

BMJ Open Factors influencing obesogenic dietary intake in young children (0–6 years): systematic review of qualitative evidence

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ABSTRACT

Background: Obesogenic dietary intake is prevalent in young children and is associated with obesity and other adverse health outcomes in childhood and later in life.

Objective: To describe the barriers to and facilitators of obesogenic dietary intake in early childhood, in order to inform interventions and public health policies to prevent obesity.

Design: Systematic review of qualitative literature on factors influencing obesogenic diets in children aged 0–6 years.

Data sources: MEDLINE, EMBASE, CINAHL, PsycINFO, Web of Knowledge, British Nursing Index, ASSIA and Sociological Abstracts.

Review methods: Qualitative studies meeting the inclusion criteria were synthesised. Data were analysed by creating a thematic framework, underpinned by the socioecological model, which included familiarisation of data across the studies, indexing, charting, mapping and interpretation.

Results: 20 studies from the USA (10), Europe (6) and Australia (4) included the views of 1067 participants (901 parents/caregivers, 37 children, 87 teachers, 15 dietitians and 27 nursery staff). Study designs included focus groups (n=16), individual interviews (n=6) and ethnography (n=1) with some studies using more than one design. Despite wide differences in the study context and focus, several consistent themes emerged. Parental factors increasing young children's obesogenic diets were: negative parent/family/peer modelling, lack of knowledge, time constraints, using food as reward, affordability and concerns about child's health. Child preferences also increased intake. Environmental factors increasing intake include: availability, advertising, societal, cultural and preschool/childcare influences.

Conclusions: Future intervention strategies should aim to promote modelling of positive behaviours, create home and preschool environments that promote healthy diets, and simultaneously target factors at the family and preschool/childcare levels.

Trial registration number: This review is one of a series of systematic reviews on the determinants of obesogenic behaviours in young children, registered with the International Prospective Register for Systematic Reviews (PROSPERO), CRD42012002881.

Strengths and limitations of this study

- To our knowledge, this is the first systematic review of qualitative evidence on factors influencing obesogenic dietary intake in preschool-aged children and we found that carers/parents, family and peer modelling significantly influenced young children's diet.
- We conducted a comprehensive search to identify relevant literature and followed strict systematic review procedures to minimize selection and reviewer related biases.
- Data was synthesized using a thematic framework, underpinned by the socio-ecological model.
- Ten (out of 12) factors/themes were consistently reported by nine or more studies.
- Almost all studies were conducted in developed countries and study participants were mainly mothers, which could limit the generalisability of the findings.

INTRODUCTION

Recent figures show alarming numbers of obese and overweight preschool-aged children.¹ In 2010, 43 million children under the age of five were obese or overweight worldwide and the prevalence was estimated to rise from 6.7% to 9.1% in 2020.² In 2013, around 22% of children in school aged 4–5 years and around 33% children aged 10–11 years were overweight or obese in England.³ In 2014, a study in the USA reported that almost half of the children who were obese in eighth grade were overweight or obese when they started kindergarten.⁴ Furthermore, they concluded that the child's weight status is set by age five and tracks throughout childhood.⁴ Childhood obesity is an increasing public health problem as it affects health and well-being adversely during childhood and adulthood.⁵ However, preventing child overweight and obesity remains an important and complex public health challenge.^{6–8} Evidence

indicates that an individual's behaviour is influenced by a multitude of factors operating at different levels of the socioecological model of health behaviour.^{9 10}

Quantitative evidence suggests that energy balance-related behaviours (EBRBs) such as consumption of energy dense, nutrient poor food (eg, unhealthy snacks) and drink (eg, sugar-sweetened beverages, SSBs) and sedentary behaviours (eg, TV viewing) are the main cause of the increase in overweight and obesity in children.^{11–13} Targeting these multiple EBRBs could help prevent overweight and obesity, since they are known to lie on the causal pathway of weight gain in young children.^{14–16} SSB consumption is associated with obesity, and predictive of excess weight gain^{17 18} and responsible for the higher caloric intakes among SSB consumers.¹⁹

There is increasing evidence that certain dietary intake patterns (obesogenic diet) are associated with obesity, excess weight gain and other adverse (physical, emotional, educational and social) outcomes in childhood and adulthood.^{20–23} For example, energy-dense diets that are poor in essential nutrients (non-core foods) have adverse effects on obesity prevalence as well as on general health status and well-being.⁶ Sedentary behaviours and obesogenic dietary intake patterns of fast food, snacks (high fat, sweet, salt) and SSB consumption, adopted during childhood, are known to track into adulthood.^{24–27} Consumption of SSBs (such as fruit juices/drinks or fruit-flavoured beverages which have high sugar content) in young children is a risk factor for overall poor diet¹⁹ and oral health.^{28 29}

Early childhood is seen as a period of habit formation and a crucial time for interventions to prevent overweight and obesity.³⁰ In order to change dietary behaviours, it is important to understand the factors influencing these behaviours and interventions targeting these factors may be more effective.^{14 31} Modifying lifestyle has become an important avenue for investigation, since evidence suggests that complex interventions involving multiple methods are required to change dietary behaviour.³⁰

However, most studies addressing this topic are quantitative and on school-aged children and adolescents, with few studies conducted specifically among preschool-aged children. Qualitative research informs quantitative research and guides the design of intervention and practice.³² This paper systematically synthesises the qualitative evidence on the factors influencing obesogenic dietary intake in preschool children underpinned by the socioecological model, in order to inform obesity preventative strategies.

METHODS

An iterative scoping stage (with input from experts) was followed by a combined search strategy with terms related to population (preschool children aged 0–6 years), exposure and outcome (fruit and vegetable consumption, SSB and other obesogenic diet consumption, physical activity and sedentary behaviours) to identify papers. The overall study design, search, inclusion/

exclusion and quality assessment strategies are previously described in the published protocol³³ and follow review methods described by the Evidence for Policy and Practice Information (EPPI) Centre for the rigorous conduct and reporting of systematic reviews for policy and practice.³⁴

Search strategy

The search strategy for literature was comprehensive and was without period or language restrictions (see online supplementary table S1). We also handsearched and contacted authors of included studies to identify relevant literature. A total of 37 868 articles were identified through search of eight electronic databases in August 2012, after deduplication (MEDLINE n=20 374, EMBASE n=17 331, CINAHL n=775, PsycINFO n=1868, Web of Knowledge n=13 455, BNI n=291, ASSIA n=113 and Sociological Abstracts n=135). The flow chart of the literature search is presented in figure 1. A rerun search of June 2014 yielded 8908 articles after deduplication. The results of the 10 additional qualitative studies that met our inclusion criteria have been reported in the discussion. No additional themes emerged from these recent studies and the overall conclusions of our review did not change.

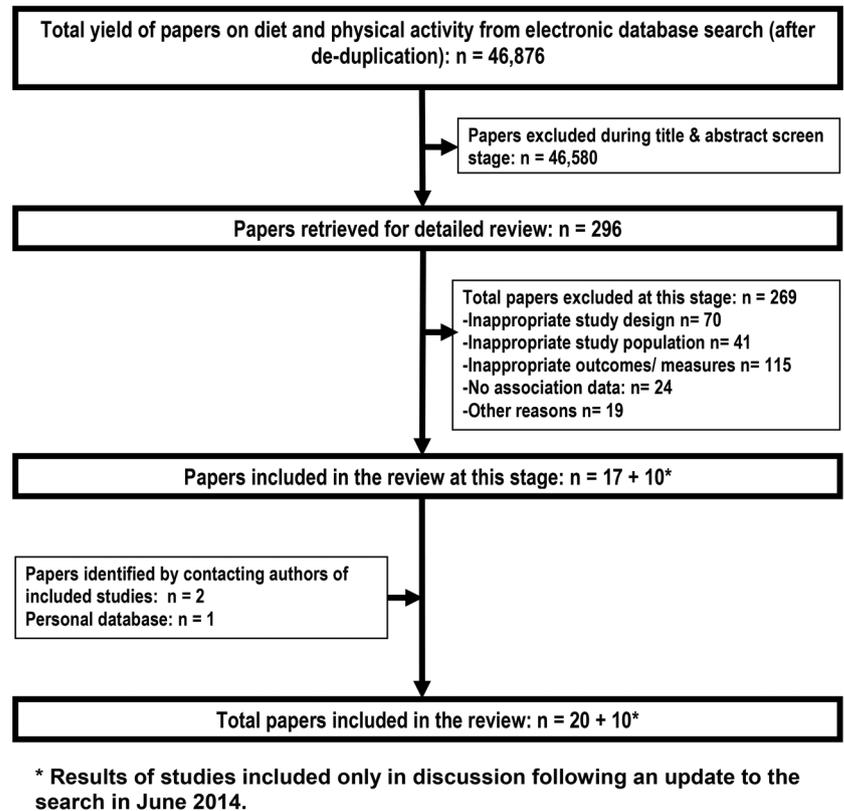
Study selection

Qualitative studies providing a greater understanding of the factors influencing obesogenic dietary intake in preschool-aged children were included (see inclusion/exclusion criteria in online supplementary table S2). The following foods were included as obesogenic diets: snacks high in sugar, salt or fat (eg, crisps, chips, cakes, pastry, sweets and chocolate), combinations of foods (eg, fast food, junk food, convenience food and takeaway food), diets categorised by other researchers as obesogenic (eg, non-core foods, non-prudent diet and western diet) and SSBs (soft drinks, fruit juices, other sweetened drinks).

Quality assessment

A standard quality assessment tool for qualitative study designs, as specified by the EPPI centre, was used³⁴ and investigated the following preset criteria: research questions clearly stated, approach appropriate for the research question, qualitative approach clearly justified, study context clearly described, role of the researcher clearly described, sampling method clearly described, sampling strategy appropriate for the research question, method of data collection clearly described, data collection method appropriate, method of analysis clearly described, analysis appropriate for the research question, and conclusions supported by sufficient evidence. Quality of the studies was based on the total quality assessment score—'high': met 9–12 quality criteria, 'intermediate': met 5–8 quality criteria, 'low': met 4 or less quality criteria.

Figure 1 Flow chart of the systematic literature search for qualitative studies on obesogenic dietary intake in young children.



Study selection and quality appraisal was performed by one author (VMP) and all included studies were double reviewed (RL). Of the 37 868 articles, 286 papers were shortlisted for further review. From these, 17 qualitative studies describing the factors influencing obesogenic dietary intake in young children (0–6 years) were included in the review. Three additional papers were identified in August 2013, two^{35 36} through correspondence with first authors of included studies and one³⁷ from the personal database of one of the authors (RL).

All excluded studies were recorded with details and reasons for exclusion. Nineteen papers, mainly conference abstracts or PhD theses, without peer-reviewed full-text papers, were also excluded and have been accounted for in the flow chart (figure 1) as excluded for ‘other reasons’.

Data extraction and analyses

The included qualitative studies (n=20) reported outcomes of interviews, focus groups and participant observation.

A pre-piloted Excel spreadsheet was used to collect information about the study objectives, settings, sample size and selection and other details of the research methods. The data extraction and analysis followed the thematic framework approach underpinned by the socioecological model and included familiarisation of the data across the studies, creating a thematic framework, indexing, charting, mapping and

interpretation.^{38 39} Data extraction involved an iterative process of reading and rereading of the studies, the identification of themes concerning views on factors influencing obesogenic dietary intake. A stepwise approach was used to compare and consolidate the initial themes into one list and finally a summary into overarching themes. Details of individual studies (including methods, emergent themes, participant quotes and author conclusions) are documented in online supplementary table S3. The thematic framework was created by RL and double-checked by VMP to ensure agreement and consistency in data extraction and reporting. Any disagreement was resolved by consensus.

RESULTS

Study characteristics

The included studies (n=20) had a total of 1067 participants (901 parents/caregivers, 37 children, 87 teachers, 15 dieticians and 27 nursery staff, ie, 9 managers, 6 cooks and 12 other staff). Studies were mainly conducted in developed countries (USA n=8,^{40–47} Mexico n=1,⁴⁸ Canada n=1,⁴⁹ Australia n=4,^{37 50–52} UK n=3,^{36 53 54} Sweden n=1,⁵⁵ multiple (6 and 8 countries, respectively) and countries in Europe n=2,^{35 56} between 2004 and 2013. Eighteen studies were of high quality and two were of intermediate quality.^{43 47} Qualitative evidence on SSB intake was identified from 8 studies,^{35 41 42 47 48 50 53 56} and data on obesogenic food intake from 18 studies.^{36 37 40 42–56} Most studies (n=13)

were in non-generalisable populations such as obese children or low-income families, and these were categorised as non-representative of the general population.^{35–37 40–47 50 53}

Eleven of the 20 studies aimed to recruit parents,^{36 37 40 41 46 48 49 51 53 55 56} three recruited only mothers,^{42 47 52} one had only fathers,⁴³ one had only child participants⁵⁰ and four had mixed populations, that is, parents and teachers³⁵; mothers and dieticians⁴⁵; mothers and children,⁴⁴ and nursery staff, parents and children.⁵⁴ Overall, the number of fathers recruited per study was small.^{40 41 43 46 48 55 56} The study designs varied: 16 studies held focus groups, 6 interviewed individual participants and 1 was an ethnographic study,⁵⁴ with some studies using more than one data collection method. The number of participants in each study ranged from 6 to 209. Most studies included children aged 2–6 years and only four studies specified that children below 2 years were included.^{36 43 45 47}

Thematic analysis

Several behavioural factors were identified as barriers to or facilitators of healthy diet and, despite of differences in study context and focus, 15 themes were identified with 12 themes reported consistently by three or more studies (see online supplementary table S3). The factors were thematically coded and analysed at three levels as per the socioecological model (table 1): child (1 theme), parental/family (7 themes) and environmental (4 themes). Participant (parent, mother, father, child, teacher, etc) quotes are presented in parentheses to illustrate points in respective themes.

Themes identified

Child factors

Child's preference/likes

This was the only child-level theme identified and was reported by 14 studies. These studies found child's taste

preferences, attitudes, likes and dislikes towards food/beverage consumption and difficult feeding/fussy eating to be factors influencing diet in young children, with parents usually offering what the child preferred. ("Your child can influence how you feed them, definitely, depending on their likes and dislikes"—Parent.³⁷ "We feel like we've got to give our kids things all the time... because they want it, we have got to take them to McDonalds"—Mother.⁵²) Caregivers also described strategies to overcome barriers to healthy eating: motivating and encouraging children to make healthy choices, through negotiation, repeated exposure to healthy food and opportunities for children to prepare meals.

Parental/family/peer factors

Modelling

Fifteen studies reported parental/family/peer influences, of which 10 studies reported that negative parental modelling, conflicting food purchases, and parental preference for takeaways and packaged food were barriers to healthy eating in children. ("I've learned that children do copy us...when your husband is having chocolate it's not fair to expect your child to have banana or fruit"—Mother.²⁴) Fourteen studies reported that family member/s and peers influenced child's dietary behaviours, sometimes challenging parental practices. Older siblings and wider family members were often perceived as role models. ("As a parent, you are responsible for your children's lifestyle. We have to guide our children...Children don't do what parents tell them to; they do what parents do"—Parent.⁵⁵)

Knowledge, perceptions, beliefs, confidence, motivation and cooking skills

Fourteen studies reported that such parental influences affect their child's diet. Many parents reported poor nutritional knowledge/education, were more concerned about child's underweight status than overweight, or

Table 1 Summary of factors influencing young children's obesogenic diet

Broad themes	Studies* exploring each theme
<i>A. Child factors:</i>	
1. Preference/likes	2,3,4,5,7,8,9,10,13,14,16,17,19,20
<i>B. Parental factors:</i>	
2. Modelling (parental/ family/peer)	1,2,3,4,7,9,10,11,12,13,14,17,18,19,20
3. Knowledge, perceptions, beliefs, confidence, motivation and cooking skills	1,2,6,7,8,10,11,13,14,15,16,17,18,19
4. Time and convenience	2,3,4,7,10,11,14,15,17,18
5. Using food as a reward	3,5,7,11,12,13,15,16,17,19
6. Affordability/cost	2,3,4,10,11,13,14,17,18
7. Concerns about child's health	3,5,7,9,10,13,14,15,18
8. Involving children in food preparation	12,13,17
<i>C. Environmental factors:</i>	
9. Societal/cultural influence	3,4,11,15,17
10. Preschool/childcare/healthcare influence	1,3,4,6,7,9,10,11,13,14
11. Availability of obesogenic food and drinks	1,4,5,7,8,10,11,12,15,17
12. Advertising and packaging	1,2,3,4,7,9,10,11,12,13

*Study number as per online supplementary table S3.

were overweight themselves, which limited accurate identification of their child's weight status. Some studies reported unhealthy food preparation and feeding practices, early weaning and early introduction of solids as factors affecting healthy diet in infants and toddlers. ("They talk to you and educate you about nutrition, they teach you...I did not know about the pyramid of food, the amount of bread, the amount of rice and fruit...and that is a big influence"—Mother.⁴²) One study reported that lack of support, confidence, motivation and cooking skills was a barrier to healthy eating in children. ("The confidence I think could be (a barrier to providing healthy food), yeah, thinking, oh my goodness I'm going to mess that meal up, I'm going to go for the easy option"—Parent.³⁶)

Time and convenience

Ten studies reported influences on this theme. Parents resorted to convenience food to help them juggle jobs and children's activities, and lack of time clearly influenced parents' choices and affected children's diets. ("It's hard, so you almost give up good eating for activities...so they either eat good and don't get a good activity, or you get a good activity and you eat at McDonald's"—Parent.⁴⁹ "I don't cook and I'm the only one who can cook...but I am never there. There will be nights I'll work 18 hours straight and I'll be up at 6:00... and go to work...When I do feed her, it's McDonald's, Burger King, something like that. I can grab and go... because I don't have the time"—Caregiver.⁴⁰)

Using food as a reward

Ten studies reported that parents used obesogenic food as a reward for good behaviour. ("She then asked for a chocolate from the Christmas tree. I said she could have one if she ate a Satsuma first, which she did." "Because she had eaten all of her food, I said, do you want some ice-cream?"—Parent.⁵³) This practice could directly increase obesogenic food intake and also make it more desirable for children.

Affordability/cost

Nine studies reported the influence of financial constraints. Most of these studies reported that participants felt they could not afford to purchase healthy food for their children, which they perceived to be more expensive than unhealthy food. ("A limited household income should not be the same as living an unhealthy life. The government should subsidise healthy...food." "Healthier food should cost less. I cannot believe that fruit and vegetables should be so terribly expensive"—Parent.⁵⁵)

Concerns about child's health

Nine studies reported that parents' or carers' concerns about their child's health influenced their dietary decisions, usually positively but also in some cases adversely. ("...and during some of that time I'll let him eat that without arguing about eating the junk food a lot of

times just as long as I know he's filling up on something"—Parent.⁴⁰)

Involving children in food preparation

Three studies reported that involving children in food preparation, being creative with food, making mealtime special (eg, picnic), mealtime rituals and routines, could facilitate healthy eating. ("I try to get them into the kitchen as much as I can, especially if I know that they don't like the dish that I am preparing"—Parent.⁵¹)

Environmental factors

Societal/cultural influence

Five studies reported that societal and cultural pressures influenced children's dietary intake while some parents found it difficult to manage without social support. ("Well, I think society has a responsibility for our children's lifestyle, since the politicians make the laws. I believe in early prevention..."—Parent.⁵⁵) Social norms and cultural challenges such as influence of friends and social occasions, social support from grandparents and friends, and SSB consumption at home being a norm in some cultures adversely influenced dietary intakes. ("In our culture, children are allowed to have sweets several times a week...it's not a big deal"—Parent.⁵⁵)

Preschool/childcare/healthcare influence

Ten studies reported that preschool/childcare and healthcare policies influenced children's dietary intake. Parents and teachers acknowledged that both were role models with collective responsibility towards children and that childcare settings should provide and assist parents to provide healthy food to children. ("When children have chocolate milk or other sugared sweetened beverages at school every day, the preschool will have a stimulating and key role for the intake of sugar"—Parent.³⁵ "We cannot control what they eat and their diet really depends on the place where they stay during the day"—Parent.⁵⁶)

Parents expected preschool to also provide them with information on healthy eating, so parents could promote healthy dietary intake within the family unit. ("Preschool affects our children's lifestyle. Children spend all day there...preschools should have the mission to coach parents to raise children with healthy lifestyles...parents groups for instance..."—Parent.⁵⁵)

Availability of obesogenic food and drinks

Ten studies reported that children tend to consume obesogenic food and drink whenever it was available, at home or at school. ("Probably the most obvious thing (influencing a child's food preferences) to me is what is available. If we have certain foods in the house she will eat them, if we don't, she doesn't ask for them"—Parent.⁵¹ "My children only drink cartons of orange juice. I have nothing else"—Parent.³⁵) Controlling of home and school food environment and limiting the availability/accessibility of unhealthy food was

considered to facilitate a healthy diet in children. (“I keep an eye on what she actually is eating because I’m sure if I put a big tin of Quality Street out in front of her, she’d quite happily demolish as many as possible”—Parent.⁵³)

Advertising and packaging

Ten studies reported that children and parents are influenced by marketing of obesogenic foods. Advertising, food packaging, food placement in supermarkets, and high availability of unhealthy foods in public places made it difficult for parents to make healthy food choices. (“I think when sweets are obviously in the shops and advertising them and the children can see them, it makes it very hard obviously to get away from that with them demanding things like that”—Parent.³⁶ “Children are exposed to temptation all of the time, both in the shops, on television and in newspapers”—Parent.⁵⁵)

DISCUSSION

Previous systematic reviews have stated that there is lack of evidence on the factors influencing obesogenic dietary intake in young children.^{10 13 14} Our systematic review of qualitative evidence identified many behavioural (parent/carer and child) and environmental (home/preschool/childcare and wider environment) factors, reported by parents and carers as influencing obesogenic dietary intake in young preschool-aged children. Almost all of the studies (18/20) were of ‘high’ methodological quality. Ten of the 12 factors/themes (per socioecological model) were reported by nine or more studies and 2/12 were reported by three and five studies, respectively.

At the child’s level; child’s dietary preferences/likes were consistently reported by 14 studies as a major factor in child’s obesogenic dietary intake. These could be appetite-related behaviours which may be enhanced by environmental influences.⁵⁷ Also, preschool-aged children potentially make inappropriate food choices in the absence of parental supervision.⁵⁸ Child preferences also influenced parental feeding decisions, so promoting an authoritative parenting style in addition to teaching parents easy to cook, tasty, healthy and affordable foods appears to be important.

At the parental/family level, negative parent/family/peer modelling, lack of knowledge, time constraints, use of food as a reward, affordability and concerns about child’s health were studied extensively by more than eight studies each and were identified as influencers of children’s obesogenic dietary intake. These findings are consistent with other research on the topic.^{10 13 59} Parental, family and peer modelling was reported extensively by 15 studies and strongly influences the child’s obesogenic dietary intake. Hence, promoting parental positive modelling should be included in any intervention. Quantitative evidence has shown that early weaning from exclusive breastfeeding⁶⁰ and introduction to

non-core foods early^{61 62} was significantly associated with increased obesogenic dietary intake in young children. Studies have shown that dietary intake of children is dependent on who feeds the child.⁶³ We found that choice of obesogenic dietary intake in children had influences from social, environmental and behavioural domains. Recent qualitative studies have also reported similar findings.^{35 64–69} Preschool-aged children rely on their parents or carers for food and some children may be more vulnerable to parental unhealthy feeding habits and strategies.

Maternal factors were studied more extensively than those of paternal or other carers; perhaps this is because mothers spend more time with their preschoolers and it is easier to recruit mothers to studies. Also, evidence suggests that maternal factors are associated with increased obesity in children.^{70 71} Three studies in our review reported that children who were involved in the food preparation ate healthy meals. This was also the conclusion of a recent qualitative study.⁷² We also found that parents who recognised childhood obesity as a problem tried to promote healthy eating habits in their children. So improving parent’s identification and understanding of obesity may be a useful intervention strategy.

At the environmental level; availability of obesogenic food/drinks, advertising, societal, cultural and preschool/childcare influences were identified as factors influencing obesogenic dietary intake in children. Quantitative evidence shows a positive association with availability and obesogenic dietary behaviours⁷³ and that home food availability mediates the association between maternal nutrition knowledge and child’s diet.⁷⁴ We found that parents could make changes to the home food environment to promote a healthy diet. Our review also found that parents expect day care/preschool providers, paediatricians and policymakers to help improve their nutritional knowledge and the child’s dietary intake. Perhaps capacity building and training of staff at nursery/preschool, and developing interventions integrating social class and culture into ecological frameworks, may be effective in obesity prevention through the identification and development of culturally sensitive nutritional information.^{75 76} Environmental factors such as supermarkets/convenience stores (food placement, offers), food pricing, food availability and food advertising influence the child’s diet. It would be useful to investigate whether changing environmental determinants such as advertising, marketing, packaging, pricing and food positioning could reduce obesogenic dietary intake in young children.^{77 78}

The collective findings of our review concur with the larger body of evidence in older children and adolescents that knowledge, taste preferences, school policies, parental modelling, influence of peers, availability and accessibility all influence eating behaviours.^{20 79–82} Our findings are also similar to those of a recent Australian qualitative study and a systematic review which investigated only parental influences on dietary intake in

children aged 2–5 years and highlighted the following factors: cultural differences, parental attitudes, perceptions and concerns; barriers faced by lower income families to providing healthy foods; using food to shape child's behaviour; lack of understanding of weight status and obesity consequences; inappropriate parent feeding practices and nutrition knowledge.^{32–72}

STRENGTHS AND WEAKNESSES OF THE REVIEW

To the best of our knowledge, this is the first systematic review of qualitative evidence on the factors influencing obesogenic dietary intake in preschool-aged children. We conducted a comprehensive search without period or language restrictions, as well as handsearched and contacted authors of included studies to identify relevant literature. We also followed preset inclusion criteria and systematic review procedures throughout to minimise selection and reviewer-related biases. All but 2 of the 20 included studies were assessed to be of 'high' methodological quality and only 2 were of 'intermediate' quality. Ten of the 12 factors/themes were consistently reported by at least nine studies. Seventeen of the 20 studies were published after 2003, indicating that most research on this topic is contemporary. Relevant studies up to June 2014 have been included in our review and this may be a limitation, but we believe that recent qualitative studies will not significantly alter our conclusions. Studies included in this review were almost all from developed countries, although a few were set in the UK. Furthermore, very few fathers or carers were included as participants, which limits the scope of the findings.

CONCLUSIONS

There is consistent qualitative evidence that several factors at various levels of the socio-ecological model (child, parent and environment), influence obesogenic dietary intake, although modelling appears to have the most influence. These findings support the rationale for the design and testing of multilevel interventions to reduce obesogenic dietary intake in young preschool age children. Such interventions should also target the barriers to healthy eating—affordability, convenience, modelling, education, child preference, availability and advertising.

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Supplementary Table 1: Search Strategy

Medline and Embase via Ovid (01/08/2012) and 10/06/2014	
1	(Determin*4 or correlates or factors or predict*3 or associate*3 or interaction or influence*1 or temperament or beliefs or attitudes or knowledge or perceptions or views or intentions or facilitators or barriers or experiences or prevent*3 or reduc*5 or increas*3 or promot*3 or education or curriculum or program*3 or polic*3 or media or campaign or review or intervention*1 or initiative*1 or strategy*3 or evaluation or trial).mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
2	(Infant* or Toddler* or Preschool* or Nurser*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
3	((Fruit*1 or Vegetable*1 or juice or sugar sweetened beverage*1 or fizzy drinks or soft drinks or junk food or fast food or processed food or unhealthy food or takeaway food or non-core food or energy dense food or high fat food or fatty food or nutrient poor food or unhealthy diet or healthy eating or portion size or empty calories or confectionery or sweet*1 or dessert*1 or chocolate*1 or cake*1 or biscuit*1 or burger*1 or chip*1 or crisp*1 or snack*1 or breakfast or lunch or dinner or obes*6 or overweight).mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
4	3 not (allerg*3 or dental caries)
5	(physical activ*5 or inactiv*3 or exercise*1 or outdoor or TV or Television or Tele or sedentary or (screen adj time)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
6	1 AND 2 AND (4 OR 5)
7	6 not (cerebral palsy or asthma or cystic fibrosis or autism).mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]

Cinahl and Psychinfo via Ebsco (03/08/2012) and 10/06/2014	
S1	TX (Determin*4 or correlates or factors or predict*3 or associate*3 or interaction or influence*1 or temperament or beliefs or attitudes or knowledge or perceptions or views or intentions or facilitators or barriers or experiences or prevent*3 or reduc*5 or increas*3 or promot*3 or education or curriculum or program*3 or polic*3 or media or campaign or review or intervention*1 or initiative*1 or strategy*3 or evaluation or trial)
S2	TX (Infant* or Toddler* or Preschool* or Nurser*)
S3	TX (Fruit*1 or Vegetable*1 or juice or sugar sweetened beverage*1 or fizzy drinks or soft drinks or junk food or fast food or processed food or unhealthy food or takeaway food or non-core food or energy dense food or high fat food or fatty food or nutrient poor food or unhealthy diet or healthy eating or portion size or empty calories or confectionery or sweet*1 or dessert*1 or chocolate*1 or cake*1 or biscuit*1 or burger*1 or chip*1 or crisp*1 or snack*1 or breakfast or lunch or dinner or obes*6 or overweight)
S4	TX S3 not (allerg*3 or dental caries)
S5	TX (physical activ*5 or inactiv*3 or exercise*1 or outdoor or TV or Television or Tele or sedentary or (screen n1 time))
S6	TX S1 AND S2 AND (S4 OR S5)
S7	TX S6 not (cerebral palsy or asthma or cystic fibrosis or autism)

BNI via Healthcare Databases supplied by ProQuest (07/08/2012) and 10/06/2014	
1	((Determin*4 or correlates or factors or predict*3 or associate*3 or interaction or influence*1 or temperament or beliefs or attitudes or knowledge or perceptions or views or intentions or facilitators or barriers or experiences or prevent*3 or reduc*5 or increas*3 or promot*3 or education or curriculum or program*3 or polic*3 or media or campaign or review or intervention*1 or initiative*1 or strategy*3 or evaluation or trial)).ti,ab
2	((Infant* or Toddler* or Preschool* or Nurser*)).ti.ab
3	((Fruit*1 or Vegetable*1 or juice or sugar sweetened beverage*1 or fizzy drinks or soft drinks or junk food or fast food or processed food or unhealthy food or takeaway food or non-core food or energy dense food or high fat food or fatty food or nutrient poor food or unhealthy diet or healthy eating or portion size or empty calories or confectionery or sweet*1 or dessert*1 or chocolate*1 or cake*1 or biscuit*1 or burger*1 or chip*1 or crisp*1 or snack*1 or breakfast or lunch or dinner or obes*6 or overweight)).ti.ab
4	(allerg*3 or dental caries).ti.ab
5	3 not 4
6	(physical activ*5 or inactiv*3 or exercise*1 or outdoor or TV or Television or Tele or sedentary or (screen adj time)).ti.ab.
7	1 AND 2
8	5 OR 6
9	7 AND 8
10	(cerebral palsy or asthma or cystic fibrosis or autism).ti.ab.
11	9 not 10

Assia and SocAbstracts via ProQuest (14/08/2012) and 10/06/2014	
1	ab,ti(Determin*4 or correlates or factors or predict*3 or associate*3 or interaction or influence*1 or temperament or beliefs or attitudes or knowledge or perceptions or views or intentions or facilitators or barriers or experiences or prevent*3 or reduc*5 or increas*3 or promot*3 or education or curriculum or program*3 or polic*3 or media or campaign or review or intervention*1 or initiative*1 or strategy*3 or evaluation or trial)
2	ab,ti(Infant* or Toddler* or Preschool* or Nurser*)
3	ab,ti(Fruit*1 or Vegetable*1 or juice or sugar sweetened beverage*1 or fizzy drinks or soft drinks or junk food or fast food or processed food or unhealthy food or takeaway food or non-core food or energy dense food or high fat food or fatty food or nutrient poor food or unhealthy diet or healthy eating or portion size or empty calories or confectionery or sweet*1 or dessert*1 or chocolate*1 or cake*1 or biscuit*1 or burger*1 or chip*1 or crisp*1 or snack*1 or breakfast or lunch or dinner or obes*6 or overweight)
4	ab,ti(allerg*3 or dental caries)
5	S3 NOT S4
6	ab,ti(physical activ*5 or inactiv*3 or exercise*1 or outdoor or TV or Television or Tele or sedentary or (screen near time))
7	S1 AND S2
8	S5 OR S6
9	S7 AND S8
10	ab,ti(cerebral palsy or asthma or cystic fibrosis or autism)
11	S9 NOT S10

Web of Knowledge via Thomson Reuters (13/08/2012) and 10/06/2014	
1	((Determin*4 or correlates or factors or predict*3 or associate*3 or interaction or influence*1 or temperament or beliefs or attitudes or knowledge or perceptions or views or intentions or facilitators or barriers or experiences or prevent*3 or reduc*5 or increas*3 or promot*3 or education or curriculum or program*3 or polic*3 or media or campaign or review or intervention*1 or initiative*1 or strategy*3 or evaluation or trial) AND (Infant* or Toddler* or Preschool* or Nurser*)) AND ((Fruit*1 or Vegetable*1 or juice or sugar sweetened beverage*1 or fizzy drinks or soft drinks or junk food or fast food or processed food or unhealthy food or takeaway food or non-core food or energy dense food or high fat food or fatty food or nutrient poor food or unhealthy diet or healthy eating or portion size or empty calories or confectionery or sweet*1 or dessert*1 or chocolate*1 or cake*1 or biscuit*1 or burger*1 or chip*1 or crisp*1 or snack*1 or breakfast or lunch or dinner or obes*6 or overweight) NOT (allerg*3 or dental caries) OR (physical activ*5 or inactiv*3 or exercise*1 or outdoor or TV or Television or Tele or sedentary or (screen near time)))
2	NOT (cerebral palsy or asthma or cystic fibrosis or autism)

Supplementary table 2: Inclusion and exclusion criteria for systematic review of qualitative evidence on factors influencing obesogenic dietary intake in preschool children (0-6 years).

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none">- Qualitative studies that provide greater understanding of barriers and facilitators of obesogenic dietary intake in obese or non-obese children.- Preschool children aged 0-6 years at baseline.	<ul style="list-style-type: none">- Non-human studies- Laboratory-based (such as vitamin and preloading studies)- Quantitative studies- Studies in clinical populations (e.g. malnutrition, disability, allergy, dental caries, asthma, cerebral palsy, cystic fibrosis, autism)- Studies primarily on breast/ bottle-feeding and weaning in infants.

Supplementary Table 3: Evidence from qualitative studies on factors influencing obesogenic dietary intake in young children (0-6 years)

NR: Non Representative; R: Representative; SSB: sugar sweetened beverage; f&v: fruit and vegetable

No	Author, year and country of study	Study design, behaviour studied, study name	Age range of children	Emergent themes	Illustrative quotes (author interpretation where quotes not available)	Author conclusions
1	De Craemer 2013 Six European countries (Belgium, Bulgaria, Germany, Greece, Poland and Spain).	NR: Focus groups (n=24 with 122 parents and n=18 with 87 teachers in municipalities with highest prevalence of overweight or obesity) SSB and water consumption <i>ToyBox study</i>	2-10 years (Mean age range 4 – 6.8 years)	Knowledge -Misperceptions about consumption levels. -‘can be healthy’ e.g. chocolate milk and fruit juices. -low perceived need to change. -Practical tips and ready- to- use classroom materials would help. Availability -Not buying SSBs, substituting fruits for fruit juices. Modelling -Parents and teachers as role models. Advertising -Importance of packaging. School/childcare/healthcare influence - Childcare providers influence	“We don’t have sugar sweetened beverages. We only offer water. The children drink water, milk, juice, diluted juices, and tea” “We don’t have sugar sweetened beverages. We only offer water.” “My children only drink cartons of orange juice. I have nothing else.” “I think it would be a good idea to install a water station or something like that.” “We drink (water), and when we drink, the children also drink.” “The packaging is really important for children.” “When children have chocolate milk or other sugared sweetened beverages at school every day, the preschool will have a stimulating and key role for the intake of sugar ”	Need to raise awareness about parent-teacher shared responsibility at home and in preschool. Need for classroom teaching to extend to home.
2	Hayter 2013 The UK	NR: a) Focus groups (n=4 with 33 parents) and b) family interviews (n=4 with 6 individuals). In low-income, urban and rural households. Obesogenic diet	18 – 39 months	Confidence -Lack of confidence in cooking skills. Time and convenience -Not enough time to cook from scratch. Cost -Food expensive on a tight budget, hence saving through supermarket promotions. -Children may not eat new foods and parents cannot afford waste Advertising -Shopping with children stressful and advertising aimed at children results in pester power. Modelling -Children copy adult, peer and sibling behaviour. Family & peer influence -Conflicting feeding styles of partners.	“The confidence I think could be [a barrier to providing healthy food], yeah, thinking, oh my goodness I’m going to mess that meal up, I’m going to go for the easy option” “Oh he cooks sometimes but when it’s his turn he just thinks a takeaway is easier!” “having fresh fruits and vegetables on a daily basis is expensive” “It’s like a money factor, you can’t just think, oh I’ll buy all that stuff because they might eat it...” “I’ll stop buying something if they spit it out once because we don’t want the waste” “I think when [sweets are] obviously in the shops and advertising them and [the children] can see them, it makes it very hard obviously to get away from that with them demanding things like that.” “I’ve learned that children do copy us... when your husband is having chocolate it’s not fair to expect your child to have banana or fruit” “[my daughter] is eating a lot more vegetables now since she’s started school dinners because she’s seeing other children around her eating them”	Intervention to help parents to build their confidence and self-efficacy.

				<p>-Grand-parents want to spoil children with unhealthy food.</p> <p>Child preference -Children are fussy. -Mealtimes feel like battle ground and are stressful for parents and children.</p>	<p>"The other day... it was only about half hour before tea and [the children's father] went away and give them more biscuits and I was like, what's the point in that?"</p> <p>"Unfortunately when my daughter hit about two she got ridiculously picky about what she would eat. It had to be something which she could pick up, so it would be chicken dippers and sausages and stuff. Everything else, won't touch"</p>	
3	<p>Petrunoff 2012</p> <p>Australia</p>	<p>NR: Focus groups (n=13 with 88 parents). High (n=44) and low (n=44) socioeconomic status</p> <p>Obesogenic diet</p>	3-5 years	<p>Using food as a reward -Rewarding good behaviour with food.</p> <p>Child preference -Parents highlighted the significant influence children play on the food they provide.</p> <p>Time and convenience -Takeaway and packaged food was considered to be convenient and reduced food preparation time and mess.</p> <p>Concerns about child's health -Parents concerned about nutrients, food additives, specific diseases related to excessive food consumption.</p> <p>Advertising -Media advertising, influence of large supermarkets on food purchases, food placement targeting young children.</p> <p>Family and peer influence -Majority commented on influence of peers and siblings</p> <p>School/ Childcare influence -Parents found centre-based childcare helpful in providing and assisting them to provide healthy food but they also sometimes found it restrictive.</p> <p>Cost -Most parents (especially from low SES) felt that healthy food was expensive.</p> <p>Societal/cultural influences -Pressure from friends and need to allow unhealthy food on social occasions.</p> <p>Modelling -Many commented on parental (including fathers) and grand-parents role modelling.</p>	<p>"something little as a treat isn't a problem, as long as I know that my children are getting good nutritious meals then in between those meals I don't mind them having extra things"</p> <p>"Your child can influence how you feed them, definitely, depending on their likes and dislikes."</p> <p>" It's a convenience thing, usually it is in between meals or you know, as we say we are on the go, so if you are going out to their activities...."</p> <p>"... Health factor is a big thing for us, you know you want to eat food that makes you feel good and gives you energy..."</p> <p>"If you take a child into the supermarket it's got its eyes fixed on something... the direct marketing is towards the child, it is not towards the adult' and ' ... it is all about making money and the big business."</p> <p>"...like he wants what everyone else has and everybody else has."</p> <p>"So it is really hard to find something special to put in the lunch box'</p> <p>No direct quotes</p> <p>No direct quotes</p> <p>No direct quotes but parents recognised their role amidst multiple stakeholders "The majority of it [should be the parent's role] otherwise advertisers basically, and the manufacturers too..."</p>	<p>It may be worthwhile to challenge the belief that: provision of 'obesogenic foods' can be frequent as long as children are eating a healthy balance of foods is factored into parents' decision making.</p>
4	<p>Stenhammar 2012</p>	<p>R: Focus groups (n=5 with random sample</p>	4 years	<p>Modelling -Parent as model and guide.</p>	<p>"As a parent, you are responsible for your children's lifestyle. We have to guide our children... Children don't do what parents tell them to; they do what parents do."</p>	<p>Parents desire professional support from</p>

	Sweden	of 30 parents). Obesogenic diet		<p>Lifestyle and parenting -Parent lifestyle influenced child lifestyle. -Parental authority.</p> <p>Family and peer influence - imitating friends and family</p> <p>Child preferences - influence of TV</p> <p>Availability -Vast supply of unhealthy food</p> <p>Advertising -Including contradictory messages in media</p> <p>Time and convenience -Lack of time and support</p> <p>Societal/cultural influences -Power of parents groups -Collective responsibility</p> <p>School/childcare/healthcare influence -Child health care providers influence -Preschool influence and need for clear guidelines</p> <p>Cost - cost affecting food behaviours</p>	<p>"Lifestyle is how you live life in terms of diet, physical activity, sleeping... and other factors like smoking and alcohol, how you socialise with friends, your interests, work ..."</p> <p>"Parents can affect children when they are young.... When the child becomes older, friends are more important. My son often imitates his friends..."</p> <p>"Children can spend all day watching television nowadays. My daughter is completely spellbound in front of the television".</p> <p>"Children are exposed to temptation all of the time, both in the shops, on television and in newspapers. At our preschool, children eat sweets twice a week..."</p> <p>"The media publishes a lot of news about what your child should or should not eat...we get confused."</p> <p>"There is such incredible stress in cooking; it's really hard. It is easy to choose some fast food... and unhealthy."</p> <p>"In our culture, children are allowed to have sweets several times a week... it's not a big deal."</p> <p>"I almost never meet other parents and rarely have the opportunity to discuss parenting... child health nurses are too busy...."</p> <p>"Well, I think society has a responsibility for our children's lifestyle, since the politicians make the laws..."</p> <p>"Preschool affects our children's lifestyle. Children spend all day there...preschools should have the mission to coach parents to raise children with healthy lifestyles...parents groups for instance..."</p> <p>"I would love to meet parents and discuss things like television viewing, activity and eating habits and setting limits with them...Parenting is hard..."</p> <p>"A uniform policy (between preschools) would be great; there should not be differences depending on the teachers' interests". "Guidelines about sugar-rich foods and the amount of time for outdoor playing would be helpful."</p> <p>"Healthier food should cost less. I cannot believe that fruit and vegetables should be so terribly expensive."</p> <p>"A limited household income should not be the same as living an unhealthy life. The government should subsidise healthy behaviours and food."</p>	preschool, child healthcare providers and collective responsibility from society with uniform guidelines.
5	Carnell 2011 The UK	NR: Individual interviews with parents (n=14) and diary (n=22) data from mothers of predominantly	3-5 years	<p>Availability -Parents promoted or restricted intake, by setting rules or limiting purchases or hiding unhealthy food.</p>	<p>"I put crisps in the cupboard where they can't reach!"</p> <p>"Sweets are restricted to the afternoon; they can only have yogurt or fruit after dinner."</p> <p>"C..., asked for a biscuit but I said no. I said that he'd had a good dinner today plus sweets so he really didn't need anything more."</p>	Parents have high levels of motivation to limit access to unhealthy foods and encourage consumption of

		healthy weight 3-5 year olds.. SSB and Obesogenic diet		<p>Concerns about child's health -Parents motivated by practical & health considerations.</p> <p>Using food as a reward</p> <p>Child preference</p>	<p>"I keep an eye on what she actually is eating because I'm sure if I put a big tin of Quality Street out in front of her, she'd quite happy demolish as many as possible."</p> <p>"He wouldn't be able to have sweets or a cake or biscuit because I don't like him to have too many sweet things really. Because of his teeth I suppose."</p> <p>"She tends to be a bit on the bigger side. I'd prefer she didn't have fizzy drinks."</p> <p>"She then asked for a chocolate from the Christmas tree. I said she could have one if she ate a Satsuma first, which she did."</p> <p>"Because she had eaten all of her food, I said do you want some ice-cream?"</p> <p>"I felt it was hard on S. to be dragged round on my errands, and that a couple of small sweets after a good breakfast wouldn't hurt"</p> <p>"I might say to her [while shopping] what sort of crisps do you like? Or what type of fruit. She tends to have a choice of what special treat, what packet of cakes she would like".</p>	healthy foods. Advice should be framed as helping parents to respond sensitively and appropriately to different children's characteristics.
6	Lloyd-Williams 2011 The UK	R: Ethnographic study using participant observation and individual interviews . Nursery managers (n=9), cooks (n=6), staff (n=12), parents (n=12) and children from 6 nurseries. Obesogenic diet	Children under 5 years	<p>School or childcare influence - Most nurseries did not have a specific healthy eating policy but used menu planning to maintain healthy eating. Level and depth of communication between nursery and parents was important. Early years foundation stage competencies such as social skills can be developed during meal times.</p> <p>Knowledge -Private nurseries had minimal access to information and guidelines. No staff had training in healthy eating for children under the age of 5 years. However, enthusiasm and interest were widespread.</p>	<p>"We provide cookies or sponge cake with custard which is to me, is quite high in sugar, although I use a lot less sugar. I halve the sugar content that I put in anything and the fat in the crumble as well I tend to halve."</p> <p>When X [child] first started here, they were giving him things that I hadn't yet tried him with....wouldn't have known to or was a bit wary of giving him."</p> <p>"Oh we will have to look out for the training definitely."</p>	Nurseries need guidance, support and training in delivering healthy meals to children.
7	Rodriguez-Oliveros 2011 Mexico	R: Focus groups (n=5 with 38 parents). SSB and Obesogenic diet	Preschool children	<p>Time and convenience</p> <p>Using food as a reward</p> <p>Family influence</p>	<p>"Sometimes my day is complicated because the available time is not enough, so, I do not have time for cooking so then we go to the restaurant... he likes chicken nuggets."</p> <p>"I told him if you behave well we will go to the convenience store to buy you a candy...."</p> <p>"I bring him whatever he wants (a cookie or a juice) when leaving the child care centeran exchange agreement with helping him feel secure when he started attending child care center."</p> <p>"During mealtimes my father always drinks soda....My father says give her a little bit. I believe that my child is consuming soda often ..."</p>	Understanding parental views and perceptions of main factors influencing pre-schoolers weight related behaviour can inform home-based or environmental

				<p>Concerns about child health</p> <p>Knowledge -Parents mentioned a lack of nutrition information about child feeding, emphasizing that they would like to improve their knowledge and skills on this topic.</p> <p>Child preferences</p> <p>Childcare center influence</p> <p>Advertising</p> <p>Availability</p>	<p>"I've been eating too much [throughout the mothers 'lives] and look I am fat. Do you want to look like me? No! You will not be able to walk."</p> <p>Fruit juice and fruit-sweetened water were also categorized as "natural foods." Fruit sweetened beverages were perceived as different from soda.</p> <p>"children do not like vegetables and prefer to drink soda instead of plain water."</p> <p>"When children have chocolate milk or other sugared sweetened beverages at school every day, the preschool will have a stimulating and key role for the intake of sugar"</p> <p>Most parents reported "trusting" or considered appropriate the nutritional quality of the menus provided at the child care center because the menus were developed by nutritionists and, therefore, "must be healthful".</p> <p>No direct quotes</p> <p>No direct quotes</p>	<p>interventions to support healthy eating.</p>
8	Bolling 2009 USA	NR: Focus groups (n=4 with 22 parents and 1 grandmother) of overweight children SSB	2-6 years	<p>Knowledge - Parents not clear about child's weight status, reluctant to view fruit juices especially 100% fruit juice as SSB. They mentioned the need for clear recommendations from healthcare providers.</p> <p>Child preference</p> <p>Availability -Restricting availability of unhealthy food</p>	<p>"A certain amount of juice is OK, 100% juice...isn't just sugar water."</p> <p>"The health department tells you they need this much juice."</p> <p>"If juice is eliminated from diet - "I think they'd throw a temper tantrum" and "I'd hear whining and crying."</p> <p>"Mine wouldn't eat any vegetables" and "He would go hungry before he would eat the vegetables."</p> <p>"...not eat for three or four days," and would "tantrum and not eat."</p> <p>"We don't allow any soda pop, Gatorade or Kool-Aid or anything like that in our house."</p>	<p>Parents are confident in adopting all recommended behaviours and seek rationale and strategies for implementation</p>
9	Fitzgerald 2009 Australia	NR: Focus groups , drawing and photo-voice in kindergarten (n=5), year 1 (n=3) and year 2 (n=7) children. Total 37 children from school in a low socio-	Age not reported	<p>Advertising -Fast food and junk food inhibit consumption of fruit and Vegetable (f&v).</p> <p>Child preference -Taste and time were barriers.</p> <p>Concerns about health</p>	<p>"McDonalds stops me eating it (f&v), plus you get a little toy every time you have a happy meal."</p> <p>"You might be watching TV and see junk food on TV that you might like and you don't eat vegetables 'cause you think they are not as nice."</p> <p>"Water doesn't taste nice, cordial tastes better... water doesn't have any flavour"</p> <p>"Don't like the taste (of water)... And some people suck on where the water comes out."</p> <p>"I bring a drink bottle with water in it. I bring water cause it's healthy."</p> <p>"I like vegetables cause they are healthy for you and make you grow up big,"</p>	<p>Children suggested useful, simple strategies to increase their fruit and vegetable and water consumption.</p> <p>It is important to listen to</p>

		economic community. SSB and Obesogenic diet <i>Healthy kids: Eat right, Play right</i>		School influence Peer influence Some children did not want to show their friends that they have fruit as it was 'cooler' to eat junk food.	"If you have never had them before and you have them at school and you like them then you could have them at home more often." "The bubblers are hard to turn and they are hot and when they are hot it burns your body." "Like if older people or teenagers are encouraging us to eat it."	students' views.
10	Haerens 2009 8 countries in Europe (Germany, Hungary, Italy, Cyprus, Spain, Estonia, Sweden and Belgium)	R: Focus groups (n=20 with 106 parents of children aged 2-4 yrs). SSB and Obesogenic diet <i>IDEFICS</i>	2-4 years	Family and Peer influence -Parents mentioned the role of other children, parents and preferences of partners as an influencing factor for behavioural change. Availability -Parents set limits on consumption of unhealthy foods. -Parents either only bought healthy foods or bought unhealthy foods for special occasions or bought everything as they did not want to deprive their children (especially low SES parents). Child preference Cost Knowledge -Parents got information from various sources- peers, healthcare providers, family, media, books School influence Concern about child's health Advertising Modelling -teachers and parents Time and convenience	"Children are stimulated to eat healthy food products if they see other children eat those products". " don't want their child to be laughed at, because the child will be the only one who has to eat a healthy snack (e.g. fruit or vegetables)" "We cannot control what they eat and their diet really depends on the place where they stay during the day." "They usually don't like fruit and vegetables or water and it is often easier to give them what they want." "We have to do other sacrifices to be able to buy healthy foods. We don't buy things children don't like as it is a waste of money if they don't eat it." No direct quotes, but parents mentioned that they were influenced by the new information or tips their child brought from school and school was a good location to promote healthy eating. Parents also mentioned the need for new, innovative and stimulating information. No direct quotes, but parents mentioned that kindergartens facilitate their children's eating habit through their food policies (e.g. products like biscuits, crisps and chocolates are not allowed). The most important common motivator to change dietary behaviour was the child's health (occurrence of diseases, medical advice, allergies.) or child's' weight gain. Parents frequently mentioned that they try to avoid shopping with their children, as they are largely influenced by advertisements and free gadgets, and more unhealthy food products are bought. No direct quotes No direct quotes	Intervention strategies should aim at creating a home and school environment in which healthy eating behaviours are the easiest choice; by making healthy food items available and by restricting access to soft drinks and snacks.

11	Lindsay 2009 USA	NR: Focus groups (n=6 with 31 mothers) and individual interviews (n=20). Low income, immigrant mothers. SSB and Obesogenic diet <i>Latino Mothers' Child Feeding Practices (LMCFP) study</i>	Upto 4 years	Cost Time and convenience Family influence Societal/cultural influence School/childcare influence Knowledge Availability Using food as a reward Advertising	<p>"Right now we are in a very difficult situation because if we have fruit or food in the house, there is not money to pay the bills." "I learn to buy the fruit when is cheap"</p> <p>"Once a week on Saturday we go to restaurants. We go to the buffet. It is very cheap and we all can eat different things and whatever everyone wants."</p> <p>"My mother, she is taking care of her granddaughter and she wants to see her chubby... she feeds her like if she was stuffing a bag, it's a pity."</p> <p>"Another thing that is very important is the help. Here nobody helps you out with the children . . . here there is no one, not a sister or a neighbour, no one."</p> <p>"We go to Dominican restaurants to eat.."</p> <p>"She (child care teacher) lets me know what they eat, and they also have a nutritionist that goes to check what kind of food the kids are having if it is healthy food".</p> <p>"They talk to you and educate you about nutrition, they teach you, ... I did not know about the pyramid of food, the amount of bread, the amount of rice and fruit...and that is a big influence."</p> <p>"If we had a car it would be different because we would be able to go to more inexpensive places. I have to walk with the groceries and with a child it is difficult."</p> <p>"I take them to McDonald's, I'm not perfect and my kids do eat McDonald's once a week.... I do use that to motivate them."</p> <p>"If you don't have time, then you start to feel guilty and then you go and buy for the kids that new cereal with sugar that the kid sees on TV.."</p>	Health promotion efforts addressing obesity must account for organisational and environmental influences on the day to day social context of young immigrant families.
12	Campbell 2007 Australia	R: Individual Interviews (n=17 parents). Obesogenic diet	5-6 years	Advertising Availability Using food as a reward Modelling	<p>"The sorts of things they ask for are the lollies and biscuits and unfortunately, with the lifestyle that we lead, we do tend to fall into the trap of 'well it's been advertised on TV and if that's what they want then I'll buy it'.</p> <p>"Probably the most obvious thing (influencing a child's food preferences) to me is what is available. If we have certain foods in the house she will eat them, if we don't, she doesn't ask for them"</p> <p>"Well I have bought Coco Pops™ and Fruit Loops™ recently only because they hadn't been eating their breakfast and I thought I am just happy for them to eat something for breakfast even if it's not good for them"</p> <p>" We don't have dessert ...unless I know it's going to be particularly troublesome meal and I will do the 'well if you eat all your tea you can have ice-cream"</p> <p>"I think if they see grownups eat something then they will like it as well. They are pretty good really and they do copy."</p>	Associations between the home food environment and children's food choices are complex and involve multiple mediators.

				<p>Peer influencing</p> <p>Involving children in food preparation</p>	<p>"I think now he is at school, I think that other children are playing a big role."</p> <p>"I try to get them into the kitchen as much as I can, especially if I know that they don't like the dish that I am preparing."</p>	
13	Pagnini 2007 Australia	<p>R: Focus groups (n=4 with 32 mothers). Rural and urban, high and low SES</p> <p>Obesogenic diet</p> <p><i>Weight of Opinion (WOO) study</i></p>	2-5 years	<p>Advertising</p> <p>Family and peer influence</p> <p>Concern about child's health -Concern about underweight and overweight, food became an emotional issue.</p> <p>Using food as a reward</p> <p>Knowledge</p> <p>Child preference - Food preferences among children were a source of struggle.</p> <p>Cost</p> <p>School/childcare influence</p> <p>Involving children in food preparation</p> <p>Modelling</p>	<p>"They don't help in the stores. They just know what they are doing – everything is right there, and they know that you wait at the register, and it's all there, isn't it?"</p> <p>"I think (son's grandmother), if he's not eating, she thinks like you don't love him or you have disowned him, and it's a bit of a catastrophe.... That is how she was raised."</p> <p>Peer interaction at food times was seen to lead children to eating a wider range of foods.</p> <p>"I'm conscious that I'm trying not to give too much chips or too much junk so that he's not one of those kids next year when he starts primary school ..."</p> <p>"I used to get people all the time saying, 'oh he's sick, what's the matter with him? You don't feed him.'"</p> <p>"We feel like we've got to give our kids things all the time, they have got to have the best toys, they've got to have this because they want it, we have got to take them to McDonalds....."</p> <p>"I think the kids now and then need to eat a little bit of rubbish....that little bit for balance so they know when to control themselves."</p> <p>"We feel like we've got to give our kids things all the time, they have got to have the best toys, they've got to have this because they want it, we have got to take them to McDonald's ."</p> <p>"It's a battle, and you don't want food to be a battle, you try to teach them that instead of living to eat, you eat to live-because my little boy eats non-stop."</p> <p>There were also economic constraints, and mothers expressed real frustration with trying to find healthy, inexpensive and quick food options.</p> <p>Parents were unanimous that the early childhood care sector had a large and important role to play in promoting healthy eating.</p> <p>No direct quotes</p> <p>No direct quotes</p>	<p>Interventions could succeed if parent's emotional and economic constraints are addressed and supported through early childhood services, neighbourhood facilities and retail outlets.</p>
14	Styles 2007 USA	<p>NR: Focus groups (n=8, with 54 parents and grandmothers). Diverse ethnicity,</p>	5 -8 years	<p>Time and convenience</p> <p>Knowledge/perceptions of weight status</p> <p>Family influence</p>	<p>"I am not consistent at all... if I have food in my house that I can fix, we don't do junk food or drive thru... but time's a big factor... I give in to the drive thru."</p> <p>"My child has been put on a diet, and he is so thin and they told me that he is not growing but that he is fat."</p> <p>"I have heard my father-in-law and mother-in-law say a thousand times I love to see her eat..."</p>	<p>Parents, caregivers would be receptive to positive, multilevel prevention</p>

		urban/rural and at least 1 overweight child. Obesogenic diet <i>Linking Interventions for Children project</i>		<p>Child preference</p> <p>“Well my kids, it’s like when we go to stores and they ask me for stuff, I wanna go get them ‘cause sometimes they do temper tantrums and you know... I just want my kids to be happy so they won’t bother me.”</p> <p>“My son will come eat snack, cakes and I might be in another room cleaning up or something... he’d eat about 4 cakes and then come ask me for a cake and juice, you know, old fast talk, get over on me...”</p> <p>“He watches everything I eat...the more I try to do about (managing my weight problems) the more I can see the reflection in him try to do (something) about it..”</p> <p>“She gets I.D.’s from school and she had gained 10 pounds per year. I think it is what she eats at school because it is where she eats the most.”</p> <p>“I would love to see a program in my daughter’s school...where the cafeteria staff comes and holds a healthy conference”</p> <p>“Healthy foods is higher. So, like let’s just say they got some hot dogs; hot dogs is cheap like \$0.89, but fat free hot dogs \$3.00 and some change....Am gonna get these (\$3.00)..? I don’t wanna be broke....”</p> <p>“Cause I was like that when I was little, I was overweight, picked on, and I don’t want to have her go through that.”</p>	approaches to help their children attain and maintain healthy weights.
15	Tucker 2006 Canada	R: Focus groups (n=10 with 71 parents). Maximum variation sample Obesogenic diet	2.5 – 5 years	<p>Time and convenience</p> <p>“Sometimes we don’t even have home-cooked meals in the evening; I’m sorry, I can’t do it. I can’t get my 3 year old and my 4 year old to skating, get home, have supper ready early in the evening, and get them to bed. It’s just not going to work. So I end up at McDonald’s, or Wendy’s, or Kelsey’s, trying to feed them their supper so they can go skating...”</p> <p>Societal influences</p> <p>Parents felt social stigma may have psychological ramifications for children.</p> <p>Availability</p> <p>“What you’re hearing is ...‘obese, obese, obese’.... Food is now processed; there’s a lot of junk available.”</p> <p>Using food as reward</p> <p>“We try everything... but often it’s bribery. You know, if you want a cookie then finish your carrots..” “I mean, it doesn’t have to be a big treat, but 3 chocolate chips is a big deal for a child... So she’ll finish her carrots or she’ll do whatever it takes...”</p> <p>Knowledge</p> <p>-Parents did not recognise unhealthy foods</p> <p>Concern about child’s health</p> <p>-concern about obesity and need to tackle food intake</p>	Interventions should consider educational messages about benefits and detriments of various strategies to healthy eating in pre-schoolers.
16	Horodynski 2005	NR: Focus group (n=1 with 7 African –	0-3 years	<p>Parenting</p> <p>“I don’t usually eat with the kids because I’m busy doing other things.”</p> <p>Using food as a reward</p> <p>“I know one routine that is not a good one is that I use gum to get her to do everything! It’s her bribe to get</p>	Fathers to be included in nutrition

				<p>Concern about child's health</p> <p>"It worries me that when she gets older she's going to have osteoporosis, loss of eye sight, whatever, high blood pressure."</p> <p>"If she doesn't get calcium, she's going to have problems later.... She slacks here now at this point, she's going to pay the price. And it's not because she's slacking, she's going to pay the price, [it's] because I slacked."</p> <p>"Even if it's a hot dog out of the refrigerator, I'm not gonna stop him from it as long as I know he's eating something,"</p> <p>Knowledge - Caregivers expressed an interest in education regarding appropriate foods, as well as how to fix nutritious meals in a short time.</p>		
19	Baughcum 1998 USA	NR: Focus groups (n=4 with 15 dieticians and 14 low income/teenage mothers). Obesogenic diet	1-3 years	<p>Knowledge/beliefs -Mothers believed a heavier infant was healthier. -Mothers believed the baby was not getting enough and it was difficult to change beliefs.</p> <p>Family influence - infant feeding practices of older generation</p> <p>Using food as a reward</p> <p>Child preference</p>	<p>"The WIC people say, don't feed your baby solid food because they get overweight. I fed all my kids cereal from the time they was about a month old because formula wasn't enough for them."</p> <p>"I gave him cereal because he wasn't getting enough food. He would be up every 2 hours screaming. And finally, when I gave him cereal at about 6 weeks, he slept a lot longer."</p> <p>"Sometimes we are battling some of the issues from other family members giving advice. We may see a 2 week old child receiving cereal from a bottle." (dietician)</p> <p>"My mom told me that if he doesn't sleep through the night, give him cereal and he'll sleep better."</p> <p>"It is mostly a treat. It's like we buy those fruit gummy things, and if they are being really good, we kind of bribe them sometimes with it. Sometimes it works and sometimes it doesn't. They get suckers when we are going on the road. I have a bag of suckers I keep in the glove box and they get those and they are not screaming and throwing fits, fighting."</p> <p>"But if they've got their mind set on that one hot dog that they want, and that's all they want, then that's all they're going to want, and they're going to scream and cry and kick and everything else until they get it."</p>	Parent who use food as reward for good behaviour or to satisfy children's emotional needs are promoting obesogenic behaviours.
20	Auld 1994 USA	NR: Individual interviews with 40 adolescent mothers and their mothers. SSB and Obesogenic diet	6months – 2 years	<p>Family influence</p> <p>Modelling</p> <p>Child preference</p>	<p>2yr old was given "regular pop at home with me and diet with my mom." Grandmothers influenced feeding decisions. Teenagers sometimes angry that grandmothers were giving the baby soda in bottle, bottle in bed, sweets.</p> <p>"There is nothing really I can do, because then it will start a big fight.."</p> <p>"Wants to eat what I eat."</p> <p>Favourite foods were hot-dogs, pizza, French fries, chicken nuggets, hash browns, eggs with cheese By 6 months children were fed ice cream, cookies, cake, pickles, soda pop....</p>	Including grandmother in nutritional education may benefit adolescent mothers and their children