A Review of the Effectiveness of Parent Targeted Health Promotion Strategies to Improve Feeding Behaviours of Children Aged 0-6 Years

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Alberta Health Services

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This report has been prepared by Nutrition Services, Alberta Health Services

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Contact and Acknowledgements

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Executive Summary

Purpose

This report presents the evidence around nutrition messages and effective strategies to influence knowledge, skills and capacity of parents of children ages 0-6 years, to improve their eating behaviours. Findings will be used to: 1) inform program planning in Nutrition Services, Population and Public Health (NS PPH); 2) support alignment of key messages and strategies, and 3) identify collaborative opportunities within and external to AHS.

Methods

- A multi-step, systematic process was used for article search, retrieval, selection, critical appraisal and synthesis.
- Studies were included if they:
  - Outlined single, multi-level or multi-component parent-targeted strategies in home, child care or community settings.
  - Reported on: 1) parent behaviours that influence child eating practices and/or; 2) innovative strategies to promote a healthy feeding relationship.

Parent-Targeted Strategy Evidence

- **4407** articles from database searches and citation lists
- **532** for full text review
- **32** appraised and synthesized
  - **13** systematic reviews
  - **19** primary research

Current State

Recent surveys about the eating behaviours of children and youth show:

- A high prevalence of excessive sugar & sodium intake in young children.
- Lower vegetable & fruit intake.
- A decline in food skills of children as fewer families prepare meals “from scratch”.
- A preference by adults aged 18-34 years to obtain nutrition information from social media versus reliable professional sources (potential parent population).

Key Findings

Education interventions in community, home and child care settings

- A variety of education strategies targeted at the parent(s) (e.g. education sessions, print resources) and at the child (e.g. classroom sessions, picture books) showed some effectiveness for improving various aspects of healthy eating practices for the family and child.
- Participatory interventions designed for both the parent(s) and child such as food preparation and cooking sessions improved healthy eating outcomes including an increase in vegetable/fruit intake and family meals prepared and eaten at home.
- Key aspects of effective interventions included: 1) multi-strategy, simple and targeted messages for parents and caregivers around desired behaviours and; 2) education lessons for children or children with their parents accompanied by age-appropriate hands-on activities.

Parent behaviours and the effect on young child's diet

- Positive behaviour support and proactive parenting strongly predicts diet quality in children.
- Evidence exists that some parenting styles may negatively impact children's feeding practices.
- Culture may influence food-related parenting practices.

Multi-level and Multi-component Strategies

- Multi-level and multi-component (personal, institutional, socio- and physical-environments) strategies increase the likelihood of behaviour change.
- Social marketing methods that align across sectors and involve families show some effectiveness if messages are consistent, frequent, and behaviour-change focused.
- Socio-economic position influences the effectiveness of individual behaviour change strategies. Some evidence exists around effectiveness of community based strategies or policies aimed at structural changes to the environment. These strategies would have a wide reach, long duration, focus on altering the environment, and/or address social factors that create barriers to healthy eating.

Implications for program planning and practice in Nutrition Services PPH

- Education can positively influence the nutrition practices of parents with children ages 0-6 years. However, it is essential to include support for parents with behaviour change and food literacy skills.
- NS PPH has several tools and resources to support parents, child care centres and community organizations when working with parents and children. Novel and creative methods to reach more parents to improve nutritional practices and outcomes are warranted.
- Determining the feasibility, cost-effectiveness, audience reach, and potential barriers and facilitators to healthy eating practices for all program plans is necessary.

Summary and recommendations

- Implement coordinated, multi-component strategies that include parent engagement activities focused on skill training and behaviour change. Incorporate hands-on learning opportunities for parents and children.
- Leverage existing NS PPH programs as well as internal and external partner opportunities to implement a more systematic, coordinated approach in home, child care and community settings, ensuring equitable access to all families across the province.
- Use innovative methods to encourage positive parenting and feeding relationship principles and role modeling of practices such as increasing vegetable and fruit intake, choosing healthy beverages, taking time for family meals and improving food skills.
- Communicate to parents with clear, purposeful, simple, actionable and targeted messages using multiple methods and platforms. Messages may need to be personalized for mothers, fathers and grandparents.

- Mitigate health inequities, recognizing that families in low socioeconomic position and those from various ethno-cultural groups may be unintentionally excluded from mainstream activities.
- Implement effective and ongoing train the trainer opportunities with partners through conferences, webinars, on-line modules, websites, newsletters and social media forums.
- Ensure priorities and programs stay relevant to families by: 1) following the drivers and trends affecting Alberta parents and their families, and; 2) by monitoring national and provincial nutrition and health outcome surveillance data.
- Develop and implement a strong evaluation plan with clear and measurable outcomes.

Evidence Strengths and Gaps

- More research is needed to understand how parent engagement strategies can be incorporated effectively into other population health promotion strategies such as supportive environments, healthy public policy, community action and health service reorientation
- This review focused on personal skill development. Most studies reported short term outcomes with overall weak study designs.
- It is well recognized that action across all 5 population health promotion strategies is required for the realization of long-term health outcomes. This report highlights opportunities for approaches applicable to the Alberta context based on the findings of this evidence review.

Introduction

Nutrition Services, Population and Public Health (NS PPH) uses a population and public health approach and evidence-based practices to develop and implement strategies, including tools, resources, programs and services that aim to improve the nutritional health of Albertans. To impact the determinants of health, NS PPH dietitians lead and participate in upstream activities with internal and external partners.

Background

In 2010, NS PPH dietitians from two working groups, the Infant and Healthy Eating Environments in Child Care (HEECC) Working Groups, reported on the evidence around key public health nutrition-related issues across Alberta[1] to inform NS PPH priorities and guide practice for this population. Parents and families are central to a child's healthy growth and development. In addition, infants and young children often interact with others in home, child care and community settings. The literature supports the effectiveness of a comprehensive school health approach[2,3] in the early learning and care (ELCC) setting early childhood environments;[4,5] thus, NS uses this comprehensive health framework to promote healthy eating in the ELCC setting.[6] One facet of this comprehensive health framework is parents and families. The purpose of this report is to focus on this dimension of the comprehensive health framework, and understand how to effectively influence parents and caregivers in the home setting, including the parenting practices, skills and behaviours needed to promote positive eating behaviours in families to promote a child's lifelong health.

This report, summarizes the published literature on effective *universal* and *targeted* strategies to engage parents in role modelling healthy eating behaviours with the goal of improving the nutritional status of healthy infants, toddlers, and preschoolers, from birth to the end of age 5 years. Figure 1 highlights the evidence review question used for the basis of this report.

Figure 1.
Evidence Review Question

What are the most effective strategies and nutrition messages to influence parenting practices, skills and capacity with parents of children age 0-6 to:

- Build their children's healthy eating habits?
- Optimize healthy growth and nutritional status?
- Improve positive behaviour change in the feeding relationship?
- Create a healthy eating environment where children learn healthy eating skills?

This report aims to:

- Inform NS PPH priorities and programs.
- Share key findings and propose recommendations that target parents.
- Support alignment and cross-department collaborations within AHS and leverage opportunities with external partners.

Intended Audience

The document is intended to inform planning within NS PPH. As such, it mainly focuses on areas of influence that can be addressed within NS PPH. Strategies beyond the scope of NS PPH are not fully explored (e.g. policies related to food labelling, nutritional content, household food insecurity and marketing to children). Other audiences for this report may include other PPH departments within AHS, and leaders, decision makers and health care providers whose work includes young child health and wellness. Findings from this review may inform the first step in priority setting; once a strategy has been identified for action, further review of the evidence is required to determine specific actions to implement.

Scope

This review focuses on:

- Strategies or innovative methods with an intentional parent component that can be assessed for scalability, regardless of setting or health outcomes measured.
- Studies that describe parent behaviours that influence child feeding.
- Studies in a home, child care or community setting if there is an intentional parent component.
- Studies in primary care settings if an implemented strategy has the potential to be modified to a PPH upstream approach.
- Interventions with an innovative strategy to promote a healthy feeding relationship or to gather information around facilitators and barriers to promoting healthy eating practices with families.

The following topics were outside the scope of this review, recognizing that further research on specific actions and desired health outcomes is warranted once strategies are selected to reach the target audience:

- Studies that assessed health, weight and/or specific nutrition outcomes but did not assess the strategy used to achieve these outcomes.
- Strategies that did not include an intentional parent component, such as parents receiving information about nutrition programming targeted at their children, but not being included in the programming.
- Studies reporting on specific population health strategies, settings and environments or various health determinants that did not include a direct parent component. The complexity and inter-relatedness of these factors and components is recognized, as is the need to apply a health equity lens when selecting and implementing public health strategies focused on influencing healthy eating practices.
- The review did not specifically search for interventions targeting unique populations (e.g. newcomers, Indigenous, etc.) nor were they excluded in the literature search.

Methods

Situational Analysis

The situational analysis table below (*Table 1*) provides data on the nutritional status and health of Albertans and Canadians, as context for the evidence review. This includes available demographic, nutrient intake, health behaviour, health equity, and food insecurity data. When available, data is presented in the context of parents and their children aged 0-6 years. When this age specific data is not available, relevant data is presented for either the broad childhood context and/or as general data for populations of interest.

Demographic data with particular relevance to this work includes the projected population growth of 30,000 children in Alberta over the next ten years, and expected increase in life expectancy of the population aged 0-4 years.

Limited nutrient intake data is available specific to this age group; however, there is information that may provide general insight into food and meal patterns of Canadian families. This includes information on food skill trends that suggest a reduction over time in transfer of food skills to children[7] and younger adults preparing fewer meals from scratch (55% of adults 18-34 years old) compared with older adults (65% of adults 35-54 years old).[8] Statistics also show 73% of parents eat one or fewer meals with their children (under 15 years old) each day.[9] Furthermore, there has been an increase over time on the percentage of household budgets spent on highly processed foods and foods from eating establishments.[7]

Nutrition trend data from 2018 indicates that younger Canadians (aged 18-34 years) prefer sources such as social media for nutrition information. This age group is least likely to follow Eating Well with Canada's Food Guide (2007)[10] and significantly more likely to follow vegetarian or vegan dietary patterns. As well, they are significantly more likely than older Canadians (greater than 35 years) to indicate "getting energy or stamina" as influential in their food choices. As this age group is most likely to be NS PPH's target population of parents, it is important to consider these trends in our messaging and approaches.[8]

Table 1. Nutritional Status and Health of Albertans and Canadians Data

Statistics	Relevant Details	Source
Population of Alberta	• Total population is 4,307,121 (2018). • Population aged 0-6 years is 386, 949 (8.9% of the population). • The population aged 0-4 years is expected to grow steadily with an increase in 30,000 children projected over the next ten years. • The population who identify as Indigenous accounted for 6.5% of the total Alberta population (2016 census) and approximately 47% of Alberta's Indigenous population is under 25 years of age (2016 Census). • Immigrants make up 21.2% of Alberta's population with 5.2% having arrived in Alberta between 2011-2016 (2016 Census, AB). Of the 2016 immigrant population, 14.9% are refugees (2016 census, AB).	2018, Interactive Health Data Application, Government of Alberta *http://www.ahw.gov.ab.ca/IHDA* *https://open.alberta.ca/dataset/90a09f08-c52c-43bd-b48a-fda5187273b9/resource/2ba84ee4-c953-457c-a8c7-351f6dd68abf/download/2019-2046-alberta-population-projections.pdf* *https://www12.statcan.gc.ca/census-recensement/2016/as-sa/fogs-spg/Facts-PR-Eng.cfm?TOPIC=7&LANG=Eng&GK=PR&GC=48*
Nutrient intake	• The Canadian Health Measures Survey (CHMS) 2012-13 data indicates that 14.7% of children (aged 3-17) reported drinking soft drinks, fruit drinks or sports drinks every day. • Found that 49% of 1-3 year olds and 72% of 4-13 year olds eat too much sodium. • Among children aged 2 to 8, sugary beverages accounted for 21.8% of average daily total sugars consumption in 2015, significantly lower than the 32.8% in 2004. • In 2015, the average daily total sugars intake from food and beverages among all children aged 2 to 8 was 101 grams (24 teaspoons). Over one-third of the total sugars came from beverages.	Canadian Health Measures Survey (CHMS) 2012-13 data *http://www.phn-rsp.ca/thcpr-vcpsre-2015/data-table-eng.php* A Salty Situation (2018) *https://www.canada.ca/en/health-canada/services/publications/food-nutrition/infographic-salty-situation.html* Change in total sugars consumption among Canadian children and adults *https://www150.statcan.gc.ca/n1/pub/82-003-x/2019001/article/00002-eng.htm*
Health assessment/status	• The 2014-15 Canadian data reports that 30.3% of Albertan children aged 5-17 years were overweight or obese. *Using older age category data due to paucity of data for younger children. • Among on-reserve First Nation (2002/3) 3-5 year olds, 48.7% were classified obese. • Obesity in Canada remains higher in Aboriginal populations compared with non-Aboriginal populations. At the provincial level, differences are statistically significant in Alberta (2007/8).	Towards a Healthier Canada- Data Table *Canadian Health Measures Survey (CHMS) 2012-13 data* Obesity in Canada – Prevalence among Aboriginal populations *https://www.canada.ca/en/public-health/services/health-promotion/healthy-living/obesity-canada/prevalence-among-aboriginal-populations.html*
Food skill and meal trends	• Canada's Dietary Guidelines (2019) cite an increase over time in household budget spent on highly processed foods and food from eating establishments. This is associated with an increase in calories, sodium, sugars and saturated fat. A reduction in the transfer of food skills to children and adolescents has also been noted. • A 2015 Canadian time use survey noted that 8% of respondents ate three meals or more with their children under 15 years of age, while the majority ate either none (34%) or one (39%) meal with them.	Canada's Dietary Guidelines (2019) *https://food-guide.canada.ca/en/guidelines/* Stats Canada General Social Survey Time Use 2015 *https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2018003-eng.htm*

Statistics	Relevant Details	Source
Food skill and meal trends *(continued)*	• The 2018 Tracking Nutrition Trends report notes that 55% of Canadians aged 18-34 report preparing their last ten meals from scratch, compared to 65% of 35-54 year olds. • The 2018 nutrition trend data indicates that while Canadians view dietitians and other health professionals as credible sources of nutrition information, they are most likely to use other sources including internet and social media. This is particularly noted for younger Canadians (aged 18-34 years). • Indicated 16% of Canadians report following Canadas's Food Guide (CFG), a drop from 24% in 2013. • Younger Canadians (aged 18-34 years) report being least likely to follow CFG amongst other adult age groups, and significantly more likely to follow a vegetarian or vegan diet. • Younger Canadians (aged 18-34 years) are significantly more likely than older Canadians (greater than 35 years) to indicate "getting energy or stamina" as influential in their food choices.	2018 Tracking Nutrition Trends report *Tracking Nutrition Trends Canadian Foundation for Dietetic Research. 2018* *https://www.cfdr.ca/Sharing/CCFNLibrary/Tracking-Nutrition-Trends.aspx*
Health Inequities	• Canadian data indicates lower fruit/vegetable consumption among Inuit, First Nations and Metis populations compared with their non-Indigenous counterparts. • Canadian data indicates lower fruit/vegetable consumption among recent immigrants compared with the general population. • Found that 11% of households with children 0 to 5 years are measured as either moderate or severely food insecure (2011-12). • Groups at higher risk of food insecurity include lone parent families and households where government benefits are the main source of income. • Food insecurity during the preschool years has been found to increase the likelihood of overweight later in childhood.	Government of Canada, Health Inequalities data tool *https://health-infobase.canada.ca/health-inequalities/data-tool/* Statistics Canada 2011/2012 data *https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310046201* Health at a glance- Food Insecurity in Canada (2015) *https://www150.statcan.gc.ca/n1/pub/82-624-x/2015001/article/14138-eng.htm*

Peer Reviewed Literature

A multi-step, systematic process was used for article search, retrieval, selection, critical appraisal and synthesis. Overview of the process can be found in *Figure 2*.

Search Strategy

Knowledge and Resource Services (KRS), AHS, was consulted to help define the question (*Figure 1*) and scope based on the identified topic. Searches were completed by project group members with annotated bibliographies generated in Mendeley. The PubMed and PubMed Central search was redefined to only capture articles in publication from 2012 to 2016. Systematic reviews, meta-analysis articles, primary research and grey literature were

included. In addition, hand search articles were identified from reference lists and other sources from 2015-2019. A full grey literature search was not conducted due to capacity and the determination that it would not further inform the question. Details around the PICO (population, intervention, comparison, and outcome) question, limits, databases, concept map, MeSH (Medical Subject Headings) terms, and search strings are outlined in *Appendix A*.

Eligibility Criteria and Study Selection

Articles were reviewed for inclusion/exclusion at the title, abstract and full text reading stages, using defined criteria (*Appendix B*). A minimum of two reviewers were responsible for screening and determining articles for inclusion at each step in the inclusion/exclusion process.

Articles were included if they reported on interventions that outlined a parent-targeted strategy either in the home, child care or community settings, and either as a single intervention or as part of a *multi-level* or multi-component intervention. Research studies that did not include an intentional, parent-targeted strategy were excluded. Commentaries, opinion papers, narrative reviews, unpublished evaluation reports and studies conducted in *low and middle income* countries were also excluded. Studies were included regardless of study design or sample size if they reported on a potentially scalable, innovative strategy that could potentially be applied in the current Alberta public health nutrition context.

A total of 4398 potential articles were retrieved from the database search. Twenty-nine articles were included after multiple pass application of inclusion/exclusion criteria at both the abstract and full text review stage. An additional 9 articles were identified through hand search strategies. Thirty-eight articles were considered for final review and critical appraisal. Of these, 32 articles (13 review articles, and 19 primary research articles) met the inclusion criteria.

Data Extraction

Data was extracted from all included studies. Studies are presented in this review by key findings/outcomes and implications for practice in the Findings section. Further details around study design, data collection tools, outcomes of interest, indicators and measurements can be found in *Appendix C*.

Quality Appraisal

Articles were critically appraised using standard public health practice evidence appraisal tools. Review articles (e.g. systematic reviews and reviews with a systematic search strategy) were appraised with the *Health Evidence Quality Assessment Tool – Review Articles.*[11] Primary research articles were appraised using the *Effective Public Health Practice Project Quality Assessment Tool for Quantitative Studies (EPHPP).*[12] Qualitative Studies were reviewed using the *Critical Appraisal Skills Program (CASP) Qualitative Checklist.*[13] A minimum of two reviewers rated each article, either independently or with the second reviewer verifying the first reviewer assessment. Discrepancies in quality assessment ratings were resolved by consensus or by a third reviewer.

While most systematic review articles were appraised as moderate or strong, only select sections answered the question of interest. In addition, there were few high-quality primary research articles. In order to identify innovative, potentially scalable strategies that might be implementable in Alberta by NS PPH, all critically appraised articles meeting the inclusion criteria were included in this evidence review.

Data Synthesis

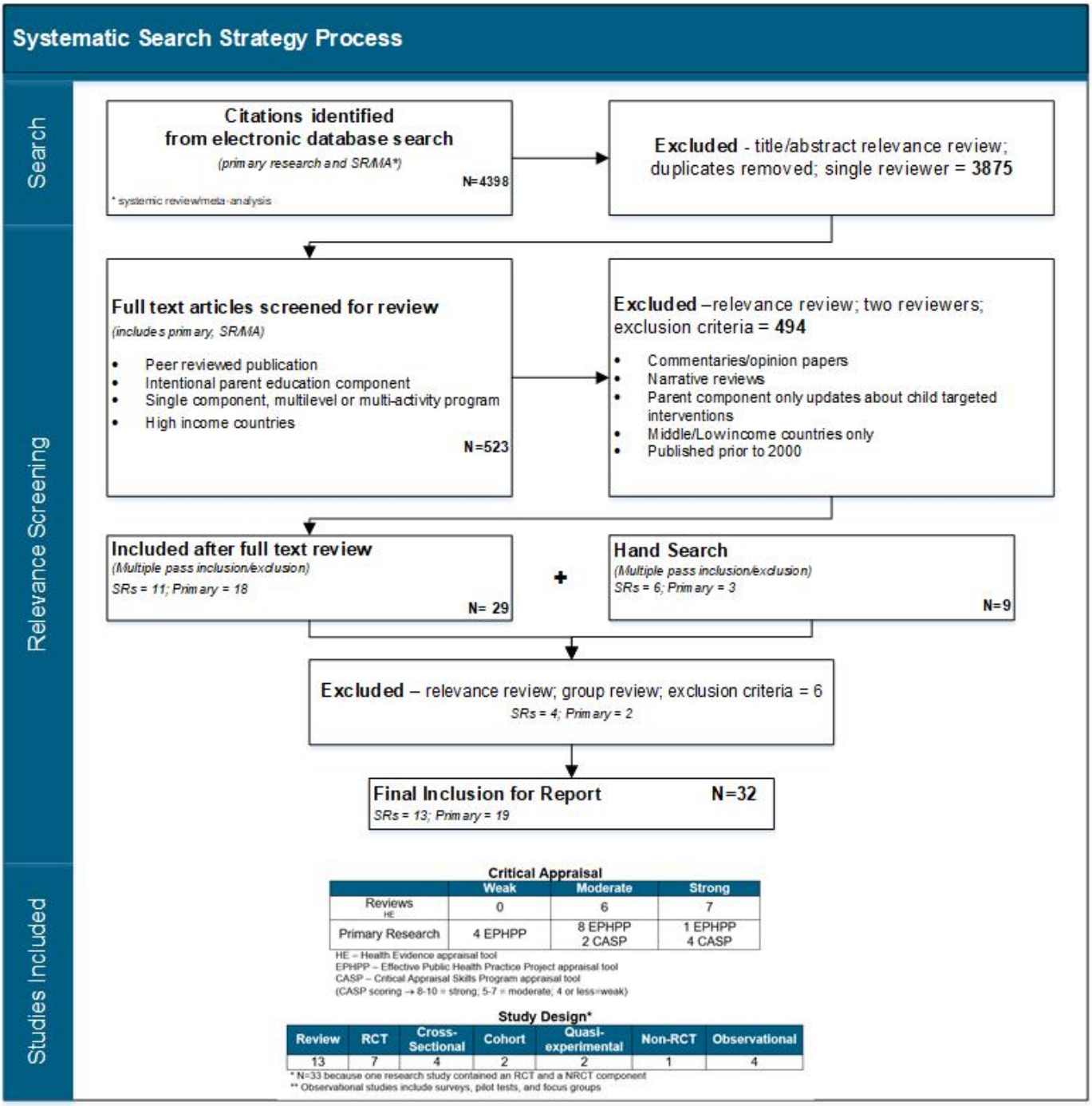
Study findings were synthesized under themes by primary audience of intervention, observations, and other factors that can influence child feeding strategies by parents. These themes are shared in the Findings section with detail on outcomes and implications to practice.

Limitations

The challenges and limitations experienced while conducting this review include:

- Multiple search questions with a focus on parent directed strategies yielded a large number of articles focused on personal health skills and few on PPH strategies impacting overall determinants of health.
- Evidence heterogeneity shows a wide range of interventions and methods used to improve feeding behaviours of young children; this created challenges for theming and recommending specific strategies that are scalable and applicable to the Alberta context.
- Systematic reviews combined various questions, definitions and methods to report on the outcomes of interest. This report only includes the relevant sections of several systematic reviews that met the inclusion criteria. Other systematic reviews were used to identify relevant primary research.
- Most primary research studies were appraised as weak due to factors such as small sample size and measurement of only short-term outcomes. However, in order to present an overview of the body of literature, all included studies were reported on with the strength of the evidence considered in making recommendations.

Figure 2. Process to Extract Literature for Report



Findings

Thirty-two published articles met the inclusion criteria, including 19 primary research studies and 13 systematic reviews (SR). Studies were reviewed by project group members and summarized to capture the overall theme of the study. Two members of the project group then reviewed these summaries to identify common themes for analysis. Six themes emerged and are described below along with considerations for practice. Given that the search strategy was based on the evidence review questions (*Figure 1*), the majority of studies focused on interventions which addressed developing personal skills (i.e. health education). For more information on the study including study type, strength of evidence, and study methodology please refer to the data table found in *Appendix C*.

Education Interventions Targeted to Parents without Child Involvement

Nineteen articles looked at interventions focused solely on parents, without any child involvement. This is not unusual as parents/caregivers are usually the main provider of food for young children, as well as being a role model and an important provider of food and nutrition information. Intervention strategies included in-person education sessions, as well as information sent to parents through paper and/or online. A description of this literature with key findings and considerations to practice is found in Table 2.

Table 2. Summary of Findings and Implications on Education Interventions for Parents without Child Involvement

Parent Strategy	Key Findings/Outcomes	Considerations for Practice
In person education sessions: • energy balance • parent modelling and children's nutritional needs • division of responsibility in child feeding • media literacy • habit formation for parents when feeding children	• Increase in parental intentions to work on at-home activities such as reducing high fat/sugar foods, switching to smaller portions and talking about healthy foods with family.[14] • Increase in child fruit and vegetable intake.[15,16] • Decrease in child drinking sugar sweetened beverages.[16] • Increase in child being offered fruit and vegetables, healthy snacks, and healthy drinks.[17] • Increase in intake of healthy snacks and water.[17] • Increase in family meals prepared at home and eaten together.[16] • Increase in parental confidence in planning, providing and encouraging healthy food choices to children.[16] • Reduction of parental pressure for children to eat.[18] • Reduction of food restriction in female children.[18] • Increase in understanding of television advertising to children.[19] • Positive changes in behaviours, attitudes, self-efficacy, values, outcome and outcome expectations when talking to their children about food commercials.[19] • Increase in parental understanding of and ability to read food labels.[19] • Improvement of feeding behaviour habits of parents.[18]	• Division of responsibility education is an important technique to help reduce pressure to eat.[18] • Education interventions show promise to influence parents to improve child feeding practices. • Using behavioural change approach to influence positive child feeding practices may be the most beneficial. • Need to consider how to best incorporate into PPH dietitian practice, including how community partnerships can support this work. • Further information is needed to identify best practices for specific age groups.

Parent Strategy	Key Findings/Outcomes	Considerations for Practice
Weekly handouts sent home	• Increase in whole grains items being packed in preschool lunch.[20] • Increase in frequency of vegetables being packed in preschool lunch.[20]	• Potential to use parts of this strategy in early-learning and child-care settings where children must bring their own meals.
Weekly suggested home activities to do with children Biweekly newsletter sent home	• Increase in fruit availability at home.[21] • Decrease in visits to fast food restaurants.[21]	• Interventions that inform parents indirectly without in person education may be a manageable form of information sharing.
Online education program accessed via computer	• The majority of parents entering the program at the pre-contemplation, contemplation, and preparation stages advanced to the action stage by the end of the module session.[22]	• Online education can allow for tailored education based on client's stages of change. • Online information can help reach clients unable to access in-person services.
CDs and DVDs for self-directed education	• Reduction in total energy intake in children after the 12 month intervention. This was mainly due to the reduction of cereals and breads carbohydrate intake and not from the reduction of energy-dense, nutrient-poor foods.[23] • Parents found the method of information sharing useful.[23]	• Self-directed resources using current technology should be an area of exploration. • Strategies to increase resource use (such as email prompting) are needed to determine how effective these interventions are.
Home visitation to parents during child's first year of life	• Home visitors were the most commonly used source for information for feeding children in the first year, followed by grandparents.[24]	• More information is needed to understand usefulness of nutrition interventions in home visitations provided by community organizations in the Alberta setting. • Use of grandparents as a source of information for parent should be explored in the future.
Blog posts written by RD	• No statistically significant difference between the two groups for veg/fruit consumption or milk and alternatives in mothers over time, body weight of mothers, and blog engagement metrics.[25] • An increase in score for meal planning habits suggests an increase in family meal planning over time among mothers in the blog group.[25] • Highest number of log-ins per participant was observed in the first week of the intervention. After a decrease in logins over time there were peaks when the blog addressed practical cooking tips and attitudes of involving children in the prep of family meals.[25]	• More research is needed to understand the impact of healthy eating blogs on parents' food related behaviours.

Parent Strategy	Key Findings/Outcomes	Considerations for Practice
A review of interventions targeted to parents in socioeconomically disadvantaged or Indigenous families	• Interventions with positive outcomes successfully engaged parents, had a strong focus on skill-building and used behaviour change strategies, social networking, progressive rewards systems and links to community resources.[26] • Successful interventions for children under two years of age consisted of providing parental support and advice about what to expect and how to manage particular situations before obesity related behaviours occur.[26] • Successful interventions at 3-5 years old included a dual focus on obesity prevention and school readiness, weight screening and referral, a focus on household routines, and a parent education component.[26]	• Parents who are socio-economically disadvantaged or Indigenous benefit from early intervention strategies and support in behaviour change techniques and not just knowledge acquisition.
Interventions designed to reduce the risk of overweight/obesity for parents delivered post-partum or in the first 2 years	• Interventions that aim to improve parental feeding practices such as infant diet and parental responsiveness to infant cues, showed the most promise in relation to behaviour change but not weight.[27]	• Intervention concepts in this review are similar in what is found in AHS Healthy Feeding *Nutrition Guideline* NG (i.e. feeding relationship topics).
Parent and Early Childhood Educator (ECE) partnerships	• Parents and early childhood educators working in partnership may lead to effective outcomes and assist children with achieving a healthy weight.[28] • Consistent educational material was found to be useful to build on previous knowledge.[28] • The best way to engage partnership between ECE programs and parents is still to be determined.[28]	• More information is needed to understand the current engagement between parents and early educators and where NS PPH could support this relationship to impact child feeding.
Parent skill training	• Promising interventions were ones that targeted parents via skill training and behavioural change strategies to establish healthy behaviours in children.[29]	• Strengthens argument that there is more value in parent interventions that focus on parent skill training and behaviour change than only sharing information and knowledge.
Home visitation: parent-based strategies in the home	• Taste exposure interventions were most effective for increasing vegetable intake.[30] • Nutrition education sessions can help increase fruit intake with daily or weekly sessions more effective than monthly session.[30] • Interventions using online information or home visitation resulted in an increase of fruit intake.[30]	• May wish to explore if/how home visitation could use strategies to improve child feeding practices.

Parent Strategy	Key Findings/Outcomes	Considerations for Practice
Multiple and coordinated strategies including messaging, social marketing and direct involvement with families to increase fruit and vegetable consumption	• Interventions most effective to increase fruit and vegetable intake included specific messaging, had multiple strategies to give messages, included family involvement, were more intensive, had multiple contacts with the audience, and were directed at behavior change.[31] • Social marketing that is consistent across multiple levels of government (national, state, local) and highlights a compelling emotional benefit is needed to motivate consumers to eat more fruit and vegetables. Effective messaging appealed to the emotional needs of the mother to be a responsible parent while focusing on the intrinsic value of eating fruit and vegetables while focusing on small steps.[32]	• Highlights programs with multiple strategies and contacts focused on behaviour change can support feeding practices. • Consider opportunities to coordinate messaging from all levels of government health and health system organizations. • Explore targeted, actionable messages framed with a nurturing tone and an emotional benefit to improve knowledge and awareness and effect behavior change in fruit and vegetable consumption patterns.

Nutrition education interventions for parents to engage with children	• Successful nutrition interventions targeted to preschoolers include:
	  ○ Targeting specific behaviours to modify (for example, increasing fruit and vegetable intake).[33]
	  ○ Aligning activities clearly with objectives and expected behaviours.[33]
	  ○ Engaging parents in-person including hands on activities and lectures.[33]
		• When targeting children in nutrition interventions, it is also important to engage parents separately so messaging can also be used in the home.
		• Face to face interventions seem to be more effective for parents.

Education Interventions Targeted to Parents and Children Together

Use of strategies to inform parents with children present were found in 7 studies. These strategies included education sessions to share information and opportunities for parents and children to prepare, cook, and eat meals together. Other strategies used included activity stations to be used by parents and their children at child care, resource fairs, and picture books for parents to read to their child. *Table 3* explains the findings of these studies in more detail.

Table 3. Summary of Findings and Implications on Education Interventions for Parents and Child Together

Parent Strategy with Child Involvement	Key Findings/Outcomes	Considerations for Practice
Education session on preparing fruit and vegetable snacks Cooking session for father and child	• Increase in child fruit and vegetable intake.[15]	• These sessions incorporate hands on learning for parents with their children. • Since these strategies were part of a broader program with multiple interventions, it is difficult to determine which component led to the positive results. Even with this uncertainty, these strategies may be helpful and unlikely to have negative effects and therefore are worthy of consideration.
Food preparation, cooking, and meal time sessions	• Increase in child fruit and vegetable intake.[16] • Decrease in child consumption of sugar sweetened beverages.[16] • Increase in family meals prepared at home and ate together.[16] • Increase in parental confidence in planning, providing and encouraging healthy food choices to children.[16]	
Parent-child activity stations at child care	• Increase in whole grain items being packed in preschool lunch.[20] • Increase in frequency of vegetables being packed in preschool lunch.[20]	• Highlights other forms of education that include parents and children learning together. • Since these strategies were part of a broader program with multiple interventions, it is difficult to determine which component led to the positive results. Even with this uncertainty, these strategies may be helpful and unlikely to have negative effects and therefore are worthy of consideration.
Resource fair for families to attend	• Increase in parental intentions to work on at home including activities such as reducing high fat/sugar foods, switching to smaller portions & talking about healthy foods with family.[14]	
Picture books for parents to read with child	• Increase in toddlers' interest in previously unfamiliar vegetables and increased consumption of unfamiliar vegetables that were shown in their picture books.[34]	• Books for parents to read with children are an interesting way to share information to parents. • Highlights need for AHS to explore variety of ways to support parents.
Family based interventions for childhood obesity using behaviour theory vs. family systems theory	• Family based interventions to impact childhood obesity using behaviour theory had better results than interventions using family systems theory.[35]	• Provides support for behaviour theory as a theoretical model for family interventions. Can explore how this theory is used in current AHS supports.

Parent Strategy with Child Involvement	Key Findings/Outcomes	Considerations for Practice
Parental support and home activities	• Cochrane review on effective interventions included parental support and home activities that encourage children to eat more nutritious foods and interventions at home and healthcare settings for children birth to 5 years of age.[36]	• Supports behaviour change theory as the predominant theoretical basis used in the review findings. • Highlights using home and healthcare settings to connect with families of children 0-5 years of age.

Education Interventions Targeted to Children without Parent Involvement

Even though the research question looked at parent specific interventions, six studies included multi-component programs which included interventions directly to the child without the parent present. These interventions were carried out in child care settings with either a child care employee or a content expert in the child care. These strategies included classroom education activities, education during meal and snack time, and also education using song and role playing in open play (Table 4).

Table 4. Summary of Findings and Implications on Education Interventions for Children without Parent Involvement

Child Strategy without Parent Involvement	Key Findings/Outcomes	Considerations for Practice
Classroom education sessions (e.g. Food pyramid, family meals, fruits and vegetables, etc.)	• Increase in fruit and vegetable intake.[15] • Decrease in drinking sugar sweetened beverages.[16] • Increase frequency of family meals prepared at home and eaten together.[16] • Increase in parental confidence in planning, providing and encouraging healthy food choices to children.[16] • Increase in whole grains items being packed in preschool lunch.[20] • Increase in frequency of vegetables being packed in preschool lunch.[20] • Increase in fruit availability at home.[21] • Decrease in visits to fast food restaurants.[21]	• Educations sessions directly to the child can support positive changes as reported in these studies. • Since these strategies were part of a broader program with multiple interventions, it is difficult to determine which component led to the positive results. Even with this uncertainty, these strategies may be helpful and unlikely to have negative effects and therefore are worthy of consideration.
Education during meal/snack time	• Increase in fruit availability at home.[21] • Decrease in visits to fast food restaurants.[21]	
Education during song time		
Role playing prompts during open play		
Child focused interventions and their effect on BMI	• MA: General health and nutrition education are encouraged for children provided by external health educators.[29]	• This suggests differences in intervention styles between children compared to their parents.

Child Strategy without Parent Involvement	Key Findings/Outcomes	Considerations for Practice

Factors associated with successful nutrition education interventions conducted with children	• SR: Successful nutrition interventions targeted to preschoolers include:
	  ○ Targeting specific behaviours to modify (for example, increasing fruit and vegetable intake).[33]
	  ○ Aligning activities clearly with objectives and expected behaviours.
	  ○ Providing training to teachers or health professionals who are implementing the nutrition education.[33]
	  ○ Provide hands on activities that are age appropriate and accommodate the concentration span of the preschooler.[33]
		• Strategies geared towards preschoolers should be developmentally appropriate in time frequency, length, and activity style.
		• Training teachers is also important to ensure messaging is meeting specific objectives and is being relayed in the preschool setting.

Parent Behaviours and the Effect on the Child's Diets

As mentioned previously, parents/caregivers are major players in influencing child feeding practices. Seven studies looked at the parental factors that are associated with child feeding and nutrition practices. Explanation of findings and considerations can be found in Table 5.

Table 5. Summary of Findings and Implications of Parent Behaviours on Child's Diets

Parent Behaviour	Key Findings/Outcomes	Considerations/ Worth to Practice
Positive behaviour support and proactive parenting	• Positive behaviour support and proactive parenting, were a strong predictor in diet quality in children.[37]	• Supports feeding relationship messaging currently used in NS.
Parental practices using preventative influence (reducing food consumption) and promotive influence (increasing consumption of other foods)	• Availability of food for children and parents' consumption behaviour show the strongest associations with food consumption in children.[38] • Active discussion about healthy foods may increase consumption of these foods while setting limits and rules may help reduce consumption of unhealthy foods.[38] • Children under six respond well to praise versus material rewards.[38]	• Supports use of role modeling to influence child feeding practices. • Report also acknowledges that messaging may create inequity and undue pressure on families experiencing food insecurity.
Underlying factors that influence child feeding behaviours in Asian Indian Mothers in the US	• Nutrition and the preservation of Indian values and culture was a motivating factor in feeding practices toward children and negative feeding practices used included pressure to eat, food rewards and eating at the television.[39] • Child feeding strategies that highlight the nutritional need while incorporating cultural beliefs could be effective in feeding behaviour change.[39]	• Highlights need for reviewing cultural needs of clients and understanding how needs may vary among groups.

Parent Behaviour	Key Findings/Outcomes	Considerations/ Worth to Practice
Maternal characteristics associated with perceptions of "picky eating", and vegetable and fruit consumption	• Toddlers were less likely to eat fruit or vegetables if their mothers did not consume vegetables and if they viewed their children as picky eaters.[40] • Developing strategies that address mothers' consumption may help increase toddler consumption of these foods.[40]	• Highlights influence of role modeling towards changes in child behaviour and supports need for this as a part of strategy to support positive child feeding practices.
Maternal correlates of child feeding practices	• Controlling parenting styles which put pressure on children to eat may disrupt the child's ability to self-regulate their food intake based on internal hunger cues.[41] • Identifying mothers at risk for developing or performing unhealthy feeding practices is important and may allow for intervention programs to target their needs.[41] • Interventions addressing maternal eating and general psychopathology may be beneficial to improve maternal child feeding practices.[41]	• Tailored messaging may support mothers from differing backgrounds and beliefs. At large scale within NS PPH programming this may not be possible but this can be reviewed in departments responsible for direct family support.
Fathers identified role in child feeding	• Results show that the majority of fathers eat meals with their family and helped organize mealtime.[42] • Fathers should be targeted to promote positive feeding practices within the family.[42]	• Father specific support may be useful and tailoring may be needed to accommodate differences in their perception of role in the family feeding environment.
Review of research on fathers' child feed practices	• Differences between mother and father feeding practices including a lower likelihood to monitor child's food intake and limit access to food.[43] • Pressuring child to eat was a common strategy for fathers to get children to eat and restrictive feeding was reported more for children with a higher BMI.[43]	

Community Level Strategy

Beyond the home/preschool setting, 2 articles looked at how community level strategies support child feeding behaviours (Table 6).

Table 6. Summary of Findings and Implications on Community Level Strategy

Description of Study	Key Findings/Outcomes	Considerations/ Worth to Practice
Community level strategies to prevent obesity in children	• Creating environments and culture to promote healthier eating can be a promising strategy in preventing obesity in children.[36]	• More information is needed to understand how strategies at the community level can support families and a literature search for this information would be needed. • This is relevant to public health nutrition work where a more upstream approach is desirable for greater impact in improving child feeding practices and creating a greater population reach.
Strategies for community based interventions to enhance eating behaviours	• High variability of factors determined in focus groups across multiple countries highlights the need for tailoring interventions at multiple levels (personal, institutional, social-environment, and physical-environment) to increase likelihood of behavioural change.[44]	• A variety of factors and reasons that lead to feeding behavior for families and *multi-level* strategies beyond personal level interventions can support behaviour changes.

Impact of socioeconomic positions on child feeding

Three studies discussed how *socioeconomic position* (SEP) impact obesity related interventions in children (Table 7).

Table 7. Summary of Findings and Implications on Impact of Socioeconomic Positions on Child Nutrition

Socioeconomic Position Observation	Key Findings/Outcomes	Considerations/ Worth to Practice
Effect of obesity prevention interventions depending on SEP	• Population health interventions that focus on individual behaviour change have been shown to be ineffective in reaching parents in lower SEP.[45] • Interventions that are modified proportionate to level of disadvantage, may be a useful component to multi-component interventions to improve nutrition in the early years.[45] • Effective interventions primarily include those that are community-based or build on policies aimed at structural changes to the environment.[26,45]	• Need to ensure that NS PPH consider SEP of population to ensure resources and programming do not increase health inequities. Also at what level can AHS support increasing health equity in these populations?

Socioeconomic Position Observation	Key Findings/Outcomes	Considerations/ Worth to Practice
The effect of SEP on maternal child feeding practices	• SEP (determined by mother education level or family income) and ethnicity influence mothers' knowledge, beliefs and/or motivation regarding child feeding practices.[41]	• Further supports for more information needed on how AHS can support community-based strategies such as structural changes to the environment and policy change.

Discussion

This literature review explores the effectiveness of various strategies that target parents, and aim to improve eating behaviours and nutrition among children aged 0-6 years. The majority of studies reporting positive outcomes included a parent component as a part of multi-component strategy. Although a variety of settings and approaches were reported on in this review, most studies measured short-term outcomes, with modest results, and had a weak study design. Based on the evidence summarized in this report, there was no single parent-targeted strategy that stood out as especially effective for impacting longer term outcomes. However, there were a number of positive findings to help guide NS PPH planning for future initiatives to support children and their families in establishing healthy eating at a young age.

Developing Personal Skills as a Strategy

The majority of studies reviewed focus on health and nutrition education of parents and children. Within the five action areas for health promotion in the Ottawa Charter for Health Promotion,[46] these interventions fall under "developing personal skills". In comparison with the large body of research examining personal skill development, there were fewer studies on the other four health promotion strategies- build healthy public policy, create supportive environments, strengthen community action, and reorient health services. This is likely due, in part, to the scope of the research questions presented during the literature search. However, this review is relevant given that knowledge building programs for parents of children 0-6 years of age are common among current AHS programs and as part of a multi-component strategy can be effective in helping to shape young children's nutrition attitudes and behaviours.

Among the personal skill development findings, some of the strategies found to be most effective included: in person education sessions to parents,[14–19,30] weekly handouts/ newsletters sent home,[20,21] parent-with-child education[15] and cooking sessions,[16] activity stations at child care for parent and child,[20] resource fairs,[14] picture books to take home,[34] and classroom education sessions for children.[15–17,20,21] Some of the outcomes that were measured included: increased consumption of "healthy foods";[15–17,30,34] decreased intake of food high in sugar;[16] and increase in child accessibility to "healthy foods".[14,15,20,21] It is

noteworthy that NS offers many of these programs; however, the evidence points towards a more systematic, coordinated approach, rather than each of these programs being offered as a single episodic intervention. It is also recognized that NS does not offer many of these programs in all communities, nor to all parents, and uptake of programs where they are offered may be limited. These challenges need to be further explored. There are also opportunities for future planning that build on current approaches. Again, these are noted below. Ongoing evaluation of such programs will be important to determine their reach and effectiveness with the delivery models and to make improvements where warranted. Finally, the literature was clear that there is not a one-size-fits-all approach to supporting parents of young children to develop positive eating behaviours. Families in low SEP and those from various ethno-cultural groups may be unintentionally excluded from the mainstream activities.

Each facet of the findings are discussed in more detail below.

Audience of Intervention

While many studies focused on developing personal skills, there were differences among the target populations. The majority of studies focused on parents by means of either in-person[17–19] or technology-based[22,23] means. That parents comprised the largest target group was expected, as parents are the main providers of food and meals for children at this age, and the role modelling and environments they create in the home have a large influence on their children.[26–29]

Other interventions expanded beyond a single education intervention, to incorporate multiple educational sessions either with parents only, parents with their children, or children alone.[14–16,20,21] Although it is not possible to attribute positive outcomes to specific components of these interventions, it does support the contention that programs that involve both children and parents may help build consistent messages for the entire household and thereby have a greater impact on the overall home environment and practices by family members, including the children. Having multiple points of contact with families and different strategies to relay the material can help reinforce messaging.[31]

The Use of Child Care Setting To Carry Out Interventions

Child care facilities were the location for many of the interventions reviewed in this report. As noted previously, this review did not include activities that addressed the child care environment, as this work has been done previously and the positive impact of creating health eating environments in child cares (using a comprehensive health approach) is well established.[5] Over half of all families in Alberta rely on child care outside the home (either formal or informal), therefore the child care sector offers an important means to reach parents with messages and education programs and to role model positive messages and practices. For example, child cares may act as a knowledge hub to support parent training, host activities for children to attend with their parents, as well as to include food and nutrition education and activities for children during the day. Over the past several years, NS

dietitians have developed and implemented a range of staff education activities for child cares, including promotion of changes to the physical and social environments, menu, meal and snack planning, and policy tools. There is strong research to show the effectiveness of such approaches.[33] Future plans to apply a comprehensive health approach to the child care sector by complementing current activities with education strategies informed by this review, offers the opportunity to further improve children's eating behaviours, while supporting families and the child care staff.

Intervention Types Used

While there was variation in how information was delivered to families, the most common method was through in-person group sessions. Among these in person sessions, activities included classroom information, cooking, and food preparation sessions.[14–21] Some more unique interventions included activity stations for parents with their children at a child care, and role-playing prompts for children during open play.[20,21] Passive materials were also used to educate parents including sending home handouts, suggested home activities, newsletters, and picture books for families to read together.[20–22,34] These strategies included positive outcomes such as parents' understanding and skill to improve feeding practices and improvements in foods being offered to children. A limited number of studies used technologies such as online education, self-led CD's and DVD's, and blog posts[22,23,25] with varying degrees of success.

As NS PPH considers options on how to support families with nutrition education in an efficient and cost-effective manner, less resource intensive interventions such as online tools hold promise. Another advantage of using technology may be the ability to connect with families who lack access to in-person resources, have difficulty securing child care to attend in-person sessions, live in communities where face to face interventions may be limited, or prefer online education. Furthermore, technology, including social media, may allow for an expanded reach for nutrition information. These methods are not without limitations as technology may not be accessible for certain families with limited technological literacy or internet services. Staffing and resources costs may vary based on interventions style and prioritization of resources to these services whether they are face to face interventions or using technology.

Influence of Parenting Styles on Child Behaviour

Parenting styles vary and this can create a challenge in understanding possible ways to support families in making healthy food choices. Currently the foundation for NS PPH strategies for young child nutrition is Ellyn Satter's *Division of Responsibility*. In this model, positive mealtime experiences are encouraged versus restrictive eating and negative mealtime experiences.[47] This approach is consistent with an authoritative parenting style.[48] Specific points to highlight to parents include the importance of positive behaviour management (using proactive and non-aversive interactions and reinforcing positive behaviour), making healthy foods available in the home and parents modelling desired eating behaviours.[37,38] These are important concepts when supporting families to make

changes to their and their children's eating behaviours. The mutual benefits for parents and children are derived in part from the parent role-modeling the behaviours they wish to see in their children. NS PPH may wish to consider additional messaging through existing programs where parents interact with health professional such as well child clinics and primary care networks.

Findings also show the importance of targeting all parents in the household to support positive feeding practices in children.[40–43] While mothers are usually the main target in programming, fathers also contribute to their children's food and nutrition attitudes and practices and this warrants further exploration. While positive parenting strategies described above are important for both mothers and fathers, more information is needed to determine whether and how intervention strategies may need to be specifically tailored to fathers. While this review discovered some research on fathers, there was a dearth of research on the influence of non-parent caregivers such as grandparents, foster parents, and others. Further research is needed to better understand how to effectively approach these populations to influence positive feeding behaviours in children.

Other factors that may influence the support given to the parents include cultural practices of the family.[39] Although only one study in the review highlighted this, it brings into question the importance on how parental support may be adapted to address unique needs of various cultures. This may include cultural parenting styles, beliefs about health, the importance of traditional foods, and religious practices.

Socioeconomic Position (SEP) and Influence on Feeding Behaviours

Another critical facet to this topic is families in lower *SEP* and to understand effective means to reach and positively influence and support these families. This review suggests that community-based strategies that focus on the needs of these families may be most effective. Moreover, an area that was not explored in this report, but is critical to the desired outcomes of improved early child nutrition, is public policy. Unlike health, education and community based programs; healthy public policy can reach and affect all households equally, regardless of SEP.[26,41,45] Examples of potential public policies include restrictions on the marketing of unhealthy foods to children, limits on the amount of sodium and sugar in foods aimed specifically for young children, and restriction on the availability of unhealthy food options in places where young children are likely to be (child cares, recreation centres, public buildings). While this report did not include policy as a strategy, the findings revealed disparities in nutrition practices and health outcomes based on SEP and recognized that barriers outside of the family's control can exist that prevent change regardless of the family's nutrition knowledge and desire to provide their children with healthy food options. Employing the health equity assessment tool[49] in future work at AHS can help identify where programs are not meeting the needs of families who are experiencing barriers to health and tailor interventions that meet their needs.

The Importance of Supportive Environments and Community/Home-Based Strategies

The majority of studies included in this review took place in child care facilities. It is important to note that many families in Alberta do not access these services. However, it was found that, while studies that took place in the community were fewer, similar strategies to those in child cares appeared to be successful when they were provided in the community;[24,30,36,44] including multiple messaging approaches directed at behaviour change. To apply this to practice, further work would be required to identify where community opportunities exist to connect with these parents. These can include primary health care, community family services, early childhood coalitions, preschool programs, and community organizations. Other in-home education strategies such as web-based programs, audio/video resources sent to the home, and print materials sent from a child care centre could also be replicated in a community setting.[20–24]

Home visits by healthcare professionals was examined by Gildea et al.[24] While the findings were positive, this option would require considerable review given it does not fit with current AHS models of care as there are a limited number of home visitation programs in AHS that provide specialized care for a targeted population of families. Well child clinic visits in health care clinics may provide additional opportunity to meet objectives to improve eating habits in young children. Home visitation programs also exist in the community where non-profit organizations provide services to parents. There may be potential for AHS staff to provide resources to these programs but a review of the program would be needed to ensure that information provided is appropriate for the targeted families.

Implications for Practice

Currently NS PPH dietitians offer a number of nutrition education programs and resources for parents of young children. In addition, NS dietitians have developed a number of tools and resources for child care centres and community organizations that support these parents and children. Findings from this review support education as an effective approach to positively influence nutritional practices of parents of children aged 0-6 years and provide new insights into more novel and creative ways to reach more parents and improve nutritional practices and outcomes. Based on this review, it is recommended that NS PPH consider the following questions when reviewing any existing program or when identifying opportunities for supporting new initiatives:

- Where is the program/service located? Are there families excluded (intentionally or unintentionally) from this program?
- Does the program recognize health inequities and if so, what measures are taken to ensure the program does not widen these inequities? Utilizing the Health Equity Assessment Tool can provide guidance in this area.
- Have cultural needs been identified and addressed to support the audience the best possible way?
- Does the program approach align with an authoritative model of parenting and the Ellyn Satter model of healthy relationships with eating?

Although the majority of the findings reviewed parent interventions in a research setting, in practice other factors must be taken into account when deciding on future planning. Feasibility of intervention, the cost to benefit ratio, and sustainability are just a few that were not addressed in these findings but are important considerations for AHS when deciding future program planning.

The relationships that NS dietitians have with child cares and community organizations in Alberta are an excellent opportunity to further support parents and children. In light of recent changes to some of these programs, it is an ideal time to identify and implement strategies to help these organizations who work with families. One of the major advantages of these partnerships is the ability for AHS to provide supports and services in the community with a larger reach than if implemented by AHS alone. It would also be useful to consider how the material developed by NS PPH influences the messages and approaches by other AHS programs and programs offered outside of AHS. This may open opportunities for partnership in future work.

There are large gaps in the literature retrieved among four of the five health promotion strategies.[46] The majority of results fall under developing personal skills. While this evidence review has highlighted the positive impact this strategy can have on the nutritional behaviours of young children, the remaining strategies – creating supportive environments, healthy public policy, strengthening community action and reorienting health services – also play a critical role in influencing, supporting, and empowering families to follow healthy feeding practices. Further exploration is needed, to understand how these strategies and interplay between them can be used to enhance the personal skill development activities.[50] Consideration also needs to be given to the literature suggesting that population health interventions that focus on individual behaviour change have been shown to be ineffective in reaching parents in lower SEP.[45] The multitude of studies in personal skill development was likely a result of the literature search methodology, therefore, a future review focusing on all health promotion strategies will be important to understand how NS PPH and more broadly, AHS, can contribute in these areas.

Findings in the literature should also be reviewed with the age of the children in mind. Between birth and 6 years of age there are significant changes in child development and feeding and most studies used relatively large age ranges when gathering research participants. This should be considered when reviewing the findings and how this may influence strategies for different age groups under 6 years of age.

Many of the interventions in the literature occurred in a research setting with a great deal of implementation support from the researchers. This may be difficult to carry out in a real-world setting due to scalability and cost versus benefit to implement. When reviewing these programs and how they could be adapted within AHS and our community, these factors are important considerations.

AHS' role as a large voice in promoting health in the province may provide opportunity to lead social marketing campaigns to support parents in improving children eating behaviours. There is little information on these strategies in the findings of this report, however further research is warranted if this is identified as a priority action within NS PPH; this could include reviewing public health nutrition campaigns (federally, provincially, and internationally) and other public health topics such as tobacco control, seat belt use, sudden infant death syndrome, and illicit drug use.[51] While some studies used various technologies to send nutrition information to parents (e.g., audio CD, DVD, and websites), further exploration of proactive media such as mobile apps and social media platforms may identify effective low-cost ways to reach large groups of parents.

Conclusions

This evidence summary brings to light a number of program approaches, primarily focused on the personal health practices of knowledge and skill development, which demonstrate positive effects on nutritional behaviours of children aged 0-6. To have greater impact and mitigate the impact of health inequity, it is important to address the other health promotion strategies (build healthy public policy, create supportive environments, strengthen community action, and reorient health services) to influence policy, social norms, systems and networks. Based on this review, it is recommended that the following factors be considered in future NS PPH programs and strategies that aim to improve nutrition related health outcomes of children aged 0-6 years. These include:

- Identify opportunities to address all health promotion strategies in collaboration with internal and external stakeholders.
- Use multi-component strategies to improve outcomes. *Multi-level* strategies that combine parent, child and family skill building with strategies to address the social and physical environments at home, in child cares, and in the community create a healthy environment for the child to thrive.
- Develop learning opportunities that focus on skill building and include both separate and combined opportunities for children and their parents.
- Enhance the capacity of community organizations and the child care sector to provide nutrition information and education for children and their families.
- Explore the possibility of working with agencies who provide home visitation services to provide home visitation staff with training on nutrition for young children and their families and skill training.
- Consider both mothers and fathers when developing messages and programs.
- Consider how different cultures may influence parenting styles and how to effectively reach and positively influence parents from different backgrounds.
- Use behavioural change theory as a basis for intervention planning.
- Explore new technologies as options for information sharing and education.
- Ensure messages and strategies are thoughtfully planned to avoid any unintended consequences related to cultural or socio-economic considerations.
- Create equitable supports for families to reduce health disparities between children of differing *socioeconomic positions*.

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Appendix A. Search Term and Strategy for the Literature Review

Evidence Review Question*
1. What strategies are most effective in influencing parenting practices of building healthy eating habits in their children aged 0-6? 2. What strategies are most effective in changing feeding behaviours to optimize healthy growth and nutritional status in children aged 0-6? 3. What strategies are effective in communicating nutrition messaging to improve positive behaviour change in the feeding relationship of parents with children aged 0-6? 4. What are the most effective strategies to enhance parental skills and capacity in order to create a healthy eating environment where children learn healthy eating skills? **Consideration given to settings, methods and targeted messages*
Limits
Age *(to capture 0-end of 5 years of age)***:** Children 0-6; Child 6-12; Child, preschool 2-5; All infant; Infant 1-23 months; Infant newborn birth-1 month **Publication date for database search:** 2000 to 2015 **Hand search:** 2000-2019 **Geography:** Canada, U.S., U.K. Australia, New Zealand, and Western Europe **Language:** English
Databases**
Business Source Complete; Business Source Elite; CAB Abstracts; CINAHL; Education Research Complete; EMBASE; ERIC; Evidence-Based Medicine; Family & Society Studies Worldwide; Family Studies Abstracts; Health Source'; MEDLINE; Natural Standard; Nursing Reference Center; Practice-Based Evidence in Nutrition; PsycINFO; Psychology & Behavioral Sciences Collection; PubMed; PubMed Central; Scopus; Social Work Abstracts; SocINDEX with Full Text; Web of Science ***Grey Literature databases was not extensively searched due to capacity and determination that it would inform the question further.*

Concept	Synonym
Parent[1] *[1] Focus on parent vs caregivers, care workers which mainly refers to caring for the ill and elderly.*	parent* [Keyword]; parents [MeSH]; grandparent* [Keyword]; "legal guardian" [Keyword]; legal guardians [MeSH]; guardianship [CINAHL heading]; caregiver* [Keyword]; caregivers [MeSH]
Healthy Eating Behaviour[2]/Healthy Feeding Relationship *[2] Spelling variations are also important to account for (behavior vs. behavior, etc.).*	feeding behavior [MeSH]; "feeding behavior*" [Keyword]; "feeding behaviour*" [Keyword]; food habits [MeSH]; "food habit*" [Keyword] "feeding relationship" [Keyword]; "eating behavior*" [Keyword]; "eating behaviour*" [Keyword]; "healthy eating behavior*" [Keyword]; "healthy eating behaviour*" [Keyword]; "healthy eating" [Keyword]; "healthy diet*" [Keyword]; "feeding relationship" [Keyword]
Concept	**Synonym**
Positive Discipline Parenting Approach	"positive discipline" [Keyword]; parenting [Keyword, MeSH]; "parenting approach" [Keyword]; parent-child relations [MeSH]; "child rearing" [Keyword, MeSH]; "effective parenting" [Keyword]; "positive parenting" [Keyword]; "parenting skill*" [Keyword]; "mother-child relations [MeSH]
Health Promotion	"health promotion" [Keyword, MeSH]; "health marketing" [Keyword]; "social marketing" [Keyword, MeSH]; "population health*" [Keyword]; "healthy messaging*" [Keyword]; "nutrition messaging*" [Keyword]; "health communication*" [Keyword]; "nutrition communication*" [Keyword]; communication [Keyword, MeSH]
Children[4] (0-6) *[4]the age limiters found in the databases should also be applied (separately)*	"child* [Keyword]; child [Mesh]; child, preschool [MeSH]; toddler* [Keyword]; infant* [Keyword]; infant [MeSH]; baby [Keyword]
Optimum Nutrition/Healthy Growth	"optimum nutrition" [Keyword]; nutrition [Keyword]; "healthy growth" [Keyword]; child development [MeSH]

Keyword Search Strings
(parent* OR grandparent* OR “legal guardian*” OR guardianship OR caregiver*) AND (“healthy eating” OR “feeding behaviour*” OR “feeding behavior*” OR “food habit*” OR “healthy diet” OR “feeding relationship” OR “eating behavior*” OR “eating behaviour*”) AND (“optimum nutrition” OR nutrition OR “healthy growth” OR “child development”)
(parent* OR grandparent* OR “legal guardian*” OR guardianship OR caregiver*) AND (“healthy eating” OR “feeding behaviour*” OR “feeding behavior*” OR “food habit*” OR “healthy diet” OR “feeding relationship” OR “eating behavior*” OR “eating behaviour*”) AND (“health promotion” OR communication OR “health marketing” OR “social marketing”) AND (“optimum nutrition” OR nutrition OR “healthy growth” OR “child development”)
(parenting OR “positive discipline” OR “parenting approach” OR “parent-child relations” OR “mother-child relations” OR “child rearing” OR “effective parenting” OR “positive parenting” OR “parenting skill*”) AND (“healthy eating” OR “feeding behaviour*” OR “feeding behavior*” OR “food habit*” OR “healthy diet” OR “feeding relationship” OR “eating behavior*” OR “eating behaviour AND (“optimum nutrition” OR nutrition OR “healthy growth” OR “child development”)
(parenting OR “positive discipline” OR “parenting approach” OR “parent-child relations” OR “mother-child relations” OR “child rearing” OR “effective parenting” OR “positive parenting” OR “parenting skill*”) AND (“healthy eating” OR “feeding behaviour*” OR “feeding behavior*” OR “food habit*” OR “healthy diet” OR “feeding relationship” OR “eating behavior*” OR “eating behaviour*”) AND (“health promotion” OR communication OR “health marketing” OR “social marketing”) AND (“optimum nutrition” OR nutrition OR “healthy growth” OR “child development”)
Above search strings were completed with the addition of the following search string: AND (child* OR preschool OR toddler* OR newborn OR infant* OR neonate* OR baby)

Appendix B. Literature Inclusion/Exclusion Criteria

Component	Inclusion Criteria	Exclusion Criteria
Language	English	Non-English
Publication Date	2000-2015 *Systematic review up to 2016 *PubMed search July to Dec of 2015 *Hand search for articles after 2015	Prior to 2000
Population	Infants/Children Birth-end of 5 years	Ages 6 years and above Premature infants; Breastfeeding strategies
Geography	Developed countries as noted in World Bank 2015 document (see below). Use your judgement: if the country has a political, social, cultural context that may be applicable to Canada, then include it as a yes or maybe.	All countries not identified in the inclusion list.
Health status	Both mother and baby/child have to be healthy Obesity prevention strategies (e.g. healthy living messages)	Those that don't fall into "healthy" category Existing diseases/conditions in treatment e.g. Eating disorders, obesity treatment (physical exam, assessment and counselling/support provision, identification of co-morbidities, exploration of motivation/ readiness to change)
Setting	Community, home School (Kindergarten year only) & child care - if it has a parent/caregiver engagement component	Institutionalized, hospital School and child care interventions/ programs with no parent/caregiver engagement component
Methods	Articles that evaluate a strategy (i.e. class, newsletter (KT), PHN involvement, multi-component programs, social marketing, multimedia, etc.)	If the article only postulates/recommends a strategy without evaluating that strategy, it would be excluded. Interested in the **How** not the **What** **Study type:** case studies, narratives, conference proceedings, books

World Bank Upper Middle Income and High Income Countries (2015)[52]

Albania	Canada	French Polynesia	Latvia	Norway	St. Kitts & Nevis
Algeria	Cayman Islands	Gabon	Lebanon	Oman	St. Lucia
American Samoa	Channel Islands	Germany	Libya	Palau	St. Martin
Angola	Chile	Greece	Liechtenstein	Panama	St. Vincent & the Grenadines
Antigua & Barbuda	China	Greenland	Lithuania	Paraguay	Suriname
Argentina	Colombia	Grenada	Luxembourg	Peru	Sweden
Aruba	Costa Rica	Guam	Macao	Poland	Switzerland
Australia	Croatia	Hong Kong	Macedonia	Portugal	Taiwan, China
Austria	Cuba	Hungary	Malaysia	Puerto Rico	Thailand
Azerbaijan	Curaçao	Iceland	Maldives	Qatar	Tonga
Bahamas, The	Cyprus	Iran	Malta	Romania	Trinidad & Tobago
Bahrain	Czech Republic	Iraq	Marshall Islands	Russia	Tunisia
Barbados	Denmark	Ireland	Mauritius	San Marino	Turkey
Belarus	Dominica	Isle of Man	Mexico	Saudi Arabia	Turkmenistan
Belgium	Dominican Rep.	Israel	Monaco	Serbia	Turks & Caicos
Belize	Ecuador	Italy	Mongolia	Seychelles	Tuvalu
Bermuda	Equatorial Guinea	Jamaica	Montenegro	Singapore	United Arab Emirates
Bosnia & Herzegovina	Estonia	Japan	Namibia	Sint Maarten	United Kingdom
Botswana	Faeroe Islands	Jordan	Netherlands	Slovak Republic	United States
Brazil	Fiji	Kazakhstan	New Caledonia	Slovenia	Uruguay
Brunei Darussalam	Finland	Korea, Rep.	New Zealand	South Africa	Venezuela
Bulgaria	France	Kuwait	N. Mariana Islands	Spain	Virgin Islands (U.S.)

Appendix C. Detailed Table of Literature Used in Report

Primary literature (N=19)

Study Details	Methods	Findings/Conclusions
Agras, 2012[18] **Study Design:** RCT, cluster design **Country:** USA **Population:** Targeted (WIC* clients) **Participants:** 62 families with children between 2 and 4 years old with at least 1 overweight/obese parent. **Purpose:** To ascertain whether a parent education program based on Satter's division of responsibility in feeding children (DOR) is effective in enhancing parent/child feeding interactions for children with an overweight/obese parent. **EPHPP Appraisal:** Moderate	**Design** • Control group classes aimed at increasing physical activity, eating healthy foods. • Intervention group classes aimed at improving child feeding practices. • Parent-reported questionnaires at baseline and upon completion in the 5 week program. **Nutrition Outcomes Measured & Reported** • Primary outcome- Pressure to eat. • Secondary outcomes- Food restriction and satisfaction with treatment. *WIC- U.S. Department of Agriculture Food and Nutrition Service's Special Supplemental Nutrition Program for Women Infants and Children	**Findings** • Parental pressure to eat decreased significantly more in intervention versus control. • No significant difference for level of food restriction between intervention & control groups and parent satisfaction with treatment. • Parents of female children decreased food restriction in intervention more than controls. **Limitations** • Small sample size. • Reliance on parent reporting of behavior change. • No data on income or socioeconomic status. **Conclusion** • Interventions based on Satter's DOR is more effective in reducing parent pressure on child to eat and restrictive feeding in girls versus control. • Efforts to increase consumption of healthy foods in toddlers should include counselling to parents to model eating such foods and not to pressure children to eat them. **Implications for Public Health Nutrition Practice** • Reinforces benefits of using DOR in parent messaging.
Agrawal, 2012[14] **Study Design:** Observational Cohort **Country:** USA **Population:** Targeted (Head Start clients) **Participants:** None-Study describes how the initiative Healthy Kids Healthy Futures (HKHF) was implemented at 4 Head Start locations throughout Boston. **Purpose:** To present HKHF and describe how the program was developed and implemented. **CASP Appraisal:** 8/10	**Design** • Nutrition component of program called "We Can!". • 5 sets of the workshops were held for parents of children attending 4 Head Start programs. These parents were recruited by Head Start staff and the program was run by trained health and nutrition professionals. **Nutrition Outcomes Measured & Reported** • Program evaluation was completed to identify changes in parent's knowledge, behaviours, and intentions before the sessions and again after the last session.	**Findings** • Participation in the intervention was associated with a significant change in fruit and vegetable consumption. • Overall positive results from first 2 years: ◦ Partners satisfied with HKHF partnership. ◦ Opportunities for improvement identified for Head Start programs, including goal setting and action plans. ◦ 95% of Head Start staff participating in Nutrition and Physical Activity Self-Assessment in Child Care workshop found it helpful. ◦ No significant change in parents knowledge & attitude in eating, activity & screen time; significant change in behavioural intentions toward eating & activity in the home (i.e. reduce high fat/ sugar foods, switch to smaller portions, help child plan activity with friends, talk about healthy foods with family). **Strengths** • Program engages parents of preschooler in school/ child care and community settings in ongoing manner. • We can! workshop had 18% of parents attending the 4 Head Start programs attended workshop; this is relatively high. • Programs are free, had moderately high rates of retention, and located in community centre with public transit access. **Limitations** • Small sample size; Lack of control group; Self-reported responses. **Conclusion** • Demonstrates concrete, positive results that can be replicated. • Evidence of initial positive impact for improved capacity of educators to develop strategies to prevent childhood obesity. Increased opportunity for caregivers to build skills supporting informed & healthy food choices, increased physical activity, reduced screen time; increased opportunities for kids to be active with families. **Implications for Public Health Nutrition Practice** • Unsure of AHS capacity to implement a multi-level program but could provide nutrition support to a community program.

Study Details	Methods	Findings/Conclusions
Bensley, 2006[22] **Study Design:** Cross-sectional **Country:** USA **Population:** Targeted (WIC* clients) **Participants:** 39451 WIC participants from 7 states. **Purpose:** To determine the usefulness and impact of wichealth.org on stage of change associated with 8 WIC client nutrition issues. **EPHPP Appraisal:** Moderate *WIC- U.S. Department of Agriculture Food and Nutrition Service's Special Supplemental Nutrition Program for Women Infants and Children	**Design** • WIC participants completed screening questions to determine their stage of change and then completed modules to accommodate the specific stage of change. An online survey was given after module completion. **Nutrition Outcomes Measured & Reported** • Perception of site usefulness. • Movement along the stages of change. • Relationship between user belief in ability to engage in behavior and movement in stages of change.	**Findings** • Majority of users entered website in maintenance stage of change, with most being associated with the Physical Activity and Providing Regular Meals and Snacks modules. • Users entering in the pre-contemplation stage most often accessed Feeding and Trust Skills and Picky Eating Behaviours. • Contemplation and Preparation stages were most often seen with the Picky Eating Behaviours module. • Users in the action stage most frequently completed modules Postpartum Wellness or Maintaining Breastfeeding. • Most individuals agreed that the website provided information that was helpful to them (97.4%) and the majority (61.8%) indicated a plan to apply what was learned. • The proportion of users intending to change the way they feed their child was significantly different by the number of stages progressed for all modules except Postpartum Wellness, Physical Activity and Breastfeeding. **Limitations** • Can't distinguish between unique (single) users or multiple use users that have completed more than one module. • 12% of users indicated they have children less than 1 year of age. • Most of the modules are not necessarily intended for this population. • Generalizing results to all WIC clients is limited. • The high incidence of active oriented beginner stages may be due in part to the notion that those who are more active will naturally seek avenues for education such as that found within wichealth.org. • SES level within the WIC system was not determined further reducing the ability to generalize all results across all WIC populations. **Conclusion** • The high incidence of client access to the Internet and positive client response to a web based approach for education should be an indicator for the further exploration of how the Internet can be used for delivering education to WIC clients. • Using the internet for directed learning in the form of follow-up counseling may provide additional tools needed to move toward action. However it must be recognized that not all WIC clients have easy access to the internet therefore wichealth.org should be considered as only one of many possible options for delivering nutrition education to WIC clients. **Implications for Public Health Nutrition Practice** • Highlights the ability to distribute specific information to a client based on their stage of change. • Internet based education can be a way to reach people across the province to supplement in person interventions.
Briley, 2006[20] **Study Design:** Cohort **Country:** USA **Population:** Universal **Participants:** 132 families **Purpose:** A secondary analysis to identify specific behavior changes underlying achieved increases in servings of fruit and vegetables and whole grains. **EPHPP Appraisal:** Weak	**Design** • Initial intervention: Weekly handouts for parents x5 weeks. Matched child care activities each week: parent-child station, teacher-child classroom activity, teacher-parent note/response. • Direct observation by trained observers: meals packed at baseline & 6 weeks post-intervention. Lunches observed & recorded - 3 days, random, non-consecutive. **Nutrition Outcomes Measured and Reported** • Average daily portion size; % parent who packed at least 1 svg of target food at least once; # days parents packed at least 1 svg of target food; % children with daily exposure of at least one target food.	**Findings** • The program showed positive results in that whole grains increased after the intervention compared to controls, increase in frequency per week and increase in portion size; vegetables were packed more habitually and adequately (slight increase in portion). However the average number of days in which a vegetable was packed was 3/5. • Explanation for the positive results: More parents packed whole grains and parents packed vegetables on more days. **Limitations** • 5 weeks may be too short to detect positive results. • Small sample. • Convenience sample. • Bias towards highly educated, high socioeconomic status. • Difficult to determine whole grains upon observation, even with rigorous training. **Conclusion** Despite positive increases in vegetable and whole grains, the percent of children with daily exposure to these foods remained <25%. Different strategies needed to increase different target foods. **Implications for Public Health Nutrition Practice** • Possibility to use parts of this strategy in CHEERS for child care initiative.

Study Details	Methods	Findings/Conclusions
DeBock, 2012[15] **Study Design:** RCT, cluster design **Country:** Germany **Population:** Universal **Participants:** 348 pre-school aged children from 18 pre-schools. **Purpose:** To assess the short-term impact of a nutritional intervention aimed at reducing childhood overweight in German pre-school children.	**Design** • A 6 month intervention was administered once weekly by a nutrition expert consisting of a joint meal preparation and activities for children and parents. • Control group established through wait listed group. • Baseline, 6 month, and 12 month questionnaires were completed by parents to assess F&V intake and water and sugar sweetened beverage consumption as well as anthropometric measures. **Nutrition Outcomes Measured & Reported** • Children F&V intake. • Water intake. • Sugar sweetened beverage intake. • Anthropometric measurements.	**Findings** • Participation in the intervention was associated with a significant change in fruit and vegetable consumption. • The intervention did not have significant effects on daily water intake or the consumption of high energy drinks. • No significant intervention effect was found on body mass index or waist-height ratio. • Process evaluation showed reach of 47.8% & 68.3 % (recruited and non-recruited, respectively) into the target population. • Implementation rate and fidelity was high. **Strengths** • One of few known studies evaluating impact of nutritional intervention in preschools. • Used objective anthropometric outcomes in addition to self-reported behavioural outcomes. • Parental inclusion in the intervention. **Limitations** • Children were sampled from preschools that applied for a nutritional intervention, possibly resulting in limited generalizability. • Didn't have sustainability measurements from all the participating preschools. • Due to the numbers of children providing both pre and post intervention measurements the analysis may have been underpowered for detecting changes in anthropometric outcomes or water and sugar sweetened drink consumption. • Evaluated only a limited number of behavioral outcomes. • Did not measure nutritional intake directly, but focused instead on dietary patterns. **Conclusion** • Although authors were unable to demonstrate an effect of our intervention on anthropometric measures after 6 months, they anticipate that increased fruit and vegetable intake over a longer time period might eventually lead to a change in anthropometric features. **Implications for Public Health Nutrition Practice** • Not all interventions can be carried out by AHS employees but there may be possibility for community partnership for train the trainer implementation of programs to increase fruit and vegetable intake.
Dumas, 2020[25] **Study Design:** RCT **Country:** Canada **Population:** Universal **Participants:** 84 French speaking mothers > 18 years with at least 1 child aged 2-12 years, who were primarily responsible for food purchase and prep and reported consuming fewer than recommended servings of fruit and vegetables and/or milk and alternatives. **Purpose:** Evaluate the effects of an evidence-informed healthy eating blog written by an RD on intakes and food behaviors of Canadian mothers. **EPHPP Appraisal:** Moderate	**Program** • Parallel, RCT: 6 month intervention delivered through a weekly blog written by an RD integrating behavior change techniques promoting healthy eating & a control group with no blog exposure. • Preliminary focus group helped inform the blog design. Content based on objectives inspired by Eat Well Campaign and WHO nutrition recommendations. • Data collected through 3 automated, self-administered, web-based 24-hr dietary recall (baseline, 3 month & end of 6 month intervention). **Nutrition Outcomes measured & reported** • Daily F/V; milk/alternatives: CFG 2007. • Perceived meal planning/cooking skills. • Body weight. • Engagement with the blog. • Internet use ethnicity, employment, education, income, child # & age.	**Findings** • No statistically significant difference between the 2 groups for fruit and vegetables consumption or milk and alternatives in mothers over time. • An increase in score for meal planning habits suggests an increase in family meal planning among mothers in the blog group over time. • No effect on body weight of mothers. • Highest number of log in per participant was observed in the first week of the intervention. After a decrease in logins over time there were peaks when the blog addressed practical cooking tips and attitudes of involving children in the prep of family meals. • There was no significant association between blog engagement metrics and veg/fruit and milk/alternatives consumption of the mothers in the blog group. **Limitations** • High socioeconomic status and primarily white mothers were participants in the study. Self-reported measures were used. • Small sample size. Participants reported using various other forms of social media in their everyday lives which may have attenuated effects of the blog. **Conclusions** • A healthy eating blog had no impact on eating behaviors of mothers. **Implications for Public Health Nutrition Practice** • More research is needed to understand the impact of healthy eating blogs on parents' food related behaviours. • It appears to be a low cost nutrition intervention that might have potential for target populations.

Study Details	Methods	Findings/Conclusions
Duncanson, 2013[23] **Study Design:** RCT **Country:** Australia **Population:** Universal **Participants:** 146 parent-child dyads in rural norther New South Wales. **Purpose:** To determine if providing self-directed nutrition and parenting resources would positively affect the dietary patterns of children ages 2-5 years. **EPHPP Appraisal:** Moderate	**Design** • Control group received a healthy eating and physical activity brochure at the beginning and the CD and DVD at the end of trial. • Intervention group got the CD and DVD right away with instructions for optimal use. They got 1 prompt by mail with the 3 month survey. • Survey was done at baseline, 3 months, and 12 months. **Nutrition Outcomes Measured & Reported** • Changes in dietary patterns (energy intake, food types (based on food groups), fat, saturated fat, protein, carbohydrates, sugar, and fibre).	**Findings** • Energy intake (EI) from nutrient dense food and % energy from energy dense foods were high at baseline relative to estimated total energy intake. • There was a group by time reduction in total EI after 12 months and an intervention group by time effect on carbohydrate intake due to reduction in bread/cereal consumption. • No significant decrease in energy dense nutrient poor foods. • The intervention did not have significant effects on daily water intake or the consumption of high energy drinks. **Strengths** • RCT study design. **Limitations** • Reporting limitations (over reporting bias) from food frequency questionnaire. • Parent age difference between intervention and control group. • Limits in generalizability (rural Australia). **Conclusion** • Small but important changes to child dietary intake may be achieved using self-directed resources and may be useful at a population level (for large reach). • Strategies to increase resource use such as prompting email or modifying resources for technological advances are needed to further explore their effectiveness). **Implications for Public Health Nutrition Practice** • Potential of self-directed material for wide reach throughout the province and in areas difficult to access for direct care.
Gildea, 2009[24] **Study Design:** Observational **Country:** UK (N. Ireland) **Population:** Universal **Participants:** 215 Mothers of one-year old infants. **Purpose:** To report on the sources of feeding advice that a sample of mothers in one health and social services board of Northern Ireland reported that they had used in the first year of their infant's life, and their perceptions of usefulness. **CASP Appraisal:** 9/10	**Design** • Sample of mothers selected through birth registry. • Data collected through interview questions during usual home visitation. **Nutrition Outcomes Measured & Reported** • Sources of feeding advice used by mothers. • Perceptions of usefulness.	**Findings** • Health visitors were the most commonly cited source of information followed by grandparents. • 10% of mothers relied solely on health visitor's advice. **Strengths** • Information collected face to face. • Health visitors did not collect the data. • Structure of questionnaire. **Limitations** • No open ended questions. • Only obtained information from mothers. • Data collected retrospectively. • Excluded parents of premature, low birthweight, multiple birth, or babies with medical conditions and cannot be generalized. **Conclusion** • Health visitors are a valuable resource to families of young children for up to date feeding guidance. **Implications for Public Health Nutrition Practice** • Important to take into consideration value of information shared to parents through home visitation services (AHS and community led visitation programs).

Study Details	Methods	Findings/Conclusions
Haerens, 2009[44] **Study Design:** Focus groups **Country:** Europe **Population:** Universal **Participants:** 155, 6-8 year-olds (74 boys, 81 girls); 189 parents of 2-4 and 6-8 year olds (28 men, 161 women) in 8 countries. **Purpose:** To describe important influencing factors for dietary behaviors in order to determine the best approaches for developing the dietary components of the standardized intervention. **CASP Appraisal: 8/10**	**Design** • 20 focus group with children; 36 focus groups with parents from the 'identification and prevention of dietary- and lifestyle- induced health effects in children and infants' (IDEFICS) is to implement a standardized, community based multi-component healthy eating intervention for younger children in 8 countries. **Nutrition Outcomes Measured & Reported** For Children • Food preferences (home/school). • Food type availability (home/school). • Rules (home/school). • Existing nutrition education types at school. For Parents • Information channels; shopping behaviours; barriers/facilitators for child to eat healthy/unhealthy foods (home/school); food type availability (home/school); food rules (home/school); Motivators for behavioural change; role of the school, teachers and parents.	**Focus Group Results:** Constructs include: social, physical, institutional, and personal/family related barriers. Themes: 1) Rules regarding food consumption at home: i) parents & children in all countries noted rules at home while some parents noted not having any rules. In Germany, children appeared to be unaware of home rules; 2) Rules about food consumption at school: i) Swedish parents noted strict school rules; other parents reported no clear rules or policies; iii) most common rules: no gum, soft drinks or sweets; 3) Barriers for healthy eating at home: i) lack of time; ii) grandparents/other family members breaking the rules; iii) husbands unhealthy preferences; iv) lack of money to buy healthy foods; v) difficulty understanding food labels; vi) availability of unhealthy foods; 4) Facilitating factors for healthy eating at home: i) parents as role models; ii) positive rules; iii) unhealthy foods not available; iv) eating breakfast; v) offering healthy snacks in a child-friendly way; vi) offering water as a first choice; 5) Food shopping factors: i) price, promotions, seasonal changes, family food preferences - most influential with lower SES; medium and higher SES were more influenced by quality vs. price; iii) advertising, habits, weekly menus, shopping lists, price: quality relationships; iv) not shopping with children – advertising/free gadgets = more unhealthy food purchases; 6) Motivators for behavior change: i) personal/child weight/health ii) media/ friends/relatives/parents/teachers; iii) Higher SES liked tips from school.. **Strengths** • Large study that reinforces themes about barriers/influencers of parents' food choices for their children. **Limitations** • Information collected in 8 different languages, potentially limiting the validity of the analysis. **Conclusion** • Personal & environmental tailored education programming is needed for potential behaviour change. **Implications for Public Health Nutrition Practice** • Consider multi-level, multi-activity, multi-setting strategies for parents and children. Leverage coordinated messaging and acknowledge parent barriers/facilitators in promoting healthy eating behaviours.
Hastmann, 2011[21] **Study Design:** Study 1- RCT; Study 2- NRCT **Country:** USA **Population:** Universal **Participants:** Study 1- 24 preschool children; Study 2- 52 preschool children **Purpose:** To evaluate the impact of the HOP'N Home intervention on childhood obesity prevention through changes to the physical/social home environment delivered in a child care setting. **EPHPP Appraisal:** Weak	**Design** Study 1: Two child care classrooms, 1 child care; randomized for the HOP"N Home intervention or control; Children & families participated in pretest, posttest, & follow-up to measure child height/weight; parent survey; Child care providers: 3 intervention trainings & weekly checklists to assess implementation of the HOP"N Home. Study 2: Two full-day home-based child care & two full-day center-based child care sites, non- randomized; same pretest/posttest assessments; no 4-month f/u; Minor changes to curriculum, activities, and trainings to increase family involvement. **Nutrition Outcomes Measured & Reported** • Program satisfaction. • Changes made in the home. • Program component uptake: newsletter; activities; asking their child questions; using music CD.	**Findings** • Home environments significantly increased in fruit availability; children decreased in frequency of fast food restaurant visits per week; unexpectedly, child asking for vegetables decreased pretest to posttest; no impact on weight status • Intervention well received by children, parents, and child care personnel, and was delivered with good fidelity. **Strengths** • Diversity of the children participating in study two; The use of objective height and weight measurements and valid survey items; Intervention was minimally invasive, easy to implement & highly disseminated; potential for public health impact; very low drop-out of children for pretest/posttest height/weight assessments; 75% return rate on parent surveys. **Limitations** • Parental report of their child's dietary intake, and child asking behaviors. It is possible that parents in the HOP"N Home intervention might have felt more pressure to report socially desired behaviors. However, given that so many behaviors did not change over time leads, it doesn't appear to be the case; Small pilot study, relatively small sample sizes. **Conclusion** • Parental report of a novel study targeting young children's self-regulation skills to ask parents for healthful home environments. More intensive interventions may be necessary; however, it is important to maintain high implementation fidelity. • Children's behaviour asking for F/V did not increase and there was not significant improvement to the home environment when children did ask. This may be due to parents being the gatekeepers of food in the home. **Implications for Public Health Nutrition Practice** • It would be important to determine what is appropriate for children to be asking from parents in the context of food.

Study Details	Methods	Findings/Conclusions
Heath, 2014[34] **Study Design:** Quasi-random **Country:** UK **Population:** Universal **Participants:** Part 1- 119 children (mean age 21 months), parents; Part 2- 60 children (mean age 22 months), parents. **Purpose:** Part 1- To examine the impact of books on children's visual preferences for exposed (target) foods vs. non-exposed (control foods); Part 2- To investigate how a food's initial status impacts the books' effectiveness to increase children's willingness to taste target foods. **EPHPP Appraisal:** Moderate	**Design** Experiment 1: Parents randomly selected to receive a book on a liked vegetable, disliked vegetable, unfamiliar vegetable, liked fruit or unfamiliar fruit and given instructions to read to their child every day for 2 weeks. Child brought to lab to look at various pictures of F/V. Experiment 2: Parents received a book on a target vegetable that was either liked, disliked of unfamiliar by the child and was read each day for 2 weeks. Child brought to lab to determine willingness to try the targeted food versus a control. Also used parent's self-reports on child's liked/disliked foods to compare results to child's willing to like these foods. **Nutrition Outcomes Measured & Reported** Experiment 1: Visual preference between target food and control food. Experiment 2: Child's willingness to taste food offered based on targeted food from book and also from parent's report on liked and disliked foods.	**Findings** • Picture books enhanced child's visual attention to exposed food versus control and this was more effective for foods that they were unfamiliar with vs known or liked foods. • Parents of young children can accurately report on the vegetables their children like and dislike. • Food reported to be likes was tasted by more children, tasted first by more children, required less encouragement to be eaten and was consumed in greater quantities. • Whether children tasted a food or not was not influenced by whether it had been seen in their picture book or its initial status as liked, disliked, or unfamiliar. **Limitations** • Unknown what parents effect on feeding behaviours is or how the books are delivered to the child. • There may have been a possible influence from verbal cues during study. **Conclusion** • There is potential for picture books to play a positive role in encouraging healthy eating in young children. **Implications for Public Health Nutrition Practice** • Books tailored for children to read with their parents may be a method to encourage healthy eating in young children and may be an intervention with lo input for healthcare professionals once the book was developed.
Hindin, 2004[19] **Study Design:** Quasi-experimental **Country:** USA **Population:** Targeted (Head Start parents) **Participants:** 35 parents from Head Start programs. **Purpose:** To evaluate whether a media literacy nutrition education curriculum about the effects of television advertising on children's food choices influenced the behaviour, attitudes, and knowledge of Head Start programs. **EPHPP Appraisal:** Strong	**Design** • Parents participated in a 4 week food safety program as a comparison condition and then a 4 week media literacy nutrition education program as the intervention. **Nutrition Outcomes Measured & Reported** • Parents' understanding of the persuasive techniques of commercials. • Ability to distinguish between truths and claims in advertising. • Outcome expectations, values, self-efficacy, and behaviours in relation to talking about advertisements to parents with children while co-viewing or in response to purchase requests.	**Findings** Significant effects on: • Parents understanding TV advertising. • Attitudes about television advertisements. • Outcome expectations, values, self-efficacy, and TV mediation behaviours. • Understanding of and being able to read food labels. **Strengths** • Study design. • Same instructor in control and intervention study. • Materials designed for low-level English. **Limitations** • Sample selection was not random and small. **Conclusion** • This study suggest a curriculum can be easily conducted by dietitians and they can modify the teaching to analyze other forms of media that sell nutrition misinformation of public **Implications for Public Health Nutrition Practice** • Example of a program that may be relatively easy to implement. • Unsure if this caused any dietary change in the household.

Study Details	Methods	Findings/Conclusions
Horodynski, 2010[40] **Study Design:** Cross-sectional **Country:** USA **Population:** Targeted (Head Start) **Participants:** 399 (199 parents of African American and 200 Non-Hispanic white mothers descent). **Purpose:** To examine whether and how toddlers' F/V consumption is associated with maternal F/V consumption, mothers' perceptions of toddlers as "picky eaters", maternal efficacy, and sociodemographic characteristics of the family. **EPHPP Appraisal:** Moderate	**Design** • Data collectors came to the participant's home to observe toddler eating a usual meal or snack and take height and weight data of mother and toddler. • Mothers completed a questionnaire to gather information on mothers' feeding self-efficacy, perceptions of toddler mealtime behavior, and their own and their toddler's food consumption. **Nutrition Outcomes Measured & Reported** • Rating scale measuring the "child viewed as a picky eater". • Toddler's vegetable consumption measured dichotomously. • Toddler's fruit consumption measured dichotomously.	**Findings** Significant effects on: • Toddlers were less likely to consume vegetables four or more times a week if their mothers did not eat vegetables four or more times a week, considered their child as a "picky eater", and were African American. • Less likely to eat fruit four or more times a week if their mothers did not eat fruit four or more times a week and when mothers viewed their child as a "picky eaters". **Limitations** • Self-reporting bias of participants. • Recall bias. • Unknown mothers' own preference for fruits and vegetables and the availability in the home. • Generalizability of the findings to non-consenting families is likely to be limited. **Conclusion** • Health professionals need to consider mothers own consumption of fruit and vegetables when developing strategies to increase toddler consumption of these foods. **Implications for Public Health Nutrition Practice** • Strengthens knowledge on the importance of parent's choices on those of their children. • Can help strengthen messaging towards parents for advice versus directing messaging to what the child should eat.
Mallan, 2013[42] **Study Design:** Cross-sectional **Country:** Australia **Population:** Universal **Participants:** 436 fathers of a 2-5 year old child. **Purpose:** To describe fathers' perceived responsibility for child feeding, and to identify predictors of how frequently fathers eat meals with their child. **EPHPP Appraisal:** Weak	**Design** • Demographic data collected on participants. • Self-reported questionnaire was completed by participants. **Nutrition Outcomes Measured & Reported** • Information on family meal times. • The number of times the father ate with the child per week. • Perceived responsibility for feeding their pre-school children.	**Findings** • Family meals were often/mostly eaten together (79%) and at the table (77%), and were rarely/sometimes eaten in front of the TV (72%). • Approximately 50% of the fathers reported they were responsible at least half of the time for organizing meals or deciding what kind and how much food their child would be offered. • Significant variables: less time spent in employment, higher perceived responsibility, and a more involved attitude to the role of fathers were independently related to a greater number of meals eaten with the child during an average week. **Strengths** • Sample appears to be representative of fathers from a range of socioeconomic groups. **Limitations** • Cross sectional nature precludes claims of causal relationships between variables. • Responses obtained only from fathers (no maternal responses). • Although results may be generalizable to fathers from a broad range of backgrounds, may still be limited to those who are highly engaged and involved. **Conclusion** • This study found most fathers were engaged and involved in family meals and child feeding and thus, should be viewed as potential agents for the positive feeding practices with the family. • Coupled with evidence that fathers' involvement with a child tends to peak during the preschool years, this period may present a 'receptive' moment in which to engage fathers in feeding and nutrition related interventions. **Implications for Public Health Nutrition Practice** • Highlights importance of paternal role in feeding children and shaping their health outcomes. • Can be important to look for opportunities to support fathers directly and/or parents as a whole.

Study Details	Methods	Findings/Conclusions
McGowan, 2013[17] **Study Design:** RCT **Country:** UK **Population:** Universal **Participants:** 126 parents of children aged 2-6 years old. **Purpose:** To evaluate an intervention promoting habit formation for 3 parental feeding behaviours: serving fruit/vegetables, serving healthy snacks, and serving non sweetened drinks. **EPHPP Appraisal:** Moderate	**Design** • Intervention group received training on habit formation for the 3 feeding behaviours during 4 home visits over an 8 week period. • The control group received no intervention • Both groups completed questionnaires at baseline and after treatment and the intervention group was also interviewed about the program. **Nutrition Outcomes Measured & Reported** • Primary outcome was parental habit strength for each behaviour. • Secondary outcome was children's food intake.	**Findings** • For all parental feeding behaviors, automaticity increased more in the intervention group than the control group. • Changes in children's' food intake correlated with changes in parental automaticity. • Program acceptability was high. **Limitations** • All data based on parent report (concerns over social desirability, reliability, and validity) • Potential responder bias • Confounding by face to face contact in intervention group. **Conclusion** • A possible reason not all interventions have translated into positive dietary changes is that knowledge based interventions have limited efficacy across many domains of health behavior and may have limitations in the area of parental feeding. • Habits (repetitive behaviors that have become 'automatic'), although historically used to explain persistence of unhealthy behaviours, can also be applied to positive health behaviours. Once formed, habits self-perpetuate because each encounter with the associated cue reinforces the situation-behaviour link. **Implications for Public Health Nutrition Practice** • Parents are receptive to and capable of behavior changes to promote healthy eating in their young children.
Momin, 2013[39] **Study Design:** Cross-sectional **Country:** USA **Population:** Targeted (Immigrant Asian Indian mothers) **Participants:** 27 mothers of children aged 5 to 10. **Purpose:** To understand current practice of child feeding behaviours and underlying factors influencing these practices. **CASP Appraisal:** 7/10	**Design** • In depth interviews were completed to gather information on 5 feeding behaviours of interest using open ended questions. **Nutrition Outcomes Measured & Reported** • The five behaviours reviewed were family meals, parental modeling, pressuring child to eat, rewarding with food, eating while watching TV. • The current child feeding behaviours as described by the mothers themselves. • Their beliefs and expectations about desirable and undesirable outcomes of these feeding behaviours. • Their perceived behavioural control, or perceived ease or difficulty in practicing feeding behaviours. • Perceived social norms regarding these behaviours of people who are important to the participants.	**Findings** • Cultural beliefs related to religion, ethnic identity, and traditional foods are strong determinants of both positive and negative feeding behaviours among immigrant Asian Indians. • Consumption of Indian dishes during family meals was one way for Asian Indian mothers to keep their family connected to Indian culture, which they now perceived to be foreign to their children. • Feeding behaviours were influenced by an underlying belief that traditional Indian dishes are healthy and have nutritional value. • Food rewards were often used because they are practical solutions to avoid children's food fussiness, even though mothers knew it was inappropriate. • Mothers in this study used TV viewing to distract children's attention from their food consumption, hoping to develop a preference for foods they were ''sneaking'' into their children's diet. **Limitations** • Small sample sizes and sampling protocol the results of this study do not generalize in the traditional sense from sample to population. • The height and weight data for mothers were self-reported and therefore used only to broadly characterize the sample. • The interview data were not very rich in terms of the mothers' views on social norms related to child feeding. **Conclusion** • Mothers' beliefs of the nutritional value of traditional Indian foods and their concern with development of ethnic identity could be used as positive motivators to help maintain and promote positive behaviors such as family meals. • Addressing negative behavior such as pressuring to eat, deep-rooted within cultural and religious beliefs, is challenging. It requires developing alternative feeding strategies that acknowledge and respect such beliefs rather than ignore them. **Implications for Public Health Nutrition Practice** • Cultural factors can influence parenting behaviours and should be taken into account when supporting parents from different cultures and backgrounds.

Study Details	Methods	Findings/Conclusions
Montano, 2015[37] **Study Design:** RCT **Country:** USA **Population:** Targeted (WIC program users) **Participants:** 731 families. **Purpose:** To test hypothesis that parents' positive behavior support (PBS), characterized as skillful behavior management and proactive structuring of children's activities, would predict dietary quality over the course of early childhood (2-5 years old). **EPHPP Appraisal:** Weak	**Design** • Families were randomly assigned to intervention "Family Check Up" (FCU) or control (usual WIC services). • FCU consisted of 3 sessions tailored to family needs an initial interview, a homebased assessment (which included a play task, a cleanup task, delayed gratification task, teaching task, inhibition task, and a meal preparation and lunchtime task), and a feedback session. • Families were followed each year for 2 more years. **Nutrition Outcomes Measured & Reported** • Parent behaviour score on: does parent encourage positive behaviour in child, help child transition between activities, give choices, respond to behaviour, give verbal structure to assist child in managing tasks. • Engagement of both parent and child. • Presence of positive behaviour support. • Dietary quality of the food served during the videotaped meal preparation and lunch time task. • Poverty status.	**Findings** • Parent behaviour support predicted meals' dietary quality to following year in all age groups. • Dietary quality significantly predicted PBS 1 year later in age groups 3-4 and 4-5 years old. • The relative strength of relationship from PBS to dietary quality was significantly stronger than the reverse. **Strengths** • Large, geographically and culturally diverse randomized sample. • Inclusion of pertinent covariates. • Longitudinal design. • Observational assessment of parenting, child behaviours, dietary quality in the home. **Limitations** • Dietary quality based on 1 meal in each year assessed. • Meal preparation had to be in the space of 10 minutes. • Constraints of the task could be limiting (child couldn't play with toys during meal prep, presence of researcher, time limit). • Did not assess relationship between parenting skills, PA and provision of healthy meals in the same model. • Recruitment was only families who were enrolled in WIC. **Conclusion** • There is initial strong evidence of a temporal link between observable parenting behaviours and dietary practices from age 2 to 5 years. • Positive parenting behaviour during early childhood may reduce overweight/obesity in later life and decrease the prevalence of weight related mental and physical health conditions. **Implications for Public Health Nutrition Practice** • Findings support AHS NS messaging with feeding relationship theory. • May be worthwhile to determine if targeted interventions are worth supporting for similar populations.
Pivonka 2011[32] **Study Design:** Formative research with small group interviews & focus groups **Country:** US **Population:** Universal **Participants:** Stage 1: 27 people in 11 small groups; Stage 3: 48 mothers in 6 focus groups; Stage 4: 24 adults in 4 focus groups + online survey of 1033 people. **Purpose:** To understand the prevailing knowledge, attitudes and beliefs of mothers and their children regarding FV, as well as prevailing facilitators & barriers to consumption in order to design adaptable, sustainable and compelling messaging using existing message dissemination methods. **CASP Appraisal:** 6/10	**Design** • Small group interviews and focus groups at stages 1, 3 & 4 of the rebranding process for the 'Fruits & Veggies – More Matters' social marketing campaign promoting FV intake to mothers. **Data collection** • Stage 1: 11 small group interviews; 6 families –single or married parents with at least one 4-14 year old child; 3 mother dyads- two mothers each with at least one 4-14 year old child; two "tween" trios, ages 8-12 year olds, same sex and age range. • Stage 3: 6 focus groups; 48 mothers (various cultural/socioeconomic position), ages 25-49& at least 1, 4-14 year old child. • Stage 4: 4 single sex focus groups, split by income; 12 men, 12 women (various cultural and socioeconomic position); tested 4 graphics. On-line survey of 1033 respondents, screened to represent age, sex, income, cultural and sole or shared grocery shopping responsibility. **Nutrition Outcomes Measured & Reported** • Attitudes and beliefs around diet, FV and barriers to healthy eating.	**Findings** • Stage 1: A compelling emotional benefit was needed to motivate consumers. National, state and local messaging consistency is needed. Hectic lifestyles and budget constraints substantially impacted people's food choices. Time is limited and highly valued; Cost vs. value is important. Parents reported that they lacked opportunities to influence family food choices due to limited shared meals and limited time spent cooking. Mothers perceive themselves as role models, primary menu planners, shoppers, cooks and gatekeepers. Their role in taking care of their families is increasingly challenging due to external influences on children – peer pressure, unsupervised time, and widely available unhealthy food. Other challenges include complex health messages from various sources of unknown trustworthiness. Diet is viewed as foundational to health with FV being important. Fruit is viewed more positively than vegetables as it is easier to prepare, easier as snacks and preferred by children. Mothers did not know how to best cook vegetables. FV offer appropriate value for cost, especially frozen and canned varieties. Fresh FV perceived to taste best, followed by frozen. Low income consumers found it difficult to buy fresh FV and could not afford time-saving, fresh-cut options. Six benefits identified for FV: 1) 'important that they be eaten regularly'; 2) 'help keep you at your best'; 3) 'improve your health'; 4) 'come in many varieties'; 5) 'make you feel better'; 6) 'provide energy for your body'. • Stage 3: Mothers believed they were getting enough FV, although they also knew they could get more. More compelling message than assigning a goal number, was 'it all adds up'. A nurturing tone to the message was preferred to a preaching, frightening or bullying tone. The most effective approach was to be the mother's ally and encourage their caretaker role to keep their families healthy and happy and help build a foundation for a healthier future. Mothers were relieved that fresh, frozen, canned, dried and 100% juice all counted as FV choices. Four positioning concepts ('serve up the passion', 'thrive', 'appetite for life' and 'primed to perform' were tested. The 'appetite for life' concept was the most compelling, but needed more emotional appeal. • Stage 4: The branding platform "Fruits and Veggies – More Matters" was created and tested with focus groups narrowing graphics choices to 3. On-line survey respondents rated the importance of the 6 identified benefits. About 80% of respondents considered each benefit important/very important. 41% perceived that the slogan was a reminder of the benefits of a FV-rich diet. Another 27% reported that specific FV and the idea that 'people should eat more FV' came to mind. Respondents preferred the juggler graphic to others presented with their interest in the slogan increasing. **Strengths** • Solid formative research to inform social marketing programs/messages. • Messages developed in this campaign are universal, not specific to a particular food guide.

Study Details	Methods	Findings/Conclusions
		• Early effectiveness findings are reported with more detail in provided in other cited research. **Conclusions** • Results of the formative research provided insight for food and nutrition practitioners to overcome consumers' perceived barriers to eating F/V. • Appealing to the emotional benefit and a nurturing message tone are important to target mothers' perceived responsibility as caretakers. • Although awareness has increased because of the campaign, early findings are limited in demonstrating behaviour change. **Implications for Public Health Nutrition Practice** • Consider opportunities to coordinate messaging campaigns from all levels of governments healthy and health systems organizations. • Explore targeted, actionable messages framed with a nurturing tone and an emotional benefit to improve knowledge and awareness and to effect behaviour change in FV consumption patterns.
Rose, 2014[16] **Study Design:** Pilot study **Country:** USA **Population:** Targeted (low-income day care setting) **Participants:** 10 families. **Purpose:** To test the feasibility & acceptability of a nutrition education/cooking program aimed at teaching positive eating behaviors to parents & their preschool children. **CASP Appraisal:** 8/10	**Design** • Families participated in a 10 session program (1 session per month) over the dinner hours at that day care by trained program staff. • Each 90 minute session included nutrition education/activities and discussion (separate for parents and children), skill building in food preparation/cooking (parents and children together), family meal preparation, group family meal, take home educational materials, and an evaluation. • Questionnaires were completed at baseline, midway and at end of study. **Nutrition Outcomes Measured & Reported** • Program feasibility (retention, attendance) and acceptability (satisfaction). • Child food preparation skills, dietary intake, and body mass index (BMI) percentile. • Parent self-efficacy regarding healthy eating practices. • Family meal frequency.	**Findings** • 74% attended the program on average with all reporting high satisfaction. • Certain child diet outcomes improved including increased fruit & vegetable intake, decreased sugar sweetened beverage, and no gain in body mass index. • Parent self-efficacy improved & family meal frequency increased. **Strengths** • High participant retention and engagement was strong. • Results are similar to comparable study from Germany. **Limitations** • The study was exploratory in nature, with a small sample size, weak study design (pre-post-test), low program dose (monthly) & lack of control group. **Conclusion** • The study demonstrated feasibility & acceptability & inferred potential efficacy of a child care based nutrition education/cooking program. • Components of commonalities of few successful obesity prevention efforts for this target population were factors incorporated into the study design (examples include using a theoretical framework, direct/indirect engagement of parents, multicomponent strategies, documentation of behavior change & follow up in clinic or community settings). • The result provides additional evidence highlights the importance of including these components in community-based obesity prevention based programs. • There is a need for larger RCT to confirm efficacy. **Implications for Public Health Nutrition Practice** • A program such as this may not be possible to replicate within AHS due to financial and human resources needed but opportunity may arise for partnership with external partners working with similar population groups.

Systematic Reviews/Meta-analyses (N=13)

Study Details	Methods	Findings/Conclusions
Beauchamp, 2014[45] **Study Design:** Systematic Review **Country:** Multiple **Population:** Targeted (low socioeconomic position) **Participants:** Multiple participants across 14 studies (8 studies focused on children). **Purpose:** To identify interventions for obesity prevention that evaluated a change in adiposity according to socioeconomic position (SEP) and to determine the effectiveness of these interventions across different socioeconomic groups. **HE Appraisal:** Strong	**Design** • Published articles up to September 2012 were obtained from 8 databases and grey literature searched. Results were scanned for eligibility and studies to be included in the study were reviewed. **Nutrition Outcomes Measured & Reported** • Anthropometric measures categorized to be effective or not among lower SEP.	**Findings** • Interventions shown to be ineffective in lower SEP participants were primarily based on information provision directed at individual behaviour change. • Studies that were shown to be effective in lower SEP participants primarily included community-based strategies or policies aimed at structural changes to the environment (had a wide reach, long duration, focus on altering environmental, or social factors that may act as barriers to healthy behaviours). • Interventions targeting individual-level behaviour change may be less successful in lower SEP populations. **Strengths** • The first review to examine interventions to prevent weight gain according to their effectiveness by SEP. **Limitations** • Only developed, English speaking countries in the review. • Unsure if the interventions were sufficiently powered to stratify by SEP. • Results should be interpreted with caution because they may not have adjusted for age or sex. **Conclusion** • Conclusions about which intervention characteristics were most likely to contribute to widening inequalities is limited due to weak quality of primary studies. • Low SEP must include strategies that address environmental, structural, or social changes. **Implications for Public Health Nutrition Practice** • Interventions beyond “developing personal skills” may be more effective for people in a lower SEP. • Supports use of health equity assessment tool in projects and exploration of future work to address all 5 strategies in health promotion.
Ciliska, 2000[31] **Study Design:** Systematic Review **Country:** USA **Population:** Targeted (low income) **Participants:** 4106 mothers of young children across 4 studies targeted to young children (15 total studies in the review). **Purpose:** To identify what is the effectiveness of community0based interventions to increase fruit and vegetables consumption in people 4 years of age and older. **HE Appraisal:** Strong	**Design** • Published articles up to August 1998 were obtained from 12 databases and a hand search. Results were scanned for eligibility and studies to be included in the study were reviewed. **Nutrition Outcomes Measured & Reported** • Increase in eating fruit and vegetables.	**Findings** • Interventions given to the parents resulted in an increase of fruits and vegetables in three of four studies. • Interventions were in the form of healthcare professional visits, education sessions, workshops, and small group discussion. **Limitations** • Only English language articles were used and 14 articles could not be retrieved. • All studies from USA. **Conclusion** • Interventions were most successful if a part of a multi-component program and included education directed at behaviour change instead of acquisition of information, multiple intervention contacts and specific messaging on fruit and vegetable consumption. • Also none of the interventions seen are harmful in reducing fruit and vegetable consumption. **Implications for Public Health Nutrition Practice** • Further support for multi-component interventions focusing on behavior change.

Study Details	Methods	Findings/Conclusions
Khandpur, 2014[43] **Study Design:** Systematic Review **Country:** Multiple **Population:** Universal **Participants:** 3863 fathers of children 2-18 years of age across 20 studies reviewed for fathers' child feeding practices. **Purpose:** To compile child feeding research that had included fathers and to 1) document characteristics of studies assessing fathers; feeding practices, 2) outline general patterns in fathers feeding practices, 3) summarize evidence on child and parent correlates of fathers feeding practices and 4) generate future research recommendations. **HE Appraisal:** Moderate	**Design** • Published articles up to February 2014 were obtained from 4 databases searched. Results were scanned for eligibility and studies to be included in the study were reviewed. **Nutrition Outcomes Measured & Reported** • General patterns in fathers' feeding practices. • Child and parent correlates of fathers' feeding practices.	**Findings** • Feeding strategies employed by this group of fathers included encouragement to eat and food-related bribes to increase food intake among daughters. • Pressuring children to eat was a common feeding strategy adopted by fathers. • Observations of family meal times revealed more nuanced strategies used by fathers (and mothers) including neutral prompts. • Differences in maternal and paternal meal-time practices emerged across nine studies. • Compared with mothers, fathers reported significantly lower perceived responsibility for child feeding, lower monitoring of child food intake, lower frequency of eating meals with children, higher frequency of control over the amount of food taken by the child, and higher pressure to eat. • Fathers also reported higher restriction of their child's food intake to control or maintain their child's weight than mothers but were less likely to report that they keep track of snack foods and desserts, place limits on snacks, or ensure daily availability of fruits and vegetables. • Mealtime observations revealed that fathers were less likely to use neutral prompts, reasoning, or praise and used fewer feeding strategies in general per meal than mothers. **Strengths** • Review focuses on the important, but largely neglected, topic of fathers' child feeding practices. • Additional strengths include a rigorous, standardized search strategy, and a review of study characteristics central to the implementation of future research such as recruitment approaches, measures utilized and their validity for use with fathers. **Limitations** • It is possible that some articles were inadvertently excluded and multiple studies from a larger project were included which exacerbates homogeneity in the study samples. • A meta-analysis of the data was not performed given the small number of studies identified and the breadth of research questions, designs, measurement instruments, and data analytic strategies implemented. **Conclusion** • Fathers should be routinely included in child feeding research, and recruitment approaches should be expanded to engage fathers from diverse socioeconomic, racial/ethnic and geographic backgrounds including nonresident and nontraditional fathers. • Similarities and differences in mothers' and fathers' perceived roles in child feeding and child feeding strategies should be explicitly examined. • Measures should be validated for use with fathers, and fatherhood theories from sociology and psychology should be considered as a foundation for such research. **Implications for Public Health Nutrition Practice** • The role of fathers in child feeding strategies must not be overlooked when looking at parent interventions. • No intervention ideas were specifically determined in this review.
Laws, 2014[26] **Study Design:** Systematic Review **Country:** Multiple **Population:** Targeted (Socioeconomically disadvantaged and/or indigenous families) **Participants:** 9750 families of children 0-5 years old across 32 studies. **Purpose:** To systematically review the literature to examine the effectiveness of interventions to prevent obesity or improve obesity related behaviours in children 0-5 years from socioeconomically disadvantaged or Indigenous families. **HE Appraisal:** Moderate	**Design** • Published articles from 1993-2013 were obtained from 8 databases searched. Results were scanned for eligibility and studies to be included in the study were reviewed. **Nutrition Outcomes Measured & Reported** • Parental feeding practices. • Anthropometric measures. • Child/family diet. • Physical activity. • Sedentary behaviours.	**Findings** • Anticipatory guidance approaches in infancy appear to be effective in influencing early obesity related behaviours such as breastfeeding or the timing of introduction of solids. • Interventions need to commence in the antenatal period or at birth to positively impact on breastfeeding outcomes amongst socioeconomically disadvantaged mothers. • Common features of successful interventions for preschoolers (aged three to five years) include a dual focus on obesity prevention and school readiness, weight screening and referral, focus on household routines and an educational component for parents. • Studies with positive outcomes successfully engaged parents, had a strong focus on skill building, use of behaviour change strategies, social networking, progressive rewards systems and links to community resources. • Developing culturally appropriate programs appear to be critical to engaging parents from racial minority groups. • Successful interventions also engaged children in educational activities related to nutrition, physical activity and sedentary behaviours as well as physical activity sessions focusing on development of gross motor skills. • The limited number of Indigenous studies, prevent us making recommendations for settings to target Indigenous parents. • The home appears to be an effective setting to deliver interventions to infants under two years of age. • Primary healthcare settings is an emerging setting of interest for children under two years from socio economically disadvantaged parents. • The findings from preschool based interventions were mixed, with parental engagement being a critical factor to the success of interventions delivered in the preschool setting.

Study Details	Methods	Findings/Conclusions
		Limitations • Only included peer-reviewed papers published in English over the past 20 years. • Publication bias may have influenced the review findings in favour of positive outcomes. • Studies from non-English speaking countries may be under-represented and important findings published in grey literature may have been missed. • The search strategy specifically focused on studies targeting socioeconomically disadvantaged or Indigenous children and may have missed studies that did not report on socioeconomic status. • It was also not possible to combine the results of different studies in the form of a meta-analysis due to heterogeneity in the study populations, intervention types and outcome measures. **Conclusion** • Findings of obesity prevention interventions amongst socioeconomically disadvantaged families are promising, when commenced in early infancy, although longer term follow up is required to assess the impact on healthy weight gain. • Interventions amongst preschoolers including racial and ethnic minority groups are more effective when they have a strong component of parental engagement, use evidence based behaviour change techniques, focus on building skills not just knowledge acquisition, provide rewards and links to social networking opportunities and community resources. **Implications for Public Health Nutrition Practice** • Sets guidance for interventions shown to be effective in socioeconomically disadvantaged groups which are a high risk population in need.
Ling, 2017[29] **Study Design:** Meta-analysis **Country:** Multiple **Population:** Universal **Participants:** Multiple. 52 RCT studies targeting healthy children aged 2-5. **Purpose:** To estimate the effects of lifestyle interventions on body mass index (BMI) among preschool children and explore potential intervention moderators. **HE Appraisal:** Moderate	**Design** • Published articles up to October 2015 were obtained from 6 databases searched. Results were scanned for eligibility and studies to be included in the study were weighted standardized mean differences for BMI were calculated using random-effects models to estimate effect sizes. **Nutrition Outcomes Measured & Reported** • Effectiveness of an intervention targeting sedentary activity, screen time, physical activity, or nutrition to positively influence BMI.	**Findings** • School-based or prevention intervention with active parental involvement did not yield better outcomes. • Interventions targeting parents with parenting skill training and behavioural change strategies, and children with general health and nutrition education, resulted in greater effects. **Limitations** • The studies included had high degree of heterogeneity, limiting the robustness of the findings. • Only BMI was used to evaluate the intervention effects. • There are some evidence of publication bias. **Conclusion** • The meta-analysis highlights the promising intervention approaches of parenting skill training and behavioural change strategies to target parents. However, for children, general health and nutrition education should be employed. **Implications for Public Health Nutrition Practice** • Highlights differences of successful interventions for parents and their children which suggests a targeted approach depending on the audience.
McPhie, 2012[41] **Study Design:** Systematic Review **Country:** Multiple **Population:** Universal **Participants:** Multiple mothers of children between 2 and 6 years of age across 17 studies. **Purpose:** To identify the maternal child feeding practices in order to understand the determinants of childhood obesity. **HE Appraisal:** Moderate	**Design** • Published articles from 2000-2012 were obtained. Results were scanned for eligibility and studies to be included in the study were reviewed. **Nutrition Outcomes Measured & Reported** • Associations between parental characteristics (ethnicity/race, household income, parent education and acculturation) and parenting styles with parent child feeding practices (restriction, pressure to eat, monitoring, modeling healthy eating habits).	**Findings** • This review suggests that maternal parenting and maternal characteristics (personal and psychopathology) are associated with maternal child feeding practices (greater use of maternal restriction and pressure to eat or in other words, greater control and reduced sensitivity in how mothers feed their children) which may disrupt the child's ability to self-regulate their food intake based on internal hunger cues which is associated with excessive weight gain. • This review also showed that maternal personal characteristics such as socioeconomic status, as determined by maternal education or family income, and ethnicity are correlated with a mother's knowledge, beliefs and/or motivation regarding maternal child feeding practices. • Identifying mothers at risk for developing or performing unhealthy feeding practices is important and may allow for intervention programs to target their needs (different interventions may be needed for families from various ethnic/cultural groups, or socioeconomic backgrounds. • Interventions addressing maternal pressure to eat for mothers with general psychopathology, and restriction of daughters' food intake for mothers with eating psychopathology may be beneficial. **Limitations** • Wide variation in how maternal variables are measured which reduced the comparability of results.

Study Details	Methods	Findings/Conclusions
		• All except one of the studies included in this review were cross-sectional so neither the directionality of the relationships between the maternal correlates and maternal child feeding practices can be explicitly determined, nor the long-term relationships between maternal correlates and maternal child feeding practices. • The studies included in this review had relatively small sample sizes, thereby restricting the generalization and accuracy of their findings. • Many of the studies focused only on simple correlations and often did not adjust for covariates. • Collectively, these issues may compromise the strength of the findings amongst the reviewed studies. **Conclusion** • It may be valuable for interventions to approach maternal child feeding practices from within the context of parenting. • Tailoring interventions that aim to modify maternal feeding practices to the needs of the mothers in the target group is likely to enhance the effectiveness of childhood obesity prevention. **Implications for Public Health Nutrition Practice** • Highlights the importance of mother focused interventions in support feeding practices to their children.
Morris, 2015[2] **Study Design:** Systematic Review **Country:** Multiple **Population:** Universal **Participants:** Multiple preschool children across 15 studies reviewed for obesity prevention interventions with parental involvement. **Purpose:** To evaluate the success of childhood obesity interventions delivered in Early Childhood Education and Care (ECEC) services that included a parental component. **HE Appraisal:** Moderate	**Design** • Published articles from 2000-2014 were obtained from 6 databases searched. Results were scanned for eligibility and studies to be included in the study were reviewed. **Nutrition Outcomes Measured and Reported** • Capacity building of agents. • Screen time. • Physical activity. • Fruit and vegetable intake. • Reduction of energy dense nutrient poor foods. • Increasing water consumption. • Environmental change.	**Findings** • Interventions that communicated with parents on classroom activities and content often achieved their primary outcome measure. • Capacity building of parents, educators and communities is a contributor to positive changes to body mass index (BMI) outcomes. • Several successful studies that lowered or slowed BMI increases included major changes to ECEC water policies. • Parental interest, participation and satisfaction led to significant changes in child BMI, as found in one study and may be a significant contributor to parent engagement in ECEC. **Limitations** • High attrition was a factor in four studies. • Weak parental components were identified by some studies as contributing to the poor outcomes. • Some parental confounders were not identified and adjusted for. • The RCT design is difficult to do well in public health settings and as such is a possible limitation of the evaluated studies. **Conclusion** • Engaging parents and ECEC educators to work in partnership may lead to effective outcomes and assist the preschool population with achieving a healthy weight. • The best ways to engage this partnership and share the areas of responsibility are still to be determined. **Implications for Public Health Nutrition Practice** • Strengthens argument for interventions that involve parents and early childhood professionals to be involved together to improve child feeding behaviours.
Murimi, 2018[33] **Study Design:** Systematic Review **Country:** Multiple **Population:** Universal **Participants:** 6840 children 3-6 years old across 7 studies reviewed for nutrition interventions at the preschool level. **Purpose:** To identify factors associated with successful nutrition education interventions conducted in children. **HE Appraisal:** Moderate	**Design** • Published articles from 2009-2016 were obtained from 4 databases searched. Results were scanned for eligibility and studies to be included in the study were reviewed. **Nutrition Outcomes Measured & Reported** • Study sample. • Objective of education intervention. • Study design. • Length and frequency of intervention. • Behavioural theory/construct. • Achievement of objectives. • Risk of bias. • Major findings.	**Findings** Success nutrition interventions targeted to preschoolers include: • Targeting specific behaviours to modify (for example, increasing fruit and vegetable intake). • Aligning activities clearly with objectives and expected behaviours. • Engage parents in person including hands on activities and lectures. • Providing training to teachers or health professionals who are implementing the nutrition education. • Provide hands on activities that are age appropriate and accommodate concentration span of preschooler. **Strengths** • Review focuses on analyzing several factors that contribute to success of various interventions as opposed to a single intervention type. **Limitations** • Only English studies were included. • Some articles had limited information on their methods and results. **Conclusion** • Interventions geared to preschool children are encouraged to design short and frequent secessions that include hands on activities for the children while also targeting parents. **Implications for Public Health Nutrition Practice** • Strategies geared towards preschoolers should also involve parents and teachers so messaging is repeated at preschool and into the home. • Interventions should be developmentally appropriate in time frequency, length, and activity style.

Study Details	Methods	Findings/Conclusions
Redsell, 2018[27] **Study Design:** Systematic Review **Country:** Multiple **Population:** Universal **Participants:** Children and their parents across 35 eligible studies. **Purpose:** To identify interventions designed to reduce the risk of overweight/obesity that were delivered antenatally or during the first 2 years of life with outcomes reported from birth to 7 years of age. **HE Appraisal:** Strong	**Design** • Published articles from 1990-2013 were obtained from 6 databases searched. Results were scanned for eligibility and studies to be included in the study were reviewed. • Intervention types were categorized under behavioural trials (nutritional and/or responsive feeding interventions, breastfeeding promotion and lactation support interventions, parenting and lifestyle interventions, and maternal health interventions) and non behavioural trials (formula milk interventions). **Nutrition Outcomes Measured and Reported** • The primary outcomes were infant/child body mass index, weight, weight gain velocity, weight for- length and weight-for-age from birth to 7 years of age. • Secondary outcomes were breastfeeding uptake and duration, timing of introduction of solid food, diet intake and quality, responsive feeding practices and physical activity from birth to 7 years of age.	**Findings** Success nutrition interventions targeted to preschoolers include: • The most promising obesity prevention interventions for children under 2 years of age are those that focus on diet and responsive feeding. • The most effective trials were either driven by behavioural change theory or included diet, nutrition and parental responsiveness components. **Limitations** • The majority of behavioural interventions were not underpinned by a theory of change and where a theory was applied, this tended to be social-cognitive in nature targeting the individual and/or family rather than the environment or health system. • Many studies failed to adequately describe their randomization method or attrition rates. • The majority of studies lacked sufficient detail to make valid conclusions about which interventions might be most effective. • Reporting of participant adherence and fidelity of intervention delivery was variable and problems in these areas may explain the small effect size. **Conclusion** • Interventions that aim to improve parental feeding practices, including infant diet and parental responsiveness to infant cues, showed most promise in relation to behaviour change but not weight. **Implications for Public Health Nutrition Practice** • This review points out the need for a broader ecological intervention approach to improving infant/toddler diets. • Nourish program uses many concepts for educating parents on the feeding relationship, and concepts that are included in the Healthy Feeding Nutrition Guideline. • Healthy Beginnings might have some concepts that could be transferred to the AHS home visitation programs.
Sung-Chan, 2013[35] **Study Design:** Systematic Review **Country:** Multiple **Population:** Universal **Participants:** 982 children 2-19 years old across 15 studies reviewed for childhood-obesity interventions. **Purpose:** To examine the methodological rigor and treatment effectiveness of family-based interventions according to intervention types and theoretical orientations. **HE Appraisal:** Strong	**Design** • Published RCT's from 1975-2012 were obtained from 6 databases searched. Results were scanned for eligibility and studies to be included in the study were reviewed. **Nutrition Outcomes Measured & Reported** • Treatment effectiveness of weight related measures.	**Findings** • Within the behavioural approach, the subtype that focused on healthy eating and exercising and involved one family member or the whole family was more effective than the subtype that incorporated parenting style and child management in addition to a family-based healthy lifestyle intervention. • All eight type 1 studies reported substantial changes at the end of treatment, and four studies showed that significant changes were maintained at follow-up. These findings strongly suggest that a behavioural approach to family-based intervention consistently achieved better outcomes. • Comparing the two subtypes of the family systems approach, we found that the family therapy type outperformed the intervention that combined family therapy and behaviourally based lifestyle intervention. • Comparing the two theoretical frameworks, outcome of 13 interventions based on the behaviour theory scored higher than the two studies based on the family systems theory. • The behavioural approach also had a much higher number of treatment effect with a full score of 4 than the family therapy approach. • Among the four subtypes within the two theoretical traditions, the behavioural approach to family-based healthy lifestyle intervention again had the highest number of full score of 4. **Conclusion** • Attention to age in family-based obesity intervention is called for. • Researchers need to further identify the family components that can potentially mediate treatment effects. • Researchers should address the role of gender in family-based intervention. • Taking into consideration of the role of culture in studies of family-based interventions may be highly significant. **Implications for Public Health Nutrition Practice** • Gives information on the benefits associated with behaviour theory in family based interventions. • Developmentally appropriate interventions should be taken into consideration.

Study Details	Methods	Findings/Conclusions
Touyz, 2018[30] **Study Design:** Systematic Review and Meta-analysis **Country:** Multiple **Population:** Universal **Participants: 3947** children across 18 studies reviewed for home-based interventions. **Purpose:** To examine the effectiveness of parent-targeted in-home interventions in increasing fruit and vegetable intake in children. **HE Appraisal:** Strong	**Design** • Published articles from 2000-2016 were obtained from 5 databases searched. Results were scanned for eligibility and studies to be included in the study were reviewed. • 12 of the studies were analyzed for the stated outcomes. **Nutrition Outcomes Measured and Reported** • Fruit and/or vegetable intake in children (including intake of a target vegetable in grams or daily intake of servings of a fruit and/or vegetables via parent self-report).	**Findings** • Nutrition education interventions resulted in a small but significant increase in fruit intake (P=0.028), but not vegetable intake. • Parent-targeted, home-based taste exposure interventions led to a significant increase in vegetable intake, with a moderate effect (P<0.001), but the effect on fruit intake was not reported in the study. • Online and home visiting interventions compared to telephone based interventions resulted in significant increases in F and V intake. • Interventions involving daily or weekly sessions reported positive outcomes more frequently than those using monthly sessions. **Limitations** • Parents identified time as a barrier to exposure activities (i.e. recording, telephone sessions, etc.) within the trial. • Only 2 of 18 studies targeted non-white, non-English speaking parents. **Conclusion** • Taste exposure is an effective parent-targeted, home-based intervention strategy for promoting short-term (up to 12 months) increases in children's vegetable intake. • Interventions delivered in the home or via online modalities result in a significant, short term (up to 12 months) increase in children's fruit intake. • Parent involvement and taste exposure are important to increase fruit and vegetable intake in children. • Unclear whether the intervention effects observed in this systematic review can be generalized across different cultures, ethnicities, and economic backgrounds. **Implications for Public Health Nutrition Practice** • Highlights ideas for home based interventions to improve fruit and vegetable intake. • Shows importance of parent involvement to change child's food intake.

Waters, 2011[36]
Study Design: Cochrane Review
Country: Multiple
Population: Universal
Participants: multiple children across 55 studies (36 new to this update); 27946 children included in the meta-analysis.
Purpose: To determine the effectiveness of evaluated interventions intended to prevent obesity in children, assessed by a change in body mass index (BMI). Secondary purpose to examine the characteristics of the program and strategies to answer the questions "What works for whom, why and for what cost.
HE Appraisal: Strong
	Design
	• Searches from original Cochrane review were rerun to find updated research. Articles from 2005-2010 were added to the previous review studies from 1990-2005.
	Nutrition Outcomes Measured & Reported
	• Primary outcomes include height and weight, percent fat content, BMI, ponderal index, skin-fold thickness, and prevalence of overweight and obesity.
	• Secondary outcomes include activity levels, dietary intake, change in knowledge, environment change, stakeholder views of the interventions, measures of self-esteem, health status, wellbeing and quality of life, harm associated with intervention process or outcomes, and cost effectiveness/cost of intervention.
		Findings
		• Not all individual interventions were effective, and there was a high level of observed heterogeneity.
		• Overall, children in the intervention group had a standardized mean difference in adiposity (measured as BMI or zBMI) of -0.15kg/ m2 (95% confidence interval (CI): -0.21 to -0.09).
		• Intervention effects by age subgroups were -0.26kg/m2 (95% CI:-0.53 to 0.00) (0- 5 years), -0.15kg/m2 (95% CI -0.23 to -0.08) (6-12 years), and -0.09kg/m2 (95% CI -0.20 to 0.03) (13-18 years).
		• Heterogeneity was apparent in all three age groups and could not explained by randomization status or the type, duration or setting of the intervention.
		• Only eight studies reported on adverse effects and no evidence of adverse outcomes such as unhealthy dieting practices, increased prevalence of underweight or body image sensitivities was found.
		• Interventions did not appear to increase health inequalities although this was examined in fewer studies. The highest levels of the condition experienced by those most disadvantaged.
		• For children 0-5 years, interventions outside of education are more effective which related to parent engagement.
		• In developed countries there is a significant trend observed between obesity and lower socio-economic status, while in some developing countries the contrary is found, with children from relatively affluent families more vulnerable to obesity.
		Limitations
		• High level of observed heterogeneity.
		• A broad range of program components were used in these studies and whilst it is not possible to distinguish which of these components contributed most to the beneficial effects observed.
		• There are gaps in available evidence in relation to younger children, particularly aged 0-3 yrs.
		• There is a lack of which specific intervention components are most effective and what is affordable and cost-effective.
		Conclusion
		• Strong evidence to support beneficial effects of child obesity prevention programs on BMI, particularly for programs targeted to children aged six to 12 years. Our synthesis indicates the following to be promising policies and strategies:
		  ○ School curriculum that includes healthy eating, physical activity and body image.
		  ○ Improvements in nutritional quality of the food supply in schools.
		  ○ Environments and cultural practices that support children eating healthier foods and being active throughout each day.
		  ○ Support for teachers and other staff to implement health promotion strategies and activities (e.g. professional development, capacity building activities).
		  ○ Parent support and home activities that encourage children to be more active, eat more nutritious foods and spend less time in screen based activities.

Study Details	Methods	Findings/Conclusions
		• Promising findings for 0-5 involved interventions in home or healthcare settings. • Childhood obesity prevention research must now move towards identifying how effective intervention components can be embedded within health, education and care systems and achieve long term sustainable impacts. • Behaviour change interventions cannot operate in isolation. **Implications for Public Health Nutrition Practice** • Integrate effective interventions from settings such as community, home, primary care and others.
Yee, 2017[38] **Study Design:** Systematic Review & Meta-analysis **Country:** Multiple **Population:** Universal **Participants:** Parents of children under the age of 18 from 88 studies reviewed in the qualitative analysis and 37 studies used in the meta-analysis. **Purpose:** To examine the influence of parents on child food consumption behaviour in two contexts: promotive in nature (healthy food) and preventative in nature (unhealthy food). **HE Appraisal:** Moderate	**Design** • Published articles up to March 2016 were obtained from 4 databases searched. Results were scanned for eligibility and studies to be included in the study were reviewed and studies that were eligible for calculation of effect sized were used to complete a meta-analysis. **Nutrition Outcomes Measured and Reported** • Parental variables such as guidance/education, restrictive guidance/rule-making, availability accessibility, modeling, pressure to eat, rewarding food consumption, rewarding with verbal praise, and using food as a reward. • Food consumption variables such as fruit and vegetables consumption, sugar-sweetened beverages, and snack consumption.	**Findings** • Some behaviours, such as parents' own food consumption behavior, and availing certain types of food, have been shown to be strong correlates of child food consumption behaviour. • Some behaviors such as active and restrictive guidance, are effective only in certain contexts; active being more effective in encouraging fruits and vegetables consumption, while restrictive guidance is more effective in discouraging unhealthy eating such as sugar sweetened beverage consumption. **Strengths** • The review was conducted using a non-exhaustive list of studies, conclusions are drawn from overall trends across studies, rather than from singular studies, rendering a small number of missed articles less consequential. **Limitations** • Most of the studies were limited to populations in western countries and might not generalize across to cultures outside of these countries. • Lack of uniformity in measuring a number of these parental variables. **Conclusion** • There is a wide variety of behaviors that parents engage in to either promote or prevent certain child food consumption behaviors. There appears to be a number of research gaps that needs to be filled. **Implications for Public Health Nutrition Practice** • Review supports the use of role modelling positive meal-time practices to positively influence children's' eating behaviors. • Supports the emphasis of role modelling as an effective parent strategy to focus on. • Availability of foods showed a positive association, but this reviewer suggests caution for populations who are food insecure; messages/strategies in this realm may create a greater inequity and undue pressure on families.

Appendix D. List of Definitions

Term	Definition
High Income	High income country is a country with a high-income economy as defined by the World Bank. Income is measured using gross national income (GNI) per capital, in U.S. dollars, calculated from local currency using the World Bank Atlas method. Other similar but technically different terminology for high income economies include “First World” and “developed country”. In this report, the World Bank Economies 2015 document was used to determine studies conducted in high income countries.[52]
Low and Middle Income	Low, low-middle and high-middle income economy groupings are three of the four income groupings as defined by the World Bank. As for the high-income economy grouping, income is measured using gross national income (GNI) per capital in U.S. dollars. The middle income category is divided into lower middle or upper middle. Other terms such as “developing country” and “Third World” are terminology previously used. In this report, the World Bank Economies 2015 document was used to determine studies conducted in developed countries.[52]
Multi-level	For the purpose of this review, multi- level strategies are defined as those that impact more than one population public heath strategy. For example, multi-level strategies may include strategies that focus developing personal skills of parent and families along with creating supportive environments in settings including home, child care/ school, and in the community.
Socioeconomic position	Socioeconomic position refers to “the social and economic factors that influence what positions individuals or groups hold within the structure of a society”[53]
Targeted population approach	Intended to apply to a priority sub-group within the broader, defined population. “Eligibility and access to services are determined by selection criteria, such as income, health status, employment status or neighbourhood”.[54] For example, many programs that are implemented for parents and are accessed through existing programs which aim to target a certain population. In the literature, this was noted when the parent interventions were trialed for parents who accessed a certain support based on their needs (i.e. low income, ethnicity, etc.) and was not accessible to the larger population in the community.
Universal population approach	Designed to apply to an entire population. “Eligibility and access are based simply on being part of a defined population”.[54] For example, a resource that is used by home visitation nurses to give to all mothers who had a recorded birth in the community would ensure that all mothers receive the same information without a pre requirement or a targeted message to only some mothers.

Appendix E. List of Study Designs

Term	Definition
Controlled before-after Study (CBA)	A study in which observations are made before and after the implementation of an intervention, both in a group that receives the intervention and in a control group that does not.[55]
Cross sectional study (CS)	A study that collects information on interventions (past or present) and current health outcomes, i.e. restricted to health states, for a group of people at a particular point in time, to examine associations between the outcomes and the exposure to interventions.[56]
Descriptive review with systematic search strategy (DR)	For the purpose of the report, this is defined as a review with the search strategy outlined, although the search may not be as rigorous as that outlined when conducting a systematic review of the literature.
Grey literature (GL)	Grey literature consists of documents produced by all levels of government, academics, business and organizations "where publishing is not the primary activity of the producing body".[57] Examples include annual reports, conference proceedings, technical reports, theses, white papers, and even informal communication such as blogs, emails, or social media posts.
Interrupted-time-series study (ITS)	A study that uses observation at multiple time points before and after an intervention (the "interruption"). The design attempts to detect whether the intervention has had an effect significantly greater that any underlying trend over time.[55]
Meta-analysis (MA)	A statistical technique to combine the results of multiple studies resulting in a single pooled estimate of effect.[58]
Narrative review (NR)	These are evidence overviews or expert commentaries on a given health topic. Unlike systematic reviews, they are not designed to be reproducible as their methodology (e.g. search strategy, inclusion criteria) is usually not described.[58]
Non-randomized controlled trial *or* Non-randomized trial (NRCT)	An experimental study in which people are allocated to different interventions using methods that are not random. The most common types of NRCTs in public health are natural experiments where an intervention takes place and an existing group, not receiving the intervention, is used as a control.[55]
Randomized controlled trial *or* Randomized trial (RCT)	An experimental study in which people are allocated to different interventions using methods that are random.[55]
Systematic review (SR)	A review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyze data from the studies that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyze and summarize the results of the included studies.[58]