timing of introduction of complementary foods on iron and zinc status of formula fed infants at 12, 24, and 36 months of age. *Journal of the American Dietetic Association* 101(4):443-7.	i) Intervention stopped at age 6 months; follow-up at 3 years ii) Not promotion of supplements
Keller KL, Pietrobelli A, Johnson SL, Faith MS (2006) Maternal restriction of chidren's eating and encouragements to eat and the 'non-shared environment': a pilot study using the child feeding questionnaire. International Journal of Obesity 30, 1670-1675	i) US cohort study, not an RCT
Kelly, L. E. and B. J. Patterson (2006). Childhood Nutrition: Perceptions of Caretakers in a Low-Income Urban Setting." *Journal of School Nursing* 22(6): 345-351.	i) Cross-sectional study
Kirjavainen PV, Salminen SJ, Isolauri E (2003) Probiotic bacteria in the management of atopic disease: underscoring the importance of viability. *Journal of Pediatric Gastroenterology & Nutrition*. 36 (2):223-7.	i) Sick children
Lever R, MacDonald C, Waugh P et al. (1998) Randomised controlled trial of advice on an egg exclusion diet in young children with atopic eczema and sensitivity to eggs. *Pediatric Allergy & Immunology* 9(1):13-9.	i) Sick children
Mabin D (1995) Controlled trial of a few foods diet in severe atopic dermatitis. *Archives of Disease in Childhood* 73:202-207.	i) All participant children with diagnosed atopic dermatitis affecting > 10% surface area
Marini, A., Agosti, M., Motta, G. and Mosca, F. (1996) Effects of a dietary and environmental prevention programme on the	i) Not an RCT

incidence of allergic symptoms in high atopic risk infants: three years' follow-up. *Acta Paediatr Suppl*, 414, 1-21.	
Mihrshahi S, Peat JK, Webb K et al. (2004) Effect of omega-3 fatty acid concentrations in plasma on symptoms of asthma at 18 months of age. Pediatric Allergy & Immunology. 15 (6):517-22.	RCT included in review by Tricon et al 2006 included in this NICE RR
Nguyen, S. P. (2007). An apple a day keeps the doctor away: Children's evaluative categories of food. Appetite 48(1): 114-118.	i) Irrelevant outcomes
Nowak-Wegrzyn, A. (2005). Three-year outcomes of dietary fatty acid modification and house dust mite reduction in the childhood asthma prevention study. Pediatrics 116(2): 540.	ii) Abstract of paper included in this RR (Peat 2004)
Nossar V, Hudson D (2001) Improving health outcomes for children by home visiting. Medicine Today. 2 (8):135-136.	i) Not an RCT
Oscarson RA, Branum J (1999) A Soyabean education curriculum for pre-schoolers: introducing new foods to children. *Journal of Family and Consumer Services* 91(1): 64.	i) Not an RCT (Before-after study)
Rosenfeldt V, Benfeldt E, Neilsen SD et al. (2003) Effect of probiotic Lactobacillus strains in children with atopic dermatitis. *Journal of Allergy and Clinical Immunology* 111(2): 389-95.	i) All participant children diagnosed with moderate to severe atopic dermatitis
Rosenfeldt V, Benfeldt E, Valerius NH et al. (2004) Effect of probiotics on gastrointestinal symptoms and small intestinal permeability in children with atopic dermatitis. Journal of Pediatrics. 145 (5):612-6.	i) All participant children diagnosed with moderate to severe atopic dermatitis
Sant'Ana, L., A. Cruz, et al. (2006). Effect of a multi-mixture in the nutritional status of preschool children regarding iron. [Portuguese]. Revista de Nutricao 19(4): 445-454.	i) Comparison of supplementation and fortification – not relevenat to this RR
Sharma, M. (2006). School-based interventions for childhood and adolescent obesity. Obesity Reviews **7**(3): 261-269.	i) Children aged >5 years
Staab D, Von Rueden U, Kehrt R et al. (2002) Evaluation of a parental training program for the management of childhood atopic dermatitis. *Pediatric Allergy & Immunology* 13(2):84-90.	i) All participant children diagnosed with moderate to severe atopic dermatitis
Sistek D, Kelly R, Wickens K, Stanley T, Fitzharris P, Crane J (2006) Is the effect of probiotics on atopic dermatitis confined to food sensitised children? Clincal and Experimental Allergy 36, 629-633	i) Not in a healthy population – participants had current dermatitis
Vandenplas Y, Hauser B, Van den Borre C et. al. (1995) The long-term effect of a partial whey hydrolysate formula on the prophylaxis of atopic diseases. *European Journal of Pediatrics*; 154(6): 488-94.	i) Intervention stopped at age 6 months; follow-up to 5 years ii) Relevant to 6-24 m review
Wardle J (2003) Modifying children's food preferences: the effects of exposure and reward on acceptance of an unfamiliar vegetable. *European Journal of Clinical Nutrition* 57, 341-348.	i) Children 3-7 years. Data extracted from another paper by Wardle also 2003 which is included in RR

UK non-RCTs excluded

UK studies	*Reasons for exclusion*
Cooke L, Carnell S, Wardle J (2006) Food neophobia and mealtime consumption in 4-5 year old children. International Journal of Behavioral Nutrition and Physical Activity 3:14.	i) No intervention
Entwistle, N. (1994). An innovative strategy to promote oral health in schoolchildren. Journal of the Royal Society of Health 114(6): 311-313.	i) Children ≥5 years
Maliderou M, Reeves S, Noble C (2006) The effect of social demographic factors, snack consumption and vending machine use on oral health of children living in London. British Dental	i) UK survey of children all >5y (age 11 years)

Journal 201 (7) Oct 7, pp 441-444	
Milford R, Kleve L, Lea J, Greenwood R (2006) A pilot evaluation of the Solihull approach. Community Practitioner 79 (11) Nov, pp 358-362	i) UK non-RCT ii) No RR outcomes
Ogden J, Reynolds R, Smith A (2006) Expanding the concept of parantal control: A role for overt and covert control in children's snacking behaviour? Appetite 47, 100-106	i) UK nonRCT ii) Children all at school, aged 4-11

Excluded papers suggested by stakeholders or Programme Development Group member

Suggested paper	Reason for exclusion
Systematic review	
Jayaweera H, and Garcia I. (2003) Living on a low income: A structured review of women's views of poverty and childbearing. National Perinatal Epidemiology Unit, Oxford UK.	i) Narrative review ii) Contextual evidence only
Randomised controlled trial	
Drewett RF. (2007) The social facilitation of food intake. *Archives of Disease in Childhood* 92: 377.	i) Commentary on Lumeng 2007 (already included)
UK non-randomised controlled trial	
Dowler E, and Calvert C (1995) Nutrition and diet in lone-parent families in London. Family Policy Study Centre	i) No intervention – survey only ii) Contextual evidence only

APPENDIX C: Search Strategy

Searches for NICE Rapid Review "The effectiveness of public health interventions to improve the nutrition of young children aged 6 months to 5 years".

1. Search for systematic reviews (12/04/06)

The following search terms were used to identify relevant systematic reviews (from 1995 onwards):

Resource	Issue/ search date	Records	After dedupe	Custom 4 code
CDSR	2006/2 25/04/06	118	75	cdsr sr child nutrition
DARE	25/04/06	171	79	dare sr child nutrition
NRR	2006/1 25/04/06	75 28 118 36 126 8 745 105	505	NRR_MultiCentreComplete SR child nutrition NRR_MultiCentreOngoing SR child nutrition NRR_ParticipCentreComplete SR child nutrition NRR_ParticipCentreOngoing SR child nutrition NRR_RegandNatComplete SR child nutrition NRR_RegandNatOngoing SR child nutrition NRR_SingleCentreComplete SR child nutrition NRR_SingleCentreOngoing SR child nutrition
HTA	25/04/06	16	14	hta sr child nutrition
SIGN	12/04/06	2	2	sign sr child nutrition
NGC	24/04/06	10	10	ngc sr child nutrition
NCCHTA	12/04/06	0		NA
NICE	14/04/06	0		NA
HSTAT	24/02/06	3 relevant records	3	hstat sr child nutrition
ReFeR	20/2/06	4 relevant records	4	refer sr child nutrition
Clinical Evidence	25/02/06	0		NA
HEBW	25/02/06	1 chapter relevant	1	hebw sr child nutrition
TRIP	25/02/06	0		NA

Cochrane Database of Systematic Reviews (CDSR)
http://www.cochrane.org/reviews/clibintro.htm

The online Cochrane Library was searched. The strategy used a combination of MeSH subject headings and text searches. The search is focused on 'population', 'interventions' and 'outcomes'. The search located 118 systematic reviews.

ID	Search	Records
#1	MeSH descriptor Infant, this term only in MeSH products	6
#2	MeSH descriptor Child explode all trees in MeSH products	9
#3	infant* or preschool* or pre*school or "pre school" or nursery* or playschool* or kindergarten* or crèche* or pre*school* or "pre school" in Title, Abstract or Keywords in all products	30395
#4	(#1 OR #2 OR #3)	30396
#5	<nothing>, from 1995 to 2006 in all products	292971
#6	(#4 AND #5)	17724
#7	((food* or nutrition* or diet* or nutritive or feed* or eating or health) near/3 (supplement* or habit* or behaviour* or behaviour* or attitude* or belief* or policy* or value*)) in Title, Abstract or Keywords in all products	11135
#8	solid food or solids or baby food* in Title, Abstract or Keywords in all products	1738
#9	wean* or weaning in Title, Abstract or Keywords in all products	848
#10	MeSH descriptor Weaning, this term only in MeSH products	52
#11	family food in Title, Abstract or Keywords in all products	198
#12	MeSH descriptor Fruit explode all trees in MeSH products	425
#13	MeSH descriptor Vegetables, this term only in MeSH products	322
#14	fruit* or vegetable* in Title, Abstract or Keywords in all products	1378
#15	MeSH descriptor Sodium, Dietary explode all trees in MeSH products	335
#16	sodium in Title, Abstract or Keywords in all products	14226
#17	vitamin* or iron or mineral* in Title, Abstract or Keywords in all products	11357
#18	MeSH descriptor Vitamins explode all trees in MeSH products	2
#19	MeSH descriptor Minerals explode all trees in MeSH products	1617
#20	MeSH descriptor Food Habits, this term only in MeSH products	411

#21	MeSH descriptor Food explode all trees in MeSH products	9669
#22	MeSH descriptor Nutrition, this term only in MeSH products	527
#23	MeSH descriptor Nutrition Policy, this term only in MeSH products	57
#24	MeSH descriptor Diet, this term only in MeSH products	2108
#25	MeSH descriptor Feeding Behaviour, this term only in MeSH products	351
#26	MeSH descriptor Health Behaviour, this term only in MeSH products	738
#27	(nutrition* or nutrient* or micronutrient* or diet* or energy) near/3 (intake or advice or counsel* or education or supplement* or requirement* or value) in Title, Abstract or Keywords in all products	8937
#28	MeSH descriptor Energy Intake, this term only in MeSH products	1786
#29	MeSH descriptor Nutritional Requirements, this term only in MeSH products	296
#30	MeSH descriptor Nutritive Value, this term only in MeSH products	99
#31	nutrition* near/3 knowledge in Title, Abstract or Keywords in all products	98
#32	MeSH descriptor Breast Feeding, this term only in MeSH products	708
#33	breastfeeding or breastfed in Title, Abstract or Keywords in all products	481
#34	((salt or sugar) near/3 (intake or consumption)) or soft drink* or soda or candy or chocolate or sweets or confection* in Title, Abstract or Keywords in all products	914
#35	MeSH descriptor Carbonated Beverages, this term only in MeSH products	38
#36	MeSH descriptor Cacao, this term only in MeSH products	65
#37	MeSH descriptor Candy, this term only in MeSH products	31
#38	(#7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37)	47367
#39	(#6 AND #38)	3294
#40	MeSH descriptor Infant Food explode all trees in MeSH products	818
#41	MeSH descriptor Infant Nutrition, this term only in MeSH products	421
#42	MeSH descriptor Child Nutrition, this term only in MeSH products	169

#43	(infant or child) near/3 (food* or nutrition* or feed*) in Title, Abstract or Keywords in all products	2241
#44	(#40 OR #41 OR #42 OR #43)	2271
#45	<nothing>, from 1995 to 2006 in all products	292971
#46	(#44 AND #45)	1335
#47	(#39 OR #46)	3647
#48	MeSH descriptor Food Hypersensitivity explode all trees in MeSH products	386
#49	food near/3 (allergy* or sensitive*) in Title, Abstract or Keywords in all products	256
#50	MeSH descriptor Dental Caries, this term only in MeSH products	843
#51	MeSH descriptor Tooth Loss, this term only in MeSH products	21
#52	MeSH descriptor Tooth Erosion, this term only in MeSH products	57
#53	dental caries or ((dental or tooth) near/3 (loss or decay or erosion)) in Title, Abstract or Keywords in all products	1622
#54	MeSH descriptor Nutritional Status, this term only in MeSH products	788
#55	MeSH descriptor Growth, this term only in MeSH products	547
#56	MeSH descriptor Body Weight, this term only in MeSH products	4004
#57	MeSH descriptor Malnutrition, this term only in MeSH products	42
#58	nutritional status or body weight or bodyweight or malnutrition in Title, Abstract or Keywords in all products	13734
#59	MeSH descriptor Thinness, this term only in MeSH products	43
#60	MeSH descriptor Obesity, this term only in MeSH products	2948
#61	overweight or OBEs* or thinness or (body near/3 (height or size)) in Title, Abstract or Keywords in all products	6339
#62	MeSH descriptor Body Height, this term only in MeSH products	830
#63	MeSH descriptor Body Size, this term only in MeSH products	31
#64	MeSH descriptor Child Development, this term only in MeSH products	623
#65	child* near/3 (development or growth) in Title, Abstract or Keywords in all products	1487
#66	breastfeeding near/4 (length or duration) in Title, Abstract or Keywords in all products	92

#67	MeSH descriptor Rickets, this term only in MeSH products	24
#68	rickets in Title, Abstract or Keywords in all products	61
#69	(nutrition* or nutrient* or micronutrient* or diet* or energy) near/3 (intake or advice or counsel* or education or supplement* or requirement* or value) in Title, Abstract or Keywords in all products in All Fields in all products	360066
#70	MeSH descriptor Energy Intake, this term only in MeSH products in All Fields in all products	976
#71	MeSH descriptor Nutritive Value, this term only in MeSH products in All Fields in all products	976
#72	MeSH descriptor Nutritional Requirements, this term only in MeSH products in All Fields in all products	976
#73	MeSH descriptor Nutritional Requirements, this term only in MeSH products in All Fields in all products	976
#74	MeSH descriptor Anaemia, Iron-Deficiency, this term only in MeSH products	286
#75	anemi* or aenemi* or iron deficien* in Title, Abstract or Keywords in all products	3430
#76	MeSH descriptor Gastrointestinal Diseases explode all trees in MeSH products	15511
#77	MeSH descriptor Parasitic Diseases explode all trees in MeSH products	3505
#78	(parasitic or gastrointestinal or respiratory) near/3 (disease* or infection* or parasite*) in Title, Abstract or Keywords in all products	5059
#79	MeSH descriptor Respiratory Tract Diseases explode all trees in MeSH products	26648
#80	MeSH descriptor Asthma, this term only in MeSH products	6965
#81	MeSH descriptor Eczema, this term only in MeSH products	266
#82	asthma or eczema or wheeze in Title, Abstract or Keywords in all products	15586
#83	MeSH descriptor Mortality, this term only in MeSH products	262
#84	MeSH descriptor Infant Mortality, this term only in MeSH products	293
#85	MeSH descriptor Morbidity, this term only in MeSH products	535
#86	mortality or morbidity in Title, Abstract or Keywords in all products	26064
#87	MeSH descriptor Health Knowledge, Attitudes, Practice, this term	1360

	only in MeSH products	
#88	health near/3 (knowledge or attitude* or practice*) in Title, Abstract or Keywords in all products	4218
#89	MeSH descriptor Maternal Behaviour, this term only in MeSH products	93
#90	MeSH descriptor Paternal Behaviour, this term only in MeSH products	4
#91	(maternal or paternal or mother* or father* or parent* or carer*) near/3 (behaviour* or behaviour* or knowledge or practice*) in Title, Abstract or Keywords in all products	767
#92	(#48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62 OR #63 OR #64 OR #65 OR #66 OR #67 OR #68 OR #69 OR #70 OR #71 OR #72 OR #73 OR #74 OR #75 OR #76 OR #77 OR #78 OR #79 OR #80 OR #81 OR #82 OR #83 OR #84 OR #85 OR #86 OR #87 OR #88 OR #89 OR #90 OR #91)	379396
#93	(#47 AND #92)	3400

(Hits shown are for all records in Cochrane Library- not just Cochrane reviews. Of the 3400 final hits, 118 were Cochrane reviews.)

Database of Abstracts of Reviews of Effects (DARE) and Health Technology Assessment (HTA) database

This search used the CRD DARE admin database (Cairs B), which contains DARE records and CDSR abstracts, and the CRD HTA admin database. The search is focused on 'population' and 'interventions'. The search located 171 reviews in DARE and 16 in HTA.

1. S infant /kwo
2. S child /kwo
3. S (infant$ or child$ or preschool$ or nursery$ or playschool$ or crèche$ or kindergarten$)
4. S s1 or s2 or s3
5. S (wean$ or fruit$ or vegetable$ or nutrient$ or micronutrient$ or salt or sugar or soda or candy or chocolate or sweets or confection$ or soft(w)drinks)
6. S weaning /kwo
7. S fruit /kwo
8. S vegetables /kwo
9. S sodium dietary /kwo
10. S vitamins /kwo
11. S minerals /kwo
12. S food /kwo
13. S food habits /kwo
14. S nutrition /kwo
15. S nutrition policy/ kwo
16. S diet/ kwo
17. S feeding behaviour /kwo
18. S health behaviour /kwo

19. S energy intake /kwo
20. S nutritional requirements /kwo
21. S nutritive value /kwo
22. S breast feeding /kwo
23. S carbonated beverages /kwo
24. S cacao /kwo
25. S candy /kwo
26. s s5 or s6 or s7 or s8 or s9 or s10 or s11 or s12 or s13 or s14 or s15 or s16 or s17 or s18 or s19 or s20 or s21 or s22 or s23 or s24 or s25
27. s s4 and s26
28. S infant food /kwo
29. S infant nutrition /kwo
30. S child nutrition /kwo
31. s infant$ (3w) food$
32. s infant$ (3w) diet$
33. s infant$ (3w) nutrition$
34. s infant$ (3w) feed$
35. s child$ (3w) food$
36. s child$ (3w) diet$
37. s child$ (3w) nutrition$
38. s child$ (3w) feed$
39. s s28 or s29 or s30 or s31 or s32 or s33 or s34 or s35 or s36 or s37 or s38
40. s s27 or s39

National Research Register (NRR) (including CRD ongoing reviews)
http://www.nrr.nhs.uk/

#1.	INFANT single term (MeSH)	1464
#2.	CHILD explode all trees (MeSH)	7457
#3.	(#1 or #2)	8173
#4.	(food* or nutrition* or diet* or nutritive or feed* or eating:ti)	6314
#5.	((solid next food) or solids or (baby next food*) or wean* or (family next food) or fruit* or vegetable* or nutrient* or micronutrient* or salt or sugar or (soft next drink*) or soda or candy or chocolate or sweets or confection*)	1185
#6.	WEANING single term (MeSH)	18
#7.	FRUIT explode all trees (MeSH)	35
#8.	VEGETABLES single term (MeSH)	22
#9.	SODIUM DIETARY explode all trees (MeSH)	18
#10.	VITAMINS explode all trees (MeSH)	683
#11.	MINERALS explode all trees (MeSH)	108
#12.	FOOD explode all trees (MeSH)	680
#13.	FOOD HABITS single term (MeSH)	77
#14.	NUTRITION single term (MeSH)	79
#15.	NUTRITION POLICY single term (MeSH)	3
#16.	DIET single term (MeSH)	488

#17.	FEEDING BEHAVIOR single term (MeSH)	51
#18.	HEALTH BEHAVIOR single term (MeSH)	142
#19.	ENERGY INTAKE single term (MeSH)	46
#20.	NUTRITIONAL REQUIREMENTS single term (MeSH)	9
#21.	NUTRITIVE VALUE single term (MeSH)	1
#22.	BREAST FEEDING single term (MeSH)	160
#23.	CARBONATED BEVERAGES single term (MeSH)	3
#24.	CACAO single term (MeSH)	1
#25.	CANDY single term (MeSH)	2
#26.	(#4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25)	7861
#27.	(#3 and #26)	789
#28.	INFANT FOOD explode all trees (MeSH)	30
#29.	INFANT NUTRITION single term (MeSH)	74
#30.	CHILD NUTRITION single term (MeSH)	40
#31.	(infant next food)	31
#32.	(infant next diet*)	7
#33.	(infant next nutrition*)	80
#34.	(infant next feed*)	82
#35.	(child next feed*)	4
#36.	(child next food*)	1
#37.	(child next diet*)	3
#38.	(child next nutrition*)	52
#39.	(#28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37 or #38)	216
#40.	(#27 or #39)	894
#41.	infant*:ti	1566
#42.	child*:ti	8184
#43.	preschool*:ti	29
#44.	nursery*:ti	18
#45.	playschool:ti	0
#46.	kindergarten:ti	0
#47.	creche:ti	0
#48.	(#41 or #42 or #43 or #44 or #45 or #46 or #47)	9654
#49.	(#48 and #26)	973
#50.	(#27 or #39 or #49)	1316

Scottish Intercollegiate Guidelines Network (SIGN)
http://www.sign.ac.uk/guidelines/published/numlist.html
Examined full list of titles- 2 relevant under 'child health'.

National Guideline Clearinghouse (NGC)
http://www.guideline.gov/
(child* or infant*) and ("diet*" or nutrition or "food*" or "feed*")
775 results screened by hand. 10 relevant results added to Endnote library.

National Coordinating Centre for Health Technology Assessment (NCCHTA)
http://www.hta.nhsweb.nhs.uk/projectdata/1_project_listings.asp
Examined all records in category 'children and younger people' – none relevant.

National Institute for Health and Clinical Excellence (NICE)
http://www.nice.org.uk/
Looked at guidelines under the topics 'Gynecology, pregnancy and birth' and ' Mouth and dental'.
Searched using search terms: food, feed, nutrition, child and infant.
No relevant results.

Health Services Technology Assessment Text (HSTAT)
http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=hstat
infant food AND book [hstat]
infant feed AND book [hstat]
infant nutrition book [hstat]
child food AND book [hstat]
child feed AND book [hstat]
child nutrition AND book [hstat]
All results checked- 3 relevant added to Endnote library.

Clinical Evidence
Searched hard copy - no relevant chapters found.

Health Evidence Bulletins Wales (HEBW)
http://hebw.cf.ac.uk/
Searched all records on 'child health' and 'nutrition' – one bulletin relevant 'Maternal and Early Child Health' (Jan 1998). Link added to Endnote library.

Research Findings Register (RefeR)
http://www.info.doh.gov.uk/doh/refr_web.nsf/Home?OpenForm
diet* or nutrition* or food* or feed*
All results checked- 4 relevant added to Endnote library.

Turning Research Into Practice (TRIP)
http://www.tripdatabase.com/index.html
(nutrition or diet* or food$ or feed*) and child*
(nutrition or diet* or food$ or feed*) and infant*
5 relevant SRs identified all previously identified in searches of CDSR, DARE and HEBW.

2. Search for RCTs (April 2006)

A combined strategy was developed and approved from the draft strategies for infants (6-24 months), and preschool children (2 years to 5 years). The strategy was;

(a) run in Medline for 1990 onwards, with the addition of an RCT filter, excluding developing countries (using MeSH terms), and restricted to English language studies.

Database: Ovid MEDLINE(R) 1966 to April Week 3 2006
1 infant/ or (infant or infants).ti,ab. (544028)
2 child, preschool/ or (preschool$ or nursery$ or playschool$ or kindergarten$ or crèche$ or (pre adj school$)).ti,ab. (567032)
3 or/ 1-2 (813397)
4 limit 3 to (english language and yr="1990 - 2006") (337550)
5 ((food or nutrition$ or diet$ or nutritive or feed$ or eating or health) adj3 (supplement$ or habit$ or behaviour$ or behaviour$ or attitude$ or belief$ or polic$ or value)).ti,ab. (68072)
6 (solid food or solids or baby food$).ti,ab. (6305)
7 weaning/ or (wean$ or weaning).ti,ab. (24735)
8 family food.ti,ab. (64)
9 exp fruit/ or vegetables/ or fruit$.ti,ab. or vegetable$.ti,ab. (53926)
10 sodium, dietary/ or sodium.ti,ab. (186306)
11 sodium chloride, dietary/ (1858)
12 (vitamin or vitamins or iron).ti,ab. or exp vitamins/ (259600)
13 minerals.ti,ab. or exp minerals/ (69562)
14 food habits/ or exp food/ or nutrition/ or nutrition policy/ (451147)
15 health behaviour/ or diet/ or feeding behaviour/ (102527)
16 ((nutrition$ or nutrient$ or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or energy intake/ or nutritional requirements/ or nutritive value/ (79802)
17 (nutrition$ adj3 knowledge).ti,ab. (717)
18 breastfeeding.ti,ab. or breastfeeding/ (18800)
19 (((salt or sugar) adj3 (intake or consumption)) or soft drinks or soda or candy or chocolate or sweets or confection$).ti,ab. or carbonated beverages/ or cacao/ or candy/ (10205)
20 or/ 5-19 (1069244)
21 4 and 20 (30858)
22 infant food/ or infant nutrition/ or (infant adj3 (food$ or nutrition)).ti,ab. (15242)
23 child nutrition/ or (child$ adj3 (food$ or nutrition)).ti,ab. (7510)
24 or/ 22-23 (21592)
25 limit 24 to (english language and yr="1990 - 2006") (8756)
26 21 or 25 (33704)
27 exp food hypersensitivity/ or (food adj3 (allerg$ or sensitivit$)).ti,ab. (10200)
28 exp dental caries/ or dental caries.ti,ab. or tooth loss/ or tooth erosion/ or (tooth adj4 (loss or erosion or decay)).ti,ab. (31122)
29 nutritional status/ or nutritional status.ti,ab. or growth/ or growth.ti,ab. or body weight/ or body weight changes/ or weight.ti,ab. or bodyweight.ti,ab. or malnutrition/ or malnutrition.ti,ab. (944319)
30 overweight/ or overweight.ti,ab. or obes$.ti,ab. or thinness/ or thinness.ti,ab. or body height/ or body size/ or (body adj4 (height or size)).ti,ab. (105314)
31 child development/ or (child$ adj3 (development or growth)).ti,ab. (34873)
32 (breastfeeding adj3 (length or duration)).ti,ab. (719)
33 rickets/ or rickets.ti,ab. (5073)

34 ((nutrition$ or nutritive or nutrient$ or micronutrient$ or dietary or energy) adj3 (intake or status or value)).ti,ab. or energy intake/ or nutritional requirements/ or nutritive value/ (67225)
35 (anemi$ or anaemi$).ti,ab. or anemia, iron deficiency/ or iron deficien$.ti,ab. (69682)
36 exp gastrointestinal diseases/ (494192)
37 exp parasitic diseases/ or ((parasitic or gastrointestinal or respiratory) adj3 (disease$ or infection$ or parasite$)).ti,ab. (247196)
38 exp respiratory tract diseases/ (690651)
39 Asthma/ or (asthma or wheeze).ti,ab. (85689)
40 Eczema/ or eczema.ti,ab. (9424)
41 mortality/ or infant mortality/ or mortality.ti,ab. (247406)
42 Morbidity/ or morbidity.ti,ab. (128904)
43 health knowledge, attitudes, practice/ or (health adj3 (knowledge or practice$ or attitude$)).ti,ab. (39326)
44 maternal behaviour/ or ((maternal or paternal or mother$ or father$ or parent$ or carer$) adj3 (behaviour$ or behaviour$ or knowledge or attitude$ or belief$ or practice$)).ti,ab. (13639)
45 paternal behaviour/ (884)
46 or/ 27-45 (2679767)
47 26 and 46 (19561)
48 exp africa/ or exp caribbean region/ or exp central america/ or exp latin america/ or exp south america/ or exp asia/ (439496)
49 developing countries/ (45951)
50 or/ 48-49 (456371)
51 47 not 50 (15364)
52 clinical trial.pt. (428181)
53 (randomized or placebo).ab. or clinical trials/ (300865)
54 randomly.ab. or trial.ti. (151868)
55 or/ 52-54 (607054)
56 51 and 55 (2574)
57 animals/ not (animals/ and humans/) (2962375)
58 56 not 57 (2511)
59 from 58 keep 1-2511 (2511)

(b) run for 1990- 2006 in CENTRAL (without the RCT filter).

ID	Search	Hits
#1	MeSH descriptor **Infant**, this term only in **MeSH products**	6
#2	MeSH descriptor **Child** explode all trees in **MeSH products**	9
#3	**infant* or preschool* or pre*school or "pre school" or nursery* or playschool* or kindergarten* or crèche* or pre*school* or "pre school"** in **Title, Abstract or Keywords** in **all products**	30395
#4	(**#1** OR **#2** OR **#3**)	30396
#5	**<nothing>**, from 1990 to 2006 in **all products**	377491
#6	(**#4** AND **#5**)	22878

#7	**((food* or nutrition* or diet* or nutritive or feed* or eating or health) near/3 (supplement* or habit* or behaviour* or behaviour* or attitude* or belief* or polic* or value*))** in **Title, Abstract or Keywords** in **all products**	11135
#8	**solid food or solids or baby food*** in **Title, Abstract or Keywords** in **all products**	1738
#9	**wean* or weaning** in **Title, Abstract or Keywords** in **all products**	848
#10	MeSH descriptor **Weaning**, this term only in **MeSH products**	52
#11	**family food** in **Title, Abstract or Keywords** in **all products**	198
#12	MeSH descriptor **Fruit** explode all trees in **MeSH products**	425
#13	MeSH descriptor **Vegetables**, this term only in **MeSH products**	322
#14	**fruit* or vegetable*** in **Title, Abstract or Keywords** in **all products**	1378
#15	MeSH descriptor **Sodium, Dietary** explode all trees in **MeSH products**	335
#16	**sodium** in **Title, Abstract or Keywords** in **all products**	14226
#17	**vitamin* or iron or mineral*** in **Title, Abstract or Keywords** in **all products**	11357
#18	MeSH descriptor **Vitamins** explode all trees in **MeSH products**	2
#19	MeSH descriptor **Minerals** explode all trees in **MeSH products**	1617
#20	MeSH descriptor **Food Habits**, this term only in **MeSH products**	411
#21	MeSH descriptor **Food** explode all trees in **MeSH products**	9669
#22	MeSH descriptor **Nutrition**, this term only in **MeSH products**	527
#23	MeSH descriptor **Nutrition Policy**, this term only in **MeSH products**	57
#24	MeSH descriptor **Diet**, this term only in **MeSH products**	2108
#25	MeSH descriptor **Feeding Behaviour**, this term only in **MeSH products**	351

#26	MeSH descriptor **Health Behaviour**, this term only in **MeSH products**	738
#27	**(nutrition* or nutrient* or micronutrient* or diet* or energy) near/3 (intake or advice or counsel* or education or supplement* or requirement* or value)** in **Title, Abstract or Keywords** in **all products**	8937
#28	MeSH descriptor **Energy Intake**, this term only in **MeSH products**	1786
#29	MeSH descriptor **Nutritional Requirements**, this term only in **MeSH products**	296
#30	MeSH descriptor **Nutritive Value**, this term only in **MeSH products**	99
#31	**nutrition* near/3 knowledge** in **Title, Abstract or Keywords** in **all products**	98
#32	MeSH descriptor **Breast Feeding**, this term only in **MeSH products**	708
#33	**breastfeeding or breastfed** in **Title, Abstract or Keywords** in **all products**	481
#34	**((salt or sugar) near/3 (intake or consumption)) or soft drink* or soda or candy or chocolate or sweets or confection*** in **Title, Abstract or Keywords** in **all products**	914
#35	MeSH descriptor **Carbonated Beverages**, this term only in **MeSH products**	38
#36	MeSH descriptor **Cacao**, this term only in **MeSH products**	65
#37	MeSH descriptor **Candy**, this term only in **MeSH products**	31
#38	(**#7** OR **#8** OR **#9** OR **#10** OR **#11** OR **#12** OR **#13** OR **#14** OR **#15** OR **#16** OR **#17** OR **#18** OR **#19** OR **#20** OR **#21** OR **#22** OR **#23** OR **#24** OR **#25** OR **#26** OR **#27** OR **#28** OR **#29** OR **#30** OR **#31** OR **#32** OR **#33** OR **#34** OR **#35** OR **#36** OR **#37**)	47367
#39	(**#6** AND **#38**)	4175
#40	MeSH descriptor **Infant Food** explode all trees in **MeSH products**	818
#41	MeSH descriptor **Infant Nutrition**, this term only in **MeSH products**	421
#42	MeSH descriptor **Child Nutrition**, this term only in **MeSH products**	169
#43	**(infant or child) near/3 (food* or nutrition* or feed*)** in **Title, Abstract or Keywords** in **all products**	2241

#44	(#40 OR #41 OR #42 OR #43)	2271
#45	<nothing>, from 1995 to 2006 in all products	292971
#46	(#44 AND #45)	1335
#47	(#39 OR #46)	4528
#48	MeSH descriptor Food Hypersensitivity explode all trees in MeSH products	386
#49	food near/3 (allerg* or sensitiv*) in Title, Abstract or Keywords in all products	256
#50	MeSH descriptor Dental Caries, this term only in MeSH products	843
#51	MeSH descriptor Tooth Loss, this term only in MeSH products	21
#52	MeSH descriptor Tooth Erosion, this term only in MeSH products	57
#53	dental caries or ((dental or tooth) near/3 (loss or decay or erosion)) in Title, Abstract or Keywords in all products	1622
#54	MeSH descriptor Nutritional Status, this term only in MeSH products	788
#55	MeSH descriptor Growth, this term only in MeSH products	547
#56	MeSH descriptor Body Weight, this term only in MeSH products	4004
#57	MeSH descriptor Malnutrition, this term only in MeSH products	42
#58	nutritional status or body weight or bodyweight or malnutrition in Title, Abstract or Keywords in all products	13734
#59	MeSH descriptor Thinness, this term only in MeSH products	43
#60	MeSH descriptor Obesity, this term only in MeSH products	2948
#61	overweight or obes* or thinness or (body near/3 (height or size)) in Title, Abstract or Keywords in all products	6339
#62	MeSH descriptor Body Height, this term only in MeSH products	830
#63	MeSH descriptor Body Size, this term only in MeSH	31

	products	
#64	MeSH descriptor **Child Development**, this term only in **MeSH products**	623
#65	**child* near/3 (development or growth)** in **Title, Abstract or Keywords** in **all products**	1487
#66	**breastfeeding near/4 (length or duration)** in **Title, Abstract or Keywords** in **all products**	92
#67	MeSH descriptor **Rickets**, this term only in **MeSH products**	24
#68	**rickets** in **Title, Abstract or Keywords** in **all products**	61
#69	**(nutrition* or nutrient* or micronutrient* or diet* or energy) near/3 (intake or advice or counsel* or education or supplement* or requirement* or value) in Title, Abstract or Keywords in all products** in **All Fields** in **all products**	360066
#70	**MeSH descriptor Energy Intake, this term only in MeSH products** in **All Fields** in **all products**	976
#71	**MeSH descriptor Nutritive Value, this term only in MeSH products** in **All Fields** in **all products**	976
#72	**MeSH descriptor Nutritional Requirements, this term only in MeSH products** in **All Fields** in **all products**	976
#73	**MeSH descriptor Nutritional Requirements, this term only in MeSH products** in **All Fields** in **all products**	976
#74	MeSH descriptor **Anemia, Iron-Deficiency**, this term only in **MeSH products**	286
#75	**anemi* or aenemi* or iron deficien*** in **Title, Abstract or Keywords** in **all products**	3430
#76	MeSH descriptor **Gastrointestinal Diseases** explode all trees in **MeSH products**	15511
#77	MeSH descriptor **Parasitic Diseases** explode all trees in **MeSH products**	3505
#78	**(parasitic or gastrointestinal or respiratory) near/3 (disease* or infection* or parasite*)** in **Title, Abstract or Keywords** in **all products**	5059
#79	MeSH descriptor **Respiratory Tract Diseases** explode all trees in **MeSH products**	26648
#80	MeSH descriptor **Asthma**, this term only in **MeSH products**	6965
#81	MeSH descriptor **Eczema**, this term only in **MeSH**	266

	products	
#82	**asthma or eczema or wheeze** in **Title, Abstract or Keywords** in **all products**	15586
#83	MeSH descriptor **Mortality**, this term only in **MeSH products**	262
#84	MeSH descriptor **Infant Mortality**, this term only in **MeSH products**	293
#85	MeSH descriptor **Morbidity**, this term only in **MeSH products**	535
#86	**mortality or morbidity** in **Title, Abstract or Keywords** in **all products**	26064
#87	MeSH descriptor **Health Knowledge, Attitudes, Practice**, this term only in **MeSH products**	1360
#88	**health near/3 (knowledge or attitude* or practice*)** in **Title, Abstract or Keywords** in **all products**	4218
#89	MeSH descriptor **Maternal Behaviour**, this term only in **MeSH products**	93
#90	MeSH descriptor **Paternal Behaviour**, this term only in **MeSH products**	4
#91	**(maternal or paternal or mother* or father* or parent* or carer*) near/3 (behaviour* or behaviour* or knowledge or practice*)** in **Title, Abstract or Keywords** in **all products**	767
#92	(**#48** OR **#49** OR **#50** OR **#51** OR **#52** OR **#53** OR **#54** OR **#55** OR **#56** OR **#57** OR **#58** OR **#59** OR **#60** OR **#61** OR **#62** OR **#63** OR **#64** OR **#65** OR **#66** OR **#67** OR **#68** OR **#69** OR **#70** OR **#71** OR **#72** OR **#73** OR **#74** OR **#75** OR **#76** OR **#77** OR **#78** OR **#79** OR **#80** OR **#81** OR **#82** OR **#83** OR **#84** OR **#85** OR **#86** OR **#87** OR **#88** OR **#89** OR **#90** OR **#91**)	379396
#93	(**#47** AND **#92**)	4240
#94	MeSH descriptor **Developing Countries** explode all trees in **MeSH products**	414
#95	MeSH descriptor **Asia** explode all trees in **MeSH products**	4365
#96	MeSH descriptor **Africa** explode all trees in **MeSH products**	2029
#97	MeSH descriptor **Latin America** explode all trees in **MeSH products**	46
#98	MeSH descriptor **South America** explode all trees in **MeSH products**	641

#99	MeSH descriptor **Central America** explode all trees in **MeSH products**	117
#100	MeSH descriptor **Caribbean Region** explode all trees in **MeSH products**	170
#101	(**#94** OR **#95** OR **#96** OR **#97** OR **#98** OR **#99** OR **#100**)	7363
#102	(**#93** AND NOT **#101**)	3594

(Hits shown are for all records in Cochrane Library- not just Cochrane reviews. Of the 3594 final hits, 3420 were on the Cochrane Central Register of Clinical Trials)

(c) translated (including RCT filter) for Cinahl and run for 1990 onwards, excluding developing countries (using MeSH terms), and restricted to English language studies.

Database: CINAHL - Cumulative Index to Nursing, Allied Health Literature 1982 to April Week 3 2006
1 infant/ or (infant or infants).ti,ab. (44468)
2 child, preschool/ or (preschool$ or nurser$ or playschool$ or kindergarten$ or crèche$ or (pre adj school$)).ti,ab. (39697)
3 or/ 1-2 (62789)
4 limit 3 to (english language and yr="1990 - 2006") (57492)
5 ((food or nutrition$ or diet$ or nutritive or feed$ or eating or health) adj3 (supplement$ or habit$ or behaviour$ or behaviour$ or attitude$ or belief$ or polic$ or value)).ti,ab. (15245)
6 (solid food or solids or baby food$).ti,ab. (193)
7 weaning/ or (wean$ or weaning).ti,ab. (1407)
8 family food.ti,ab. (14)
9 exp fruit/ or vegetables/ or fruit$.ti,ab. or vegetable$.ti,ab. (4135)
10 sodium.ti,ab. (1938)
11 sodium chloride, dietary/ (390)
12 (vitamin or vitamins or iron).ti,ab. or exp vitamins/ (10286)
13 minerals.ti,ab. or exp minerals/ (1493)
14 food habits/ or exp food/ or nutrition/ or nutrition policy/ (24918)
15 health behaviour/ or diet/ or eating behaviour/ (17793)
16 ((nutrition$ or nutrient$ or nutritive or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or energy intake/ or nutritional requirements/ or nutrients/ (9778)
17 (nutrition$ adj3 knowledge).ti,ab. (281)
18 breastfeeding.ti,ab. or breastfeeding/ (5978)
19 (((salt or sugar) adj3 (intake or consumption)) or soft drinks or soda or candy or chocolate or sweets or confection$).ti,ab. or carbonated beverages/ or cacao/ or candy/ (981)
20 or/ 5-19 (66503)
21 4 and 20 (7222)
22 exp infant feeding/ or infant food/ or infant nutrition/ or (infant adj3 (food$ or nutrition or feed$)).ti,ab. (7263)
23 child nutrition/ or (child$ adj3 (food$ or nutrition or feed$)).ti,ab. (2535)
24 or/ 22-23 (9470)
25 limit 24 to (english language and yr="1990 - 2006") (8510)
26 21 or 25 (11885)
27 exp food hypersensitivity/ or (food adj3 (allerg$ or sensitivit$)).ti,ab. (1113)

28 exp dental caries/ or dental caries.ti,ab. or tooth loss/ or tooth erosion/ or (tooth adj4 (loss or erosion or decay)).ti,ab. (1981)
29 nutritional status/ or nutritional status.ti,ab. or growth/ or growth.ti,ab. or body weight/ or body weight changes/ or weight.ti,ab. or bodyweight.ti,ab. or nutrition disorders/ or malnutrition.ti,ab. (30433)
30 obesity/ or overweight.ti,ab. or obes$.ti,ab. or thinness/ or thinness.ti,ab. or body height/ or (body adj4 (height or size)).ti,ab. (12078)
31 child development/ or (child$ adj3 (development or growth)).ti,ab. (5163)
32 (breastfeeding adj3 (length or duration)).ti,ab. (301)
33 rickets/ or rickets.ti,ab. (137)
34 ((nutrition$ or nutritive or nutrient$ or micronutrient$ or dietary or energy) adj3 (intake or status or value)).ti,ab. or energy intake/ or nutritional requirements/ or nutrients/ (7702)
35 (anemi$ or anaemi$).ti,ab. or anemia, iron deficiency/ or iron deficien$.ti,ab. (2580)
36 exp gastrointestinal diseases/ (15478)
37 exp parasitic diseases/ or ((parasitic or gastrointestinal or respiratory) adj3 (disease$ or infection$ or parasite$)).ti,ab. (7318)
38 exp respiratory tract infections/ (12393)
39 Asthma/ or (asthma or wheeze).ti,ab. (9279)
40 Eczema/ or eczema.ti,ab. (687)
41 mortality/ or infant mortality/ or child mortality/ or mortality.ti,ab. (19340)
42 Morbidity/ or morbidity.ti,ab. (9922)
43 exp attitude to health/ or (health adj3 (knowledge or practice$ or attitude$)).ti,ab. (30607)
44 exp family attitudes/ or maternal behaviour/ or ((maternal or paternal or mother$ or father$ or parent$ or carer$) adj3 (behaviour$ or behaviour$ or knowledge or attitude$ or belief$ or practice$)).ti,ab. (7921)
45 paternal behaviour/ (40)
46 or/ 27-45 (143309)
47 26 and 46 (5403)
48 exp africa/ or exp caribbean region/ or exp central america/ or exp latin america/ or exp south america/ or exp asia/ (38475)
49 developing countries/ (2428)
50 or/ 48-49 (40389)
51 47 not 50 (4578)
52 exp clinical trials/ (36679)
53 double blind studies/ (7302)
54 single-blind studies/ (1911)
55 triple-blind studies/ (31)
56 clinical trial.pt. (17004)
57 random assignment/ (12464)
58 (randomized or randomised or placebo or randomly).ab. (27422)
59 trial.ti. (8600)
60 or/ 52-59 (54501)
61 51 and 60 (541)
62 animals/ not (animals/ and humans/) (610)
63 61 not 62 (541)
64 from 63 keep 1-541 (541)

(d) translated (including RCT filter) for EMBASE and run for 1990 onwards, excluding developing countries (using MeSH terms), and restricted to English language studies.

Database: EMBASE 1980 to 2006 Week 16

1 infant/ or (infant or infants).ti,ab. (219518)
2 preschool child/ or (preschool$ or nurser$ or playschool$ or kindergarten$ or crèche$ or (pre adj school$)).ti,ab. (95474)
3 or/ 1-2 (283860)
4 limit 3 to (english language and yr="1990 - 2006") (178266)
5 ((food or nutrition$ or diet$ or nutritive or feed$ or eating or health) adj3 (supplement$ or habit$ or behaviour$ or behaviour$ or attitude$ or belief$ or polic$ or value)).ti,ab. (57721)
6 (solid food or solids or baby food$).ti,ab. (10288)
7 weaning/ or (wean$ or weaning).ti,ab. (16460)
8 family food.ti,ab. (46)
9 exp fruit/ or vegetable/ or fruit$.ti,ab. or vegetable$.ti,ab. (33632)
10 sodium.ti,ab. (156325)
11 exp electrolyte intake/ (7893)
12 (vitamin or vitamins or iron).ti,ab. or exp vitamin/ (251178)
13 minerals.ti,ab. or exp nutrients/ or mineral intake/ (6353)
14 exp food/ or exp nutrition/ (683161)
15 health behaviour/ or diet/ or feeding behaviour/ (66291)
16 ((nutrition$ or nutrient$ or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or dietary intake/ (64378)
17 (nutrition$ adj3 knowledge).ti,ab. (696)
18 breastfeeding.ti,ab. or breastfeeding/ (3147)
19 (((salt or sugar) adj3 (intake or consumption)) or soft drinks or soda or candy or chocolate or sweets or confection$).ti,ab. or carbonated beverages/ or cacao/ or sugar/ (13146)
20 or/ 5-19 (940481)
21 4 and 20 (24576)
22 exp infant nutrition/ or (infant adj3 (food$ or nutrition)).ti,ab. (20687)
23 child nutrition/ or (child$ adj3 (food$ or nutrition)).ti,ab. (5372)
24 or/ 22-23 (25259)
25 limit 24 to (english language and yr="1990 - 2006") (18026)
26 21 or 25 (33292)
27 exp food allergy/ or (food adj3 (allerg$ or sensitivit$)).ti,ab. (8192)
28 exp tooth disease/ or dental caries.ti,ab. or (tooth adj2 (loss or erosion or decay)).ti,ab. (20726)
29 nutritional status/ or nutritional status.ti,ab. or body weight/ or weight.ti,ab. or bodyweight.ti,ab. or exp nutritional disorder/ or malnutrition.ti,ab. (432600)
30 obesity/ or overweight.ti,ab. or obes$.ti,ab. or thinness.ti,ab. or (body adj2 (height or size)).ti,ab. (84535)
31 child development/ or (child$ adj3 (development or growth)).ti,ab. (23840)
32 (breastfeeding adj3 (length or duration)).ti,ab. (470)
33 rickets/ or rickets.ti,ab. (2847)
34 ((nutrition$ or nutritive or nutrient$ or micronutrient$ or dietary or energy) adj3 (intake or status or value)).ti,ab. or dietary intake/ (52299)
35 (anemi$ or anaemi$).ti,ab. or iron deficiency anemia,/ or iron deficien$.ti,ab. (49971)
36 gastrointestinal disease/ (12810)
37 parasitosis/ or ((parasitic or gastrointestinal or respiratory) adj3 (disease$ or infection$ or parasite$)).ti,ab. (47022)
38 respiratory tract disease/ (12936)
39 Asthma/ or (asthma or wheeze).ti,ab. (78177)
40 Eczema/ or eczema.ti,ab. (9163)
41 infant mortality/ or child mortality/ (5849)
42 Morbidity/ or morbidity.ti,ab. (128234)

43 (health adj3 (knowledge or practice$ or attitude$)).ti,ab. (10231)
44 maternal behaviour/ or ((maternal or paternal or mother$ or father$ or parent$ or carer$) adj3 (behaviour$ or behaviour$ or knowledge or attitude$ or belief$ or practice$)).ti,ab. (11462)
45 paternal behaviour/ (488)
46 or/ 27-45 (818823)
47 26 and 46 (16565)
48 exp africa/ or exp caribbean region/ or exp central america/ or exp latin america/ or exp south america/ or exp asia/ (205246)
49 developing countries/ (16894)
50 or/ 48-49 (216435)
51 47 not 50 (13576)
52 controlled study/ (2151388)
53 exp clinical trial/ (385764)
54 outcomes research/ (54972)
55 randomized controlled trial/ (104939)
56 (randomized or randomised or randomly or placebo).ab. (270650)
57 trial.ti. (52353)
58 or/ 52-57 (2468183)
59 51 and 58 (5753)
60 animal/ not (animal/ and human/) (12808)
61 59 not 60 (5753)
62 from 61 keep 1-5753 (5753)

(e) translated (including RCT filter) for PsycINFO and run for 1990 onwards, excluding developing countries (using MeSH terms), and restricted to English language studies.

Database: PsycINFO 1985 to April Week 4 2006
1 exp infant development/ or (infant or infants).ti,ab. (26351)
2 (preschool$ or nurser$ or playschool$ or kindergarten$ or crèche$ or (pre adj school$)).ti,ab. (19889)
3 or/ 1-2 (44856)
4 limit 3 to (english language and yr="1990 - 2006") (31308)
5 ((food or nutrition$ or diet$ or nutritive or feed$ or eating or health) adj3 (supplement$ or habit$ or behaviour$ or behaviour$ or attitude$ or belief$ or polic$ or value)).ti,ab. (26875)
6 (solid food or solids or baby food$).ti,ab. (207)
7 weaning/ or (wean$ or weaning).ti,ab. (1585)
8 family food.ti,ab. (27)
9 (fruit$ or vegetable$).ti,ab. (3974)
10 sodium.ti,ab. (2547)
11 sodium/ (890)
12 (vitamin or vitamins or iron).ti,ab. or exp vitamins/ (2636)
13 minerals.ti,ab. (150)
14 food preferences/ or exp food/ or exp nutrition/ or food intake/ (10183)
15 eating behaviour/ or exp diets/ (4960)
16 ((nutrition$ or nutrient$ or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or energy expenditure/ (4564)
17 (nutrition$ adj3 knowledge).ti,ab. (224)
18 breastfeeding.ti,ab. or exp breastfeeding/ (581)
19 (((salt or sugar) adj3 (intake or consumption)) or soft drinks or soda or candy or chocolate or sweets or confection$).ti,ab. (884)

20 or/ 5-19 (48617)
21 4 and 20 (1338)
22 (infant adj3 (food$ or nutrition)).ti,ab. (64)
23 (child$ adj3 (food$ or nutrition)).ti,ab. (628)
24 or/ 22-23 (680)
25 limit 24 to (english language and yr="1990 - 2006") (566)
26 21 or 25 (1784)
27 exp food allergies/ or (food adj3 (allerg$ or sensitivit$)).ti,ab. (189)
28 (dental caries or (tooth adj4 (loss or erosion or decay))).ti,ab. (64)
29 nutritional status.ti,ab. or growth/ or growth.ti,ab. or body weight/ or body size/ or weight.ti,ab. or bodyweight.ti,ab. or nutritional deficiencies/ or malnutrition.ti,ab. (42288)
30 exp obesity/ or overweight.ti,ab. or obes$.ti,ab. or thinness.ti,ab. or (body adj4 (height or size)).ti,ab. (8989)
31 child development/ or early childhood development/ or (child$ adj3 (development or growth)).ti,ab. (21313)
32 (breastfeeding adj3 (length or duration)).ti,ab. (97)
33 rickets.ti,ab. (10)
34 ((nutrition$ or nutrient$ or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or energy expenditure/ (4564)
35 (anemi$ or anaemi$).ti,ab. or anemia/ or iron deficien$.ti,ab. (503)
36 exp gastrointestinal disorders/ (2691)
37 exp parasitic disorders/ or ((parasitic or gastrointestinal or respiratory) adj3 (disease$ or infection$ or parasite$)).ti,ab. (913)
38 exp respiratory tract disorders/ (4347)
39 Asthma/ or (asthma or wheeze).ti,ab. (2161)
40 Eczema/ or eczema.ti,ab. (91)
41 mortality rate/ or mortality.ti,ab. (8243)
42 morbidity.ti,ab. (6428)
43 health knowledge, attitudes, practice/ or (health adj3 (knowledge or practice$ or attitude$)).ti,ab. (6579)
44 mother child relations/ or mother child communication/ or parent child relations/ or parent child communication/ or ((maternal or paternal or mother$ or father$ or parent$ or carer$) adj3 (behaviour$ or behaviour$ or knowledge or attitude$ or belief$ or practice$)).ti,ab. (38558)
45 father child relations/ or father child communication/ (2466)
46 or/ 27-45 (128746)
47 26 and 46 (1022)
48 exp developing countries/ or exp africa/ or exp caribbean region/ or exp central america/ or exp latin america/ or exp south america/ or exp asia/ (20525)
49 47 not 48 (990)
50 (empirical study or quantitative study).md. (830270)
51 treatment outcome clinical trial.md. (10357)
52 experimental design/ (4221)
53 (randomized or placebo or randomly).ab. (39678)
54 trial.ti. (5491)
55 or/ 50-54 (839684)
56 49 and 55 (718)
57 animals/ not (animals/ and humans/) (2278)
58 56 not 57 (718)
59 from 58 keep 1-718 (718)

The search results from all searches were downloaded into an Endnote library and deduplicated.

Search	Results/Imported	Results after deduplication	Custom4 code
RCT medline	2511	1654	medline rct child nutrition
RCT central	3420	807	central rct child nutrition
RCT cinahl	541	177	cinahl rct child nutrition
RCT embase	5753	2886	embase rct child nutrition
RCT psycinfo	718	413	psycinfo rct child nutrition

3. UK Studies (not RCTs) (17/03/06)

The search strategies used for the RCT searches of Medline, Embase, Cinahl and Psycinfo were repeated, but RCTs and reviews were excluded, and the searches limited to UK only or studies by UK institutions.

Database: Ovid MEDLINE(R) <1966 to April Week 3 2006>

1 infant/ or (infant or infants).ti,ab. (544028)
2 child, preschool/ or (preschool$ or nurser$ or playschool$ or kindergarten$ or crèche$ or (pre adj school$)).ti,ab. (567032)
3 or/ 1-2 (813397)
4 limit 3 to (english language and yr="1990 - 2006") (337550)
5 ((food or nutrition$ or diet$ or nutritive or feed$ or eating or health) adj3 (supplement$ or habit$ or behaviour$ or behaviour$ or attitude$ or belief$ or polic$ or value)).ti,ab. (68072)
6 (solid food or solids or baby food$).ti,ab. (6305)
7 weaning/ or (wean$ or weaning).ti,ab. (24735)
8 family food.ti,ab. (64)
9 exp fruit/ or vegetables/ or fruit$.ti,ab. or vegetable$.ti,ab. (53926)
10 sodium, dietary/ or sodium.ti,ab. (186306)
11 sodium chloride, dietary/ (1858)
12 (vitamin or vitamins or iron).ti,ab. or exp vitamins/ (259600)
13 minerals.ti,ab. or exp minerals/ (69562)
14 food habits/ or exp food/ or nutrition/ or nutrition policy/ (451147)
15 health behaviour/ or diet/ or feeding behaviour/ (102527)
16 ((nutrition$ or nutrient$ or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or energy intake/ or nutritional requirements/ or nutritive value/ (79802)
17 (nutrition$ adj3 knowledge).ti,ab. (717)
18 breastfeeding.ti,ab. or breastfeeding/ (18800)
19 (((salt or sugar) adj3 (intake or consumption)) or soft drinks or soda or candy or chocolate or sweets or confection$).ti,ab. or carbonated beverages/ or cacao/ or candy/ (10205)
20 or/ 5-19 (1069244)
21 4 and 20 (30858)
22 infant food/ or infant nutrition/ or (infant adj3 (food$ or nutrition)).ti,ab. (15242)
23 child nutrition/ or (child$ adj3 (food$ or nutrition)).ti,ab. (7510)
24 or/ 22-23 (21592)
25 limit 24 to (english language and yr="1990 - 2006") (8756)
26 21 or 25 (33704)
27 exp food hypersensitivity/ or (food adj3 (allerg$ or sensitivit$)).ti,ab. (10200)
28 exp dental caries/ or dental caries.ti,ab. or tooth loss/ or tooth erosion/ or (tooth adj4 (loss or erosion or decay)).ti,ab. (31122)
29 nutritional status/ or nutritional status.ti,ab. or growth/ or growth.ti,ab. or body weight/ or body weight changes/ or weight.ti,ab. or bodyweight.ti,ab. or malnutrition/ or malnutrition.ti,ab. (944319)
30 overweight/ or overweight.ti,ab. or obes$.ti,ab. or thinness/ or thinness.ti,ab. or body height/ or body size/ or (body adj4 (height or size)).ti,ab. (105314)
31 child development/ or (child$ adj3 (development or growth)).ti,ab. (34873)
32 (breastfeeding adj3 (length or duration)).ti,ab. (719)
33 rickets/ or rickets.ti,ab. (5073)
34 ((nutrition$ or nutritive or nutrient$ or micronutrient$ or dietary or energy) adj3 (intake or status or value)).ti,ab. or energy intake/ or nutritional requirements/ or nutritive value/ (67225)

35 (anemi$ or anaemi$).ti,ab. or anemia, iron deficiency/ or iron deficien$.ti,ab. (69682)
36 exp gastrointestinal diseases/ (494192)
37 exp parasitic diseases/ or ((parasitic or gastrointestinal or respiratory) adj3 (disease$ or infection$ or parasite$)).ti,ab. (247196)
38 exp respiratory tract diseases/ (690651)
39 Asthma/ or (asthma or wheeze).ti,ab. (85689)
40 Eczema/ or eczema.ti,ab. (9424)
41 mortality/ or infant mortality/ or mortality.ti,ab. (247406)
42 Morbidity/ or morbidity.ti,ab. (128904)
43 health knowledge, attitudes, practice/ or (health adj3 (knowledge or practice$ or attitude$)).ti,ab. (39326)
44 maternal behaviour/ or ((maternal or paternal or mother$ or father$ or parent$ or carer$) adj3 (behaviour$ or behaviour$ or knowledge or attitude$ or belief$ or practice$)).ti,ab. (13639)
45 paternal behaviour/ (884)
46 or/ 27-45 (2679767)
47 26 and 46 (19561)
48 exp africa/ or exp caribbean region/ or exp central america/ or exp latin america/ or exp south america/ or exp asia/ (439496)
49 developing countries/ (45951)
50 or/ 48-49 (456371)
51 47 not 50 (15364)
52 clinical trial.pt. (428181)
53 (randomized or placebo).ab. or clinical trials/ (300865)
54 randomly.ab. or trial.ti. (151868)
55 or/ 52-54 (607054)
56 51 not 55 (12790)
57 animals/ not (animals/ and humans/) (2962375)
58 56 not 57 (12398)
59 exp great britain/ (208103)
60 (united kingdom or great britain or england or wales or scotland or ireland).in. (182658)
61 or/ 59-60 (380175)
62 58 and 61 (744)
63 from 62 keep 1-744 (744)

Database: CINAHL - Cumulative Index to Nursing , Allied Health Literature <1982 to April Week 3 2006>

1 infant/ or (infant or infants).ti,ab. (44468)
2 child, preschool/ or (preschool$ or nurser$ or playschool$ or kindergarten$ or crèche$ or (pre adj school$)).ti,ab. (39697)
3 or/ 1-2 (62789)
4 limit 3 to (english language and yr="1990 - 2006") (57492)
5 ((food or nutrition$ or diet$ or nutritive or feed$ or eating or health) adj3 (supplement$ or habit$ or behaviour$ or behaviour$ or attitude$ or belief$ or polic$ or value)).ti,ab. (15245)
6 (solid food or solids or baby food$).ti,ab. (193)
7 weaning/ or (wean$ or weaning).ti,ab. (1407)
8 family food.ti,ab. (14)
9 exp fruit/ or vegetables/ or fruit$.ti,ab. or vegetable$.ti,ab. (4135)
10 sodium.ti,ab. (1938)
11 sodium chloride, dietary/ (390)
12 (vitamin or vitamins or iron).ti,ab. or exp vitamins/ (10286)
13 minerals.ti,ab. or exp minerals/ (1493)

14 food habits/ or exp food/ or nutrition/ or nutrition policy/ (24918)
15 health behaviour/ or diet/ or eating behaviour/ (17793)
16 ((nutrition$ or nutrient$ or nutritive or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or energy intake/ or nutritional requirements/ or nutrients/ (9778)
17 (nutrition$ adj3 knowledge).ti,ab. (281)
18 breastfeeding.ti,ab. or breastfeeding/ (5978)
19 (((salt or sugar) adj3 (intake or consumption)) or soft drinks or soda or candy or chocolate or sweets or confection$).ti,ab. or carbonated beverages/ or cacao/ or candy/ (981)
20 or/ 5-19 (66503)
21 4 and 20 (7222)
22 exp infant feeding/ or infant food/ or infant nutrition/ or (infant adj3 (food$ or nutrition or feed$)).ti,ab. (7263)
23 child nutrition/ or (child$ adj3 (food$ or nutrition or feed$)).ti,ab. (2535)
24 or/ 22-23 (9470)
25 limit 24 to (english language and yr="1990 - 2006") (8510)
26 21 or 25 (11885)
27 exp food hypersensitivity/ or (food adj3 (allerg$ or sensitivit$)).ti,ab. (1113)
28 exp dental caries/ or dental caries.ti,ab. or tooth loss/ or tooth erosion/ or (tooth adj4 (loss or erosion or decay)).ti,ab. (1981)
29 nutritional status/ or nutritional status.ti,ab. or growth/ or growth.ti,ab. or body weight/ or body weight changes/ or weight.ti,ab. or bodyweight.ti,ab. or nutrition disorders/ or malnutrition.ti,ab. (30433)
30 obesity/ or overweight.ti,ab. or obes$.ti,ab. or thinness/ or thinness.ti,ab. or body height/ or (body adj4 (height or size)).ti,ab. (12078)
31 child development/ or (child$ adj3 (development or growth)).ti,ab. (5163)
32 (breastfeeding adj3 (length or duration)).ti,ab. (301)
33 rickets/ or rickets.ti,ab. (137)
34 ((nutrition$ or nutritive or nutrient$ or micronutrient$ or dietary or energy) adj3 (intake or status or value)).ti,ab. or energy intake/ or nutritional requirements/ or nutrients/ (7702)
35 (anemi$ or anaemi$).ti,ab. or anemia, iron deficiency/ or iron deficien$.ti,ab. (2580)
36 exp gastrointestinal diseases/ (15478)
37 exp parasitic diseases/ or ((parasitic or gastrointestinal or respiratory) adj3 (disease$ or infection$ or parasite$)).ti,ab. (7318)
38 exp respiratory tract infections/ (12393)
39 Asthma/ or (asthma or wheeze).ti,ab. (9279)
40 Eczema/ or eczema.ti,ab. (687)
41 mortality/ or infant mortality/ or child mortality/ or mortality.ti,ab. (19340)
42 Morbidity/ or morbidity.ti,ab. (9922)
43 exp attitude to health/ or (health adj3 (knowledge or practice$ or attitude$)).ti,ab. (30607)
44 exp family attitudes/ or maternal behaviour/ or ((maternal or paternal or mother$ or father$ or parent$ or carer$) adj3 (behaviour$ or behaviour$ or knowledge or attitude$ or belief$ or practice$)).ti,ab. (7921)
45 paternal behaviour/ (40)
46 or/ 27-45 (143309)
47 26 and 46 (5403)
48 exp africa/ or exp caribbean region/ or exp central america/ or exp latin america/ or exp south america/ or exp asia/ (38475)
49 developing countries/ (2428)
50 or/ 48-49 (40389)
51 47 not 50 (4578)

52 exp clinical trials/ (36679)
53 double blind studies/ (7302)
54 single-blind studies/ (1911)
55 triple-blind studies/ (31)
56 clinical trial.pt. (17004)
57 random assignment/ (12464)
58 (randomized or randomised or placebo or randomly).ab. (27422)
59 trial.ti. (8600)
60 or/ 52-59 (54501)
61 51 not 60 (4037)
62 animals/ not (animals/ and humans/) (610)
63 61 not 62 (4030)
64 exp united kingdom/ or (united kingdom or great britain or uk or england or wales or scotland or ireland).in. (124156)
65 63 and 64 (477)
66 from 65 keep 1-477 (477)

Database: EMBASE <1980 to 2006 Week 16>

1 infant/ or (infant or infants).ti,ab. (219518)
2 preschool child/ or (preschool$ or nurser$ or playschool$ or kindergarten$ or crèche$ or (pre adj school$)).ti,ab. (95474)
3 or/ 1-2 (283860)
4 limit 3 to (english language and yr="1990 - 2006") (178266)
5 ((food or nutrition$ or diet$ or nutritive or feed$ or eating or health) adj3 (supplement$ or habit$ or behaviour$ or behaviour$ or attitude$ or belief$ or polic$ or value)).ti,ab. (57721)
6 (solid food or solids or baby food$).ti,ab. (10288)
7 weaning/ or (wean$ or weaning).ti,ab. (16460)
8 family food.ti,ab. (46)
9 exp fruit/ or vegetable/ or fruit$.ti,ab. or vegetable$.ti,ab. (33632)
10 sodium.ti,ab. (156325)
11 exp electrolyte intake/ (7893)
12 (vitamin or vitamins or iron).ti,ab. or exp vitamin/ (251178)
13 minerals.ti,ab. or exp nutrients/ or mineral intake/ (6353)
14 exp food/ or exp nutrition/ (683161)
15 health behaviour/ or diet/ or feeding behaviour/ (66291)
16 ((nutrition$ or nutrient$ or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or dietary intake/ (64378)
17 (nutrition$ adj3 knowledge).ti,ab. (696)
18 breastfeeding.ti,ab. or breastfeeding/ (3147)
19 (((salt or sugar) adj3 (intake or consumption)) or soft drinks or soda or candy or chocolate or sweets or confection$).ti,ab. or carbonated beverages/ or cacao/ or sugar/ (13146)
20 or/ 5-19 (940481)
21 4 and 20 (24576)
22 exp infant nutrition/ or (infant adj3 (food$ or nutrition)).ti,ab. (20687)
23 child nutrition/ or (child$ adj3 (food$ or nutrition)).ti,ab. (5372)
24 or/ 22-23 (25259)
25 limit 24 to (english language and yr="1990 - 2006") (18026)
26 21 or 25 (33292)
27 exp food allergy/ or (food adj3 (allerg$ or sensitivit$)).ti,ab. (8192)
28 exp tooth disease/ or dental caries.ti,ab. or (tooth adj2 (loss or erosion or decay)).ti,ab. (20726)

29 nutritional status/ or nutritional status.ti,ab. or body weight/ or weight.ti,ab. or bodyweight.ti,ab. or exp nutritional disorder/ or malnutrition.ti,ab. (432600)
30 obesity/ or overweight.ti,ab. or obes$.ti,ab. or thinness.ti,ab. or (body adj2 (height or size)).ti,ab. (84535)
31 child development/ or (child$ adj3 (development or growth)).ti,ab. (23840)
32 (breastfeeding adj3 (length or duration)).ti,ab. (470)
33 rickets/ or rickets.ti,ab. (2847)
34 ((nutrition$ or nutritive or nutrient$ or micronutrient$ or dietary or energy) adj3 (intake or status or value)).ti,ab. or dietary intake/ (52299)
35 (anemi$ or anaemi$).ti,ab. or iron deficiency anemia,/ or iron deficien$.ti,ab. (49971)
36 gastrointestinal disease/ (12810)
37 parasitosis/ or ((parasitic or gastrointestinal or respiratory) adj3 (disease$ or infection$ or parasite$)).ti,ab. (47022)
38 respiratory tract disease/ (12936)
39 Asthma/ or (asthma or wheeze).ti,ab. (78177)
40 Eczema/ or eczema.ti,ab. (9163)
41 infant mortality/ or child mortality/ (5849)
42 Morbidity/ or morbidity.ti,ab. (128234)
43 (health adj3 (knowledge or practice$ or attitude$)).ti,ab. (10231)
44 maternal behaviour/ or ((maternal or paternal or mother$ or father$ or parent$ or carer$) adj3 (behaviour$ or behaviour$ or knowledge or attitude$ or belief$ or practice$)).ti,ab. (11462)
45 paternal behaviour/ (488)
46 or/ 27-45 (818823)
47 26 and 46 (16565)
48 exp africa/ or exp caribbean region/ or exp central america/ or exp latin america/ or exp south america/ or exp asia/ (205246)
49 developing countries/ (16894)
50 or/ 48-49 (216435)
51 47 not 50 (13576)
52 controlled study/ (2151388)
53 exp clinical trial/ (385764)
54 outcomes research/ (54972)
55 randomized controlled trial/ (104939)
56 (randomized or randomised or randomly or placebo).ab. (270650)
57 trial.ti. (52353)
58 or/ 52-57 (2468183)
59 51 not 58 (7823)
60 animal/ not (animal/ and human/) (12808)
61 59 not 60 (7823)
62 united kingdom/ or (united kingdom or uk or england or wales or scotland or ireland or great britain).in. (863816)
63 61 and 62 (1023)
64 from 63 keep 1-1023 (1023)

Database: PsycINFO <1985 to April Week 4 2006>

1 exp infant development/ or (infant or infants).ti,ab. (26351)
2 (preschool$ or nurser$ or playschool$ or kindergarten$ or crèche$ or (pre adj school$)).ti,ab. (19889)
3 or/ 1-2 (44856)
4 limit 3 to (english language and yr="1990 - 2006") (31308)
5 ((food or nutrition$ or diet$ or nutritive or feed$ or eating or health) adj3 (supplement$ or habit$ or behaviour$ or behaviour$ or attitude$ or belief$ or polic$ or value)).ti,ab. (26875)

6 (solid food or solids or baby food$).ti,ab. (207)
7 weaning/ or (wean$ or weaning).ti,ab. (1585)
8 family food.ti,ab. (27)
9 (fruit$ or vegetable$).ti,ab. (3974)
10 sodium.ti,ab. (2547)
11 sodium/ (890)
12 (vitamin or vitamins or iron).ti,ab. or exp vitamins/ (2636)
13 minerals.ti,ab. (150)
14 food preferences/ or exp food/ or exp nutrition/ or food intake/ (10183)
15 eating behaviour/ or exp diets/ (4960)
16 ((nutrition$ or nutrient$ or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or energy expenditure/ (4564)
17 (nutrition$ adj3 knowledge).ti,ab. (224)
18 breastfeeding.ti,ab. or exp breastfeeding/ (581)
19 (((salt or sugar) adj3 (intake or consumption)) or soft drinks or soda or candy or chocolate or sweets or confection$).ti,ab. (884)
20 or/ 5-19 (48617)
21 4 and 20 (1338)
22 (infant adj3 (food$ or nutrition)).ti,ab. (64)
23 (child$ adj3 (food$ or nutrition)).ti,ab. (628)
24 or/ 22-23 (680)
25 limit 24 to (english language and yr="1990 - 2006") (566)
26 21 or 25 (1784)
27 exp food allergies/ or (food adj3 (allerg$ or sensitivit$)).ti,ab. (189)
28 (dental caries or (tooth adj4 (loss or erosion or decay))).ti,ab. (64)
29 nutritional status.ti,ab. or growth/ or growth.ti,ab. or body weight/ or body size/ or weight.ti,ab. or bodyweight.ti,ab. or nutritional deficiencies/ or malnutrition.ti,ab. (42288)
30 exp obesity/ or overweight.ti,ab. or obes$.ti,ab. or thinness.ti,ab. or (body adj4 (height or size)).ti,ab. (8989)
31 child development/ or early childhood development/ or (child$ adj3 (development or growth)).ti,ab. (21313)
32 (breastfeeding adj3 (length or duration)).ti,ab. (97)
33 rickets.ti,ab. (10)
34 ((nutrition$ or nutrient$ or micronutrient$ or diet$ or energy) adj3 (intake or advice or counsel$ or education or supplement$ or requirement$ or value)).ti,ab. or energy expenditure/ (4564)
35 (anemi$ or anaemi$).ti,ab. or anemia/ or iron deficien$.ti,ab. (503)
36 exp gastrointestinal disorders/ (2691)
37 exp parasitic disorders/ or ((parasitic or gastrointestinal or respiratory) adj3 (disease$ or infection$ or parasite$)).ti,ab. (913)
38 exp respiratory tract disorders/ (4347)
39 Asthma/ or (asthma or wheeze).ti,ab. (2161)
40 Eczema/ or eczema.ti,ab. (91)
41 mortality rate/ or mortality.ti,ab. (8243)
42 morbidity.ti,ab. (6428)
43 health knowledge, attitudes, practice/ or (health adj3 (knowledge or practice$ or attitude$)).ti,ab. (6579)
44 mother child relations/ or mother child communication/ or parent child relations/ or parent child communication/ or ((maternal or paternal or mother$ or father$ or parent$ or carer$) adj3 (behaviour$ or behaviour$ or knowledge or attitude$ or belief$ or practice$)).ti,ab. (38558)
45 father child relations/ or father child communication/ (2466)
46 or/ 27-45 (128746)

47 26 and 46 (1022)
48 exp developing countries/ or exp africa/ or exp caribbean region/ or exp central america/ or exp latin america/ or exp south america/ or exp asia/ (20525)
49 47 not 48 (990)
50 (empirical study or quantitative study).md. (830270)
51 treatment outcome clinical trial.md. (10357)
52 experimental design/ (4221)
53 (randomized or placebo or randomly).ab. (39678)
54 trial.ti. (5491)
55 or/ 50-54 (839684)
56 49 not 55 (272)
57 animals/ not (animals/ and humans/) (2278)
58 56 not 57 (271)
59 (britain or united kingdom).lo. (15410)
60 (united kingdom or uk or england or wales or scotland or ireland or great britain).in. (128302)
61 or/ 59-60 (130706)
62 58 and 61 (43)
63 from 62 keep 1-43 (43)

Results of UK searches

The search results from all searches were downloaded into an Endnote library and then deduplicated.

Search	Results	After deduplication	Custom4 code
medline uk	744	488	medline uk child nutrition
cinahl uk	477	412	cinahl uk child nutrition
embase uk	1021	748	embase uk child nutrition
psycinfo uk	43	33	psycinfo uk child nutrition

Maternal and child nutrition: update searches
Julie Glanville
30 January 2007

Where possible the original saved searches were rerun. Where saved searches were not available the original search strategies as recorded in the original search writeup were retyped into the relevant database/search engines.

Nutrition of children aged 7 months to 5 years - reviews, RCTs and UK studies

Database	Records retrieved	Records after deduplication against update searches and original library
Reviews		
CDSR (Cochrane Library 2006/2; 2006/3 and 2006/4)	100	96
DARE (CRD admin database)	22	0
NRR (issue 2006/1; 2006/2; 2006/3 and 2006/4)	100	92
HTA (CRD admin database 17/1/07)	0	0
SIGN (SIGN website)	0	0
NGC (NGC website)	2	1
NCCHTA (NCCHTA website)	0	0
NICE (NICE website)	0	0
HSTAT (HSTAT interface)	0	0
ReFeR (ReFeR website)	0	0
TRIP (TRIP website)	0	0
Clinical evidence	0	0
HEBW (website)	0	0
RCTs		
Medline (Ovid, 17/1/07)	142	89
Central (Cochrane Library 2006/2; 2006/3 and 2006/4)	356	294
Cinahl (Ovid, 16/1/07)	154	20
Embase (Ovid, 17/1/07)	874	432
Psycinfo (Ovid, 30/1/07)	100	59
UK		
Medline (Ovid, 17/1/07)	61	53
Cinahl (Ovid, 16/1/07)	81	47
Embase (Ovid, 17/1/07)	73	46
Psycinfo (Ovid, 30/1/07)	4	4

APPENDIX D – Methodology Checklist

From: National Institute for Health and Clinical Excellence (2006). *Methods for development of NICE public health guidance.* London: National Institute for Health and Clinical Excellence. Available from: www.nice.org.uk

Notes on the use of methodology checklist: systematic reviews

Section 1 identifies the study and asks a series of questions aimed at establishing the internal validity of the study under review – that is, making sure that it has been carried out carefully, and that the outcomes are likely to be attributable to the intervention being investigated. Each question covers an aspect of methodology that research has shown makes a significant difference to the conclusions of a study. For each question in this section you should use one of the following to indicate how well it has been addressed in the review.
Well covered
Adequately addressed
Poorly addressed
Not addressed (that is, not mentioned, or indicates that this aspect of study design was ignored)
Not reported (that is, mentioned, but insufficient detail to allow assessment to be made)
Not applicable

The study addresses an appropriate and clearly focused question

Unless a clear and well-defined question is specified, it will be difficult to assess how well the study has met its objectives or how relevant it is to the question you are trying to answer on the basis of its conclusions.

A description of the methodology used is included

One of the key distinctions between a systematic review and a general review is the systematic methodology used. A systematic review should include a detailed description of the methods used to identify and evaluate individual studies. If this description is not present, it is not possible to make a thorough evaluation of the quality of the review, and **it should be rejected as a source of level 1 evidence** (though it may be useable as level 4 evidence, if not better evidence can be found).

The literature search is sufficiently rigorous to identify all the relevant studies

A systematic review based on a limited literature search – for example, one limited to Medline only – is likely to be heavily biased. A well-conducted review should as a minimum look at Embase and Medline, and from the late 1990s onward, the Cochrane Library. Any indication that hand searching of key journals, or follow up of reference lists of included studies were carried out in addition to electronic database searches can normally be taken as evidence of a well-conducted review.

Study quality is assessed and taken into account

A well-conducted systematic review should have used clear criteria to assess whether individual studies had been well conducted before deciding whether to include or exclude them. If there is not indication of such an assessment, **the review should be rejected as a source of level 1 evidence**. If details of the assessment are poor, or the methods are considered to be inadequate, the quality of the review should be downgraded. In either case, it may be worthwhile obtaining and evaluating the individual studies as part of the review you are conducting for this guideline.

There are enough similarities between the studies selected to make combining them reasonable

Studies covered by a systematic review should be selected using clear inclusion criteria. These criteria should include, either implicitly or explicitly, the question of whether the selected studies can legitimately be compared. It should be clearly ascertained, for example, that the populations covered by the studies are comparable, that the methods used in the investigations are the same, that the outcome measures are comparable and the variability in effect sized between studies is not greater than would be expected by chance alone.

Section 2 relates to the overall assessment of the paper. It starts by rating the methodological quality of the study, based on your responses in Section 1 and using the following coding system:

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

The code allocated here, coupled with the study type, will decide the **level of evidence** that this study provides.
The aim of the other two questions in this section is to summarise your view of the quality of this study and its applicability to the patient group targeted by the guideline you are working on.

Methodology checklist for SRs

First author/year

Section 1: Internal validity

	In a well-conducted SR:	**In this study this criterion is: (copy one option into your column with comment if required)**	Reviewer 1 (initials)	Reviewer 2 (initials)
1.1	The study addresses an appropriate and clearly focused question	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.2	A description of the methodology used is included.	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.3	The literature search is sufficiently rigorous to identify all the relevant studies.	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.4	Study quality is assessed and taken into account.	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.5	There are enough similarities between the studies selected to make combining them reasonable.	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		

Section 2: Overall assessment of the study

2.1	How well was the study done to minimise bias? Code ++, + or -	Reviewer 1 (initials) Comment if desired	Reviewer 2 (initials) Comment if desired	Reviewer 3 (initials) Agreed
2.2	If coded as + or – what is the likely direction in which bias might affect the study results?			
2.3	Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain the overall effect is due to the study intervention?			
2.4	Are the results of this study directly applicable to the patient group targeted by this guideline?			

Notes on the use of methodology checklist: randomised controlled trials

Section 1 identifies the study and asks a series of questions aimed at establishing the internal validity of the study under review – that is, making sure that it has been carried out carefully, and that the outcomes are likely to be attributable to the intervention being investigated. Each question covers an aspect of methodology that research has shown makes a significant difference to the conclusions of a study.
For each question in this section you should use one of the following to indicate how well it has been addressed in the study.
Well covered
Adequately addressed
Poorly addressed
Not addressed (that is, not mentioned, or indicates that this aspect of study design was ignored)
Not reported (that is, mentioned, but insufficient detail to allow assessment to be made)
Not applicable

The study addresses an appropriate and clearly focused question

Unless a clear and well-defined question is specified, it will be difficult to assess how well the study has met its objectives or how relevant it is to the question you are trying to answer on the basis of its conclusions.

The assignment of subjects to treatment groups is randomised.

Random allocation of patients to receive one or other of the treatments under investigation, or to receive either treatment or placebo, is fundamental to this type of study. **If there is no indication of randomisation, the study should be rejected.** If the description of randomisation is poor, or the process used is not truly random (for example, allocation by date, alternating between one group and another) or can otherwise be seen as flawed, the study should be given a lower quality rating.

An adequate concealment method is used.

Research has shown that where allocation concealment is inadequate, investigators can overestimate the effect of interventions by up to 40%. Centralised allocation, computerised allocation systems or the use of coded identical containers would all be regarded as adequate methods of concealment, and may be taken as indicators of a well-conducted study. If the method of concealment used is regarded as poor, or relatively easy to subvert, the study must be given a lower quality rating, and can be rejected if the concealment method is seen as inadequate.B.2.4Subjects and investigators are kept ‘blind’ about treatment allocation.
Blinding can be carried out up to three levels. In single-blind studies, patients are unaware of which treatment they are receiving; in double-blind studies the doctor and the patient are unaware of which treatment the patient is receiving; in triple-blind studies patients, healthcare providers and those conducting the analysis are unaware of which patients received which treatment. The higher the level of blinding, the lower the risk of bias in the study.

The treatment and control groups are similar at the start of the trial.

Patients selected for inclusion in a trial should be as similar as possible, in order to eliminate any possible bias. The study should report any significant differences in the composition of the study groups in relation to gender mix, age, stage of disease (if appropriate), social background, ethnic origin or comorbid conditions. These factors may be covered by inclusion and exclusion criteria, rather than being reported

directly. Failure to address this question, or the use of inappropriate groups, should lead to the study being downgraded.

The only difference between groups is the treatment under investigation.

If some patients received additional treatment, even if of a minor nature or consisting of advice and counselling rather than a physical intervention, this treatment is a potential confounding factor that may invalidate the results. **If groups were *not* treated equally, the study should be rejected unless no other evidence is available.** If the study *is* used as evidence it should be treated with caution, and given a low quality rating.

All relevant outcomes measured in a standard, valid and reliable way.

If some significant clinical outcomes have been ignored, or not adequately taken into account, the study should be downgraded. It should also be downgraded if the measures used are regarded as being doubtful in any way, or applied inconsistently.

What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?

The number of patients that drop out of a study should give concern if the number is very high. Conventionally, a 20% drop-out rate is regarded as acceptable, but this may vary. Some regard should be paid to *why* patients dropped out, as well as how many. It should be noted that the drop-out rate may be expected to be higher in studies conducted over a long period of time. A higher drop-out rate will normally lead to downgrading, rather than rejection of a study.

All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention-to-treat analysis).

In practice, it is rarely the case that all patients allocated to the intervention group receive the intervention throughout the trial, or that all those in the comparison group do not. Patients may refuse treatment, or contra-indications arise that lead them to be switched to the other group. If the comparability of groups through randomisation is to be maintained, however, patient outcomes *must* be analysed according to the group to which they were originally allocated, irrespective of the treatment they actually received. (This is known as *intention-to-treat* analysis.) If it is clear that analysis was not on an intention-to-treat basis, the quality of the study should be downgraded.

Where the study is carried out at more then one site, results are comparable for all sites.

In multi-site studies, confidence in the results should be increased if it can be shown that similar results were obtained at the different participating centres.

Section 2 relates to the overall assessment of the paper. It starts by rating the methodological quality of the study, based on your responses in Section 1 and using the following coding system:

++	All or most of the criteria have been fulfilled. Where they have not been fulfilled the conclusions of the study or review are thought **very unlikely** to alter.
+	Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought **unlikely** to alter the conclusions.

–	Few or no criteria fulfilled. The conclusions of the study are thought **likely or very likely** to alter.

The code allocated here, coupled with the study type, will decide the **level of evidence** that this study provides.
The aim of the other two questions in this section is to summarise your view of the quality of this study and its applicability to the patient group targeted by the guideline you are working on.

Methodology checklist for RCTs

First author/year

Section 1: Internal validity

	In a well-conducted RCT study:	**In this study this criterion is: (copy one option into your column with comment if required)**	Reviewer 1 (initials)	Reviewer 2 (initials)
1.1	The study addresses an appropriate and clearly focused question	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.2	The assignment of subjects to treatment groups is randomised	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.3	An adequate concealment method is used	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.4	Subjects and investigators are kept 'blind' about treatment allocation	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.5	The treatment and control groups are similar at the start of the trial	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.6	The only difference between groups is the treatment under investigation	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.7	All relevant outcomes are measured in a standard, valid way	Well covered Adequately addressed Poorly addressed Not addressed Not reported		

		Not applicable		
1.8	What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?	Where available, Reviewer 1 report and Reviewer 2 check: Number randomised into each arm Number in each arm with outcome data at the end of the trial Dropout rate (%) for each arm Dropout rate (%) overall		
1.9	All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis, ITT)	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		
1.10	Where the study is carried out at more than one site, results are comparable for all sites	Well covered Adequately addressed Poorly addressed Not addressed Not reported Not applicable		

Section 2: Overall assessment of the study

2.1	How well was the study done to minimise bias? Code ++, + or -	Reviewer 1 (initials) Comment if desired	Reviewer 2 (initials) Comment if desired	(Reviewer 3) Agreed
2.2	If coded as + or – what is the likely direction in which bias might affect the study results?			
2.3	Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain the overall effect is due to the study intervention?			
2.4	Are the results of this study directly applicable to the patient group targeted by this guideline?			