A Needs Assessment of the Educational Needs of Child Care Educators in the Promotion of Healthy Eating in the Child Care Setting

by

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Abstract

Child care utilization in Canada has increased dramatically in the last two decades. Child care centres provide opportunities for the promotion of healthy eating habits among a great number of young children. Child care educators play a major part in the promotion of healthy eating and behaviour change in children. However, there is room for improving the promotion of healthy eating in child care centres and by child care educators. Furthermore, there is a need for programs aimed at promoting healthy eating, with a special emphasis on child care educators in the child care setting.

The two main aims of this research were to conduct a needs assessment through: 1) a consultation with key informants in the child care sector to explore and identify the educational needs of child care educators in the promotion of healthy eating in child care; and 2) a rapid review of interventions designed to promote children's consumption of vegetables and fruits in child cares. First, a cross-sectional online survey was used to consult with a group of key informants on their perceptions of and recommendations for child care educators' educational needs in the promotion of healthy eating in child cares. Second, a rapid review methodology was used to guide a literature review on interventions aimed at promoting children's consumption of vegetables and fruits in child care centres.

Through the consultation with key informants, this study found there is a need for further training of child care educators in the promotion of healthy eating. In addition, other influential factors need to be addressed to enhance the promotion of healthy eating in child care centres. The rapid review revealed that comprehensive healthy eating interventions targeting children, parents, child care staff and the centre's food environment were more successful than single interventions in promoting healthy eating in child care centres. The findings of this research bring insight into what is needed for the promotion of healthy eating in child cares, and what are the most effective approaches to promote

healthy eating in this setting. The findings from the needs assessment will inform the development of future programs aimed at promoting healthy eating in child cares.

Preface

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Chapter 1 . Literature Review

1.1 Introduction

The two main aims of this research were to conduct a needs assessment through: 1) a consultation with key informants in the child care sector to explore and identify the educational needs of child care educators in the promotion of healthy eating in child care; and 2) a rapid review of interventions designed to promote children's consumption of vegetables and fruits in child cares.

The first aim was to explore and identify the educational needs of child care educators in their promotion of healthy eating in the child care setting from the perspective of key informants. The specific objectives were: 1) to consult with a sample of key informants from different child care sectors in Alberta involved in the delivery of programs and/or research to examine their perceptions of and recommendations for child care educators' educational needs in the promotion of healthy eating in child cares; and 2) to update the findings of previous work on the educational needs of child care educators in their promotion of healthy eating in Alberta child cares.

The second aim of this thesis was to conduct a rapid review of the published literature on interventions aimed at promoting children's consumption of vegetables and fruits in the child care setting. The specific objectives were: 1) to identify the types of interventions used at different ecological levels in the promotion of children's consumption of vegetables and fruits in child cares; and 2) to identify the type of strategies used in the interventions included in the review.

The findings from this thesis will serve as a foundation to inform the development of future programs aimed at promoting healthy eating in child care centres.

1.2 Background and literature review

1.2.1 Child care in Canada

Child care centre utilization in Canada has increased dramatically over the last two decades, especially for preschool children. In 2011, approximately 60% of Canadian children aged two to four years were using child care[1] compared to 42% in 1995 (Bushnik 2006; Sinha 2014). In 2011, 40% of Alberta's children attended child care (Sinha 2014). Sixty-percent of children using child care attend on a full-time basis, and spend at least 30 hours a week, meaning that children may potentially be eating up to one-half to two-thirds of their daily food intake in the child care centre (Bushnik 2006; Sinha 2014). The child care setting provides a great opportunity for the promotion of healthy eating habits in young children given that most children attend some form of child care for an extended period.

However, it is noteworthy that children attending child care may be at increased risk of overweight and obesity. Two systematic reviews investigated the association between child care and childhood overweight and obesity, and found that children who attended child care centres beginning in the early years as infants (less than 1 year of age) and attended for more than 20 hours per week (considered high intensity) may be at increased risk of childhood obesity (Black et al. 2017; Alberdi et al. 2016). Albeit, more research is needed to gain insight into the underlying factors potentially contributing to the obesogenic environment of the child care setting.

1.2.2 Overweight and obesity and eating habits of preschool children

The prevalence of overweight and obesity in preschool children has been incrementally rising world-wide, from 4.2% in 1990 to 6.7% in 2010, and is expected to increase to 9.1% in 2020 (de Onis, Blössner, and Borghi 2010). In Canada, over 30% of children aged 5-17 years were overweight and obese according to the Canadian Community Health Measures in 2012 to 2013 (CHMS) (Government of

[1] Child care refers to "temporary care and supervision of a child by an individual other than a child's parent"; including preschool programs, daycare programs, and kindergarten (Government of Alberta 2011).

Canada 2014), while in Alberta, the prevalence for overweight and obesity was 21.8 % in children aged 2-17 years (Alberta Health Services 2010) . These numbers are concerning since overweight preschool children are four times more likely to become overweight adults when compared with normal weight children (Gurnani, Birken, and Hamilton 2015), and are more likely to develop risk factors for cardiovascular diseases and type 2 diabetes than healthy children (Sahoo et al. 2015; Freedman et al. 2005).

Poor eating and sedentary behaviours are associated with childhood overweight and obesity. Poor eating behaviours are characterized by the consumption of high-energy foods and lower-energy expenditure, resulting in an energy imbalance that causes weight gain (Hill, Wyatt, and Peters 2012). There is ample evidence to show that children with high intakes of energy-dense foods and low consumption of vegetables and fruits (V & F) are at increased risk of overweight and obesity (Birch and Ventura 2009; Dubois et al. 2007). In contrast, consuming a high-quality diet in childhood is associated with improved weight status and decreased risks factors for chronic diseases (Lock et al. 2005). Fruits and vegetables contain nutrients and functional components that promote health and are beneficial for cognitive development in young children, as well as protective for the development of risk factors for cardiovascular diseases, type 2 diabetes and some kinds of cancer (Nyaradi et al. 2016; Nyaradi et al. 2013; Boeing et al. 2012; Steinmetz and Potter 1996).

The most recent Canadian Food Guide, *Eating Well with Canada's Food Guide* (EWCFG) recommends that children aged four to eight years should eat five servings of V & F per day, as well as four servings of grain products, two of milk and alternatives, and one of meat and alternatives (Government of Canada 2007). There are no published data on the adherence to EWCFG dietary recommendations for young children; however, studies reporting on previous guidelines found that children were not meeting the recommendations for V & F (Pabayo et al. 2012; Dubois et al. 2011;

Garriguet 2004). A cross-sectional study conducted in Edmonton, Alberta found that more than 70% of children aged four to five years were not meeting the minimum number of recommended servings of V & F (Pabayo et al. 2012). Similar trends were found in the United States where 60% of children did not meet the recommended number for servings of fruits and 93% did not meet the recommendations for servings of vegetables, in 2007-2010 (Centre for Disease Control and Prevention 2014). Promoting healthy eating habits in young children is a major public health issue and should be a priority for healthy public policy to ensure the health and wellbeing of the future generations.

1.2.3 Promotion of healthy eating in child cares

Child care is an important setting for the promotion of healthy eating and the prevention of overweight and obesity in young children (Benjamin-Neelon and Briley 2011; Fuller et al. 2005). Children develop eating habits, food preferences and sedentary or active behaviours during the early years of life and are likely to carry them into adulthood (Birch and Fisher 1998; Mikkilä et al. 2004). Therefore, promoting healthy eating habits in child care is crucial for children's development of healthy lifestyle habits.

Child care centres could offer opportunities for the promotion of healthy eating, such as increasing the access to foods and for modeling healthy eating habits to children (Birch and Ventura 2009; Story, Kaphingst, and French 2006; Birch and Fisher 1998). However, the promotion of healthy eating habits in child care is more complex than it appears – it is influenced by several factors, such as: government policies and regulations, child care centre's policies, practices and food environment, parents support of healthy eating, child care educator's[2] role modeling, and children's food preferences (Fitzgerald and Spaccarotella 2009; Stokols 1996). It is essential to consider all of these aspects of the micro- and macro-environments of child care centres in the promotion of healthy eating.

[2] Child care educator refers to a "staff member of a child care program whose primary duty is child care and who is actively engaged in the supervision of children" (Government of Alberta 2016).

Enforcing government policies and regulations is one of the primary approaches to ensure the promotion of healthy eating and the provision of healthy food in child care centres (Larson et al. 2011). In Alberta, licensed child care centres are required to comply with EWCFG dietary recommendations for the food provided at the centre, but EWCFG only provides broad guidance on food choice and does not provide any specifications about the quality of food (Government of Alberta 2016). In order to provide detail about the quality of the food provided to children, the *Alberta Nutrition Guidelines for Children and Youth* (ANGCY) were created, which are meant to help in the development of healthy food environments for children in educational and recreational settings (Government of Alberta 2012).

The child care centre's nutrition policies and practices also have a great influence in the promotion of healthy eating and children's dietary intake at the centre. The nutrition policies and practices determine adherence to the nutrition guidelines, the nutritional quality of the food served to children, and the child care educator's role modeling behaviours at mealtimes (Erinosho et al. 2012; Erinosho et al. 2011; Larson et al. 2011). Together these factors will determine the food environment of the centre. Furthermore, it is recognised that having a supportive healthy food environment in child care can improve children's eating behaviours (Bevans et al. 2011; Freedman and Alvarez 2010).

Several studies have found that child care centres can serve as important venues for teaching and promoting healthful eating habits to children, and that children's eating behaviours and dietary intake can be modified through nutritional programs. Programs that have successfully improved children's dietary habits have something in common, they have used at least one or more of the following strategies: changed centre's policies and practices, modified centre's food environment, provided nutrition education to children, provided training and resources for child care staff, and involved parents in the promotion of healthy eating (Witt and Dunn 2012; Zask et al. 2012; Larson et al. 2011; Bell et al. 2015; Williams et al. 2002). Nevertheless, other studies reported room for improvement

in several key areas in the promotion of healthy eating in child cares, such as: the food provided to children, the child care educator's role in the promotion of healthy eating, the child care staff's knowledge of nutrition guidelines, and the parents support of child care's nutrition policies (Shewring 2016; Farmer 2014; Larson et al. 2011; Erinosho et al. 2012).

1.2.3.1 *Alberta Nutrition Guidelines for Children and Youth*

In 2008, the Government of Alberta launched the *Alberta Nutrition Guidelines for Children and Youth* (ANGCY) in response to requests for guidance in the creation of environments that support healthy eating behaviours for children and youth. The goal of the ANGCY is "to equip facilities and organizations [including child care centres] with the tools they need to provide children and youth with healthy food choices" (Government of Alberta 2012). The ANGCY focuses on three areas as a comprehensive approach in the promotion of healthy eating: 1) providing healthy diets for children; 2) enhancing access to safe and nutritious foods; and 3) creating environments that support healthy food choices (Table 1-1)(Government of Alberta 2012). The ANGCY provides a Food Ranking System (FRS) to categorize foods into three main categories: 'choose most often', 'choose sometimes' and 'choose least often', as an alternative to categorized foods served at centres as either healthy or unhealthy (Government of Alberta 2012).

The aim of implementing the ANGCY in child cares is to shape and standardize nutrition practices in child care centres and to realize best practices in the promotion of healthy eating among young children. However, it is not clear to what extent the ANGCY are adopted and implemented across child cares in Alberta as the guidelines are not mandatory resulting in the adoption and implementation of them to varying degrees (Downs et al. 2011). A small explanatory qualitative study conducted in Edmonton, Alberta found that the ANGCY were positively described by child care educators, as relevant and easy to use (Nikolopoulos et al. 2012). Yet, other subsequent studies conducted in Alberta

found there was a lack of knowledge of the ANGCY's general recommendations amongst child care educators, highlighting an important barrier for realising both the adoption and the implementation of the guidelines in the child care setting (Shewring 2016; Farmer et al. 2014).

Table 1-1. Three areas of focus of the *Alberta Nutrition Guidelines for Children and Youth* in the promotion of healthy eating in child care centres.

1) Providing healthy diets for children	**2) Enhancing access to safe and nutritious food**	**3) Creating environments that support healthy food choices**
- Choose foods from all for groups of *Eating Well with Canada's Food Guide* - Drink water daily - Choose appropriate food portion sizes. - Use the Food Ranking System - Limit energy-dense foods - Make nutritious foods more accessible	- Provide safe food handling training for all individuals who prepare and serve food - Adherence to provincial food safety standards - Provide menu planning training for staff	- Make the healthy choice the easy choice to make - Work with staff, parents and children to develop policies that support healthy eating - Encourage adults to be positive role models - Provide healthy eating environments - Serve food in age appropriate portion sizes - Introduce new foods in small amounts, on multiple occasions - Avoid using food as a reward

Source: Government of Alberta (2012).

1.2.3.2 Role of child care educators in the promotion of healthy eating

Child care educators (CCE) play a major part in the promotion of healthy eating and behaviour change in children, through role modeling and the feeding styles they use at mealtimes (Nikolopoulos et al. 2012; Hughes et al. 2007). Role modeling is defined as the positive eating behaviours CCE perform to teach and act as examples for children (Cruess, Cruess, and Steinert 2008). Children tend to imitate the habits of adults around them, and since children in child care often spend at least 20 hours per week

with CCE, the caregiver's eating and role modelling behaviours can greatly influence the development of children's eating habits (Birch and Ventura 2009).

Children's eating behaviours are also influenced by the instruction received from CCE at mealtimes and the context in which food is provided are behavioural components that are considered in the categorization of different caregiver feeding styles (Hughes et al. 2007). According to Nicklas et al. (2001), there are three types of caregiver feeding styles: authoritarian, authoritative, and permissive. Authoritarian feeding style is characterized by excessive control of children's food intake and eating behaviours through instructions, directives or coercion, including high use of restrictive behaviours, using food as a reward or punishment, and persuading children to eat although they are not hungry (Nicklas et al. 2001); these excessive control of children's eating practices may promote food rejection, picky eating, overeating and overweight/obesity (Birch, Savage, and Ventura 2007; Hughes et al. 2005). Permissive feeding style, on the other hand, is characterized by a lack of control in children's eating behaviours or 'nutritional neglect', were children chose what to eat and in what quantities (Hughes et al. 2007); this feeding style is associated with children having a low quality diet and a high intake of energy-dense foods (Hennessy et al. 2012; Nicklas et al. 2001). Authoritative feeding style uses reasoning, questions and negotiations in order to have a fair control of children's eating practices which facilitates the development of children's dietary self-control and guides children's eating behaviours (Hughes et al. 2005; Nicklas et al. 2001); this particular feeding style is associated with increased consumption of V & F and lower consumption of energy-dense foods (Hennessy et al. 2012; Kremers et al. 2003). Ideally, CCE should adopt an authoritative feeding style to facilitate and promote the development of healthy eating habits in young children (Hennessy et al. 2012; Kremers et al. 2003). Child care educators can greatly influence the promotion of healthy eating in child care and should not disregard their role as facilitators of healthy eating.

1.2.3.3 Child care educators' educational needs for the promotion of healthy eating

Child care educators are key players in the promotion of healthy eating in child care; however, several studies have found that there is room for improving some basic areas in the CCEs' promotion of healthy eating. Based on the work done in the child care setting in the US and in Alberta, CCE would benefit from additional training and education in these areas: knowledge of and adherence to nutrition guidelines, proper handling of children's picky eating and food preferences, introduction of new foods to children, communication with parents, and role modeling of healthy eating behaviours (Shewring 2016; Farmer et al. 2014; Erinosho et al. 2012; Larson et al. 2011; Freedman and Alvarez 2010; Needham et al. 2007).

Previous research in Alberta investigated the educational needs of CCE and reported that menu planning and portion sizes, picky eating, and communication with and support for parents were the priority issues for training of CCE (Farmer et al. 2014). Additionally, Farmer et al. (2014) found that CCE preferred educational formats, such as direct email, handouts, videos, and pictures; and preferred training that was easy, short, creative and visual appealing. Of note, in Alberta, there is lack of consistent and standardised training and professional development for CCE since there is no specific or mandatory curriculum on nutrition in the early childhood programs offered in Alberta's colleges and schools. As well, there is inconsistency in the educational requirements for CCE jobs in the child care sector. For instance, training duration in some early childhood programs in Alberta can vary from 50 hours to 2 years which may include limited nutrition education in the curriculum. As a result of the wide range in both the quality of educational programs and the expectations of CCE training in Alberta, the level of CCE training can vary in breadth and depth across the province (Farmer et al. 2016).

Several studies that examined the effects of providing CCE training on healthy eating found that such training improved their role modeling behaviours and communication with parents (Lanigan 2012;

Freedman and Alvarez 2010), including improvements in the food environment and promotion of healthy eating at the centre (Markides et al. 2017; Gosliner et al. 2010). Child care educators are facilitators in the promotion of healthy eating in child cares and providing training can help them to make better use of these opportunities to promote healthy eating to children.

1.2.3.4 Role modeling

In order to create a positive food environment for children child care educators should support and model healthy eating behaviours. The recommended 'best practices' for CCE role modeling are: 1) sitting with children at mealtimes; 2) eating the same food as children; 3) informally talking with children about healthy food; 4) encouraging children to try a new foods; and 5) avoiding the use of food as a reward or punishment (Benjamin-Neelon and Briley 2011; Government of Alberta 2012). Children learn about healthy eating behaviours by observing CCE and by receiving encouragement from them. Several authors have found that children were more likely to perform healthy eating habits if they observed the CCE modeling them first (Benjamin-Neelon and Briley 2011; Erinosho et al. 2011; Addessi et al. 2005; Hendy and Raudenbush 2000).

A recent exploratory study conducted in Edmonton, Alberta found that CCE understood the importance of promoting healthy eating to young children and recognized the positive influence that role modeling has over children's eating behaviours (Shewring, 2016). However, the same study reported that these activities were not always put into practice when CCE interacted with children (Shewring 2016). Erinosho et al. (2012) reported similar findings where CCE reported performing positive role modeling regularly, but found there was a discrepancy between what was self-reported by the CCE and the activities they performed. These results highlight there is a disconnection between what is known to be the 'best practice' and what is being practiced by CCE. Furthermore, a discordance between having an awareness of the issue and putting these behaviours into action point to the need

for improving the CCE's understanding of the importance of practicing role modeling, and developing their skills in the promotion of healthy eating in the child care setting.

1.2.3.5 Children's picky eating

Picky eating and the introduction of new foods are commonly reported barriers by parents and CCE in the promotion of healthy eating in young children (Needham et al. 2007; Nikolopoulos et al. 2012; Farmer et al. 2014). Picky eating or 'fussy eating' is a relatively common behaviour in toddlers and preschool children, and it is characterized by the refusal of accepting certain food flavours and textures, especially of vegetables and fruits (Fildes et al. 2016). Picky eating is more frequent in young children and tends to decrease as children evolve into adolescence (Dovey et al. 2008). Children described as 'picky eaters' tend to eat a reduced number of food choices, restrict consumption of foods, avoid some food groups, have strong food preferences, and are unwilling to try new food (Carruth et al. 1998; Fildes et al. 2016).

Another behaviour related to picky eating is 'food neophobia' which refers to avoidance or refusal to try unfamiliar foods, which is also associated with low consumption of vegetables and fruits (Fildes et al. 2016; Lucy Cooke, Carnell, and Wardle 2006). Young children are prone to avoid and reject new foods, except for sweet and salty foods (Birch and Fisher 1998). Acceptance of new foods does not occur immediately, as young children require 5 to 10 exposures of novel foods for them to start consuming and liking them (Birch and Fisher 1998; Birch and Marlin 1982). Proper introduction of novel foods is a determinant for shaping children food preferences and eating behaviours.

The characteristics of these two eating behaviours may produce concern and anxiety to parents and CCE since children with picky eating and food neophobia tend to have a low diet-quality and consume a small variety of foods (Carruth et al. 2004; Dubois et al. 2007; Dovey et al. 2008). It is important to target these two eating behaviours in child cares to ensure children's consumption of a

high-quality diet, especially of V & F. Providing CCE with resources and strategies to handle children's picky eating and food neophobia will increase CCE's confidence and skills in the promotion of healthy eating and in dealing with parents' angst on this issue (Taveras et al. 2006).

1.2.3.6 Communication with parents

The communication that occurs between CCE and parents is important for the successful promotion of healthy eating habits in children (Benjamin-Neelon and Briley 2011). In many cases, because parents are not able to talk to a professional about their child's eating behaviours, they rely on CCE for healthy eating advice and resources, where CCE act as health educators to parents (Taveras et al. 2006). To improve their effectiveness in their role as lay health educators, CCE require additional training to improve their communication with parents and their confidence in working with parents in the promotion of healthy eating in the child care setting.

Other studies reported a disconnection between what is being promoted at the child care centre and what parents are promoting at home. For example, there are instances, where parents were not supporting the nutritional policies and practices that were supported at the centre, and unknowingly, through their lack of support and knowledge, parents were discouraging children to follow them (Farmer et al. 2014; Needham et al. 2007; Taveras et al. 2006). The food environment that parents provide is the first one to which children are exposed and is important for shaping lifelong eating habits. Children are completely dependent on their parents for the food choices they have at home, and those food choices shape children's eating habits (Chambers 2017; Natale, Messiah, et al. 2014; Birch and Fisher 1998). Informing parents about the nutrition policies and practices of the centre is likely to influence and encourage them promote healthy eating. There is evidence that parent involvement in the promotion of healthy eating in child care has positive effects on children's eating habits and dietary intake at child care (Hingle et al. 2010; Natale, Messiah, et al. 2014).

Communication and understanding between CCE and parents are crucial for the proper promotion of healthy eating. Equipping CCE with strategies on how to approach parents and ways to successfully communicate with them are warranted.

1.2.4 Intervention Mapping Approach

Intervention Mapping (IM) is an intervention planning approach that provides a framework for the development of health promotion programs (Bartholomew 2016, 3). It uses an ecological approach to assess the needs and strengths of a population, and to plan, conduct, and disseminate a program, targeting different ecological levels to produce a desired change (Bartholomew 2016, 15). The IM approach focuses on tailoring culturally appropriate interventions and promoting community participation, where the target community is involved in the development of the program. Involvement and participation are fundamental for producing the desired change in a community-based intervention (Bartholomew et al. 2011, 3).

The IM approach has been used as a framework for the creation of a variety of health promotion programs, including healthy lifestyle programs in the child care setting. The IM method has shown to be successful in creating interventions that have positive effects in promoting healthy eating in young children (Sweitzer et al. 2010; Vereecken et al. 2009).

The IM framework propose six sequential steps to tailor a health promotion program: 1) conduct a needs assessment; 2) create objectives; 3) select theoretical methods and applications; 4) develop components and materials to support the program; 5) develop a plan for adoption, implementation, and sustainability of the program; and 6) develop an evaluation plan (Bartholomew et al. 2011, 18).

1.2.4.1 Step 1. Conduct a needs assessment

The first step of the Intervention Mapping (IM) framework is to conduct a needs assessment for the program. A needs assessment is the process for identifying gaps between the current situation and the ideal or desired situation in a community (Gilmore and Campbell 2005, 7). A needs assessment seeks to understand the 'problems' in a community and provide a detailed description of it and addresses the factors that influence the 'problem', such as behaviour and environment (Bartholomew et al. 2011, 174). A needs assessment provides the foundation for the development of a health promotion program, and it guides planning and delivery of the program for a community.

Ideally, a needs assessment would contain several sources of data which produces a detailed and comprehensive understanding of the situation in the community (Bartholomew et al. 2011, 209). The IM framework recommends a consultation with key informants to explore the 'situation' in the community and also recommends a literature review on the topic (Bartholomew et al. 2011, 209). Consulting key informants from the community provides insights about the 'situation' from the community point of view and how the 'situation' in the community could be addressed. A literature review of relevant studies on the topic provides insight about what is already known on the topic.

1.3 Study rationale

There is a need to focus more efforts on the promotion of healthy eating in child cares and there is a need for programs aimed at promoting healthy eating, with a special emphasis on CCE education (Taveras et al. 2006). Child care educators have been overlooked as facilitators in the promotion of healthy eating in child cares, and in turn, they can make better use of these opportunities to teach children healthful behaviours. For CCE to embrace positive role modeling and effectively promote healthy eating to children, they will require educational programs to address these gaps.

Given there are few community-tailored, theoretically informed and empirically evaluated educational programs for child care educators, the development of an evidence-based educational program is warranted. The research conducted in this thesis will serve as a foundation for the development of future programs aimed at promoting healthy eating in the child care setting. A consultation with key informants will provide information on what is needed for the promotion of healthy eating by CCE in Alberta. Also, a rapid review of interventions used in the promotion of healthy eating in child cares will provide a comprehensive description of the programs that have been conducted and their effect on the promotion of fruits and vegetables consumption in child cares.

Understanding the educational needs of CCE in their promotion of healthy eating and insight into healthy eating interventions in child cares will provide key and valuable information for the development of future programs aimed at promoting healthy eating in child care centres.

1.4 Research purpose and objectives

1.4.1 Research purpose

The two main aims of this research are to conduct a needs assessment through: 1) a consultation with key informants in the child care sector to explore and identify the educational needs of child care educators in the promotion of healthy eating in child care; and 2) a rapid review of interventions designed to promote children's consumption of vegetables and fruits in child cares.

1.4.2 Research objectives

Study 1. Explore and identify the educational needs of child care educators in their promotion of healthy eating in the child care setting from the perspective of key informants.

1.1 Consult with a sample of key informants from different child care sectors in Alberta involved in the delivery of programs and/or research to examine their perceptions of and

recommendations for child care educator's educational needs in the promotion of healthy eating in child cares.

1.2 Update the findings of previous work conducted in Alberta on child care educator's educational needs in their promotion of healthy eating in child cares.

Study 2. Conduct a rapid review of the literature on interventions aimed at promoting children's consumption of vegetables and fruits in child cares.

2.1 Characterize the types of interventions used at different ecological levels in the promotion of children's consumption of vegetables and fruits in child cares.

2.2 Identify the type of strategies used in interventions to promote children's consumption of vegetables and fruit in child cares.

Chapter 2 . Methods

2.1 Overview of methods

The main aim of this research was to conduct a needs assessment through: 1) a consultation with key informants in the child care sector to explore and identify the educational needs of child care educators (CCE) in the promotion of healthy eating in child care; and 2) a rapid review of interventions designed to promote children's consumption of vegetables and fruits in child cares. The information gathered from the needs assessment is part of an Intervention Mapping (IM) process to inform future healthy eating programs in child cares.

Parts of the Intervention Mapping framework were used to guide the data collection of the needs assessment. The IM framework is typically used for the development of evidence-based health promotion interventions which was an appropriate choice for this study. The first step of IM is to conduct a needs assessment which involves a process of identifying gaps between the current 'situation' and the ideal or desired 'situation' in a community, and to identify factors that influence such 'situation' in a community (Bartholomew et al. 2011, 174; Gilmore and Campbell 2005, 7).

The needs assessment was comprised of two sources of data: 1) Study 1. Consultation with key informants to determine child care educator's educational needs in their promotion of healthy eating; and 2) Study 2. Rapid review of interventions aimed at promoting children's consumption of vegetables and fruits in child cares.

2.2 Study 1. Consultation with key informants

A cross-sectional study design was used with key informants to address the gaps on CCE's educational needs for the promotion of healthy eating in child cares. Online surveys with closed- and open-ended questions were used to consult with a sample of key informants from different child care

sectors. Content analysis was used to analyse the open-ended questions, and descriptive statistics were used to analyse the closed-ended questions. For a detailed description of the methods followed for Study 1, see section 3.2 Methods in Chapter 3.

2.2.1 Sampling and inclusion criteria

A sample size of at least twenty-five participants is deemed acceptable for a small qualitative study that involves content analysis (Mason, 2010). For this study, given the mix of key informants, forty key informants would provide enough information to reach the point of data saturation for content analysis (Mason 2010). The sampling size for each of the five groups of key informants in this study was composed of the following: 1) ten CCE, 2) five child care directors, 3) ten parents of children attending child care, 4) five dietitians working in the child care setting and 5) ten experts in child cares' food environment working in academia or government. The key informants were included to ensure representation from relevant agents in the child care sector involved in the promotion of healthy eating in child cares.

Inclusion criteria. Child care educators, directors and dietitians were included in the study if they worked for at least three months in child care centres. Parents were included if they were a parent or guardian of a child attending child care. Experts were included if they had expertise in child care's food environment. To be included in the study, all participants had to be able to read and write in English.

2.2.2 Recruitment

The snowball method was used for recruitment of participants. Child care educators, directors and parents were contacted through child care centres in Edmonton, Alberta. Child cares were selected if they were licensed according to the regulations of Alberta's Child Care Licensing Act (Government of Alberta 2016), provided food to children on a regular basis and had an active email address for

contacting them. Three out of twenty-six (11%) child care centres agreed to participate. Child care directors distributed the study invitation via email to CCE and parents at their child care centre.

Experts in academia and government were contacted through the Healthy Eating Environments in Child Care (HEECC) Provincial Advisory Committee, of which Dr. Anna Farmer is a member and supervisor of this thesis project. Ms. Sheila Tyminski, Chair of HEECC was contacted to ask for permission to contact the group. Once permission to contact HEECC was obtained, the Chair sent HEECC members a copy of the study's invitation and the information letter through email. Individuals interested in participating in the study followed up with the primary investigator (AAL) of the study.

Dietitians were contacted through Alberta Health Services (AHS). First, the Director of dietitians working in the child care setting was contacted to ask whether dietitians from AHS would be interested in getting involved in this study and attaining permission to contact the dietitians. Once permission was obtained, the Director sent the study invitation and information letter through an email to the dietitians working in child care centres. Dietitians who were interested in participating in the study, followed up with an email to principal investigator of the study.

Before conducting any phase of the study, approval was obtained from the Ethics Board of the University of Alberta. A $10 dollar gift card was offered to all participants for participating in the study. The Information Letter for dietitians and experts was sent along with the study invitation, while the Information Letter targeting directors, CCE and parents was embedded in the surveys. Key informants' consent to participate in the study was obtained implicitly by completing the survey. To see a copy of the invitations and information letters, see Appendix A and Appendix B, respectively.

2.2.3 Development and description of surveys

The researchers (AAL and AF) developed five similar surveys for the consultation with key informants. Each survey was tailored for each group of key informants (i.e., CCE, directors, parents,

dietitians and experts) and the surveys had a similar structure and series of questions. The questions and themes were derived from previous work conducted with child cares in Edmonton (Farmer et al. 2014; Shewring 2016) and findings from a Food Literacy Meeting with government and non-government sectors in Alberta (Farmer et al. 2016).

The surveys were composed of closed- and open-ended questions with six main sections: 1) *Alberta Nutrition Guidelines for Children and Youth* (Government of Alberta 2012); 2) Role modeling; 3) Picky eating; 4) Communication with parents; 5) Training; and 6) Training Delivery Method. The surveys inquired about the educational needs of CCE and participants were asked to comment if there is room for improvement in these areas. Also, the survey asked about the preferred delivery method for CCE training. The surveys for parents and CCE had additional questions regarding *Eating Well with Canada's Food Guide* (Health Canada 2007), while the directors' survey had an additional question that inquired about their role in the promotion of healthy eating in the child care centre. Most closed-ended questions used Likert scales responses. The surveys were pre-tested with researchers to ensure suitability and acceptability of the questions. The surveys are presented in Appendix D.

The surveys were administered online. The benefits of using online surveys include, they are "quick and easy to distribute, easy to access and data collection can be carried out quickly" (Braun and Clarke 2013, p. 136). The REDCap platform (Research Electronic Data Capture) was used to manage the online surveys. REDCap is a secure web-based survey application hosted at the University of Alberta (Harris et al. 2009). Once the surveys were set up on the REDCap platform, the surveys were pre-tested to ensure they were working properly and formatted as expected, and were accessible before delivering it to participants.

2.2.4 Data collection and analysis

Data were collected through the online surveys. The survey was open and accessible to anyone with the URL link to the survey and an internet connection for accessing it from a computer, tablet or smartphone. The URL link to access the survey was embedded in the invitation and information letter that were distributed to participants. Data were collected from March 21 to May 31, 2017. The surveys took approximately 15-20 minutes to complete, and the electronic gift cards were granted to participants who accepted the incentive.

Microsoft Excel (Inc., Redmond, WA, USA) was used for management of the data. The data were organized by group of key informants; close-ended questions were analyzed using quantitative analysis, while open-ended questions were analysed using qualitative content analysis. Fifty-three key informants' surveys were included in the analyses.

Closed-ended questions were analyzed quantitatively using descriptive statistics, and response frequency was the most utilized method for the analysis and presentation of data. Frequency counts of the number of occurrences within a particular group of respondents were accounted (Government of Canada 2002). The analysis was conducted in Microsoft Excel (Inc., Redmond, WA, USA) and histograms were used to illustrate the response frequencies. Due to the small number of respondents, responses to Likert scale questions were aggregated and collapsed. For example, 'very important' and 'important' were combined.

Open-ended responses on the survey were analyzed using content analysis. Content analysis is a systematic method that uses an inductive approach for coding and identifying themes and patterns for subjective interpretation of text data (Hsieh and Shannon, 2005). An inductive approach characterizes by "detailed readings of raw data to derive concepts, themes through interpretations made from the raw data by an evaluator or researcher" (Thomas 2006, p. 238). Conventional content analysis was the

most suitable method to analyse the survey responses, since we wanted to expand on the current knowledge on the nutrition educational needs of child care educators. Conventional content analysis entails "researcher's immersion of the data by reading all data several times and by making notes in the reading process. As this activity continues, labels for codes emerge that are reflective of the data; these often come directly from the text and then become the initial coding scheme. Codes then are sorted into categories based on how different are related and linked. These emerging categories are used to organize and group codes into meaningful clusters" (Hsieh and Shannon 2005, p. 1279). This approach allowed for the discovery of new insights to emerge from the data and brought deeper knowledge and understanding on the topic (Hsieh and Shannon 2005; Kondracki, Wellman, and Amundson 2002). Complete coding was used to identify codes, which is the process of "identifying codes from anything and everything that answers the research question, within the entire dataset" (Braun and Clarke 2013, p.206). Microsoft Office Word was used to organize and manage the qualitative data (Inc., Redmond, WA, USA). Data were coded, grouped in themes and analyzed by one researcher (AAL); however, a second researcher (APF) reviewed the analysis and conceptual ordering of data.

After reviewing the qualitative data, and including the nature of the data, it was decided that the Socioecological Model (SEM) was an appropriate framework for organizing the qualitative data, since the SEM encompasses all the levels of influence that may affect the promotion of healthy eating in child cares (i.e., individual, interpersonal, institutional, and public policy levels) (Stokols 1996).

Triangulation of data was conducted to confirm the consistency of the findings in the quantitative and qualitative data. Triangulation refers to the combination of qualitative and quantitative data to validate findings across the two kinds of data (Patton 1999, 1192). Closed-ended responses were analyzed quantitatively and open-ended were analyzed qualitatively, and then the findings from the two

sets were compared and analysed together to discover any agreement or conflict between the data in order to develop conclusions about the findings (Bryman 2006; Fetters, Curry, and Creswell 2013).

2.3 Study 2. Rapid review

The rapid review conducted in Study 2 was guided by the methodologies suggested by Khangura et al. (2012) and Gannan et at. (2010). A rapid review is characterized by "focusing the research question, using broader search strategies, reviewing the literature within a limited timeframe, restricting the amount of gray literature, extracting only key variables and executing only 'simple' quality appraisal" (Grant and Booth 2009, 100). A rapid review was the most suitable method for conducting this review since this is a new area of research and we wanted to explore available literature on the topic before committing to an extensive review. For a detailed description of the methods followed for the rapid review, see section 4.2 Methods in Chapter 4.

2.3.1 Search conducted and studies included

The original literature search was conducted in May 2016 with the assistance of a library scientist (SC) and updated in July 2017, using four electronic databases (PubMed, CINAHL, Scopus and Web of Science) for relevant articles using the following key words: 'intervention', 'healthy eating', 'child care', and 'vegetable and fruit'. Relevant reviews were scanned for additional papers. The search was limited to studies published in the last 11 years (2006-2017), the search was limited to studies published 2006 and onwards. The search was updated a year after the original search and included studies published to July 2017. The search was limited to studies published in English, French or Spanish. For a complete list of search terms and search strategies, see Appendix F.

Included studies were intervention studies that aimed to promote consumption of vegetables and fruits (V & F) among children in the child care setting, that targeted preschool children (2 to 5 years of age), that evaluated the intervention by reporting differences in V & F consumption with control

group and intervention groups comparisons or baseline and post-interventions measurements and were conducted in North America, Europe, Australia and New Zealand. Descriptive studies and pilot studies were excluded, and studies that only included overweight or obese children, or that included children with special needs were also excluded since we wanted to explore the consumption of V & F in healthy children.

2.3.2 Screening and data management

The screening of the studies followed the reporting standards of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al. 2009). A total of 958 studies were identified, 636 studies were screened based on the titles and abstracts. Forty-four full-text studies were retrieved through the University of Alberta Libraries System for further review. After the screening process was completed, 20 studies were selected for inclusion. An additional article was included after the search was updated in July 2017. A total of 21 studies were selected for analysis. The primary reviewer (AAL) screened and analysed the studies and a second reviewer (APF) confirmed the results.

2.3.3 Data collection and analysis

For each of the selected intervention studies, the following information was retrieved: aim of the study, intervention setting, target population and country, age of children, description of the intervention, strategies used, theoretical foundation, study design, sampling method, number of participants, duration/length of the intervention, main target outcomes, outcomes and process evaluation data. Although some studies evaluated other intervention outcomes, only children's consumption of V & F outcomes were taken into consideration.

The Socioecological Model (SEM) was used to organize and categorise the interventions by level of influence. The SEM proposes that a health behaviour is regulated by the interaction of multiple levels

of influences, including factors at the individual, interpersonal, institutional, and public policy levels (Stokols 1996). Studies were categorized according to the level of influence they targeted, namely the individual, interpersonal, institutional, and public policy level.

The information on the process evaluation of studies was included (if available) to provide additional data on the fidelity and the quality of implementation of interventions. The process evaluation framework proposed by Linnan and Steckler (2002) was used for this purpose which included information on context, reach, dose delivered, dose received and fidelity of interventions (Steckler and Linnan 2002). Some studies had additional articles that described the process evaluation of interventions; and these articles were also included in this review to provide contextual information on the intervention. Any qualitative and quantitative data presented in studies regarding these aspects were collected.

To add rigour to this review, the methodological quality of the studies was assessed. The Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies was used (Armijo-Olivo et al. 2012). The EPHPP tool rates the quality of methodology of interventions on six components: 1) selection bias, 2) study design, 3) confounders, 4) blinding, 5) data collection methods, 6) withdrawals and dropouts. Each component was evaluated as 'strong', 'moderate' or 'weak'. Based on the ratings for each component, the tool provides a global rating for the study assessed. Studies not receiving any 'weak' ratings were categorized as strong quality, studies receiving one 'weak' rating were categorized as moderate quality, and studies receiving two or more 'weak' ratings were categorized as weak quality (Armijo-Olivo et al. 2012). Two raters assessed the quality of studies (AAL, APF).

Chapter 3 . Study 1. Perceptions of and Recommendations for Child Care Educators' Educational Needs in the Promotion of Healthy Eating in Child Cares

3.1 Background

Child care is an important setting for the promotion of healthy eating habits and the prevention of overweight and obesity in children. In Canada, approximately 60% of young children use child care daily (Sinha 2014). Child care centres provide opportunities for increasing the availability and accessibility of foods and for modeling healthy eating habits targeting a great number of children (Birch and Ventura 2009; Story, Kaphingst, and French 2006; Birch and Fisher 1998). Several studies found that child care centres can serve as important venues for teaching and promoting healthful eating habits to children; and that children's eating behaviours can be modified through the centre's food environment, and positive interaction with child care educators (CCE) (Shewring 2016; Farmer 2014; Erinosho et al. 2012; Larson et al. 2011).

The promotion of healthy eating in child cares is influenced by several factors ranging from nutrition policies to individual behaviours. A review of the literature found that the promotion of healthy eating is influenced by the nutrition policies and practices of child cares: the degree of adherence to nutrition guidelines, the attributes of the food environment, the nutritional quality of the food served, the behaviours of CCE in the food context, the provision of nutrition education for children, and the involvement of parents (Erinosho et al. 2012; Erinosho et al. 2011; Larson et al. 2011). All these factors in conjunction should work together to promote children's healthy eating. However, there are some barriers to promoting healthy eating in child care, such as low implementation and adherence to nutrition guidelines, low quality of food served, lack of training for CCE, and negative or poor role modeling from CCE (Downs et al. 2011; Shewring 2016; Farmer et al. 2014).

Child care educators are key players in the promotion of healthy eating and behaviour change in children, through positive role modeling, encouraging healthy eating and proper introduction of new foods (Shewring 2016; Erinosho et al. 2012; Hughes et al. 2007). However, several studies found there is room for improving CCE's efforts in the promotion of healthy eating (Shewring 2016; Farmer et al.2014; Sharma et al. 2013; Lumeng et al. 2008). For instance, previous research conducted in Alberta found there is room for improving CCE's knowledge of and adherence to the *Alberta Nutrition Guidelines for Children and Youth*, handling of children's picky eating and children's food preferences, communication with parents, and role modeling of healthy eating behaviours (Shewring 2016; Farmer et al. 2014).

In 2008, the Government of Alberta launched the *Alberta Nutrition Guidelines for Children and Youth* (ANGCY) to "equip schools, recreation facilities and child care centres with the tools needed to promote healthy food choices and healthy eating behaviours" (Government of Alberta 2012, p.1). The aim of the ANGCY in child cares is to shape and standardize nutrition practices among child care centres and to realize best practices in the promotion of healthy eating among young children. The ANGCY has three pillars in the promotion of healthy eating: 1) providing healthy diets for children; 2) enhancing access to safe and nutritious foods; and 3) creating environments that support healthy food choices (Table 1-1) (Government of Alberta 2012) . Since the implementation of the ANGCY is optional, the ANGCY were adopted and implemented to varying degrees across child cares in Alberta (Shewring 2016; Downs et al. 2011). An exploratory qualitative study found the ANGCY were positively described by CCE, as relevant and easy to use (Nikolopoulos et al. 2012). Nevertheless, several other studies found CCE lacked knowledge of the ANGCY's general recommendations, highlighting an important barrier to the adoption and implementation of the guidelines and the promotion of healthy eating in child care (Shewring 2016; Farmer et al. 2014; Downs et al. 2011).

The ANGCY recommends that CCE act as role models for the creation of supportive healthy eating environments for children. Role modeling is defined as the positive eating behaviours CCE perform to act as examples to influence children's eating habits (Cruess, Cruess, and Steinert 2008). The recommended best practices for the role modeling by CCE are: 1) sitting with children at mealtimes, 2) eating the same food as children, 3) informally talking with children about healthy food, 4) encouraging children to try a new food, and 5) avoiding the use of food as a reward or punishment (Government of Alberta 2012; Benjamin-Neelon and Briley 2011).

Introduction of new foods is one of the recommendations made in the ANGCY. However, the introduction of new foods to children was perceived as challenging by CCE, and picky eating was identified as an important barrier to the introduction of new foods (Farmer et al. 2014). Picky eating is a relatively common behaviour in toddlers and preschool children that is characterized by restrictive consumption of foods, strong food preferences, and unwillingness to try new foods (Fildes et al. 2016). Picky eating has been associated with poor dietary quality and underweight in children (Fildes et al. 2016; Carruth et al. 1998). Awareness of role modeling and proper handling of children's picky eating are crucial for CCE's promotion of healthy eating among preschool children.

Little attention has been paid to the development of tailored and targeted educational programs for CCE, yet moderate evidence exists to suggest that healthy eating programs tailored to CCE are effective in improving the promotion of healthy eating in child cares (Markides et al. 2017; Lanigan 2012; Needham et al. 2007). Nevertheless, more information about the educational needs of CCE and the specific ways of tailoring effective educational programs and curriculum are needed to support CCE in their efforts to promote healthy eating in the child care setting.

The aim of this study is to explore and identify the educational needs of child care educators in their promotion of healthy eating in the child care setting from the perspective of key informants. The

objectives of this study were to consult with a sample of key informants from different child care sectors in Alberta involved in the delivery of programs and/or research to examine their perceptions of and recommendations for child care educator's educational needs in the promotion of healthy eating in child cares; and to update the findings of previous work conducted in Alberta on the educational needs of child care educators in their promotion of healthy eating in child cares.

3.2 Methods

3.2.1 Study Design

A cross-sectional design was used to address the gaps in the CCE's educational needs in the promotion of healthy eating in child cares. Cross-sectional surveys allowed us to capture a variety of data in a specific point in time in a cost effective and time efficient manner. Online surveys with closed- and open-ended questions were used to consult with a sample of key informants from different child care sectors. The benefits of using online survey include they are quick and easy to distribute, easy to access and data collection can be carried out quickly (Braun and Clarke 2013, 136). The open-ended questions were analysed using content analysis and the closed-ended questions were analysed using descriptive statistics.

3.2.2 Sampling and inclusion criteria

A sample size of at least twenty-five participants is deemed acceptable for a small qualitative study that involves content analysis (Mason, 2010). For this study, given the mix of key informants, forty key informants would provide enough information to reach the point of data saturation for content analysis (Mason 2010). The sample size for each of the five groups of key informants in this study was: 1) ten CCE, 2) five directors, 3) ten parents of children attending child care, 4) five dietitians working in the child care setting and 5) ten experts in the child cares' food environment working in academia and government. The different groups of key informants were included to have representation from relevant

agents in the promotion of healthy eating in child cares. The inclusion criteria for key informants are presented in Table 3-1.

Table 3-1 Inclusion criteria for key informants

Key informants	**Inclusion criteria**
All groups	Ability to read and write in English
Child care educators, directors and dietitians	Worked for at least three months in child care centres
Parents	To be parent or guardian of a child attending child care
Experts	To have expertise in child cares' food environment

3.2.3 Recruitment

The snowball method was used in the recruitment of participants. Child care educators, directors and parents were contacted through child care centres in Edmonton, Alberta. Child care centres located in Edmonton were identified from the Government of Alberta website (http://www.humanservices.alberta.ca/oldfusion/ChildCareLookup.cfm). Child cares were selected if they were licensed according to regulations of the Alberta Child Care Licensing Act (Government of Alberta 2016), provided food to children on a regular basis and provided an email address to contact them. Twenty-six child care centres were invited to participate through an email sent to child care directors. Of the twenty-six child cares, eight directors replied to the email and expressed interest in the study, and further information was sent to them. After sending the information, three directors replied to the email and agreed to participate in the study and formal consent process was undertaken with them. The participation rate for child care centres was 11%; although the participation rate was low, more than half of the proposed number of child care centres (n=5) participated in the study. The directors from each centre assisted with the recruitment of participants by distributing the study invitation to CCE and parents at their centre via email, directors preferred to distribute the invitation through email instead of distributing a printed copy of the invitation, even though printed flyers and posters were offered to them.

Experts in academia and government were contacted through the Healthy Eating Environments in Child Care (HEECC) Provincial Advisory Committee, of which Dr. Anna Farmer is a member and supervisor of this thesis project. Ms. Sheila Tyminski, Chair of HEECC was contacted to ask for permission to contact the group. Once permission to contact HEECC was obtained, the Chair sent the HEECC members the study invitation and the Information Letter through email. Individuals interested in participating in the study, followed up with the primary investigator (PI) (AAL) of this study.

Dietitians were contacted through Alberta Health Services - (AHS). First, the Director of dietitians working in the child care setting was contacted to ask whether dietitians from AHS would be interested in getting involved in this study and attaining permission to contact the dietitians. Once permission was obtained, the Director sent the study invitation and information letter through an email to the dietitians working in child care centres. Dietitians who were interested in participating in the study, followed up with an email to principal investigator of the study.

Before conducting any phase of the study approval was obtained from the Ethics Board of the University of Alberta. A $10 dollar gift card was offered to all participants for participating in the study. The information letter for dietitians and experts was sent along with the study invitation, while the information letter for directors, educators and parents was embedded in the survey. Consent from key informants to participate in the study was obtained implicitly by completing the survey. The study invitations and information letters are found in Appendix A and Appendix B, respectively.

3.2.4 Development and description of surveys

The researchers (AAL and AF) developed five similar surveys for the consultation with key informants. Each survey was tailored for each group of key informants (i.e., CCE, directors, parents, dietitians and experts) and each survey had a similar structure and series of questions. The questions and themes were derived from previous work conducted in Alberta (Farmer et al. 2014; Shewring 2016)

and findings from a Food Literacy Meeting with government and non-government sectors in Alberta (Farmer et al. 2016).

The surveys were composed of closed- and open-ended questions with six main sections: 1) *Alberta Nutrition Guidelines for Children and Youth* (Government of Alberta 2012); 2) Role modeling; 3) Picky eating; 4) Communication with parents; 5) Training; and 6) Training Delivery Method. The surveys inquired about the educational needs of CCE, and participants were asked to comment if there is room for improvement in these areas. Also, the surveys asked about the preferred delivery method for CCE's training. The surveys for parents and CCE had additional questions regarding *Eating Well with Canada's Food Guide* (Health Canada 2007), while the director's survey had an additional question that inquired about their role in the promotion of healthy eating in their child care centre. Most closed-ended questions used Likert scale responses.

Regarding the ANGCY, the surveys inquired about CCE's knowledge of the ANGCY's Food Ranking System (FRS) but the surveys did not inquire about the other areas of the ANGCY (i.e., Menu Planning and Food Portion Sizes). The reason for only including the FRS, and not the other areas was because menu planning is not typically part of the CCE's responsibility; however, knowledge of Food Portion Sizes (part of EWCFG) is expected for CCE. The surveys were pre-tested with researchers to ensure suitability and acceptability of the questions, and after pre-testing, some questions were re-worded to improve the clarity. The surveys are presented in the Appendix D.

All the questions on the surveys were optional, that is, if participants did not want to answer a question they could skip it and continue to answer the rest. This flexible feature of the surveys was kept since some key informants may not feel comfortable answering some of the questions. Also, mandatory questions are likely to increase the surveys' drop-outs (Dillman, Smyth, and Christian 2014).

The surveys were administered online. Some of the benefits of online surveys include they are "quick and easy to distribute to a numerous group of participants that are geographically dispersed, can be easily accessed with internet connection, allow responses to be anonymous, data collection can be carried out quickly and there is no need for data entry" (Braun and Clarke 2013, 136).

The REDCap platform (Research Electronic Data Capture) was used to manage the online surveys. REDCap is a secure web-based application for building and managing online research projects (Harris et al. 2009) hosted at the University of Alberta. Once captured in the REDCap platform, the surveys were pre-tested to ensure they were working properly and were accessible before delivering it to participants.

The surveys were open access and anyone with the URL link to the survey and internet connection could access to the survey from a computer, tablet or smartphone. The only identifier collected by the survey was the participant's email address which was collected if they agreed to receive the incentive ($10 gift card) which was optional; the email address was needed to deliver the electronic gift card. If participants did not provide an email address, their responses were kept anonymous, and if they did share their email address, their responses were kept confidential.

3.2.5 Data collection

Data were collected through online surveys that included quantitative and qualitative data. The URL link to access the survey was embedded in the invitation and information letter that was distributed to participants. Data were collected from March 21 to May 31, 2017. The surveys took approximately 15-20 minutes to complete and the electronic gift card was granted to participants who accepted the incentive.

3.2.6 Data analysis

Microsoft Excel (Inc., Redmond, WA, USA) was used for the management of data. Data were organized by groups of key informants, closed-ended questions were analyzed using quantitative methods and open-ended questions were analysed using qualitative methods. Fifty-three key informant surveys were included in the analyses, which included surveys that were answered completely or where most (50% or more) of the questions were answered. Only one survey was excluded since the respondent did not answer the majority of the questions. Missing values were omitted in the analysis, given that less than 5% of the participants had missing values (Pickles 2005).

3.2.6.1 Quantitative analysis

Closed-ended responses were analyzed quantitatively using descriptive statistics; response frequency was the most utilized method in the analysis. Frequency counts the number of occurrences within a particular group of respondents (Government of Canada 2002). The analysis was conducted in Microsoft Excel (Inc., Redmond, WA, USA) and histograms were used to illustrate response frequencies. Due to the small number of respondents, responses to the Likert scale questions were aggregated and collapsed; for example, responses such as 'very important' and 'important' were combined.

3.2.6.2 Qualitative analysis

Open-ended responses were analyzed using content analysis. Content analysis is a systematic method that uses an inductive approach for coding and identifying themes and patterns for subjective interpretation of text data (Hsieh and Shannon, 2005). An inductive approach characterizes by "detailed readings of raw data to derive concepts, themes through interpretations made from the raw data by an evaluator or researcher" (Thomas 2006, p.238). Conventional content analysis was the most suitable method to analyse the survey responses since we sought to expand on the current knowledge and the nutrition educational needs of CCE. Conventional content analysis entails "researcher's immersion of the

data by reading all data several times and by making notes of his or her first impressions of the text. As this process continues, labels for codes emerge that are reflective of the data; these often come directly from the text and then become the initial coding scheme. Codes then are sorted into categories based on how different are related and linked. These emerging categories are used to organize and group codes into meaningful clusters" (Hsieh and Shannon 2005, p. 1279). This approach allowed for the discovery of new insights to emerge from the data and brought deeper knowledge and understanding on the topic (Hsieh and Shannon 2005; Kondracki, Wellman, and Amundson 2002).

Complete coding was used to identify codes, which is the process of "identifying codes from anything and everything that answers the research question, within the entire dataset" (Braun and Clarke 2013, p.206). Microsoft Office Word was used to organize and manage the qualitative data (Inc., Redmond, WA, USA). Responses were reviewed line-by-line several times to become familiar with the data and to identify emerging themes inductively. Data were coded, grouped in themes and analyzed by one researcher (AAL); however, a second researcher (APF) reviewed the analysis and conceptual ordering of data.

Theoretical Framework. After reviewing the data and given the characteristics of the data, it was decided that it was appropriate to use the Socioecological Model (SEM) framework to organize the data by levels of influence. The SEM proposes that the performance of a behaviour is regulated by the interaction of multiple levels of influences, including factors at the individual, interpersonal, institutional, and public policy levels (Stokols 1996). According to McLeroy (1988) and Stokols (1996) individual factors are the characteristics of the individual, such as knowledge, skills, etc.; interpersonal factors are the social networks and social support systems; institutional factors are social organizations with organizational characteristics, rules and regulations for operation, such as child care centres; and public policies are local, state, and national laws and policies.

3.2.6.3 Triangulation of results

Triangulation of data was conducted to confirm the consistency of the findings in the quantitative and qualitative data. Triangulation refers to the combination of qualitative and quantitative data to validate findings across the two kinds of data (Patton 1999, 1192). Closed-ended responses were analyzed quantitatively and open-ended were analyzed qualitatively, and then the findings from the two sets of data were compared and analysed together to discover any agreement or conflict between the data in order to develop conclusions about the findings (Bryman 2006; Fetters, Curry, and Creswell 2013). For example, in the quantitative data, key informants reported that CCE needed training in handling children's picky eating, while in the qualitative data, they expressed that CCE needed specific training in child's development and introduction of new foods as part of their training in picky eating. In this case, each set of data corroborated the findings of the other and enhanced the credibility of the findings.

3.3 Results

The total number of key informants completing the survey (n=53) was composed of: eight CCE (15%), three directors (6%), twenty-nine parents (55%), six dietitians (11%), and seven experts (13%). The number of key informants completing the survey exceeded the proposed number (n=40) at the beginning of the study. This is partly due to having a higher number of parents answering the survey than planned. However, despite our recruitment efforts, we did not achieve the expected number of CCE, directors and experts. Figure 3-1 presents the distribution of key informants.

3.3.1 Quantitative data

Only the most important figures were presented in this section, refer to Appendix E for the other figures derived from quantitative data.

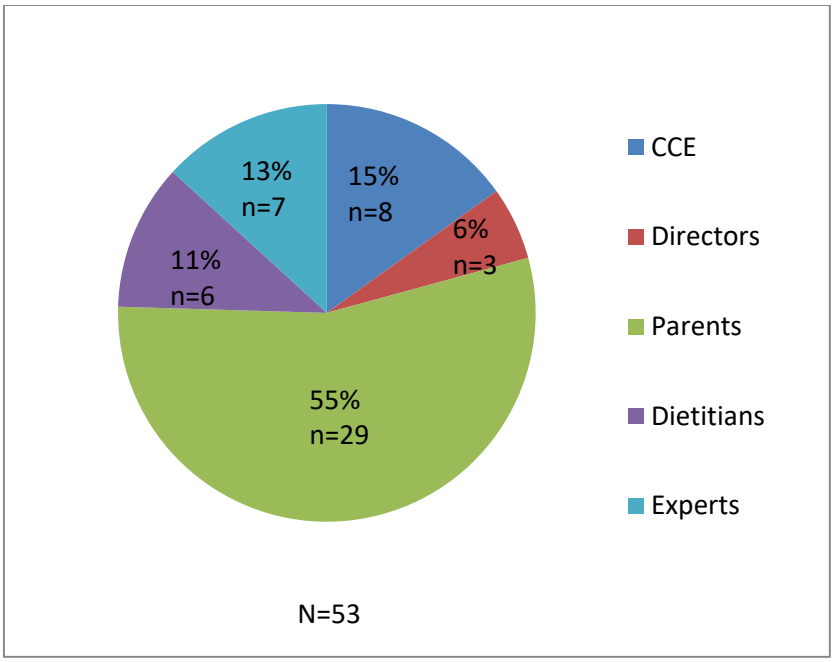

Figure 3-1. Compositions of key informants

3.3.1.1 *Eating Well with Canada Food Guide* and promotion of healthy eating in child care

CCE and parents were asked about their awareness and agreement with *Eating Well with Canada's Food Guide's* (EWCFG) recommendations. Parents were also asked whether they agreed that healthy eating was being promoted at their child's child care centre. All CCE (n=8) reported being aware of EWCFG to some extent. As well, the majority (n=7) of CCE agreed with the EWCFG recommendations which was expected since only licensed child care centres were included, and licensed child cares in Alberta are required to follow EWCFG (Government of Alberta 2016). For parents, 75.8% (n=22) agreed that healthy eating was being promoted at their child's child care, while 20.7% (n=6) were indifferent and 3.4% (n=1) disagreed. All parents (n=29) were aware of EWCFG recommendations and reported using EWCFG recommendations to some extent at home.

3.3.1.2 Awareness and perceptions of *Alberta Nutrition Guidelines for Children and Youth*

We asked key informants about their awareness and perceptions of *Alberta Nutrition Guidelines for Children and Youth* (ANGCY). Child care educators, directors and parents were asked whether the

guidelines and the Food Ranking System (FRS) of the ANGCY were put into practice at their child care centre, and CCE were also asked about their confidence in using the FRS. Most CCE (n=6) reported being aware of the ANGCY to some extent, and reported that the ANGCY and the FRS were put into practice at their centre. Also, all CCE who used the FRS (n=6) reported being confident in using the FRS to some extent. All directors (n=3) reported being aware of the ANGCY and that the ANGCY were put into practice at their centre; however, only one director reported using the FRS at the centre. Only eight out of twenty-nine (27.6%) parents reported being aware of the ANGCY and six of the eight reported the ANGCY were used at their child's centre. Five parents reported that the FRS was used at their child's centre and reported 'excellent/good' knowledge of the FRS by the CCE.

Dietitians and experts were asked about their perceptions of the level of adoption of the ANGCY in child care centres. Additionally, dietitians were asked about their awareness of the guidelines, the frequency in which they used the ANGCY in their practice, and perceptions of CCE knowledge of the ANGCY recommendations. All dietitians (n=6) were aware of the ANGCY and reported using them in their practice; these findings were as expected since dietitians employed at Alberta Health Services receive training on the ANGCY and are encouraged to use and support them. Dietitians and experts' responses were aggregated to report on the adoption of ANGCY in child cares, and most of them (n=6) reported fair adoption, but four reported poor adoption of ANGCY in child care centres (Figure 3-2). Four of six dietitians perceived that CCE had poor knowledge of the ANGCY recommendations.

Key informants were asked whether they agreed that it is important for CCE to receive training on the ANGCY. Most CCE (n=8), directors (n=3), parents (n=28) and experts (n=7) agreed, but half of dietitians (n=3) reported they 'neither agreed nor disagreed' that is important for CCE to receive training on the ANGCY (Figure 3-3).

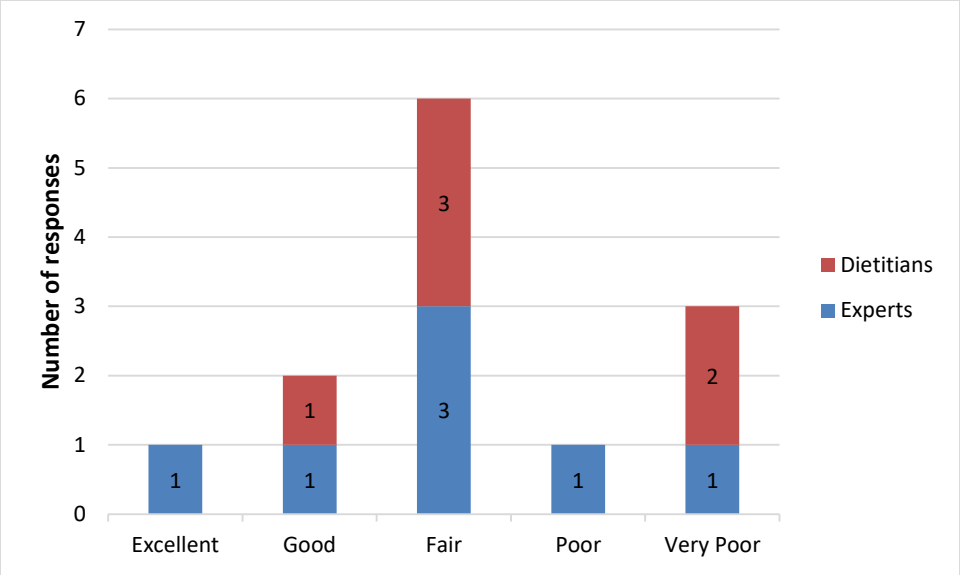

Figure 3-2. Dietitians (n=6) and expert's (n=7) perceptions of the adoption of *Alberta Nutrition Guidelines of Children and Youth* in child care centres.

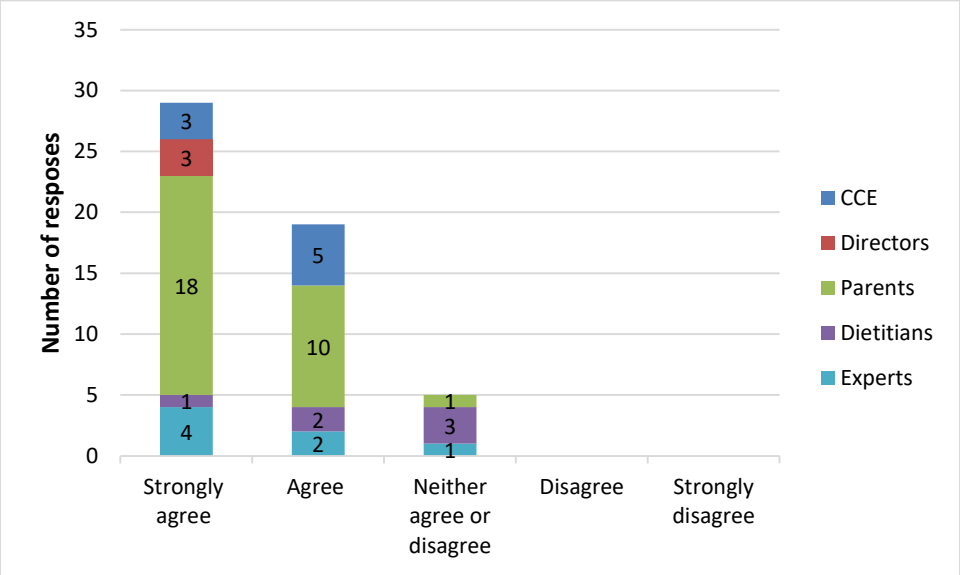

Figure 3-3. Key informants' (n=53) perceptions of the importance of child care educators need for training on the *Alberta Nutrition Guidelines for Children and Youth*.

Key informants were asked to indicate which areas of the ANGCY they considered to be the most relevant for CCE training (i.e., menu planning, food portion sizes and Food Ranking System). Key

informants could select more than one area as relevant. Overall, menu planning was the most relevant (92.4%, n=49) and food portion sizes relevant was considered the least relevant training topic for CCE (67.9% n=36) (Figure 3-4).

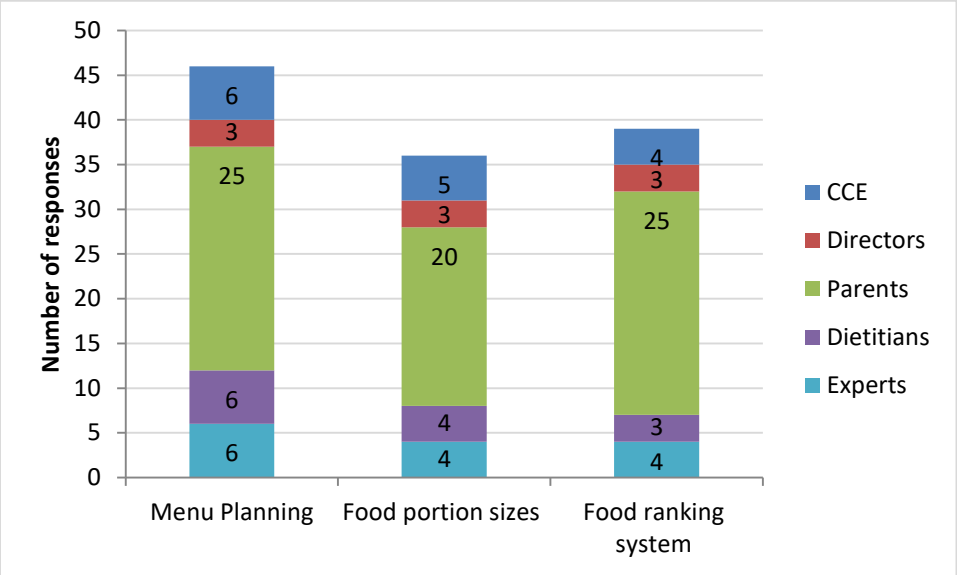

Figure 3-4. Key informants' perceptions of the relevancy of the areas of the *Alberta Nutrition Guidelines for Children and Youth* to child care educators training (n=53).

3.3.1.3 Role modeling

Child care educators were asked to self-report on their practice of role modeling behaviours at mealtimes. Directors, parents and dietitians were asked about CCE's role modeling behaviours at mealtimes at child cares. Experts were asked to rate how important they considered role modeling behaviours to be practiced by CCE at the child care setting.

All CCE (n=8) reported sitting with children, eating the same food children eat at mealtimes and encouraging children to try new foods; however, two CCE reported 'sometimes' using food as a reward or punishment with children (Figure 3-5). Although all directors (n=3) reported that CCE never used food

as reward or punishment at child care, dietitians (n=6) reports confirmed that CCE 'sometimes' used food as reward or punishment.

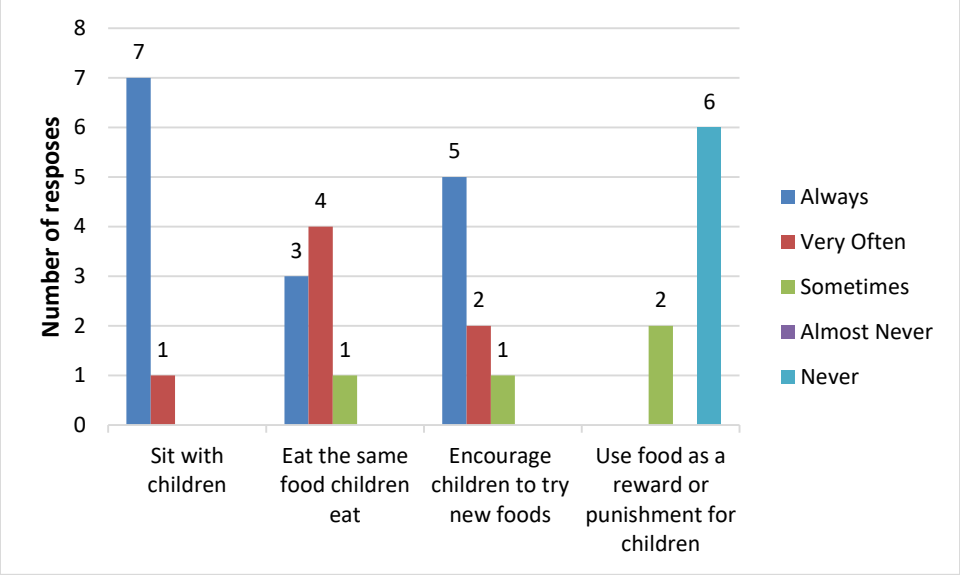

Figure 3-5. Child care educators' self-report of practicing role modeling behaviours at mealtimes (n=8)

When parents were asked about CCE's role modeling behaviours at their child's centre, 58.6% (n=17) reported not being sure if CCE ate the same food as children. While 51.7% (n=15) reported not being sure if CCE used food as reward or punishment at their child's centre, reflecting a lack of knowledge about the practices of their child's child care centre (Figure 3-6).

All experts (n=7) agreed that it was important for CCE to sit with children at meal times, to eat the same foods as children, to encourage them to try new foods, and for CCE to avoid using food as reward or punishment. Key informants were asked whether they agreed that it was important for CCE to receive training on role modeling. Most key informants (n=47) agreed that was important for CCE to receive training on role modeling (Figure 3-7).

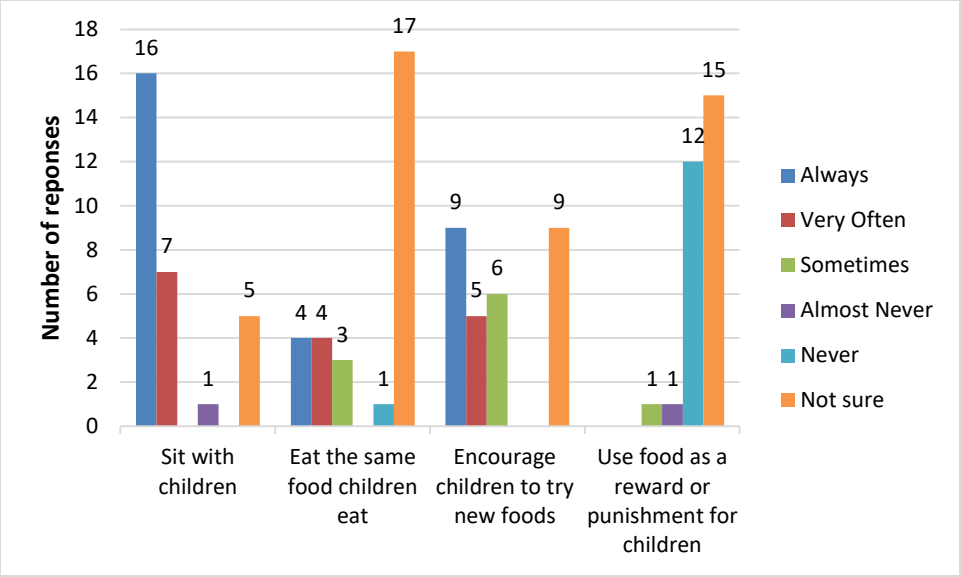

Figure 3-6. Parents' perceptions of child care educators' role modeling behaviours at mealtimes (n=29).

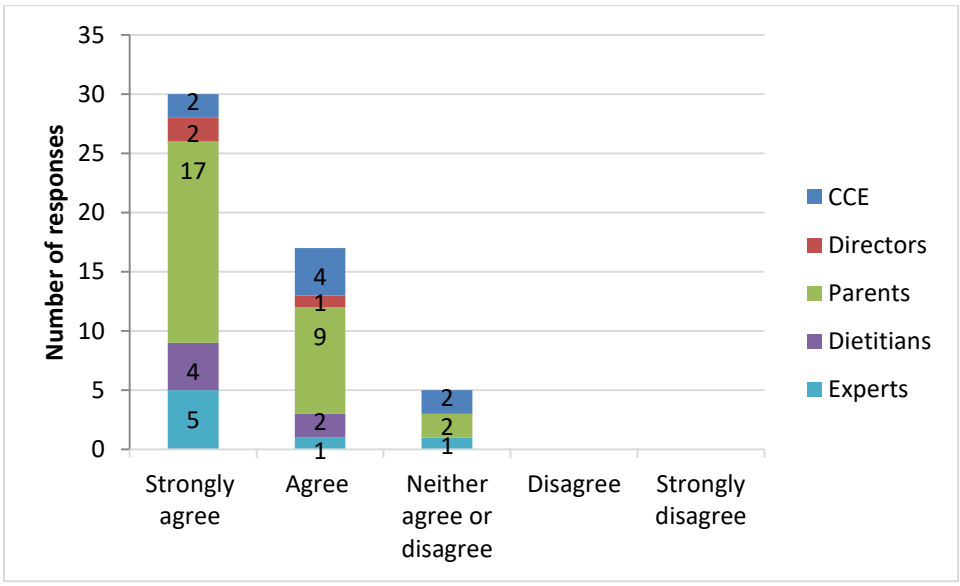

Figure 3-7. Key informant's perceptions of the importance of child care educators need for training in role modeling (n=52).

3.3.1.4 Perceptions of picky eating

Child care educators, directors, parents and dietitians were asked about the frequency of children's picky eating as a barrier to the promotion of healthy eating in child care. All of them reported

that children's picky eating was a barrier to the promotion of healthy eating to some extent, nevertheless, some parents (n=7) reported that it was 'almost never' a barrier (Figure 3-8).

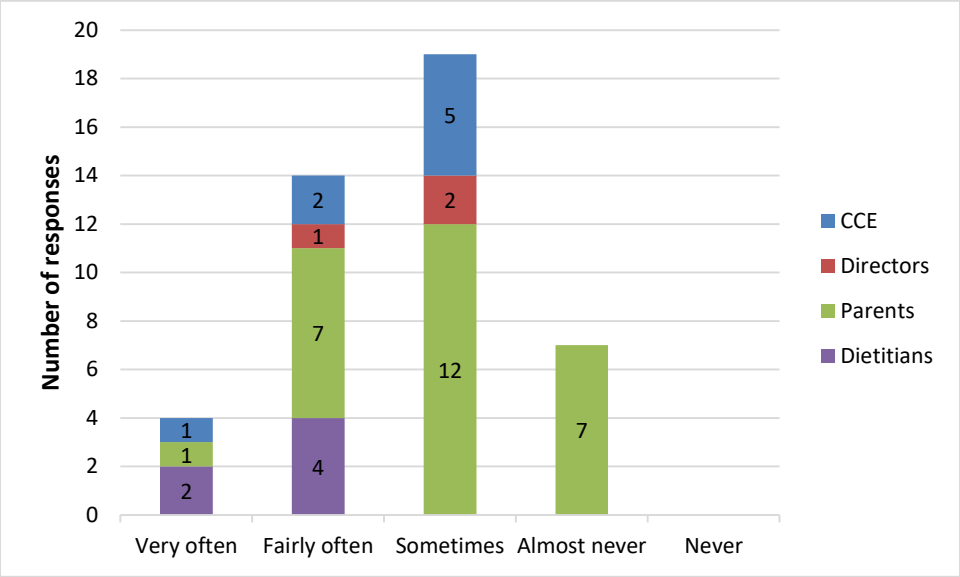

Figure 3-8. Child care educators (n=8), directors (n=3), parents (n=28) and dietitians (n=6) perceptions of the frequency of children's picky eating as a barrier to the promotion of healthy eating at the child care.

CCE were asked to self-report on their confidence in handling children's picky eating, and all of them reported being confident to some extent. However, when dietitians were asked about their perceptions of CCE's knowledge in handling children's picky eating, half of them (n=3) reported poor knowledge of CCE in handling children's picky eating (Figure 3-9). Key informants were asked whether they agreed that was important for CCE to receive training on handling children's picky eating. Most key informants agreed that was important for CCE to receive training in picky eating (Figure 3-10).

3.3.1.5 Perceptions on communication with parents

Parents were asked to report on how comfortable they felt when talking to CCE about their child's eating behaviours and to report on their confidence in CCE's healthy eating knowledge when

discussing their child's eating behaviours. Over 86% of parents (n=25) reported feeling comfortable in talking to CCE, but only 65.5% (n=19) reported feeling confident about CCE's healthy eating knowledge.

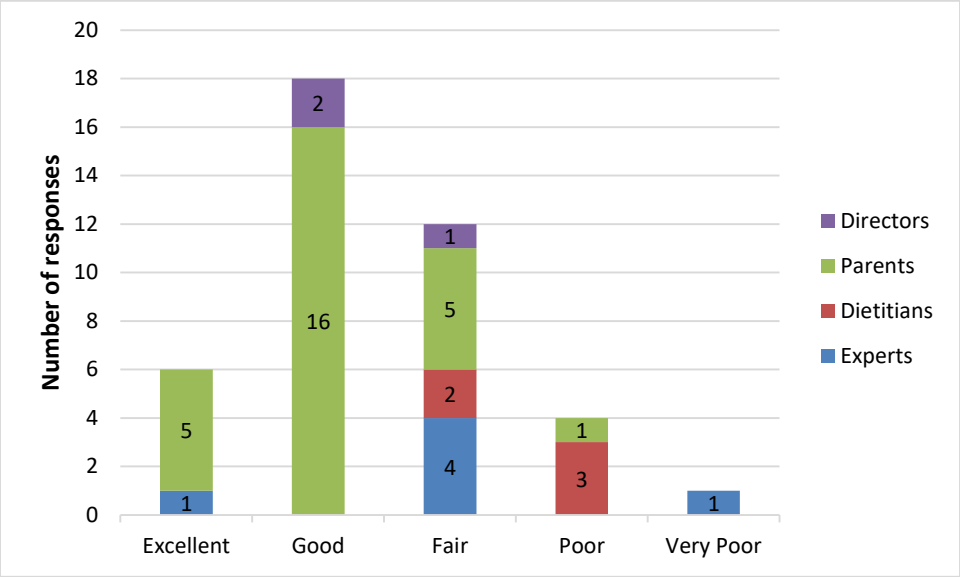

Figure 3-9. Perceptions of directors (n=3), parents (n=27), dietitians (n=5) and experts (n=6) of child care educators' knowledge in handling children's picky eating.

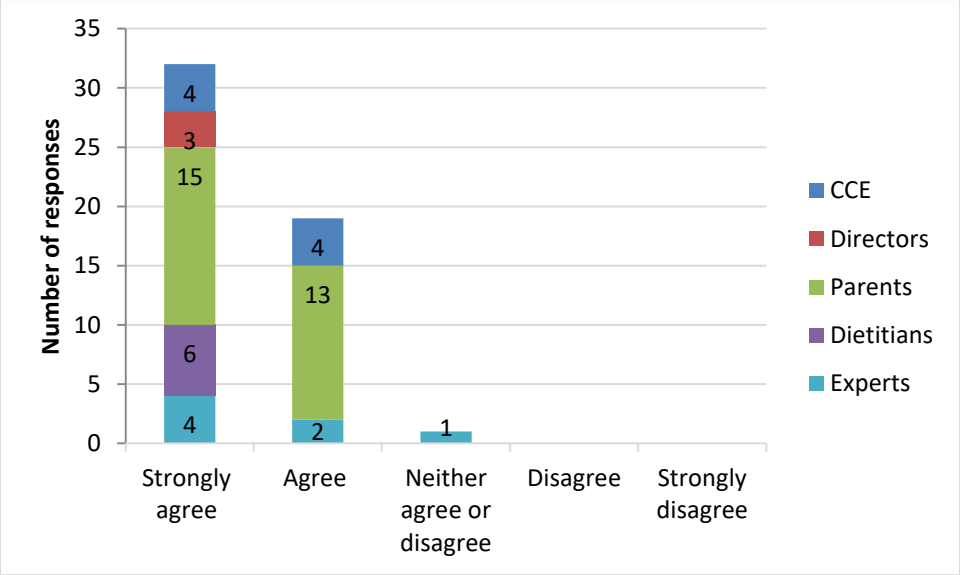

Figure 3-10. Key informant's perceptions of the importance of child care educators need for training in picky eating (n=52).

Directors and dietitians were asked to report on their perspectives of CCE's confidence and ability to talk to parents about children's eating behaviours, all directors (n=3) reported positively perceiving CCE's confidence and ability. However, half (n=3) of the dietitians reported that CCE were perceived as having 'poor' confidence and ability to talk to parents. Key informants were asked whether they agreed that was important for CCE to receive training on communication with parents. Most key informants agreed that it was important for CCE to receive training on communication with parents (Figure 3-11).

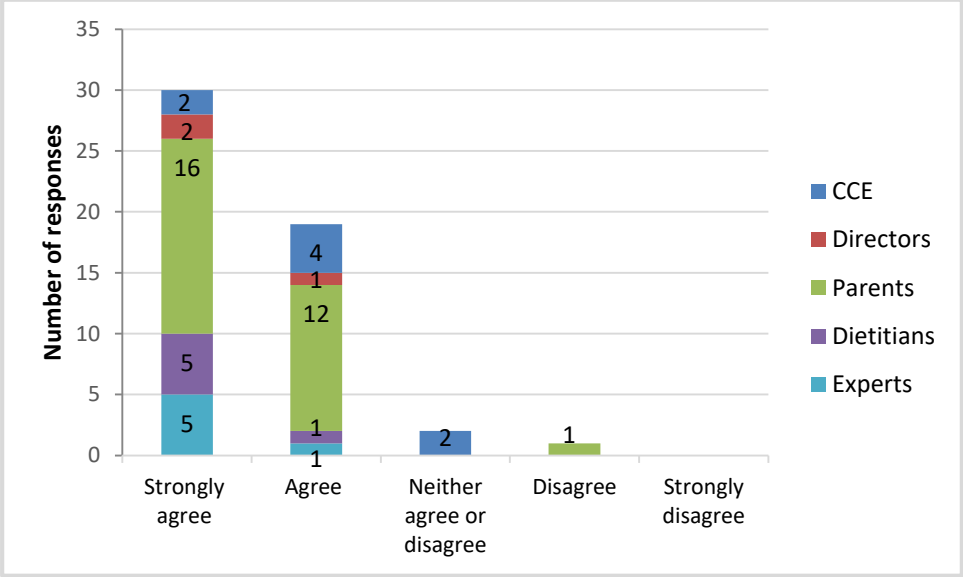

Figure 3-11. Key informant's perceptions of the importance of child care educators need for training in communication with parents (n=52).

3.3.1.6 Training delivery methods

All key informants were asked to indicate the preferred methods of delivering nutrition training to the CCE. The CCE indicated the most preferred methods were workshops (n=6) and videos (n=6). Overall, key informants indicated the preferred delivery methods included workshops (n=43), videos (n=39), website (n=29) and during meetings (n=29) (Figure 3-12).

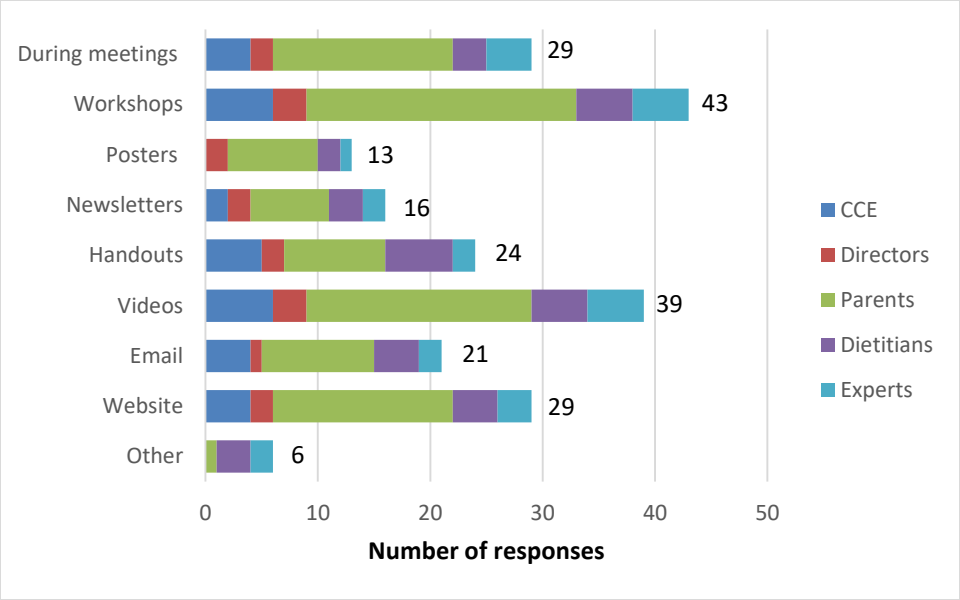

Figure 3-12. Key informants' recommendations for delivery methods of nutrition training to child care educators.

3.3.2 Qualitative Data

The Socioecological Model (SEM) was used to organize the qualitative data and categorize the information by level of influence. The responses by key informants were separated into themes and these themes were categorized into SEM levels: changes in policy, institution, interpersonal and individual levels. The frequency of themes found in the different groups of key informants is presented in Table 3-2.

Table 3-2. Themes and frequency of themes by group of key informants

	CCE	Directors	Parents	Dietitians	Experts	TOTAL
Policy level						
Need for better dissemination and implementation of the ANGCY in child care centres	1	2	1	11	2	**17**
ANGCY need to be updated		1		9	5	**15**
Institution Level						
Barriers child care centres face in implementing the ANGCY	1			2	2	**5**

	CCE	Directors	Parents	Dietitians	Experts	TOTAL
Role of directors in promoting healthy eating at the centre and the need of nutrition training for directors	1	4	1		4	**10**
Need for more opportunities for CCE and children to interact in the food context	3		1	1	3	**8**
Child care food environment should support healthy eating	1		6		4	**11**
More information for parents	1		6	2	2	**11**
Intrapersonal level						
More involvement and participation of parents			1	1	1	**3**
Individual level						
Training in healthy eating		1	2	2	2	**7**
Training in role modeling	1	2	2	8	1	**14**
Training in picky eating	1	5	2	6	6	**20**
Training in communication with parents				2	3	**5**

Key informants' responses indicated that providing training to CCE in the promotion of healthy eating will only solve one part of the problem, and there is a need for a comprehensive approach to enable the promotion of healthy eating in this setting.

"A multi-component approach is needed. Education can be one component but in and of itself it will not lead to behavior change" Dietitian 5

3.3.2.1 Policy level

- **Need for better dissemination and implementation of the *Alberta Nutrition Guidelines for Children and Youth* in child care centres**

In 2008, the Government of Alberta launched the *Alberta Nutrition Guidelines for Children and Youth* (ANGCY) to equip child care centres with the tools needed to provide children healthy food

environments that promote healthy food choices and healthy eating behaviours. Dissemination of the ANGCY consisted of distributing copies of the guidelines to all child care centres in the province of Alberta (Downs et al. 2011); even though the guidelines are meant to promote major changes in the food environment of centres, no guidance was provided to child care centres to assist them with the implementation of the ANGCY recommendations. Additionally, the guidelines are voluntary which resulted in low adoption and implementation in child care centres (Downs et al. 2011; Shewring 2016). Dietitians' reports confirmed the low adoption and implementation of the guidelines in child care centres.

"*most centres know the ANGCY exist but have no incentive to follow them, we have offered free training on the ANGCY in the past with very little uptake/ interest" Dietitian 4*

Dietitians suggested that there is a need for more efforts to enhance the adoption and implementation of ANGCY by child care centres, such support would involve providing guidance on ways of adopting and implementing the guidelines, and the development of governmental policies and regulations to support the adoption and implementation of the ANGCY. At this time, licensing regulations only require child care centres to follow the recommendations of *Eating Well with Canada's Food Guide* (EWCFG) for the foods provided at the centre (Government of Alberta 2016); however, the EWCFG recommendations are broad and do not provide detailed information about the nutritional quality of the foods, which is a characteristic feature of the ANGCY recommendations.

"Practical guidance as to how to implement [is needed]" Dietitian 5

"As they are currently only 'optional guidelines' to supplement existing mandatory provincial standards, add more detail regarding nutrition/ANGCY in the Child Care Licensing Regulations" Dietitian 2

For the ANGCY to be implemented there is a need for more efforts that promote and enable the adoption of the guidelines in child care centres.

- ***Alberta Nutrition Guidelines for Children and Youth*** **need to be updated**

Key informants provided a possible explanation for the lack of adoption of the guidelines by highlighting that they perceived the ANGCY as impractical, unclear and difficult to understand. Experts and dietitians made negative critiques on the presentation of the guidelines as well as on the content, describing them as not clear and not realistic for child care centres to implement.

"*The actual document is very lengthy and the overview is very basic. As a family day home agency we would love to use this tool in our day homes. I would like to see it condensed to a more visual tool for providers" Expert 4*

"Guidelines are complex; very time consuming to analyze all foods offered" Dietitian 1

One of the main features of the ANGCY is a Food Ranking System (FRS) to categorize foods into three main categories: 'choose most often', 'chose sometimes' and 'choose least often', as an alternative to categorize foods served as either healthy or unhealthy in child care centres (Government of Alberta 2012). The ANGCY recommends that all the food provided at the centre should belong to the 'choose most often' group which are foods low in fat, sugar and sodium. However, dietitians and experts perceived the FRS as too restrictive and not practical to implement. Overall, key informants referred to the ANGCY's content as not feasible to implement in the child care setting.

"[ANGCY] are extremely challenging to follow because of the way they categorize foods and are too restrictive... When whole grain bread and hard cheese are not 'choose most often' choices because of sodium, when there are no canned fruits that are 'choose most often', the guidelines are not realistic" Dietitian 4

"I think it is likely that the guidelines are too complicated for meal planners/preparers in child care to follow confidently" Expert 2

Dietitians, experts and directors stressed the need to update the ANGCY and the need for new resources that are simple, practical, condensed, visual and user-friendly. Also, key informants expressed the need for a more realistic, straightforward and accessible approach to increase the likelihood of child care centres adopting the guidelines.

"*Until the ANGCY are revised to be more realistic, I don't see centres using them" Dietitian 4*

"*A simplified tool or tools that comply with ANGCY may be preferable for this setting. The tools need some basic information and meal and snack planning fundamentals." Expert 2*

"*Consider a realistic goal for child care centres; perhaps a staged approach. E.g. elimination of 'choose least often' foods in child cares initially" Dietitian 1*

3.3.2.2 Institutional Level

- **Barriers child care centres face in implementing the *Alberta Nutrition Guidelines for Children and Youth***

Dietitians, experts and CCE referred to barriers that child care centres have for adopting and implementing the guidelines, such as lack of time, resources, equipment and personnel. Implementing the ANGCY recommendations would require changing the centre's food policies, modifying the menus, changing the serving style and providing training for staff (Government of Alberta 2012), which could appear as burdensome to child care staff to implement, especially if they do not have the resources to do it.

"C*hild cares have repeatedly stated they do not have the time and resources to delve into manuals, guidelines, etc. Thus a more simple/ straight forward approach is required." Dietitian 1*

"*ANGCY are challenging to implement… Add to that the challenges with limited infrastructure and training in food preparation at many centres. Staff ratios can create an immediate challenge, impacting food preparation" Dietitian 5*

Key informants also suggested that providing financial assistance to child care centres would help in covering the cost of changing the centre's menu and the provision of healthier food, leading to increased adherence to the guidelines.

"*Funding of some sort to help cover the cost of eating healthy without having to raise daycare fees to parents" CCE 6*

- **Role of directors in promoting healthy eating at the centre and the need of nutrition training for them**

Directors were asked about their role in promoting healthy eating at their child care centre and they described their role as gatekeepers of the nutrition policies and practices at the centre. They described their role as overseeing the following activities: adhering to EWCFG recommendations; directing the food service of the centre, budgeting, provision of food supplies and designing the food menu; and sharing resources and nutritional support to child care staff and parents.

"Creating and implementing nutritional practices and policies at the centre. Providing direction, resources and in services for child care staff and cook to support nutritional practices. Provide information and resources to families with regards to nutritional practices. Provide adequate resources and financial budgets to support nutritional practices /foods at the centre" Director 2

Key informants indicated the need for more dissemination of nutrition resources within child care centres, as extending the ANGCY and other resources to child care staff and families. This task is

normally performed by directors, dissemination of nutrition resources should be a priority for directors to promote healthy eating within child care centres.

"*Some [ANGCY] workshops or handouts could be provided" CCE 3*

"*Inform parents about followed policies, and approaches to promoting healthy eating and nutrition" Parent 3*

"One possible consideration would be to lend further thought as to how further information can also be extended to families about nutritional guidelines so that programs who do not provide all meals and snacks have a stronger working partnership with families in working together to ensure children's nutritional needs are better reflected in context to Alberta's nutritional guidelines. In many instances, parents would be interested and willing to support guidelines, but may not have as much awareness of them, and/or might need be interested in further lunch recipes and ideas that could be provided to them that could assist them more knowledgeably in striving towards this." Expert 6

Key informants expressed the need for increased awareness of and training for owners/directors about healthy eating. One recurrent theme was owners/directors' belief that healthy eating was 'expensive' and this belief was transferred or shared with CCE. If directors are not on board on with promoting healthy eating or have misconceptions about healthy eating being 'negative', it is very likely that no efforts will be made to promote healthy eating at the centre.

"*For some child care programs, the owner/operator [director] believes it costs more money (food and labor expenses) to provide healthy snack/meal options for children. Education geared towards Owners/Operators [directors] is critical as well." Expert 5*

Child care directors and owners play a pivotal role as gatekeepers of the nutrition policies and practices of the centre, and thus, there is a need to raise awareness of directors and owners about healthy eating to see some response to the efforts made to promote healthy eating in child cares.

- **Need for more opportunities for child care educators and children to interact in the food context**

Key informants suggested a need for more opportunities for CCE to interact with children in the food context for the promotion of healthy eating. Mealtimes represent a significant opportunity for this interaction to occur as best practices suggest that children and CCE should sit and eat together and to eat the same kind of food (Erinosho et al. 2012). However, in some child cares, there are limitations for this interaction to happen since not all child care centres provide meals to CCE or they do not have the financial means to provide food to CCE or simply do not allow CCE to eat with children at mealtimes.

"*... educators should sit at meal time and eat the same food as the children. In this way they are acting good role models for the children" Parent 25*

"*This is a difficult area as many child care programs require the children to bring meals/snacks from home which means these educators do not eat the same foods as children. As well, most educators are not permitted to eat with children regardless if food is supplied by the child care program or brought in by the educator" Expert 5*

Child care educators suggested that if they are to promote healthy eating, there should be more opportunities for them to interact with children that involve food-related activities, such as cooking, meal preparation and exploration of new foods. Child care educators must adhere to the planned children's programs and activities, and for these interactive opportunities to occur, they should be allowed and promoted by the child care program not only by CCE. Hence, there is room for improving child care programs to include more food-related activities for children in the child care setting.

"*Do more cooking with them, I believe if they have more opportunities to be part of the process they take more away from it and it opens the door for more conversations and learning opportunities" CCE 4*

- **Child care food environment should support healthy eating**

Key informants stressed the need for food environments that support healthy eating at child care centres. Parents were concerned about the food provided to their children at the child care and suggested the need for healthier and less processed foods, as well as more variety in the foods offered.

"*There are items on the menu that are not what I would consider to be 'healthy' choices. For example, hot dogs and other items with added sugar and nitrates etc***.**" *Parent 5*

"*A greater source of variety in the food provided to children. While the quality of food at our day care is excellent (better than most), the variety is fairly limited" Parent 16*

Experts, parents and CCE suggested that having a supportive food environment will make children more interested in healthy food and will help in handling children's picky eating. Some of the suggestions for a supportive food environment were to prepare food with an appealing presentation for children, and to prepare more than one option of foods offered to children at mealtimes.

"Educators or food handlers should make a way where in the food is presentable and palatable to the child's eye, so they will be attracted and they will be encouraged to eat." Parent 25

"*I do think it's important where possible to try and support at least 2 options for snack and/or meals so that hopefully children may at least have interest in one or the other" Expert 6*

"*More options during meal time. Give the children choices in what is being cooked or what is all going into it" CCE 4*

Regarding a supportive food environment, parents and experts were concerned about the food CCE bring for their own consumption at the centre (i.e., meals, snacks). For instance, some child care centres provide food/meals to the CCE but in other centres, the CCE must bring their own food. Parents were concerned about 'unhealthy' food being consumed by CCE in front of their children. Experts suggested that there should be policies and expectations about the food CCE bring to the centre to have coherence between what is served to children and what is consumed by CCE.

"*My kids have often expressed that they would like the workers lunches because they have more exciting food (which in our home is often snack/treat food)" Parent 27*

"*... where educators bring their own food to eat with children during meal times, I do think it's important for them to be [have] some expectation for educators to have policies around bringing and/or consuming foods that model positive healthy food choices as I have also been in programs where we often see educators drinking soft drinks, and/or snacking on things such as chocolates/chips etc... in presence of children" Expert 6*

Overall, experts, dietitians, parents and CCE suggested that the promotion of healthy eating habits in child care centres should start with healthy food environments supported by the child care program.

"... if healthy options are not provided by the program, the educator has limited or no input to what the children eat" Expert 5

- **More information for parents**

Key informants suggested that child care centres should include nutrition education in the communication practices they use with families and inform parents about children's eating behaviours. A common practice in child care centres is to share the weekly or monthly menu with parents, but

regularly little or no information is given about children's acceptance and consumption of food provided at the centre, parents were emphatic on this need of information.

"*Although the weekly menu is given to parents, there is no[t] information on how the children respond to food choices, and if the children eat everything that is offered through the day. There should be a way to know if my child is eating normally at the daycare to be able to adjust meals at super time at home" Parent 18*

"It would be great to know what my child chose to eat of the foods that were offered. A balanced meal is offered, but I do not know whether they ate or tried all components" Parent 19

"*I think there are many opportunities to fit nutrition messaging into the practices child cares use - conversation at drop off, pick up, activity journals, photos, tips of the day, newsletter, parent nights etc.... Again, I think it will be a suite of ideas that gets nutrition as part of the daily conversation, not an add on" Dietitian 5*

3.3.2.3 Intrapersonal level

- **More involvement and participation of parents**

Parents, dietitians and experts reported the need to involve parents in the child care's healthy eating practices, especially when dealing with children's picky eating. Dietitians suggested that parents and CCE should use the same approach in promoting healthy eating behaviours with children.

"*Practical education for both educators and parents so that a common approach can be used" Dietitian 3*

3.3.2.4 Individual level

- **Training in healthy eating**

Key informants indicated the need for more nutrition and healthy eating training for CCE; experts and parents stressed the need for more education on food origins and processes, as well as on food economics.

"Information about where food comes from and how it is processed (or not) for providers [CCE] awareness and to use when educating children about healthy eating" Expert 4

"I think it's also important for educators to know about the economics of healthy eating (e.g., it's difficult for people with less money to eat healthily, but as a society we tend to blame the victims, such as just assuming they are uneducated)." Parent 28

Dietitians, experts and parents indicated that they would like to see nutrition, including the ANGCY, being added into CCE training curriculum.

"*Include information on ANGCY during their mandatory training/college courses" Dietitian 2*

"[nutrition] as part of their training curriculum" Parent 19

There is need to add the training on the ANGCY into CCE's training curriculum. Of note, in Alberta there is not a specific nutrition curriculum integrated in the CCE educational program and there is also inconsistency in the educational requirements for working as CCE across centres in Alberta (Farmer et al. 2016), To overcomes these issues, a variety of topics in nutrition and eating behaviours should be part of CCE's training and professional development.

- **Training in role modeling**

There is need for role modeling training for CCE. Key informants indicated that positive role modeling behaviours are not always practiced by CCE and that sometimes CCE's eating behaviours

negate the efforts made for the promotion of healthy eating at the centre. There is a need for increased awareness on how CCE's eating behaviours impact children and improved understanding of how CCE act as models of eating behaviours to children.

"I have also been in programs where we often see educators drinking soft drinks, and/or snacking on things such as chocolates/chips etc... in presence of children so again some type of emphasis on modeling healthy well-being and nutrition that is also aimed at the adults [educators] as well as specific to meals/snacks prepared for children would be important" Expert 6

"*It would be great if they could consistently model healthy eating habits" Parent 19*

"*Continued reminders of the influence that the CCE educators play as models to children on healthy eating habits" Director 2*

Dietitians referred to the need for CCE to understand how the context in which food is provided impacts children's behaviours at mealtimes, and the need for more understanding in feeding styles and how it affects children, feeding styles are the strategies that CCE used to feed children (Hughes et al. 2007).

"*It is just as important to provide education around what 'context' is the food provided in (how to talk about food choices and eating habits positively and supportively, the impact/influence they have and how to build healthy relationships with food) not just the type of food provided." Dietitian 2*

"*Work with parenting messaging to help understand how parenting styles can impact approaches to food.... We need to assist educators in understanding the importance of not using food as a reward/punishment and provide practical alternative strategies/expectations" Dietitian 3*

There is also need for increased awareness among CCE of the personal comments they make to children regarding food and how these comments affect children's eating behaviours. Key informants indicated that CCE should avoid labeling food as 'bad' and tying high calorie foods into rewards.

"Awareness of personal attitudes and beliefs that are shared with children. E.g. personal comments that negate the efforts of healthy eating. E.g. bread makes you fat, I like chocolate cake for dessert, etc. Increased awareness and understanding of the feeding relationship" Dietitian 1

"*Also, my kids have said that their care workers have told them that certain foods are unhealthy but according to the food guide and the way we prepare them at home they are not. They may be higher in calorie[s] but they are not unhealthy and are rather whole foods (i.e. pizza and burgers). It concerns me that high-calorie foods are being labelled as bad at daycare" Parent 27*

- **Training in picky eating**

For CCE to properly handle children's picky eating, they require knowledge of child development and introduction of new foods. Directors and dietitians emphasized the need for CCE to understand the development of children's eating habits and the expected eating behaviours through the life cycle. Young children have small appetites and are very susceptible to rejecting new foods, especially vegetables (Birch and Fisher 1998), so having a good understanding of these facts will help CCE to distinguish between 'normal' food behaviour and picky eating in children.

"[CCE] to have 'healthy' expectations of the children (how they eat, how they express their preferences, how much they actually need to eat, etc.)" Dietitian 6

"*Sometimes educators 'forget' that this can be expected milestones in a child's development and learning" Director 2*

"*Help educators and staff distinguish typical eating behaviour from feeding difficulties that require referral to a health professional feeding team" Dietitian 3*

Aside from the need for understanding of child's development, key informants expressed the need for training CCE on the introduction of new foods. Since young children are naturally predisposed to avoiding or refusing to try unfamiliar foods, training on proper introduction of new foods is a determinant for the CCE's promotion of heathy eating with children (Birch and Fisher 1998).

"*How can I convince children to try new foods they've never tried?" CCE 1*

"*For some educators, it is difficult not to push the new foods as they want the child to try but they may not yet be ready. I think we can continue our discussions and shape our conversations with children to continue being more supportive of trying new foods and expanding their food choices." Director 1*

Child care educators should also receive training on how to handle children's picky eating and strategies to use with them at mealtimes, experts from this study suggested that CCE should receive training from dietitians with expertise on the topic. Equipping CCE with strategies on ways of handling picky eating will make them more confident in dealing with children's negative behaviours towards food.

"Educate them [CCE] in the 'normal' or 'usual' selective stages of kids so they have an understanding of why 'picky eating' can occur and what the best strategies to work with them are without interfering with the feeding relationship" Dietitian 2

- **Training in communication with parents**

Experts and dietitians expressed the need for training CCE on how to communicate with parents and how to share nutrition resources with them. Understanding between CCE and parents is crucial for the proper promotion of healthy eating at the centre.

"Provide educators with case scenarios, resources and strategies to support them" Dietitian 2

"I often hear that child care providers are looking for support on how to word nutrition messaging and suggestions/recommendations to make to parents around healthy eating, without having them become defensive" Dietitian 6

3.4 Discussion and conclusion

3.4.1 Discussion

The main objective of this study was to consult with a sample of key informants involved in some capacity in the child care sector on their perceptions of and recommendations for child care educator's educational needs in the promotion of healthy eating in child cares. Key informants expressed the need for training CCE in healthy eating but also pointed to other factors that influence CCE's promotion of healthy eating, which need to be addressed to create environments that foster healthy eating in child care.

Although the sample was small, there seemed to be a discrepancy between the reports of directors and CCE and the other groups of key informants. Directors and CCE reported an appropriate level of promotion of healthy eating in child cares, while dietitians, experts and parents reported a limited or even limited promotion of healthy eating in child care centres - pointing to many areas that need to be improved in their health promotion efforts. These discrepancies in the data do not discredit any of the reports, but they provide a richer description of the situation in child care centres, and highlight the different points of view from the diverse groups of key informants.

Dietitians and the experts were the most vocal and expressive groups on the surveys' open-ended questions, while CCE were the least expressive and provided minimal responses in the open-ended questions. A possible explanation for the differences between the groups is that dietitians and experts were likely the most educated group and they might be used to answering this kind of survey

where their perspectives and opinions are asked. While, CCE might not be used to answering this kind of survey. For future research, we would recommend another kind of data collection method for use with CCE since online surveys did not seem to be the most appropriate strategy for collecting CCE's perspectives and recommendations. Studies that have used focus groups with CCE have been successful in gathering CCE's perspectives (Needham et al. 2007; Taveras et al. 2006).

- **Educational needs of child care educators**

Picky eating was the area of training that key informants considered most important for CCE in their promotion of healthy eating – this theme came up in both the qualitative and quantitative data. As well, most participants reported that picky eating was a barrier in the promotion of healthy eating in child cares. Similar findings were found in other studies, where picky eating was a common problematic eating behaviour in young children (Fildes et al. 2016; Carruth et al. 2004). Although all CCE reported having confidence in handling children's picky eating, dietitians in this study reported perceiving CCE's poor knowledge in dealing with children's picky eating. These findings are somewhat similar to Taveras et al. (2006) where CCE were confident in their healthy eating knowledge, but this knowledge came from their own experience, not from training or best practices. Some of the specific topics for training on picky eating for CCE include children's development of eating behaviours, introduction of new foods, and strategies for handling picky eaters. There is a need for training CCE in proper handling of children's picky eating so that an evidence-based approach can be used.

Training in role modeling was also one of the most important areas for CCE training. Child care educators greatly influence children's eating behaviours through role modeling and it is critical for CCE to understand their influence on children and to perform healthy eating habits in child care (Erinosho et al. 2012; Birch and Ventura 2009). Some areas for CCE improvement were awareness of how their own eating behaviours impact children, avoidance of use of food as reward or punishment, and

understanding feeding styles. Child care educators should use an authoritative feeding style, which is an fair control of children's eating practices to guide children's eating behaviours (Nicklas et al. 2001). Child care educators should have awareness of how their role modeling and feeding styles impact children's eating behaviours and to receive training on how to perform an authoritarian style and avoid strategies that negatively impact children.

Regarding the training on *Alberta Nutrition Guidelines for Children and Youth* (ANGCY), the priority for key informants was first to update the ANGCY and then to provide training to centres and CCE. Although, it is important for CCE to receive training on healthy eating, the guidelines were not considered the most appropriate tool for educating CCE, as the ANGCY were considered unclear, impractical and challenging to follow. Of note, these findings conflict with those reported by Nikolopoulos et al. (2012), who reported the ANGCY were considered relevant and easy to use. One possible explanation for the discrepancy in the perceptions of the ANGCY, is that the former was conducted two years after the ANGCY were released, when the guidelines were still a novelty. Now it has been almost a decade since the ANGCY were published and there is evidence that the uptake of the guidelines was not favourable.

- **Implementation of the *Alberta Nutrition Guidelines for Children and Youth* in child care**

In this study, there were mixed results in the perceived adoption and implementation of the guidelines across key informants. Directors and CCE reported successful adoption and implementation of the guidelines at their centre, while dietitians and experts reported that in general there was poor adoption of the guidelines in child care centres. These findings are similar to previous research that reported the lack of adoption of ANGCY in educational settings (Downs et al. 2011; Shewring 2016). Although, adoption and implementation do not have the same meaning and are not meant to be interchangeable, the guidelines need to be adopted first in order to be implemented in child care

centres. Adoption refers to the uptake of the ANGCY by child care centres and implementation to the active efforts to put to action the guidelines' recommendations (Glanz, Rimer, and Viswanath 2008). This discrepancy in the findings could be due to the small number of child care centres included in this study which were not representative of the entire population, or to social desirability bias, which is the tendency of survey respondents to give responses that they perceive as more socially acceptable than to give responses that reflect the truth (Grimm 2010). There is need for more research on the actual adoption and implementation of the guidelines across child care centres in Alberta.

- **Communication with parents and parental involvement**

Regarding communication with parents, all CCE reported feeling comfortable in talking to parents and vice versa, most parents reported feeling comfortable in talking to CCE about children's eating behaviours. However, it was found that there was room for improving the sharing of information between CCE and parents. Parents indicated that they were not aware of nutrition policies and practices of the centre, and they expressed a desire to be more informed on their child's eating behaviours at the centre. Evidence suggest that, lack of healthy eating knowledge is a barrier for CCE to communicate with parents about children's eating behaviours (Lanigan 2012; Taveras et al. 2006). Increasing CCE's healthy eating knowledge will lead to increased communication with parents.

Through this study we found that there was need of parental involvement in child care centres; although parents were concerned about the food provided, they were not involved in the centre's healthy eating practices. Parental involvement in child care is crucial for the promotion of healthy eating. Evidence shows that that parental involvement has positive effects on children eating habits at the centre (Hingle et al. 2010; Natale et al. 2014), and research conducted in Alberta found that parental involvement was a determinant for the adoption of the ANGCY in schools (Quintanilha et al. 2013).

Therefore, involving parents in the promotion of healthy eating should be one of the priorities of child care centres.

- **Child care food environment**

A supportive food environment is indispensable for the promotion of healthy eating in child cares. We found there is room for improving some areas of child cares' food environment, such as the food provided to children, the food CCE bring to the centre, and the opportunities CCE have to interact with children in the food context. Key informants suggested having specific policies about the food CCE bring to the centre, for them to consume only healthy foods in front of the children. However, there is evidence that policies are insufficient to change CCE's eating behaviours, therefore, providing healthy food to CCE at the centre is a strategy that has shown positive effects in promoting healthy eating among CCE (Erinosho et al. 2012).

- **Role of owners/directors**

In this study, we found that there is a need to work with directors/owners to raise awareness about the importance of promoting healthy eating at their centre. Director/owners are the gatekeepers of the nutrition policies and practices of the centre, as well as of the nutrition resources shared to staff and parents (Taveras et al. 2006). The need for increased awareness and training for directors was a novel finding in this study, since this was not reported in any of the studies that explored the needs for the promotion of healthy eating in child cares.

3.4.2 Conclusions

In this study, we found that CCE required training in picky eating, role modeling and healthy eating, and the most preferred delivery methods for training were workshops, videos, website and during meetings. Although the need of training for CCE in the promotion of healthy eating is evident, there is a need to target the different factors influencing CCE's promotion of healthy eating in child

cares, such as governmental support for the promotion of healthy eating, support from child care directors and owners, involvement of parents for the promotion of healthy eating, and a supportive healthy food environment. Addressing all these factors will enable the promotion of healthy eating in child care centres.

3.4.3 Strengths and Limitations

This study has several strengths as the collection of data from multiple sources (e.g., CCE, directors, parents, dietitians and experts), the use of open- and closed-ended questions that collected qualitative and quantitative data, and the triangulation of the qualitative and quantitative data that increased the validity and credibility of the findings.

Some of the limitations of this study were the low number of child care centres participating in the study. Instrument validity was also a limitation, although the surveys were developed based in previous tools, additional validation measures should be conducted. The use of online surveys limited participation to key informants that did not have internet or computer access. Additionally, some of the responses from child care staff could be affected by desirability bias, which affected the credibility of the findings.

3.4.4 Implications for research, practice and policy

Through this study, we confirmed the need of training for CCE in their promotion of healthy eating and the need to raise awareness of directors and owners on the promotion healthy eating in child cares. Future efforts in the promotion of healthy eating in child care should provide training to CCE and work with directors and owners to raise awareness on healthy eating. Additionally, there is need to work with child care centres to overcome the barriers they face in promoting healthy eating, such as creating nutrition policies, providing healthy food to children, providing food to CCE and allowing CCE to eat with children.

In this study, we found that the current provincial nutrition guidelines are not well received by child care centres, and it is essential to update the ANGCY to have an increased uptake of the guidelines in child care centres. Also, once the guidelines are updated, it is necessary to have governmental policies and regulations to support the implementation of the ANGCY, such as making them mandatory for all child care centres to follow. Additionally, regarding policy, it is imperative to add nutrition training to the child care educators' curriculum. The findings from this study could be used to inform future policies and regulations on healthy eating in child care centres.

Chapter 4 . Study 2. Rapid Review of Interventions Aimed at Promoting Children's Consumption of Vegetables and Fruits in Child Cares

4.1 Background

Childhood overweight and obesity is a concerning public health problem and its prevalence is expected to double to 9.1% by 2020 (de Onis, Blössner, and Borghi 2010). Overweight and obese children are more likely to become overweight and obese adults than normal weight children (Gurnani, Birken, and Hamilton 2015). Some factors associated with childhood overweight and obesity are children's poor eating habits, low consumption of vegetables and fruits (V & F) and high intake of energy dense foods (Birch and Ventura 2009; Dubois et al. 2007), while in contrast, a high quality diet that includes V & F is associated with improved health and weight status (Mytton et al. 2014).

The promotion of healthy eating habits in young children is a viable way to prevent and reduce childhood overweight and obesity rates since in the early years children develop eating habits, food preferences, and active or sedentary behaviours that they may carry for the rest of their life (Birch and Fisher 1998). V & F contain nutrients and functional components that promote health that are beneficial for proper cognitive development in children and protect them from the development of chronic diseases in the future (Nyaradi et al. 2013; Boeing et al. 2012; Steinmetz and Potter 1996). Promoting healthy eating habits in young children is a major public health issue and should be a priority to ensure the health and wellbeing of the future generations.

Child care centre[3] use has increased continuously in developed countries and a high proportion of children are spending the majority of their day in this setting (Federal Interagency Forum on Child and

[3] Child care includes "Pre-school program, which is a childcare program provided to pre-school children and kindergarten children for less than four hours per day; daycare program, which is a childcare program provided to infants, pre-school children and kindergarten children for four or more consecutive hours per day; and kindergarten, which is early childhood services program provided to children 4.5 years of age or older" (Government of Alberta 2011).

Family Statistics 2016; Bushnik 2006). Children attending child care eat one-half to two-thirds of their daily food intake at the centre, opening a valuable opportunity for the promotion healthy eating habits among this population (Sinha 2014; Bushnik 2006). Of note, children who attend child care centres beginning in the early years as infants (less than 1 year of age) and attend for more than 20 hours per week (considered high intensity) may be at increased risk of childhood obesity (Black et al. 2017; Alberdi et al. 2016). Therefore, intervening in the early years is crucial for preventing childhood overweight and obesity.

Child care centres are ideal venues for reaching out to young children and for the promotion of V & F, however, the consumption of V & F in the child care setting is more complex than it appears on the surface. The social, physical and economic aspects of child cares' food environments vary considerably among centres which can influence children's eating behaviours (Nikolopoulos 2012; Larson et al. 2011). Children's consumption of V & F in child cares may be influenced by several factors, such as: children's preferences, attitudes, and beliefs; child care educator's[4] role modeling and parents support of healthy eating; child care centre's structure, norms, policies and food environment; and government regulations and public policy factors that favour or limit the consumption of healthy foods at child care (Fitzgerald and Spaccarotella 2009; Stokols 1996); taking into consideration all these aspects is essential for promoting healthy eating in child care centres.

The consumption of V & F is of special interest because these are the foods that children are more resistant to eat and regularly have the lowest consumption compared to other foods groups, such as milk and grain products, and meat and alternatives (Dubois et al. 2011; Birch and Fisher 1998). According to the Canadian Community Health Survey (Nutrition) more than 70% of children aged four to

[4] Child care educator refers to "a staff member of a child care centre whose primary function is child care and who is actively engaged in the supervision of children" (Government of Alberta 2011).

eight are not meeting the minimum number of servings of V & F recommended by *Eating Well with Canada's Food Guide* (Garriguet 2004). Similar trends are reported in the United States as 93% of children were not eating enough vegetables (Centre for Disease Control and Prevention, 2014). Several interventions targeting children and the promotion of healthy eating in child cares found that child care centres can serve as important venues for teaching children healthful eating habits and that children´s eating practices can be modified through nutrition programs and the positive interaction with child care educators (Mikkelsen et al. 2014; Zask et al. 2012; de Silva-Sanigorski et al. 2010).

A systematic review of healthy eating interventions in preschools found that children's consumption of V & F was significantly improved through healthy eating interventions (Mikkelsen et al. 2014). It is worth mentioning, there are a few reviews on interventions that promote healthy eating in child cares, but none of them solely focus on increasing children's consumption of V & F (Wolfenden et al. 2014; Mikkelsen et al. 2014). Since little is known about interventions that promote children's consumption of V & F in child cares and the strategies used in promoting and increasing children's consumption of V & F, this review will help to inform the development of effective interventions to promote healthy eating habits in young children.

The aim of this study was to conduct a rapid review of the literature on interventions aimed at promoting children's consumption of V & F in child cares. The objectives of this study were: to characterize the types of interventions used at different ecological levels in the promotion of children's consumption of V & F in child cares; and to identify the type of strategies used in interventions to promote children's consumption of V & F in child cares.

4.2 Methods

The rapid review methodology was chosen to conduct this review. A rapid review is "a type of knowledge synthesis in which systematic review processes are accelerated and methods are streamlined

to complete the review more quickly than typical systematic reviews" (Tricco, Langlois, Straus 2017, p.3). This methodology was used because the topic is focused, the literature is reviewed within a limited timeframe, and uses methods to accelerate the systematic review process without compromising the rigour and systematicity (Ganann, Ciliska, and Thomas 2010). Commonly rapid reviews are conducted within 1 to 6 months and are characterized by "carefully focusing the research question, using broader search strategies, restricting the amount of gray literature, extracting only key variables and executing only 'simple' quality appraisal" (Grant and Booth 2009, p.100). There is not a standardized methodology for the development of rapid reviews; however, we followed methods suggested by Khangura et al. (2012) and Gannan et at. (2010). For this rapid review, the literature search was limited to four databases, included specific inclusion criteria, and search and selection of studies, as well as, data collection and analysis were conducted by a single reviewer and confirmed by a second reviewer. In addition, a quality assessment of the included studies was conducted. A rapid review was the most suitable method for conducting a literature review on interventions that promote consumption of V & F in child cares to inform practice since this is a new area of research and we wanted to explore what literature was available on the topic before committing to an extensive comprehensive review.

4.2.1 Search conducted

The original literature search was conducted in May 2016 with the assistance of a library scientist (SC) and updated in July 2017, using four electronic databases (PubMed, CINAHL, Scopus and Web of Science) for relevant articles using the following key words: 'intervention', 'healthy eating', 'child care', and 'vegetable and fruit'. For the term 'child care' other additional related terms were used, such as, 'preschool', 'daycare', 'day care', 'kindergarten', given that other terms may refer to the same kind of centres and that different countries used distinct terms for non-parental care centres for young children.

Relevant reviews were scanned for additional papers. The search was limited to studies published in the last 11 years (2006-2017), the search was limited to studies published 2006 and onwards since few studies on the topic were conducted prior that date. The original search included studies published up to 2016 but then the review was updated to include studies published to July 2017. The search was limited to studies published in English, French or Spanish, given these languages were represented in the research group. For a complete list of search terms and search strategies see Appendix F.

4.2.2 Inclusion and exclusion criteria

Inclusion and exclusion criteria guided the screening process. Included studies comprised of intervention studies that aimed to promote consumption of V & F among children in the child care setting. The inclusion and exclusion criteria are described in Table 4-1.

Table 4-1. Inclusion and exclusion criteria for study selection

	Inclusion criteria	**Exclusion Criteria**
Type of interventions	Interventions that promoted consumption of V & F, among children in the child care setting.	
Participants	Preschool children (2 to 5 years of age), studies that also included child care staff and parents as part of the intervention were included.	Interventions that only included overweight or obese children. Interventions that included children with special needs.
Study Design	Studies that evaluated the intervention by reporting differences in V & F consumption with control group and intervention groups comparisons or baseline and post interventions measurements.	Descriptive studies. Pilot studies, given that we wanted to evaluate effectiveness of interventions.
Setting	Child care centres (e.g., child care, preschool, day care, etc.)	
Place	Conducted in North America, Europe, Australia and New Zealand where the population is similar to the population of Canada, since the information of this review will serve to inform future interventions to promote healthy eating in child care in Canada.	

4.2.3 Screening and data management

The screening of the studies followed the reporting standards of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al. 2009). A total of 958 studies were identified, 636 studies were screened based on the titles and abstracts. Forty-four full-text studies were retrieved through the University of Alberta Libraries System for further review. After screening process, 20 studies were selected. An additional article was included after the search was updated in July 2017. A total of 21 studies were selected for analysis. The primary reviewer (AAL) screened and analysed the studies and a second reviewer (APF) confirmed the results. The search and screening process and the reasons for exclusion are represented in Figure 4-1.

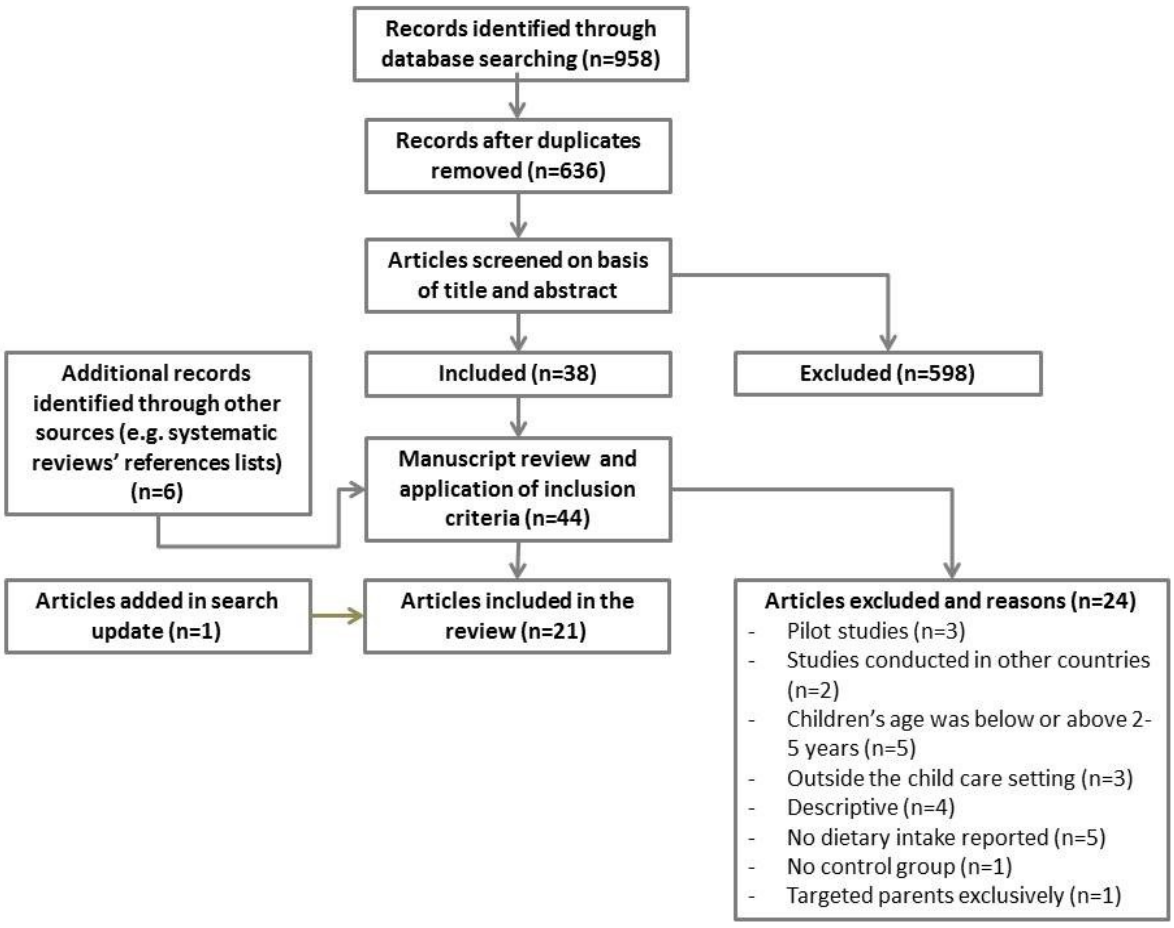

Figure 4-1. Search and screening process and the reasons for exclusion of studies

4.2.4 Data collection and analysis

For each of the selected intervention studies, the following information was retrieved: aim of the study, intervention setting, target population and country, age of children, description of the intervention, strategies used, theoretical foundation, study design, sampling method, number of participants, duration/length of the intervention, main target outcomes, outcomes and process evaluation data. Although, some studies evaluated other intervention outcomes, only children's consumption of V & F was taken into consideration. For reported outcomes, when studies reported V & F intake in number of servings, the corresponding nutritional guidelines from each country where interventions were conducted were used to translate the number of servings into grams consumed. For the studies by Williams et al. (2014) and Harnack et al. (2012), the *Dietary Guidelines for Americans 2010* were used (U.S. Department of Agriculture 2010). For the studies by Zask et al. (2012) and Bell et al. (2015), the *Australian Dietary Guidelines* were used (National Health and Medical Research Council 2013).

4.2.4.1 Theoretical framework

The Socioecological Model (SEM) was used to organize and analyse interventions. The SEM was used to guide this literature review because it includes all the levels of influence for the performance of a behaviour, such as children's consumption of V & F in in child care, and it provides a framework for organizing studies according to the levels of influence targeted (McLeroy et al. 1988). The SEM proposes that a health behaviour is regulated by the interaction of multiple levels of influences, including factors at the individual, interpersonal, institutional, and public policy levels (Stokols 1996). According to McLeroy (1988) and Stokols (1996) individual factors refer to characteristics of the individual, such as, knowledge, attitudes, preferences, beliefs, skills, etc.; interpersonal factors are the social networks and social support systems that support or discourage the performance of the behaviour, such as, family, friends, educators, etc.; institutional factors are social organizations with organizational characteristics,

rules and regulations for operation, such as child care centres; and public policies are local, state, and national laws and policies. According to Sallis et al. (2008) this model has four core principles: 1) multiple levels of factors influence health behaviours, including factors at the individual, interpersonal, institution, and public policy levels; 2) influences interact across these distinct levels; 3) interventions that target multiple levels should be most effective in behaviour change; and 4) ecological models are most effective when they target a specific health behaviour.

Studies were categorized according to the level of influence interventions targeted. Interventions targeting children's food preferences, beliefs, attitudes, knowledge, perceptions were classified as individual; interventions targeting child care staff and/or parents support, role modeling and social norms within the child care centre were categorized as interpersonal; interventions targeting child care's access to food, institution structure, norms, practices and policies were categorized as institutional; and interventions targeting public policy and government regulations were categorized as public policy (Figure 4-2) (Stokols 1996).

4.2.4.2 Process evaluation

The process evaluation of studies was included to gain more information on the fidelity and the quality of implementation of interventions. Although, is not common to include process evaluation data in rapid reviews, these data were included to gain a deeper understanding of the interventions' components that lead to an increase in children's consumption of V & F (Tricco et al. 2015; Steckler and Linnan 2002). Process evaluation is the "assessment of factors that affect or reflect how the intervention was conducted and received, and thereby has the potential to help understand the internal and external validity of the evaluation" (Baranowski and Stables 2000, p.157). The process evaluation framework proposed by Linnan and Steckler (2002) was used for this purpose and included context, reach, dose delivered, dose received and fidelity of intervention.

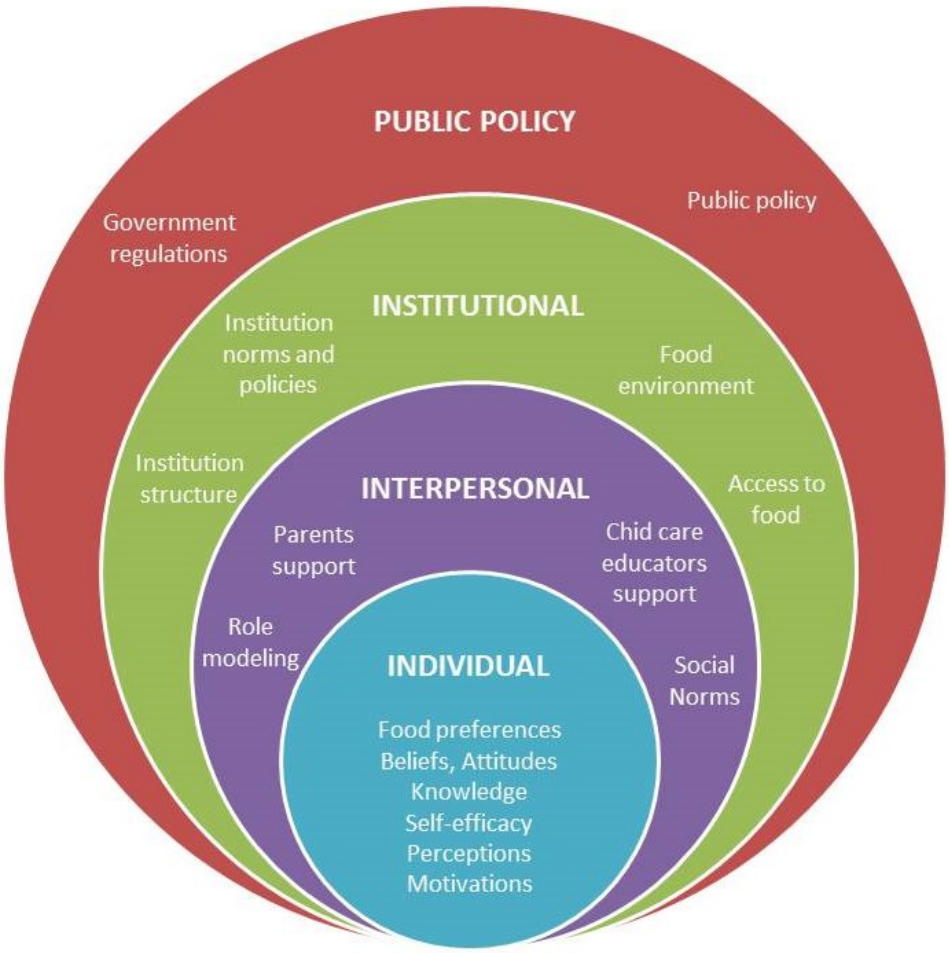

Figure 4-2. Socioecological model for consumption of vegetables and fruits in children in the child care. Adapted from Fitzgerald and Spaccarotella (2009).

According to Linnan and Steckler (2002), context refers to larger physical, political and social environment that may impact the implementation of interventions; reach is the number or proportion of expected audience that participated in an intervention; dose delivered is the number or amount of intervention's units or components delivered to the participants; dose received refers to the engagement of participants with the intervention and the proportion of materials or components received; and fidelity refers to integrity and quality of the delivery of an intervention (Steckler and Linnan 2002). Some studies had additional articles that described the process evaluation of

interventions and those articles were also included in this review. Any qualitative and quantitative data presented in studies regarding these aspects were collected.

4.2.4.3 Quality assessment

To add rigour to this review, the methodology quality of the studies was assessed, although this type of assessment may or may not be included in rapid reviews (Grant and Booth 2009). The Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies (Armijo-Olivo et al. 2012) was selected because it is easy to use and is validated to evaluate the quality of a range of intervention study designs and primary studies in public health (Armijo-Olivo et al. 2012; Thomas et al. 2004; Deeks et al. 2003). The EPHPP tool rates the quality of methodology of interventions on six components: 1) selection bias, 2) study design, 3) confounders, 4) blinding, 5) data collection methods, and 6) withdrawals and dropouts. Each component was evaluated as 'strong', 'moderate' or 'weak'. Based on the ratings for each component, the tool provides a global rating for the study assessed. Studies not receiving any 'weak' ratings are categorized as strong quality, studies receiving one 'weak' rating are categorized as moderate, and studies receiving two or more 'weak' ratings are categorized as weak quality (Armijo-Olivo et al. 2012). Two raters assessed the quality of studies (AAL, APF) and agreement was achieved between the two raters. The agreement between the two raters was over 85%.

4.3 Results

The rapid review included twenty-one studies. Table 4-2 is a list of studies that includes a classification of interventions according to the socioecological levels: individual, interpersonal, institutional and public policy. Six studies targeted the individual level (Ahern et al. 2014; de Wild et al. 2013; de Wild et al. 2015; Horne et al. 2011; Correia et al. 2014; O'Connell et al. 2012); three studies targeted the individual and interpersonal levels (De Bock et al. 2012; Fitzgibbon et al. 2011; Bibiloni et al. 2017); five studies targeted the individual, interpersonal and institutional levels (Natale, Messiah, et al.

2014; Vereecken et al. 2009; Zask et al. 2012; Williams et al. 2014; Witt and Dunn 2012); two studies targeted the interpersonal and institutional levels (Hardy et al. 2010; Natale, Lopez-Mitnik, et al. 2014); three studies targeted the institutional level (Bell et al. 2015; Harnack et al. 2012; Schwartz et al. 2015); and two studies targeted the interpersonal, institutional and public policy levels for the promotion of children's consumption of V & F in child care (De Coen et al. 2012; de Silva-Sanigorski et al. 2010).

Table 4-2. Classification of studies according to the socioecological model levels of influence

Study	**Individual**	**Interpersonal**		**Institution**	**Public Policy**
		Parents	CC staff		
Ahern et al. 2012	*				
Bell et al. 2015			*	*	
Bibiloni et al. 2017	*	*			
Correia et al 2014.	*				
De Bock et al. 2011	*	*			
De Coen et al. 2012		*	*	*	*
De Silva-Sanigorski et al. 2010		*	*	*	*
De Wild et al. 2013	*				
De Wild et al. 2015	*				
Fitzgibbon et al. 2011	*	*	*		
Hardy et al. 2010			*	*	
Harnack et al. 2012				*	
Horne et al. 2011	*				
Natale & L et al. 2014		*	*	*	
Natale & M et al. 2014	*	*	*	*	
O'Connell et al. 2012	*				
Schwartz et al. 2015				*	
Vereecken et al. 2009	*	*	*	*	
Williams et al. 2014	*	*		*	
Witt et al. 2012	*	*		*	
Zask et al. 2012	*	*	*	*	

(Note: CC, child care)

4.3.1 Population studied

Table 4-3 is a summary of the of the studies' characteristics. Of the twenty-one studies, nine studies were conducted in North America (Witt and Dunn 2012; Correia et al. 2014; O'Connell et al.

Table 4-3. Characteristics of studies

Study	Study Design	Aim of the study	Setting (Country)	Age (years)	Selection of participants	N	Duration	Theoretical foundation	Main target outcomes
INDIVIDUAL									
Ahern et al. 2012	Within-subjects design	To investigate the effectiveness of flavour–flavour learning as a strategy for increasing children's vegetable intake.	Child care (UK)	1.2 to 4.6	Convenience	3 child cares (29 children)	10 days (approx.)	None stated	Vegetable intake
Correia et al. 2014	Within-subjects design	To test the effectiveness of two community-based interventions to increase children's vegetable consumption and willingness to try vegetables.	Child care (USA)	3 to 5	Convenience	1 child care (57 children)	Not stated	None stated	Willingness to taste and consume the test vegetable
De Wild et al. 2013	Cross-over	To investigate the efficacy of Flavor Nutrient Learning model as learning strategy to improve toddlers' intake and preference of novel vegetables.	Day care (Netherlands)	2.8 (mean)	Convenience	2 day cares (28 children)	7 weeks	None stated	Preference and intake of vegetables
De Wild et al. 2015	Within-subject design, semi cross-over	To investigate the effectiveness of repeated exposure and flavour–flavour learning in increasing vegetable acceptance and intake in preschoolers.	Day care (Netherlands)	2.7 (mean)	Convenience	2 day cares (39 children)	7 weeks	None stated	Preference and ad libitum consumption of vegetable crisps
Horne et al. 2011	Repeated measures design	To investigate effectiveness of an intervention based on modelling and rewards in increasing V & F consumption in a group of 20 2–4 year olds in a day care nursery setting.	Day care (UK)	2 to 4	Convenience	1 day care (12 children)	140 days	SLT	Consumption of target V & F
O'Connell et al. 2012	RCT	To test two hypotheses: 1) that children who are served unfamiliar vegetables repeatedly at	Preschool (USA)	3 to 6 (85%= 4 to 5)	Convenience	2 preschools (96 children)	6 weeks	None stated	Vegetable intake

Study	Study design	Aim of the study	Setting (Country)	Age (years)	Selection of participants	N	Duration	Theoretical foundation	Main target outcomes
O'Connell et al. 2012 (Cont.)		lunch in preschool will increase consumption of them; and 2) that consumption will be influenced by peer eating behaviours and parental feeding behaviours.							
INDIVIDUAL/ INTERPERSONAL									
Bibiloni et al. 2017	Longitudinal	To assess the results of a nutritional education programme to improve diet quality and decrease overweight and obesity prevalence among children.	Preschool and primary school (Spain)	3 to 5	Preschools were selected randomly. Children were selected upon convenience.	2 schools (319 children)	3 years	None stated	Diet, weight, height and body mass index.
De Bock et al. 2011	CRT	To assess the short-term impact of a nutritional intervention aimed to reduce childhood overweight in German preschool children.	Preschool (Germany)	3 to 6	Convenience	18 preschools (348 children)	6 months	SLT and Zajonc's exposure effect	Healthy eating habits and anthropometrics
Fitzgibbon et al. 2011	RCT	To assess the feasibility and effectiveness of a weight control intervention delivered by teachers for black preschool children.	Preschool (USA)	3 to 5	Preschools were selected randomly. Children were selected upon convenience.	8 Preschools (618 children)	14 weeks	SCT and SDT	Height and weight, physical activity, screen time, and diet
INDIVIDUAL/ INTERPERSONAL/ INSTITUTIONAL									
Natale & Messiah et al. 2014	CRT	To assess the effectiveness of a centre-based parent and teacher healthy lifestyle role-modeling program on child nutrition and physical activity outcomes.	Child care (USA)	2 to 5	Convenience	28 child care centres, (1211 children)	1 year	SEM	Consumption of V & F, junk food, and sedentary behaviours
Vereecken et al. 2009	CRT	To assess the impact of an intervention aimed to assist Belgian preschools in the implementation of a healthy food policy on children's food intake.	Preschool (Belgium)	2 to 4	Preschools were selected randomly Children were selected upon convenience.	16 preschools (476 children)	6 months	None stated	Consumption V & F, water, sugared milk drinks and fruit juice.

Study	Study design	Aim of the study	Setting (Country)	Age (years)	Selection of participants	N	Duration	Theoretical foundation	Main target outcomes
Williams et al. 2014	Pretest/ post-test randomized control group design	To evaluate whether a nutrition educational program in childcare centres improve children's at-home daily consumption of V & F, and other at-home dietary behaviours.	Child care (USA)	4.4 (mean)	Convenience	24 child cares (1143 parents)	6 to 10 weeks	SEM	V & F consumption and other dietary behaviours at home
Witt et al. 2012	RCT	To determine whether an interactive nutrition and physical activity program for preschool, increases children's consumption of V & F.	Child care (USA)	4 to 5	Convenience	17 child cares (263 children)	6 weeks	SCT and SEM	Consumption of V & F snacks
Zask et al. 2012	Longitudinal	To decrease childhood overweight and obesity by improving fundamental movement skills, increasing V & F intake and decreasing unhealthy food consumption.	Preschool (Australia)	3 to 6 (4 mean)	Convenience	31 preschools (560 children)	10 months	HBM and CMT	Diet, movement skills and overweight indicators
INTERPERSONAL/ INSTITUTIONAL									
Hardy et al. 2010	CRT	To evaluate a low-intensity, state-wide, professional development program aimed to support early childhood professionals to promote healthy eating and physical activity among children in their care.	Preschool (Australia)	4.4 (mean)	Convenience	29 preschools (430 children)	5 months	None stated	Children's lunchbox contents, FMS, preschool policies; children's diet and recreational screen time
Natale & Lopez et al. 2014	RCT	To assess the effectiveness of a multicomponent obesity prevention intervention on BMI, diet and physical activity of inner-city multiethnic preschool children.	Child care (USA)	2 to 5	Convenience	8 child cares (307 children)	6 months	SEM	Nutrition practices, physical activity and screen time

Study	Study design	Aim of the study	Setting (Country)	Age (years)	Selection of participants	N	Duration	Theoretical foundation	Main target outcomes
INSTITUTIONAL									
Bell et al. 2015	Pre–post cohort study	To determine the impact of nutrition award program on the food and nutrient intakes of children in long day care centres.	Long day care (Australia)	2 to 4	Convenience	20 day cares (232 children)	No stated	None stated	Dietary intake and centre compliance
Harnack et al. 2012	Randomized crossover design	To evaluate the independent effects of two meal service strategies on children' intake of V & F of preschool.	Preschool (USA)	2 to 5	Convenience	1 preschool (53 children)	6 weeks	None stated	V & F and energy intake
Schwartz et al. 2015	Cross-over	To test manipulations of the child care family style feeding environment to promote fresh V & F by making them highly accessible, while also removing the competition from more energy-dense foods.	Preschool (USA)	3 to 5	Convenience	1 preschool (85 children)	3 weeks	No stated	Dietary intake
INTERPERSONAL/ INSTITUTIONAL / PUBLIC POLICY									
De Coen et al. 2012	CRT	To evaluate the effects of a 2-year, multi-component intervention based in schools, on BMI, eating and physical activity in Flanders, Belgium, targeting 3–6 year olds in communities of high and low socio-economic status.	Preschool (Belgium)	3 to 6	Convenience	31 preschools (1102 children)	2 year	SEM	BMI, diet, physical activity and screen-time behaviour
De Silva-Sanigorski et al. 2010	Cross-sectional	To evaluate the effectiveness of a intervention aimed to reduce obesity and promote healthy eating and active play in children aged 0–5 y.	Child care (Australia)	0–5 (2.9 mean)	Convenience	Intervention group: 8 long day cares, 76 Family Day Care, 45 preschools, 24 Maternal Child Health Service	4 years	SEM	BMI, healthy eating, physical activity

Study	Study design	Aim of the study	Setting (Country)	Age (years)	Selection of participants	N	Duration	Theoretical foundation	Main target outcomes
						(1,587 children). Comparison group: 17,732 children.			

Note: BMI, Body Mass Index; CRT, Cluster Randomized Trial; CMT, Competence Motivational Theory; HBM, Health Belief Model; RCT, Randomized Control Trial; SCT, Social Cognitive Theory; SEM, Socio Ecologic Model; SDT, Self-Determination Theory; SLT, Social Learning Theory

2012; Fitzgibbon et al. 2011; Williams et al. 2014; Natale, Lopez-Mitnik, et al. 2014; Natale, Messiah, et al. 2014; Harnack et al. 2012; Schwartz et al. 2015), eight studies in Europe (Ahern et al. 2014; de Wild et al. 2013; de Wild et al. 2015; Horne et al. 2011; De Bocket al. 2012; Vereecken et al. 2009; De Coen et al. 2012; Bibiloni et al. 2017), and four studies were carried out in Australia (Hardy et al. 2010; Bell et al. 2015; Zask et al. 2012; de Silva-Sanigorski et al. 2010).

Ten studies took place in preschool[5] (O'Connell et al. 2012; De Bock et al. 2012; Fitzgibbon et al. 2011; Hardy et al. 2010; Harnack et al. 2012; Schwartz et al. 2015; Vereecken et al. 2009; Zask et al. 2012; De Coen et al. 2012; Bibiloni et al. 2017), seven occurred in child care[6] (Ahern et al. 2014; Correia et al. 2014; Natale, Lopez-Mitnik, et al. 2014; Williams et al. 2014; Natale, Messiah, et al. 2014; de Silva-Sanigorski et al. 2010; Witt and Dunn 2012), and four were held in day care settings[7] (de Wild et al. 2013; de Wild et al. 2015; Horne et al. 2011; Bell et al. 2015).

All the studies included children between the ages of 2 and 5, or the mean age of children was between 2 and 5 years of age. Seven studies targeted children, parents and child care staff (Fitzgibbon et al. 2011; Natale, Lopez-Mitnik, et al. 2014; Natale, Messiah, et al. 2014; Vereecken et al. 2009; Zask et al. 2012; de Silva-Sanigorski et al. 2010; De Coen et al. 2012), four studies targeted children and parents (Bibiloni et al. 2017; De Bock et al. 2012; Williams et al. 2014; Witt and Dunn 2012), and two studies targeted children and child care staff (Hardy et al. 2010; Bell et al. 2015). (Table 4-2).

[5] "Preschool program" refers childcare program provided to preschool children and kindergarten children for less than four hours per day. (Government of Alberta 2011).

[6] "Child care" refers to care of children as a service while parents are working provided by an organization, usually from 0 to 5 years to age. (Government of Alberta 2011).

[7] "Day care" refers childcare program provided to infants, pre-school children and kindergarten children for four or more consecutive hours per day. (Government of Alberta 2011).

4.3.2 Strategies used by interventions

Studies used different kinds of intervention strategies and these strategies were classified into three categories: behavioural, educational and food environment (Table 4-4). Behavioural strategies included all behaviour change strategies used in the interventions; educational strategies were informative and didactical strategies that were directed to children, parents or child care staff; and food environment strategies were characterized by strategies that aimed to change the child care's food environment, which included strategies ranging from simple food modifications to increasing the availability of foods.

Table 4-4. Description of intervention strategies, types of intervention strategies and level of influence

Study	Bhv	Edu	FE	Description of intervention strategies
INDIVIDUAL				
Ahern et al. 2012			*	Each child received 6-8 exposures to a root vegetable puree with added apple puree (flavour–flavour learning) alternating with 6-8 exposures to another with nothing added (repeated exposure).
Correia et al 2014.			*	Intervention presented meal and snacks in two manners: 1) pairing vegetables with a familiar, well-liked food and, 2) enhancing the visual appeal of vegetables.
De Wild et al. 2013			*	Repeated exposure to vegetable soups in two flavours and applying energy manipulation; during the intervention period, half of the participants received vegetable soup flavour A low in energy content (LE) consistently paired with vegetable soup flavour B high in energy content (HE), whereas the other half of the participants received the reverse (i.e. flavour A HE + flavour B LE).
De Wild et al. 2015			*	Repeated exposure and flavour–flavour learning; half of the group received red beet crisps with a dip of tomato ketchup (Conditioned [C]) and parsnip with a neutral white sauce (Unconditioned, [UC]), whereas for the other half the order was reversed (red beet [UC], parsnip [C]).
Horne et al. 2011	*		*	Role-modelling (though cartoon videos), repeated exposure and rewards as strategies to target children's consumption of 8 fruit and 8 vegetables (presented as 4 different food sets, each comprising 2 fruit and 2 vegetables).
O'Connell et al. 2012			*	Repeated exposure of foods, during the intervention, Preschool A served three vegetables at lunch on 10 separate occasions for 30 days, while Preschool B continued normal practice; in the 7th week, schools reversed conditions and Preschool B served the vegetables for the next 6 weeks.
INDIVIDUAL/ INTERPERSONAL				
Bibiloni et al. 2017		*		Nutrition curriculum delivered through a series of cartoon movies for children. Digital presentations about children nutrition for parents.
De Bock et al. 2011	*	*		Curriculum for children, workshops for parents and joined activities for children, parents and teachers as: tasting, food preparation and growing crops.

Study	Bhv	Edu	FE	Description of intervention strategies
Fitzgibbon et al. 2011		*		Training for teachers. Healthy eating curriculum and physical activity sessions for children and newsletters for parents that complemented the children's curriculum.
INDIVIDUAL/ INTERPERSONAL/ INSTITUTIONAL				
Natale & M et al. 2014	*	*	*	Role modeling curriculum for parents and teachers; healthy eating and physical activity curriculum for children and environmental/center modifications (i.e., menu changes, including more V & F).
Vereecken et al. 2009	*	*	*	Child: Activities based on experiential education (e. g. tasting) and developmental education (e. g. explanation of concepts of food triangle); educational role-model story and characters; and role model, feedback and reinforcement by teachers for children. Parents: Newsletters, suggestions for the back and forth diary, work sheets and creations by children, parent evenings and other school activities with parents. Teacher: Training sessions, manual including didactic and policy aspects, digital learning environment, newsletters, group discussions with teachers and examples of good practices. Increased availability of healthy foods and of cooking equipment. Training sessions for principals and cafeteria staff.
Williams et al. 2014		*	*	Nutrition education for children, in combination with parent classes and weekly parent newsletters. Dietitians worked with each center director to identify areas of policy improvement that can enhance nutrition at the center and taught at least two classes to the center's staff to help them integrate the program's messages into their classroom activities.
Witt et al. 2012	*	*	*	It encouraged CCE to be positive role models of healthy eating to children. Nutrition and physical curriculum composed of circle-time lessons and imaginary trips. It provided newsletters and at home activities for parents. Training for child care educators about healthy eating and how to deliver the program. Support to implement nutrition policies at the centre.
Zask et al. 2012 (Adams, 2009)	*	*	*	The intervention strategies included skills development and awareness-raising for parents, staff and children, and social support for parents to foster behaviour changes in their children through feedback and reinforcement. Children grew V & F in gardens, had taste tests and had healthy cooking classes run by parents or staff but assisted by health professionals. Health professionals gave interactive workshops on positive parenting and healthy eating. Each term children had a visit from a health professional who conducted interactive activities. Preschool teachers were given a manual of other ideas for including positive food messages in art, drama, role-play, music and stories.
INTERPERSONAL/ INSTITUTIONAL				
Hardy et al. 2010		*	*	Professional development workshop for preschool staff in healthy eating and physical activity. Resources for preschools which included a manual and a small grant to support staff to attend training or purchase physical activity equipment for the preschool. Contact with health promotion professionals, to provide advice to preschools to support the delivery of the program.
Natale & Lopez-Mitnik et al. 2014		*	*	Training for centre staff about implementation of the program in the centre. Parents had monthly educational dinners, monthly newsletters, and at-home activities. Child care center environmental modifications, such as development of policies to increase healthy eating and menu modifications..
INSTITUTIONAL				
Bell et al. 2015		*	*	The program involved nutrition training for directors and cooks delivered by dietitians. Support for staff to improve the centre menus, policies and eating environment in line with the nutrition award criteria. Dietitians supported

Study	Bhv	Edu	FE	Description of intervention strategies
Bell et al. 2015 Cont.				each centre in changing the menu of the centre.
Harnack et al. 2012			*	It served fruits and vegetables first than other menu items as part of traditional family style meal service; and served meals portioned and plated by providers.
Schwartz et al. 2015			*	Two feeding strategies were compared to usual practice (baseline): 1) V & F served before the main meal (first course); 2) V & F served before the main meal and only V & F and milk were kept on the table after initial serving (combination).
INTERPERSONAL/ INSTITUTIONAL/ PUBLIC POLICY				
De Coen et al. 2012		*	*	The parents received a poster visualizing the target messages and containing short tips regarding parenting practices and styles to encourage children to stick to the healthy eating targets. Parents also received five letters, containing detailed information on the intervention topics and a website link with practical information such as tips and recipes. All intervention schools were requested to (i) implement five Healthy Weeks per intervention year with a minimum 1 h of classroom time dedicated to the topic together with extracurricular activities (ii) evaluate and improve their playground and snack and beverage policy, and (iii) communicate with the parents on the programme and distribute materials to the parents. At the start, two meetings were held in each intervention community with the researchers, community organizations and stakeholders regarding local social and health problems using concept mapping.
De Silva-Sanigorski et al. 2010		*	*	Distribution of newsletters, information cards, and promotional materials to early childhood workers, parents, and children. Professional development for early-childhood workers and service staff. Nutrition and physical activity resources for parents and early-childhood service staff. Early-childhood settings staffs were trained to reinforce nutrition messages and healthy eating choices for children aged 5 y. Centres were given support to engage with parents on the topic of healthy eating and to provide support for staff to adopt and implement health and well-being/nutrition policies. Production of three separate optional governmental healthy eating policies for centres.

Note: FP, food presentation; Bhv, Behavioral; Edu, educational; FE, food environment.

Six interventions included behaviour change strategies, such as role modeling, feedback and positive reinforcement (Horne et al. 2011; De Bock et al. 2012; Natale, Messiah, et al. 2014; Witt and Dunn 2012; Zask et al. 2012; Vereecken et al. 2009). Role modeling was the most used strategy, where parents and child care educators acted as healthy lifestyle role models to influence children's eating behaviours.

Thirteen of the twenty-one interventions used educational strategies. The educational strategies with children were characterized by nutrition curriculums in the form of lessons, modules and classes delivered by an educator, dietitian or a trained research member (Witt and Dunn 2012; De Bock et al.

2012; Fitzgibbon et al. 2011; Williams et al. 2014; Zask et al. 2012; Natale, Messiah, et al. 2014; Vereecken et al. 2009; Bibiloni et al. 2017). The educational strategies used with parents were in the form of workshops, resources, newsletters and at-home activities to raise awareness and knowledge about healthy lifestyle behaviours (Natale, Lopez-Mitnik, et al. 2014; Natale, Messiah, et al. 2014; Vereecken et al. 2009; Zask et al. 2012; de Silva-Sanigorski et al. 2010; De Coen et al. 2012; Fitzgibbon et al. 2011; Bibiloni et al. 2017; Hardy et al. 2010). For child care staff, the most commonly used educational activities were workshops, curriculums and resources to raise awareness and knowledge, and training on the interventions (Fitzgibbon et al. 2011; De Coen et al. 2012; Hardy et al. 2010; Natale, Lopez-Mitnik, et al. 2014; Bell et al. 2015; Natale, Messiah, et al. 2014; Vereecken et al. 2009b; Zask et al. 2012; de Silva-Sanigorski et al. 2010). The topics of the educational activities for parents and child care staff included: healthy eating, introduction of new foods, role modeling, and picky eating.

Eighteen interventions used strategies to modify the child care's food environment. Five interventions used repeated exposure (RE) of novel or non-preferred foods (Ahern et al. 2014; O'Connell et al. 2012; de Wild et al. 2013; de Wild et al. 2015; Horne et al. 2011). Repeated exposure of foods comprised of presenting food to children on repeated occasions to familiarize children with it, thus increasing children's consumption (Cooke 2007). One intervention modified food's presentation to make it more appealing to influence children consumption (Correia et al. 2014). Six interventions changed the centre's nutrition practices and policies to improve the menu, change the centre serving style, and to increase the availability of V & F (Natale, Lopez-Mitnik, et al. 2014; Zask et al. 2012; Natale, Messiah, et al. 2014; Harnack et al. 2012; Schwartz et al. 2015; De Coen et al. 2012). Six interventions provided support and resources for centres to implement and modify nutrition policies and practices (Vereecken et al. 2009; Williams et al. 2014; Hardy et al. 2010; Bell et al. 2015; de Silva-Sanigorski et al. 2010; Witt and Dunn 2012).

4.3.3 Study design of studies included

Four of the studies were randomized controlled trials (Witt and Dunn 2012; O'Connell et al. 2012; Fitzgibbon et al. 2011; Natale, Lopez-Mitnik, et al. 2014). Five of the studies were cluster randomized trials (De Bock et al. 2012; Hardy et al. 2010; Vereecken et al. 2009; De Coen et al. 2012; Natale, Messiah, et al. 2014). One study used a pretest/post-test randomized controlled group design (Williams et al. 2014), while another one used a cross-sectional design (de Silva-Sanigorski et al. 2010). Ten studies used a longitudinal design (de Wild et al. 2015; de Wild et al. 2013; Harnack et al. 2012; Schwartz et al. 2015; Bibiloni et al. 2017; Bell et al. 2015; Harnack et al. 2012; Zask et al. 2012; Ahern et al. 2014; Horne et al. 2011).

4.3.4 Total number of participants

The total number of participants in each study varied greatly. In interventions targeting only one socioecological level, participation ranged from 12 to 96 children, with the exemption of Bell et al. (2015) which had a total participation of 232 children. The interventions targeting more than one socioecological level had more participants, ranging from 211 to 1587 children. The total number of children participating in all interventions was 7,995. The number of participants in each is study is detailed in Table 4-3.

4.3.5 Participants selection

Three studies used randomization to select preschools to participate in interventions. (Vereecken et al. 2009; Bibiloni et al. 2017: Fitzgibbon et al. 2011). The rest of the studies selected child cares/preschools/day cares to participate upon convenience. (de Wild et al. 2013; de Wild et al. 2015; O'Connell et al. 2012; Witt and Dunn 2012; De Bock et al. 2012; Williams et al. 2014; De Coen et al. 2012; Hardy et al. 2010; Natale, Lopez-Mitnik, et al. 2014; Natale, Messiah, et al. 2014; Ahern et al.

2014; Bell et al. 2015; de Silva-Sanigorski et al. 2010; Horne et al. 2011; Schwartz et al. 2015; Zask et al. 2012; Correia et al. 2014; Harnack et al. 2012).

4.3.6 Main target behaviors

Four studies targeted children's consumption of V & F as a main behaviour (Ahern et al. 2014; Horne et al. 2011; O'Connell et al. 2012; Witt and Dunn 2012). Three studies focused on children's preference and consumption of V & F (de Wild et al. 2013; de Wild et al. 2015; Correia et al. 2014). Seven studies evaluated children's dietary intake in general (Williams et al. 2014; Bell et al. 2015; Harnack et al. 2012; Schwartz et al. 2015; Vereecken et al. 2009; De Bock et al. 2012; Bibiloni et al. 2017), and seven studies focused on children's diet and on active and sedentary behaviours (Fitzgibbon et al. 2011; De Coen et al. 2012; Hardy et al. 2010; Natale, Lopez-Mitnik, et al. 2014; Natale, Messiah, et al. 2014; Zask et al. 2012; de Silva-Sanigorski et al. 2010).

4.3.7 Theoretical foundation

Studies may use a behaviour change theory to guide the development and implementation of interventions. Ten of the twenty-one studies were theoretically informed. Five studies used the SEM to guide their intervention (De Coen et al. 2012; Natale, Lopez-Mitnik, et al. 2014; Natale, Messiah, et al. 2014; de Silva-Sanigorski et al. 2010; Witt and Dunn 2012). De Bock et al. (2012) and Horne et al. (2011) used the Social Learning Theory to guide their interventions, which focuses on children's learning from observing significant others (Glanz et al. 2008). Fitzgibbon et al. (2011) used the Social Cognitive Theory and the Self-determination Theory to frame the intervention; more specifically, the first one focuses on the individual, interpersonal and environmental influences, and the second focuses on the individual's motivation to perform a behaviour (Bandura 2004; Lange et al. 2011). Zask et al. (2012) used the Health Belief Model (HBM) and the Competence Motivational Theory (CMT) to guide the intervention, while HBM focuses on individual beliefs towards a health behaviour, the CMT targets an individual's

motivation to perform a behaviour (Glanz et al. 2008; Klint and Weiss 1987). The remaining studies did not specify any theoretical foundation used to support interventions.

4.3.8 Outcomes of interventions

Fifteen interventions aimed at increasing children's consumption of V & F and reported positive results, while six studies did not find any significant differences in children's consumption of V & F with the intervention. The results of interventions are presented in Table 4-5.

4.3.8.1 Individual

Four of the six interventions aimed at the individual level were successful in increasing children's consumption of V & F (Ahern et al. 2014; de Wild et al. 2015; de Wild et al. 2013; Horne et al. 2011), and these used repeated exposure (RE) of foods as a strategy. The most successful of these interventions was in the study by De Wild et al. (2015) which increased children's consumption of vegetable crisps by 58 g ($P< 0.0001$). Three studies (Ahern et al. 2014; De Wild et al. 2013; De Wild et al. 2015) had similar interventions and used a RE of vegetables alongside other food manipulation strategies (e.g., adding familiar flavours to vegetables, increasing the energy content of vegetables); however, these studies found that RE of foods was enough to increase children consumption of vegetables and there was no difference in consumption between simple RE and RE along with the food manipulation strategies. A study by O'Connell et al. (2012) also used a RE of vegetables, but they did not find any significant results in children's intake. One main difference between this study and the rest is that O'Connell et al. (2012) used fresh vegetables with children, while the others used processed/cooked vegetables. In a similar study, Correia et al. (2014) changed the presentation of vegetables by pairing them with highly liked foods and making the vegetables more appealing, the pairing of foods showed an improvement in

Table 4-5. Outcomes and process evaluation of interventions

Study	Outcome evaluation	Outcomes for diet	Process evaluation
INDIVIDUAL			
Ahern et al. 2012	Intake increased significantly from pre- to post-intervention for all purees (~36 g), with no effect of condition. Intake remained higher than baseline 1 month (P<0.001) and 6 months (P<0.001) post-intervention for all conditions.	Positive	**Context:** The strategy of pairing vegetables with liked food to increase liking and intake of vegetables is already a common practice among UK mothers, where the intervention took place. **Reach:** 15 nurseries were approach, 4 agreed to participate in the study and 3 successfully completed the intervention. **Dose delivered:** 8/8 vegetable exposures were delivered. **Dose received:** Children included in the analysis received at least 6 of the 8 vegetable exposures.
Correia et al. 2014	Vegetable consumption did not change, neither with visual appeal improvement or pairing with a liked food. Pairing increased willingness to try the vegetable from 79% to 95% of children (P=0.07).	Negative	**Context:** The center participated in the USDA's Child and Adult Care Food Program. **Reach:** Parental consent was provided for 57 of 72 children (79% participation rate). **Dose delivered:** The proposed exposures, both meals and conditions (n=4) were delivered. **Dose received:** All the children received both meals and conditions (n=4).
De Wild et al. 2013	Ad libitum intake increase significantly for both vegetable soups (~58 g) and it was stable over 6 months (P<0.0001).	Positive	**Dose delivered:** 14/14 food exposures were delivered. **Dose received:** All children included received at least 10 of the 14 food exposures.
De Wild et al. 2015	Intake increased significantly post-intervention for both vegetables (on average with 8 g) (P<0.0001), and this effect was persistent even 6 months post-intervention.	Positive	**Dose delivered:** 7/7 proposed food exposures were delivered **Dose received:** All children included in the analysis received the 7 food exposures.
Horne et al. 2011	Consumption of target fruit and vegetable increased significantly by 52% and 50%, respectively (P<0.001). All increases generalised strongly to the no-rewards lunchtime context. The increases in preschoolers' V & F consumption were maintained at 6 months post-intervention.	Positive	**Dose delivered:** 16/16 proposed food V & F exposures were delivered.
O'Connell et al. 2012	Vegetable's consumption did not increase with intervention. Greater consumption by tablemates was a significant predictor of greater vegetable consumption (P<0.05).	Negative	**Context:** The centres participated in the USDA's Child and Adult Care Food Program. **Reach:** Parental written consent was obtained for 95% of the children enrolled in the centres. **Dose delivered:** 30/30 exposures of foods were delivered.
INDIVIDUAL/ INTERPERSONAL			
Bibiloni et al. 2017	From baseline to post intervention, intervention parents reported increases in their child's consumption of two servings of fresh fruit or fruit juices daily by 32% to 72% (P<0.001) and in	Positive	**Reach:** Parental consent was obtained for 53.8% of the children enrolled in the schools. **Dose delivered:** Per academic years, 6 modules (45 min) were delivered to the children and 3 modules for parents (30 min), as proposed. **Dose received:** Only 20% of parents attended the first module session, while in the rest

Study	Outcome evaluation	Outcomes for diet	Process evaluation
Bibiloni et al. 2017 Cont.	consumption of more than serving of vegetables daily by 22% to 50% (P <0.001).		of the sessions did not reach 10% of attendees.
De Bock et al. 2011	Children in intervention increased fruit consumption by 0.22 points (~22 g) on the 6-point ordinal scale compared with consumption before intervention and compared with control children (P=0.027); also increased vegetable consumption by 0.15 points (~15 g) on the ordinal scale (P=0.027). A change of 1 on the 6-point ordinal scale approximates one portion difference (portion = size of a child's hand representing about 100 g).	Positive	**Context:** All preschools participated in a state-sponsored health promotion program which encouraged healthy eating and physical activity among pre-school children, with the long-term goal of reducing childhood overweight. **Reach:** 99% and 69% of the recruited children and parents participated, representing 47% and 68% reach into the target population for children and parents, respectively. **Dose delivered:** 10 modules for children and 5 for parents and children delivered as proposed; no session was cancelled. **Dose received:** Parental and teacher commitment was rated high. Some experts also related that parents sought more counselling after the sessions ended. **Fidelity:** Intervention fidelity was high with the majority of interventions delivered as planned (ratings 4.4 (SD 0.5) and 4.2 (SD 0.3) on 5-point ordinal scale for parent and children's modules, respectively). Those responsible for administering the intervention reported expected seasonal adaptations of the activities like a delay in seed sowing related to the weather.
Fitzgibbon et al. 2011	There were no significant differences in children's dietary intake.	Negative	**Context:** It included children enrolled in Head Start programs. The centres participated in the USDA's Child and Adult Care Food Program. **Reach:** A total of 618 children (84.8%) and 590 parents and guardians participated in the study. **Dose delivered:** The TD-WCI curriculum consisted of 28 nutrition lessons and 28 exercise sessions (40 min) (2 per week for 14 weeks). Teachers reported completing or partially completing a mean of 26.6 (SD= 1.9) of the 28 nutrition lessons and 27.1 (SD=1.7) of the 28 exercise sessions. All teachers completed at least 21 of the nutrition and exercise lessons. **Dose received:** On average, the 307 parents in the intervention group completed 5.0 (SD = 4.5) of the 13 homework assignments. Twenty parents (7%) completed all 13 assignments. One hundred fifteen parents (37%) completed more than half of the homework assignments, and 238 (78%) completed at least one assignment.
INDIVIDUAL/ INTERPERSONAL/ INSTITUTIONAL			
Natale & Messiah et al. 2014	Children's consumption of V & F increased significantly from T1 to T2 (P<0.0001). At a 2-year follow-up obese children in the intervention had a significantly higher increase in V & F consumption versus control obese children (β=5.52, P<.0001).	Positive	**Context:** The centres were part of the USDA food program and SNAP-eligible. **Dose delivered:** The teacher-parent curriculum consisted of 29 weekly technical sessions. Parents participated in monthly events, they also received monthly newsletters. The children curriculum consisted in 20 weekly lessons.
Vereecken et al. 2009	Intervention children increased consumption of fruits 9.2 g/day (95 % CI: 0.4–18.0) (P=0.039) in comparison with control children. Results	Positive	**Reach:** 61.7% of the prospect participants accepted to participate. **Dose delivered:** A two-days training was given to the school staff. Food messages and newsletters directed at the school staff and parents were made available.

Study	Outcome evaluation	Outcomes for diet	Process evaluation
Vereecken et al. 2009 Cont.	suggest that the change is due to increased availability at school (P<0.044).		
Williams et al. 2014	Children in the intervention group increased the mean number of cups vegetables consumed at home by 0.12 cups (~27 g) (95% CI 0.0 to 0.2 cups; P<0.05), and had an increase in the rate of child-initiated vegetable snacking, than children in the control group (P<0.05).	Positive	**Context:** All the centres participated in the USDA's Child and Adult Care Food Program; and half of the centres were enrolled in the Head Start program. The State of New York's Eat Well Play Hard in Child Care Settings program is a SNAP Education program. **Reach:** Participation rate was 76%, were parents filled the baseline survey. **Dose delivered:** The curriculum contained 6 healthy eating modules for children (30 min) and parents (30-60 min) separately, every week. **Dose received:** Children participants attended 5.04 classes on average. Each lesson lasted approximately 30 min, therefore, children participating at the intervention sites received a total of approximately 150 min of nutrition education. Only 12% of the eligible parents attended the parent classes, among those who did attend, 51% attended at least three or more of the six classes. 52% of parents reported reading all or most of the series of six newsletters and an additional 34% reported reading some of them.
Witt et al. 2012	Intervention significantly increased children's consumption of fruits by approximately 20.8% (P<0.001) and vegetables by approximately 33.1% (P<0.001) from baseline to post-intervention.	Positive	**Context:** All classrooms participated in the USDA's Child and Adult Care Food Program. **Reach:** 263 parents were invited to participate in the evaluation and 38% (n=100) completed the initial surveys. **Dose delivered:** 12/12 circle-time lessons (10-15 min), 6/6 imaginary trips and 6/6 interactive take home activities were delivered. **Dose received:** Child attendance at the circle-time lessons and imaginary trips ranged from 63%-85%. Children attended an average of 9.5 (SD=2.7) circle-time lessons and 4.7 imaginary trips (SD =1.5). On average, 3.4 weekly take-home activities (SD=2.4) were completed. Moreover, 22% (n=22) of the children completed all 6 take-home activities with a parent or guardian. 24% (n=25) of the children did not complete any of the take-home activities. The 2 initial take-home activities had higher completion rates compared with the other 4 take-home activities.
Zask et al. 2012	Intervention children increased vegetable (47 g) and fruits (94 g) serves by 0.63 serves (P=0.001) post-intervention.	Positive	**Reach:** 93.1% and 94.3% of parents' consent their children to participate pre- and post-intervention, respectively.
INTERPERSONAL/ INSTITUTIONAL			
Hardy et al. 2010	There were no significant changes in serves of V & F.	Negative	**Context:** Munch and Move was funded by the New South Wales (NSW) Australia Department of Health and designed for large-scale implementation across NSW. It was a key initiative of the NSW Government's Plan Preventing Overweight and Obesity in Children, Young People and their Families 2009-2011. **Reach:** Consent was obtained from the parents of 430 children for participation in the intervention (54% response rate) **Dose delivered:** A one day professional development workshop for preschool staff was delivered.

Study	Outcome evaluation	Outcomes for diet	Process evaluation
Hardy et al. 2010 Cont.			**Dose received:** One to two teachers from each preschool in the intervention group attended a Munch and Move workshop and completed an evaluation of the workshop.
Natale & Lopez et al. 2014	In the intervention children's mean fresh V & F consumption increased 60% (No statistics available)	Positive	**Reach:** 98% of children/parent response rate among centers.
INSTITUTIONAL			
Bell et al. 2015	Intake increased for all core food groups, including fruits, (range: 0·2–0·4 servings/d, (30-60 g/day) P<0·001). Except for vegetable intake.	Positive	**Context:** In South Australia, Start Right – Eat Right (SRER) is a nutrition award scheme that has been rolled out by government state-wide since 2004. **Dose delivered:** 9 h of nutrition training was delivered as proposed. **Dose received:** Centre directors and cooks received 9 h of nutrition training from SRER dietitians. **Fidelity:** The average compliance (fidelity) with the SRER criteria checklist was 62·4 (SD 4·2) out of 64 (P <0·001).
Harnack et al. 2012	Fruit intake increased 0.40 servings/meal (50 g) (P<0.01) in the intervention group when V & F were served in advance of other meal items.	Positive	**Context:** The intervention was conducted in a Head Start centre. The center participated in the USDA's Child and Adult Care Food Program. **Reach:** Informed consent was obtained from the parents of 97% of the children (N= 85). **Dose delivered:** Children were exposed to the feeding practices 3 days per week, over a 3-week period.
Schwartz et al. 2015	There was no difference in children's consumption of V & F in any of the two feeding practices modifications.	Negative	**Context:** The centre was a preschool Head Start. The center participated in the USDA's Child and Adult Care Food Program. **Reach:** Informed consent was obtained from the parents of 97% of the children (N= 85). **Dose delivered:** Children were exposed to the feeding practices 3 days per week, over a 3-week period.
INTERPERSONAL/ INSTITUTIONAL/ PUBLIC POLICY			
De Coen et al. 2012	The intervention did not produce any change in the consumption of V & F.	Negative	**Context:** The POP (Prevention of Overweight among Pre-school and school children) project was conducted in six communities, including the local authority (town or municipality). The regional health boards supported the schools and community for the implementation of the project. **Reach:** Thirty-one of the forty-nine invited pre-primary and primary schools participated (response rate 63 %). **Dose delivered**: During each intervention year there were three meetings with the teachers to follow up the implementation of the intervention and discuss the possible problems. Parents received five letters, containing detailed information on the intervention topics and a website link with practical information such as tips and recipes. Regional health boards contacted each school at least twice per year assisting them in selecting relevant intervention materials and supervising the implementation progress.

Study	Outcome evaluation	Outcomes for diet	Process evaluation
De Silva-Sanigorski et al. 2010	From baseline to follow-up intervention children increased their intake of vegetables (P<0.001) and fruits (P<0.001).	Positive	**Context:** The project, that targeted all children aged 0–5 y (n ’ 12,000) and their families in City of Greater Geelong and the Borough of Queenscliffe in Victoria, Australia. Several key organizations in the region designed, planned, and implemented the intervention. **Reach:** 31 of the 49 invited pre-primary and primary schools participated (response rate 63 %). Of the 3242 eligible children, 1589 participated at baseline. **Dose delivered:** At the start, two meetings were held in each intervention community with the researchers, community organizations and stakeholders. Each intervention year, information brochures and posters regarding the five topics of the project were distributed in the community. The intervention consisted of seven modules. The parents received a poster visualizing the target messages and containing short tips regarding parenting practices and styles to encourage children to stick to the healthy eating and PA targets. Parents also received five letters, containing detailed information on the intervention topics and a website link with practical information such as tips and recipes.

(Notes: PA, physical activity; SNAP, Supplemental Nutrition Assistance Program; USDA, United States Department of Agriculture)

children's willingness to try vegetables but did not affect children's consumption. The results of this study coincide with the findings of Ahern et al. (2014) and De Wild et al. (2015) where pairing vegetables with familiar flavours was not enough to increase children's consumption of vegetables.

4.3.8.2 Individual/ Interpersonal

Two of the three studies that had interventions targeting both the individual and the interpersonal level reported positive changes in children's consumption of V & F. These studies were characterized by providing some form of nutrition educational curriculum to children, parents and/or child care staff (De Bock et al. 2012; Fitzgibbon et al. 2011; Bibiloni et al. 2017). The two studies with positive results provided an educational curriculum and activities for children and parents aimed at improving children's diet (De Bock et al. 2012; Bibiloni et al. 2017).

4.3.8.3 Individual/ Interpersonal/ Institutional

The five interventions targeting the individual, interpersonal and institutional levels had positive results (Natale, Messiah, et al. 2014; Vereecken et al. 2009; Williams et al. 2014; Zask et al. 2012; Witt and Dunn 2012). These interventions were characterized by providing strategies for children, parents/child care staff and improving the food environment of the centre. Two studies (Natale & Messiah et al. 2014; Zask et al. 2012) focused on parental influence and reported that parents were mainly responsible for the improvements in children's consumption of V & F. Similarly, Vereecken et al. (2009) focused on improving the child care's food environment and found that by changing the food environment and the availability of foods increased children's fruit consumption.

4.3.8.4 Interpersonal/ Institutional

The studies by Natale et al (2014) and Hardy et al (2010) targeted the interpersonal and institutional levels by focusing on care staff/parents, and the centre's nutrition policies and practices. Both interventions focused on providing training to child care staff, Hardy et al. (2010) provided one

training session and Natale & Lopez et al. (2014) provided two sessions to child care staff; however, only Natale & Lopez et al. (2014) found positive results. A possible explanation for this difference is that Natale & Lopez et al. (2014) included parents in the intervention and the research staff was involved in improving the centre's food environment, on the other hand, Hardy et al. (2010) only included one to two child care staff per centre and provided resources for improving the child care's food environment but there was not a follow-up with them to see whether the resources were properly used.

4.3.8.5 Institutional

Three studies had interventions that targeted the institutional level and consisted of changes in the child care's nutrition policies and practices to improve the food environment. Two of the three interventions had positive results (Bell et al. 2015; Harnack et al. 2012; Schwartz et al. 2015). Bell et al. (2015) aimed to implement a healthy eating scheme in the child care centres, provided training for child care staff, and found that centres had high compliance to the healthy eating scheme which produced increases in children's consumption of fruits. The studies by Harnack et al. (2012) and Schwartz et al. (2015) focused on changing the centre's serving practices. Harnack et al. (2012) compared family serving style[8] to serving pre-portioned and plated food, and found increases in children's consumption of fruits with a family serving style compared to the other formats. Schwartz et al. (2015) tested two manipulations of the family serving style at the child care centre and it did not find any significant results. A possible explanation for these results is that Schwartz et al. (2015) compared different manipulations of family serving style to usual family serving style, whereas Harnack et al. (2012) compared family serving style to a completely different serving style.

[8] Family Serving Style, refers to the food service "where children select their own portions and serve themselves". (Benjamin-Neelon and Briley 2011, p.609).

4.3.8.6 Intrapersonal/ Institutional/ Public Policy

Two similar studies had interventions that targeted interpersonal, institutional and public policy levels. These included parents and child care staff, provided training to child care staff to implement the programs, and had the support from the community and governmental stakeholders to implement the interventions. One of the studies by De Silva-Sanigorski et al. (2010) aimed to increase the capability of public organizations to promote healthy eating through establishment of government structures to support the intervention. The main focus of the intervention was on child care staff and provided comprehensive training to implement the program in child care centres, which had positive results in increasing children's consumption of V & F. While the second study by De Coen et al. (2012) worked with government health boards and community stakeholders to facilitate the implementation of the intervention in the communities, the focus of the program was on parents and their influences on children's eating behaviours, but no intervention effects were found in children's diet.

4.3.9 Quality of the studies

The EPHPP quality assessment tool was used to measure the methodological quality of studies included (Armijo-Olivo et al. 2012). Two of the twenty-one studies had strong methodological quality, while nine studies had moderate quality (De Bock et al. 2012; Fitzgibbon et al. 2011; Williams et al. 2014; Hardy et al. 2010; Natale, Lopez-Mitnik, et al. 2014; Bell et al. 2015; Harnack et al. 2012; Zask et al. 2012; Bibiloni et al. 2017). Ten studies had weak methodological quality (Ahern et al. 2014; Correia et al. 2014; de Wild et al. 2013; de Wild et al. 2015; Horne et al. 2011; Witt and Dunn 2012; De Coen et al. 2012; Schwartz et al. 2015; Natale, Messiah, et al. 2014; Vereecken et al. 2009). Studies with weak quality rankings had low scores on the following criteria: selection bias (where the selection of participants was not likely to be representative of the target population or/and the level of participation was lower than 60%); confounders (where studies did not control for confounders in the analysis or the control of confounders was not described); and data collection methods (where the validity and

reliability of data collection tools were not described) according to the EPHPP quality assessment tool (Armijo-Olivo et al. 2012). The studies that had strong ratings provided more detail on the methods than the studies with weak and moderate ratings, and there were no associations between the methodological quality of interventions and the findings on studies. The quality rating of each study is detailed in Table 4-6, studies are listed according to their quality rating.

Table 4-6. Quality assessment of studies.

Study	Section Bias	Study Design	Confoun-ders	Blinding	Data Collection Method	Withdra-wals and Dropouts	Overall
O'Connell et al. 2012	1	1	1	2	1	2	Strong
De Silva-Sanigorski et al. 2010	2	2	2	2	2	N/A	Strong
Fitzgibbon et al. 2011	1	1	1	3	2	1	Moderate
Hardy et al. 2010	3	1	1	1	2	1	Moderate
Natale & L et al. 2014	1	1	1	2	1	3	Moderate
Bibiloni et al. 2017	3	2	1	2	1	1	Moderate
De Bock et al. 2011	2	1	1	2	3	1	Moderate
Williams et al. 2014	2	1	1	2	3	2	Moderate
Zask et al. 2012	3	1	1	2	2	2	Moderate
Bell et al. 2015	2	2	3	2	3	1	Moderate
Harnack et al. 2012	2	2	3	2	2	1	Moderate
Vereecken et al. 2009	3	1	1	2	3	1	Weak
De Coen et al. 2012	2	1	1	3	2	3	Weak
Witt et al. 2012	3	1	1	2	3	3	Weak
Correia et al 2014.	2	2	3	3	1	2	Weak
De Wild et al. 2015	3	2	3	2	3	1	Weak
Natale & M et al. 2014	2	1	2	2	3	3	Weak
Schwartz et al. 2015	2	2	3	3	3	1	Weak
Ahern et al. 2012	3	2	3	2	3	2	Weak
Horne et al. 2011	3	2	3	2	3	2	Weak
De Wild et al. 2013	3	2	3	2	3	2	Weak

(Note: 1=Strong, 2=Moderate, 3=Weak)

4.3.10 Process evaluation

Overall, the availability of process evaluation data reported in the studies was limited. The most reported component of the process evaluation framework was 'dose delivered' (n=19) and the least reported was 'fidelity' of implementation (n=2). Only six of the twenty-one studies reported detailed information on the process evaluation of the interventions (De Bock et al. 2012; Fitzgibbon et al. 2011; Williams et al. 2014; Witt and Dunn 2012; Hardy et al. 2010; Bell et al. 2015). Several studies reported that process evaluations of the interventions were conducted but no data were reported in the results and no references to other articles were given.

Regarding the context, nine studies reported that the child care centres in which interventions were taking place received governmental support to promote healthy eating. Eight of these interventions were conducted in the United States and participated in the United States Department of Agriculture's Child and Adult Care Food Program, which provides aid for the provision of nutritious foods to child care institutions (USDA 2017; Correia et al. 2014; O'Connell et al. 2012; Fitzgibbon et al. 2011; Natale, Messiah, et al. 2014; Williams et al. 2014; Witt and Dunn 2012; Harnack et al. 2012; Schwartz et al. 2015). Five of the nine interventions that received governmental support had positive results in children's consumption of V & F (Bibiloni et al. 2017; Natale, Messiah, et al. 2014; Williams et al. 2014; Witt and Dunn 2012; Harnack et al. 2012). Four studies reported that their interventions were designed and implemented by their local government (Williams et al. 2014; Hardy et al. 2010; Bell et al. 2015; de Silva-Sanigorski et al. 2010), and three of these interventions had positive results in children's consumption of V & F (Williams et al. 2014; Bell et al. 2015; de Silva-Sanigorski et al. 2010).

Regarding dose delivered, nineteen interventions reported the number of intervention components delivered to participants, however, no association was found between dose delivered and effectiveness of interventions.

4.4 Discussion and conclusion

4.4.1 Discussion

The aim of this study was to conduct a rapid review of the literature on interventions aimed at promoting children's consumption of V & F in the child care setting and identifying the strategies used in interventions. We used the Socioecological Model (SEM) to categorize interventions, in this particular study, interventions targeting the individual, intrapersonal and institutional levels appeared to be more successful in increasing children's consumption of V & F. This finding complies with the SEM, which proposes that interventions targeting several levels of influence are likely to produce the desired behaviour change (Stokols 1996). Of the interventions that used behavioural, educational and food environment strategies to modify children's consumption of V & F, behavioural strategies showed to be the most successful in increasing children's intake of V & F.

- **Population included**

In this review, including parents and child care staff in interventions seemed to be an element for success in studies, and involving parents and child care staff played a key role in intervention performance. Child care staff acted as agents of change in child cares and there is evidence that including child care staff in healthy eating programs improved the centre's food environment and the quality of the food served to children (Markides et al. 2017; Gosliner et al. 2010). Also, parental involvement in child care was associated as positive influence in the centre's eating practices and children's eating habits (Hingle et al. 2010). Although parents are not directly involved in the nutrition practices of the child cares, parents' eating habits have a great influence on children's eating behaviours; and therefore, studies that included parents in the interventions addressed an important influential factor in children's eating behaviours. Including parents and child care staff in interventions are determinants for influencing young children's consumption of V & F in the child cares.

- **Behaviours targeted**

This review included interventions that were focused on children's eating behaviours and those focused on children's eating and sedentary/active behaviours. However, we found that interventions that only targeted children's eating behaviours were the most successful in increasing children's consumption of V & F compared to interventions that targeted diet and other behaviours. These findings comply with the SEM framework, which proposes that interventions targeting a specific behaviour are the most effective in producing behaviour change (Stokols 1996). Although, many interventions in educational settings target diet and physical activity, focusing only on diet should be taken into consideration when aiming to produce major changes in children's food consumption.

- **Theoretical foundation**

In this review, we found that theoretically informed interventions were more likely to have positive results. Most interventions that had a theoretical foundation had positive outcomes, and all of the interventions that included behaviour change strategies had positive results by increasing children's consumption of V & F. Evidence suggest that interventions that have a behavioural and educational theoretical foundation are more likely to produce the desired change in interventions (Glanz, Rimer, and Viswanath 2008; Bartholomew et al. 2011).

- **Types of strategies**

For the different strategies used in interventions in this review, repeated exposure (RE) of foods was an effective intervention strategy for increasing children's consumption of V & F. Most interventions that used RE of foods increased children's V & F intake and maintained that increase for over 6 months. Although, the improvements were small in most studies, there was evidence that RE of foods in the early years is a predictor for increased acceptance and consumption of V & F in the future in children (Cooke 2007).

The majority of the interventions that aimed at changing the centre's food environment had positive results, and most of them were accompanied by educational strategies aimed at children, child care staff and/or parents. Similar results were found in interventions in older children were changes in school's food environment resulted in improved children's eating behaviours, including consumption of V & F (Bevans et al. 2011; Williamson et al. 2013). These results highlight the importance of the centre's food environment which sets the medium for children's performance of healthy eating behaviours (Benjamin Neelon, Briley, and American Dietetic Association 2011).

- **Reporting of outcomes**

Only nine of the fifteen interventions that reported positive results translated their findings on V & F intake into practical means, as number of servings or grams consumed. Of the interventions that reported the results in practical means, the interventions reported by Harnack et al. and Zask et al. (2012) were the most successful at increasing fruit intake by 150 g/day (50 g/meal) and 94 g/day, respectively. De Wild et al. (2013) was the most successful at increasing vegetable intake by 58 g/day. The interventions included showed that children had higher increases in fruits' intake than vegetables. Several studies have similar findings where fruit was more accepted by children than vegetables (Shim et al. 2016; Cooke and Wardle 2005). Young children have an innate preference for sweet and salty tastes, and for disliking sour and bitter tastes (Birch and Fisher 1998). Also, previous studies found that children tend to relate fruits as 'treat' foods, and that vegetables intake tend to be affected by restrictive feeding behaviours in children (Shim et al. 2016; Cooke and Wardle 2005; Cooke et al. 2004). This evidence can explain the difference between fruits and vegetables intake in interventions. A greater focus should be placed on increasing children's consumption of vegetables and in developing children's preference for this food group.

- **Methodological quality**

There were no associations between study methodological quality and the results of interventions, although most of the studies included had either 'weak' or 'moderate' ratings. A high number of studies classified as 'weak' did not report information that was assessed by the quality assessment tool, and if the information was not reported, the assessment tool rated them as 'weak'. There is a need for providing more detail on the methodology of interventions; however, it is understandable that some authors reduce the detail provided in studies to fulfill publication word-limit restrictions imposed by peer-reviewed journals.

- **Process evaluation**

Process evaluation data were limited in most of studies and a low regard was given to reporting the process evaluation results in studies that collected these data. Process evaluation is an in-depth assessment of the implementation process of interventions and requires effort for conducting such evaluations (Steckler and Linnan 2002). Other authors have pointed out the lack of process evaluation of interventions, and the lack of reporting on the design, methods and tools used in process evaluations (Androutsos et al. 2014; Mikkelsen et al. 2014). Interventions should put more effort in conducting and reporting on process evaluation of interventions to provide a deeper understanding of the program components that produced the outcomes of the interventions.

- **Rapid versus. Scoping review**

In this rapid review, additional steps were taken that were not characteristic of rapid reviews, which included the collection of process evaluation data and the use of a thematic framework to analyse the data. Collecting this information provided more information on the context of the interventions. Since there is a lack of standardized methodology for conducting rapid reviews, there is some flexibility in the steps to conduct this type of review.

Although some of the steps conducted in this review seem to be similar to those required for a scoping review, the methods required for conducting a scoping review are more comprehensive and extensive than the ones used in this review. Table 4-7 explains the differences between a rapid and a scoping review. Although there is overlap between the two types of reviews, the methodology used in this review more closely aligns with a rapid review.

4.4.2 Conclusions

Overall, within the studies included in this review we found that comprehensive interventions targeting children, parents/child care staff and the centre's food environment were successful in increasing children's consumption of V & F; and that behaviour change strategies and strategies aimed at improving the food environment of the child care centre had positive effects in increasing children consumption of V & F.

4.4.3 Strengths and Limitations

This study has several strengths: it included a variety of interventions designed to improve children's diet at child care; robust reviews methods were used; multiple databases were used to identify articles; and included information on the process evaluation of interventions and the quality assessment of studies.

Due to the nature of the rapid review methodology, this study had some limitations: the search for studies was limited, we did not look for gray literature or unpublished literature; and the selection and analysis of the studies were conducted by one primary reviewer. Also, the low quality of the studies included was a limitation of this study, as the low quality rankings put into question the validity and reliability of the findings, especially when almost half of the studies included had 'weak' methodology quality.

Table 4-7. Differences between rapid and scoping reviews

✓ = applies to the review conducted		✗ = does not apply to the review conducted	
	Rapid review		**Scoping review**	
Purpose	Type of knowledge synthesis in which systematic review processes are accelerated and methods streamlined to complete the review more quickly than is the case for typical systematic review	✓	Form of knowledge synthesis which incorporates a range of study designs to comprehensively summarize and synthesize evidence with the aim of informing practice, programs, and policy and providing direction to future research priorities	✗
Research question or objectives	Defined objectives	✓	Defined research question	✓
Literature search	Search conducted in two or more databases with specific search limits	✓	Extensive search (e.g. electronic databases, reference lists, hand searching of key journals, conferences)	✗
Screening and study selection	Predefined of inclusion and exclusion criteria by a single reviewer, with or without the verification of a second reviewer Uses PRISMA for screening of studies	✓	Iterative study selection, that evolves with the search of literature, with two reviewers working independently	✗
Data collection	Limited extraction to main study characteristics and outcomes	✗	Data is extracted using data charts, and frameworks are used to collect contextual and process information from studies	✓
	Data collection by a single reviewer, with or without verification	✓	Data collected collectively by a research team	✗
Quality appraisal	Quality appraisal is conducted by a single reviewer, with or without verification	✓	Quality appraisal is not conducted	✗
Knowledge synthesis	Narrative summaries are common Discussion of implications, recommendations for policy and research limitations are included	✓	Overview of the literature is summarized using frameworks; charts and tables are used to present data and a thematic analysis of the studies is included Discussion of implications and recommendations for policy and practice are included	✗

Adapted from Tricco, Langlois, and Straus (2017); Colquhoun et al. (2014); Levac, Colquhoun, and O'Brien (2010).

4.4.4 Implications for research, theory and practice

This review supports the need for a greater focus on increasing children's consumption of vegetables. As well, there is a need for more theoretically informed interventions in child cares, and for more consistency in reporting outcomes in children's diet in studies. Moreover, there is a need for improving the methodological quality of interventions, as there were only two studies in this review that had strong methodological quality. And finally, few studies reported on the process evaluation of interventions which is important for providing contextual information on the effect of interventions.

We confirmed that the SEM was a suitable framework for analysing health promotion interventions. The SEM assumptions about effectiveness of interventions were confirmed in this review, since we found that interventions targeting several levels of influence were effective in increasing children's consumption of V & F, and that interventions that focused on changing only one health behaviour were more effective than interventions targeting several behaviours at a time, as the SEM framework proposed.

The majority of interventions made significant improvements in children's consumption of V & F in the child care setting which confirmed that child care centres are ideal venues for the promotion of healthy eating in children, and that interventions aimed at promoting healthy lifestyles in children should not only be targeting older children in schools. Child care centres provide an ideal setting for the promotion of healthy lifestyle habits and for the prevention of childhood overweight and obesity in young children.

The findings from this review will help to guide future research on the development of interventions to increase children's consumption of V & F in child cares; however, these findings are limited and conducting a realist review will provide a deeper understanding in how interventions work to produce the desired changes in children's diets in child care centres, as a realist review seeks to

understand the mechanism that influence the performance of an intervention in certain context and place (Pawson et al. 2005).

4.4.5 Reflections on research: lessons learned

Through this review, I learned that there is no a perfect recipe for conducting an effective intervention to promote children's healthy eating. However, there are a set of components that were repeatedly present in the interventions that were effective, and these were high fidelity of delivery of interventions, high involvement of research staff in the delivery of interventions, as well as, high involvement of child care staff and parents in interventions.

Chapter 5 Discussion

5.1 Summary

The two main aims of this research was to conduct a needs assessment through a consultation with key informants to explore and identify the educational needs of child care educators in the promotion of healthy eating; and a rapid review of interventions designed to promote children's consumption of vegetables and fruits in child cares. Through Study 1, we found that there is an immediate need to provide training to child care educators (CCE) in the promotion of healthy eating. As well, that there are other influential factors that need to be addressed in order to enhance the promotion of healthy eating in child care centres. In Study 2, we found that comprehensive healthy eating interventions targeting children, parents/child care staff and the centre food environment were successful in promoting healthy eating in child care centres. The findings of these two studies brought insight into what is needed for the promotion of healthy eating in child cares, and what are the most effective approaches for promoting healthy eating in this setting.

5.2 Main findings of the thesis

- **Role of child care staff in the promotion of healthy eating**

We found that child care staff played a key role in the promotion of healthy eating in the centre. In Study 2, we found that including child care staff in interventions had a positive effect on promoting healthy eating. In Study 1, we found that directors were the gatekeepers of the nutrition policies and practices of the child care centre, and that CCE were the agents of change for the promotion of healthy eating habits in children. However, we found that there is need for increased awareness among directors about the importance of promoting healthy eating in child care, and there is an immediate need for CCE training on healthy eating, picky eating and role modeling. Evidence suggest that including child care staff in healthy eating programs improves the centre's food environment and the quality of

the food served to children (Markides et al. 2017; Gosliner et al. 2010). Future programs should target directors and CCE as part of a comprehensive approach for promoting healthy eating in child cares.

- **Involvement of parents**

Parental involvement in child care centres is crucial for the promotion of healthy eating and it is associated with positively influencing the centre's eating practices and children's eating habits (Hingle et al. 2010). In Study 2, we found that parental involvement in healthy eating interventions was a determinant for the promotion of healthy eating and children's healthy eating habits in the child care setting. Through Study 1, we found that there was need for parental involvement in child care centres. Parents were concerned about the food provided at the centre, but they were not involved in, nor were they informed of the healthy eating practices of the centre. Although, parents are not directly involved in the nutrition practices of the centre, parents can act as advocates for the promotion of healthy eating in child cares (Benjamin et al. 2008). Therefore, involving parents in the centre's nutrition practices should be one of the priorities in future healthy eating programs in child care.

- **Role of the centre's food environment.**

A supportive food environment in the child care is indispensable for promoting healthy eating behaviours in children (Benjamin-Neelon and Briley 2011; Bevans et al. 2011; Freedman and Alvarez 2010). In Study 2, we found that interventions that targeted the child care's food environment were effective in promoting healthy eating among children. In Study 1, we found that the centre's food environment played a key role in the performance of healthy eating habits in child cares, but there was room for improvement in some areas, such as in the food provided to children, the food CCE bring to the centre and eat in front of children, and in the opportunities CCE have to interact with children at mealtimes. Best practices recommends that healthy and balanced meals are provided to children, and at mealtimes CCE act as role models of healthy eating behaviours by siting with children and eating the

same kind of food children eat (Benjamin-Neelon and Briley 2011; Government of Alberta 2012). However, these recommendations are not followed in many child care centres. Improving the food environment of child care centres is a necessity for the promotion of healthy eating and there is a need to address the factors that influence the centre's food environment, such as availability of foods, financial resources, staff training and the centre's infrastructure.

- **Role modeling**

Role modeling by child care educators was a recurring theme in both studies. Child care educators have a great influence on children's eating behaviours through the eating habits they model to children in child cares (Erinosho et al. 2012; Birch and Ventura 2009). Role modeling was a strategy commonly used in interventions in Study 2, and all the interventions that used role modeling had positive results by improving children's healthy eating habits. In Study 1, we found that there was a need for training and increased awareness of role modeling among CCE. There is strong evidence that role modeling has positive effect in children's eating behaviours in child care (Shewring 2016; Erinosho et al. 2012a; Larson et al. 2011; Benjamin-Neelon and Briley 2011; Birch and Ventura 2009). Therefore, we need to raise awareness of CCE's role modeling behaviours and work with them to improve their role modeling in child care centres.

- **Picky eating and introduction of new foods**

In Study 1, we found that children's picky eating was a barrier in the promotion of healthy eating and that CCE needed training in the proper introduction of new foods to children. Picky eaters tend to resist trying new foods, hence, proper introduction of foods is crucial for dealing with children's picky eating in child cares (Carruth et al. 2004). In Study 2, we found that repeated exposure of foods was an effective strategy for introducing new foods to children (vegetables) and for developing children's preferences for them. This finding complies with the evidence that children need 10 to 15 exposures of a

new foods to start consuming and liking them (Birch and Fisher 1998). Therefore, repeated exposure of foods should be used as a strategy for introducing new food to children in child care and for handling children's picky eating behaviours. Future programs aimed at promoting healthy eating in child cares should provide training to CCE on handling children's picky eating and introduction of new foods, so an evidence-based approach can be used for dealing with this behaviour in child cares.

- **The *Alberta Nutrition Guidelines for Children and Youth***

Although data on the *Alberta Nutrition Guidelines for Children and Youth* (ANGCY) were only presented in Study 1, the ANGCY were a large theme this study. We found there was likely limited adoption and implementation of the ANGCY resulting in their minimal use in child care centres. Some of the reasons for the limited adoption included there is insufficient dissemination of the ANGCY and the lack of guidance on practical ways to implement the guidelines in child cares. The guidelines are not mandatory to implement in any educational setting in Alberta, and therefore, creating governmental policies that support the adoption and implementation of the ANGCY is one of the most important actions to take to promote healthy food environments in educational settings. There is evidence that mandatory provincial healthy eating policies are effective to improve children's eating habits in educational settings (Fung et al. 2013; Larson et al. 2011).

Additionally, the guidelines were not considered the most appropriate tool to educate CCE, as the ANGCY were considered unclear, unpractical and challenging to follow. Also, key informants reported some barriers child care centres have for adopting the ANGCY (resources, personnel and infrastructure). There is a need to update the ANGCY, making it a more practical resource that child care centres can implement, and there is also need to work with child care centres to overcome the barriers they have for adopting and implementing the ANGCY.

5.3 Strengths and Limitations

Using the Intervention Mapping approach for conducting a needs assessment allowed us to collect data from key informants as well as, empirical data from the literature review. The data gathered from the two studies complemented each other and brought insights into what is needed for the promotion of healthy eating in child cares. The consultation with key informants collected recommendations and perspectives from multiple groups involved in child cares (i.e., CCE, directors, parents, dietitians and experts), which allowed to have a better picture of the promotion of healthy eating in child cares. Also, the consultation gathered quantitative and qualitative data that were triangulated to bring validity and credibility to the findings. The literature review used robust methods to review a variety of interventions aimed at promoting healthy eating in child cares, which provided evidence on the efforts made for the promotion of healthy eating in child care centres to inform the findings from the consultation.

The findings of this thesis are limited. First, we did not conduct other components of the need assessment proposed by the Intervention Mapping framework, such as establishment of a planning group, feasibility exploration, assessment of local capacity and complete background evaluation (Bartholomew et al. 2011). Second, in the consultation, we had a small number of participants who were not representative of the entire population, and there is suspicion that some responses were affected by desirability bias, which affected the credibility of the findings; this became more apparent after noticing the difference between the responses of child care staff and the responses of the rest of key informants regarding promotion of healthy eating in the child care settings. Third, in the literature review, the search of studies was limited, and many had low quality ratings which put into questions the validity and reliability of the findings.

5.4 Implications for research, practice and policy

The findings of this thesis will serve as a foundation for the development of healthy eating programs in child care centres in Alberta, and will also guide future efforts in the promotion of healthy eating in the child care setting,

We confirmed that child care centres are ideal venues for promoting healthy eating in young children, and we found the need for more nutrition programs aimed at the child care setting. Through this research, we confirmed the need for CCE's training in their promotion of healthy eating and the need to raise awareness with directors and owners about promoting healthy eating in child cares. Additionally, there is a need to work with child care centres to overcome the barriers they face in promoting healthy eating, such as creating nutrition policies within the centre, providing healthy food to children, providing opportunities for CCE to interact with children in the food context. Future efforts in the promotion of healthy eating in child cares should provide training to child care staff and work to overcome the barriers they face in promoting healthy eating.

We confirmed that the Socioecological Model (SEM) was a suitable framework for categorizing the factors that influence the promotion of healthy eating in child care and for analysing health promotion interventions in this setting. The SEM should be used in future research for the development of comprehensive healthy eating programs in the child care setting.

In this study, we found that the current provincial nutrition guidelines are not being well received by child care centres, and there is an immediate need to update the ANGCY in order to have a better uptake of the guidelines. Also, we found the need of governmental policies and regulations that support the implementation of the guidelines, such as making them mandatory to follow by all child care centres. Additionally, regarding implementation of nutrition policy, there is a need to add nutrition training into the educational curriculum for child care educators across Alberta. The findings of this

thesis could be used as a reference for future healthy eating policies and regulations in child cares in Alberta.

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Appendices

Appendix A – Study invitations

a. Invitation for Child Care Educators, Directors and Parents

Parents
Child Care Educators
Directors

we want to hear from you!

About the promotion of healthy eating in child care

We are creating a program for the promotion of healthy eating in child care and we would like to hear about your recommendations and how child care can become a better place for the promotion of healthy eating habits to children.

Participation consist in answering a 20-minutes online survey

You will receive $10 gift card for your participation

Directors and Educators if you have more than 3 months working in child care you are eligible to participate

We would love to hear what you are thinking!

For more information access:
https://is.gd/healthyeating
Contact: Alejandra Arguelles
aarguell@ualberta.ca

b. Invitation for Dietitians

Dietitians working in child care

we want to hear from you!

About the promotion of healthy eating in child care

We are creating a program for the promotion of healthy eating in child care and we would like to hear about your recommendations and how child care can become a better place for the promotion of healthy eating habits to children.

Participation consist in answering a 20-minutes online survey

You will receive $10 gift card for your participation

If you have more than 3 months working in child care you are eligible to participate

We would love to hear what you are thinking!

For more details, please read the Information Letter or contact:
Alejandra Arguelles
aarguell@ualberta.ca

c. Invitations for experts

We want to hear from you!

About the promotion of healthy eating in child care

Experts in the child care setting working in academia or government

We are creating a program for the promotion of healthy eating in child care and we would like to hear about your recommendations and how child care can become a better place for the promotion of healthy eating habits to children.

Participation consist in answering a 20-minutes online survey
You will receive $10 gift card for your participation

We would love to hear what you are thinking!

For more details, please read the Information Letter or contact:
Alejandra Arguelles
aarguell@ualberta.ca

Appendix B – Information Letters

a. Information Letter for Child Care Centres

An educational program to increase child care educators' knowledge, skills and self-efficacy in the promotion of healthy eating in child cares

Dear director,

Thank you in advance for taking the time to read this letter. This will inform you of an opportunity as a child care centre to take part in a research study to develop a nutrition program for child care educators.

Why is the study being done? The purpose of the study is to develop an educational program to increase child care educators' knowledge, skills and self-efficacy in the promotion of healthy eating among children in child care. Results of this study will be of benefit to educators in their promotion of healthy eating.

What do we want to know? We want to know child care educators, directors and parents' recommendations for child care educators' educational needs in the promotion of healthy eating.

What do I have to do? We would like to ask for your help to invite child care educators, directors and parents at your centre to participate in our study. If you agree, we would like to ask you to send an email with an invitation and a survey link to directors, educators and parents. Participation in this study will involve contributing to a 20-minute online survey.

What are the benefits? By participating in this study you will help to the research conducted in healthy eating in child care, and you will contribute to the improvement of the food environment in this setting. After the completion of the survey participants will be offered a $10 dollar gift card for participating in the study. Other than the gift card there is no other benefit from participating in the study. There is no cost associated with being part of this study.

Are there any risks? There are no risks associated with taking part in this study. Your child care is under no obligation to participate in this study.

Is it Confidential? All the survey responses will be anonymized and no link between the responses and the child care centre will be made. You and your child care centre's name will NOT be personally identified in any publications or presentations from this study. Data will be kept confidential by the researchers and will be stored on a password protected computer in a locked office at the University of Alberta. The researcher and the Research Ethics Committee of the University of Alberta will be the only ones with access to the data. After the completion of

the study the data will be kept in a data repository in a lock office of the University of Alberta. The data gathered in this study may be used in future research but if so, it will have to be approved by a Research Ethics Board; only the anonymized data will be used and none of the identifiable information will kept for this purpose.

Can I withdraw from the study? The participation is completely voluntary. You can opt out without penalty. Even if you agree that your centre participate in the study you can change your mind and withdraw at any time. If you wish to withdraw from the study, please tell one of the researchers.

Results of this study will be included in a Master of Science thesis prepared by Alejandra Arguelles, one of the students researchers. The findings may be submitted for publishing. If you are interested in receiving a finalized version of the report you may indicate so at the beginning of the study by informing the researchers.

The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615. If you have concerns about this study, you may contact the Research Ethics Office. This office has no direct involvement with this project.

If you have any further questions regarding this study, please do not hesitate to contact Alejandra Arguelles.

Your contribution to this study will be much appreciated.

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W: 780-492-2693

Consent Statement

I have read this form and the research study has been explained to me. I have been given the opportunity to ask questions and my questions have been answered. If I have additional questions, I have been told whom to contact. I agree to participate in the research study described above and will receive a copy of this consent form. I will receive a copy of this consent form after I sign it.

_____ _____

Child Care Director Name (printed) and Signature Date

_____ _____

Name (printed) and Signature of Researcher Date

b. Information Letter for Parents, Child Care Educators and Directors

An educational program to increase child care educators' knowledge, skills and self-efficacy in the promotion of healthy eating in child cares

Dear _____,

Thank you in advance for taking the time to read this letter. This letter will inform you of an opportunity as a (child care educator/child care director/parent) to take part in a research study to develop a nutrition educational program for child care educators.

Why is the study being done? The purpose of the study is to develop an educational program to increase child care educators' knowledge, skills and self-efficacy in the promotion of healthy eating among children in the child care setting. Results of this study will be of benefit to child care educators in their promotion of healthy eating in child care

What do we want to know? We want to know your recommendations for child care educators' educational needs in the promotion of healthy eating in child care.

What do I have to do? Participation in this study will involve contributing to a 20-minute online survey. You will answer a survey to tell us about your nutrition-related recommendations and priorities for child care educator's educational needs, your answers about this topic will help us to develop an educational program for child care educators in healthy eating promotion. We will ask you to provide your email address in the survey (optional) with the purpose to identify your survey in case you desire to withdraw from the study, and to provide you with an incentive**.**

What are the benefits? After the completion of the survey you will be offered a $10 dollar coffee shop electronic gift card for participating in the study, by accepting the gift card you will be giving permission to transfer your email address to the vendor in order to receive the electronic gift card. If you do not accept the gift card, your email address will not be sent to the vendor. Other than the gift card there is no other benefit from participating in the study. There is no cost associated with being part of this study.

Are there any risks? There are no risks associated with taking part in this study. If you feel uncomfortable in answering a question you may not answer. You do not need to answer all the survey's questions in order to receive the gift card.

Is it confidential? Your responses will be confidential; all survey data will be anonymized. You and your responses will NOT be personally identified in any publications or presentations from this study. Data will be kept confidential by the researchers and will be stored on a password protected computer in a locked office at the University of Alberta. The researcher and the Research Ethics Committee of the University of Alberta will be the only ones with access to the data. After the completion of the study the data will be kept in a data repository in a lock office of the University of Alberta. The data gathered in this study may be used in future research but if so, it will have to be approved by a Research Ethics Board; only the anonymized data will be used and none of the identifiable information will kept for this purpose.

Can I withdraw from the study? The participation is completely voluntary. You can opt out without penalty. Even if you agree to be in the study you can change your mind and withdraw at any time. However, you can only withdraw from the study if you provide your email address (optional) in the

survey. Information can be withdrawn before the data is analysed, the last day to withdraw from the study will be May 15, 2017. If you desire to withdraw from the study you will still receive the electronic gift card.

Results of this study will be included in a Master of Science thesis prepared by Alejandra Arguelles, one of the student researchers. The findings may be submitted for publishing. If you are interested in receiving a finalized version of the report you may indicate so at the beginning of the study by informing the study personnel by email.

The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615. If you have concerns about this study, you may contact the Research Ethics Office. This office has no direct involvement with this project.

If you have any further questions regarding this study, please do not hesitate to contact Alejandra Arguelles.

Your contribution to this study will be much appreciated.

Researcher:

Alejandra Arguelles, MSc Candidate
4-398 Edmonton Clinic Health Academy
University of Alberta
Edmonton, AB
aarguell@ualberta.ca
W: 587-937-5054

Supervisor:

Anna Farmer, PhD, MPH, RD
4-370 Edmonton Clinic Health Academy
University of Alberta
Edmonton, AB
anna.farmer@ualberta.ca
W: 780-492-2693

wing

If you agree to participate in the study, please access to the survey by clicking following URL link:

https://is.gd/healthyeating

If clicking the URL link does not work, please 'Copy' the URL link and 'Paste' it into the address bar in your web browser.

c. Information Letter for Dietitians

An educational program to increase child care educators' knowledge, skills and self-efficacy in the promotion of healthy eating in child cares

Dear dietitian,

Thank you in advance for taking the time to read this letter. This letter will inform you of an opportunity as a dietitian to take part in a research study to develop a nutrition educational program for child care educators.

Why is the study being done? The purpose of the study is to develop an educational program to increase child care educators' knowledge, skills and self-efficacy in the promotion of healthy eating among children in the child care setting. Results of this study will be of benefit to child care educators in their promotion of healthy eating in child care

What do we want to know? We want to know your recommendations for child care educators' educational needs in the promotion of healthy eating in child care.

What do I have to do? Participation in this study will involve contributing to a 20-minute online survey. You will answer a survey to tell us about your nutrition-related recommendations and priorities for child care educator's educational needs, your answers about this topic will help us to develop an educational program for child care educators in healthy eating promotion. We will ask you to provide your email address in the survey (optional) with the purpose to identify your survey in case you desire to withdraw from the study, and to provide you with an incentive**.**

What are the benefits? After the completion of the survey you will be offered a $10 dollar coffee shop electronic gift card for participating in the study, by accepting the gift card you will be giving permission to transfer your email address to the vendor in order to receive the electronic gift card. If you do not accept the gift card, your email address will not be sent to the vendor. Other than the gift card there is no other benefit from participating in the study. There is no cost associated with being part of this study.

Are there any risks? There are no risks associated with taking part in this study. If you feel uncomfortable in answering a question you may not answer. You do not need to answer all the survey's questions in order to receive the gift card.

Is it confidential? Your responses will be confidential; all survey data will be anonymized. You and your responses will NOT be personally identified in any publications or presentations from this study. Data will be kept confidential by the researchers and will be stored on a password protected computer in a locked office at the University of Alberta. The researcher and the Research Ethics Committee of the University of Alberta will be the only ones with access to the data. After the completion of the study the data will be kept in a data repository in a lock office of the University of Alberta. The data gathered in this study may be used in future research but if so, it will have to be approved by a Research Ethics Board; only the anonymized data will be used and none of the identifiable information will kept for this purpose.

Can I withdraw from the study? The participation is completely voluntary. You can opt out without penalty. Even if you agree to be in the study you can change your mind and withdraw at any time.

However, you can only withdraw from the study if you provide your email address (optional) in the survey. Information can be withdrawn before the data is analysed, the last day to withdraw from the study will be May 15, 2017. If you desire to withdraw from the study you will still receive the electronic gift card.

Results of this study will be included in a Master of Science thesis prepared by Alejandra Arguelles, one of the student researchers. The findings may be submitted for publishing. If you are interested in receiving a finalized version of the report you may indicate so at the beginning of the study by informing the study personnel by email.

The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615. If you have concerns about this study, you may contact the Research Ethics Office. This office has no direct involvement with this project.

If you have any further questions regarding this study, please do not hesitate to contact Alejandra Arguelles.

Your contribution to this study will be much appreciated.

Researcher:

Alejandra Arguelles, MSc Candidate
4-398 Edmonton Clinic Health Academy
University of Alberta
Edmonton, AB
aarguell@ualberta.ca
W: 587-937-5054

Supervisor:

Anna Farmer, PhD, MPH, RD
4-370 Edmonton Clinic Health Academy
University of Alberta
Edmonton, AB
anna.farmer@ualberta.ca
W: 780-492-2693

If you agree to participate in the study, please access to the survey by clicking following URL link:

https://is.gd/program4educators2

If clicking the URL link does not work, please 'Copy' the URL link and 'Paste' it into the address bar in your web browser.

d. Information Letter for Experts

An educational program to increase child care educators' knowledge, skills and self-efficacy in the promotion of healthy eating in child cares

Dear expert,

Thank you in advance for taking the time to read this letter. This letter will inform you of an opportunity as an expert in the child care food environment to take part in a research study to develop a nutrition educational program for child care educators.

Why is the study being done? The purpose of the study is to develop an educational program to increase child care educators' knowledge, skills and self-efficacy in the promotion of healthy eating among children in the child care setting. Results of this study will be of benefit to child care educators in their promotion of healthy eating in child care

What do we want to know? We want to know your recommendations for child care educators' educational needs in the promotion of healthy eating in child care.

What do I have to do? Participation in this study will involve contributing to a 20-minute online survey. You will answer a survey to tell us about your nutrition-related recommendations and priorities for child care educator's educational needs, your answers about this topic will help us to develop an educational program for child care educators in healthy eating promotion. We will ask you to provide your email address in the survey (optional) with the purpose to identify your survey in case you desire to withdraw from the study, and to provide you with an incentive**.**

What are the benefits? After the completion of the survey you will be offered a $10 dollar coffee shop electronic gift card for participating in the study, by accepting the gift card you will be giving permission to transfer your email address to the vendor in order to receive the electronic gift card. If you do not accept the gift card, your email address will not be sent to the vendor. Other than the gift card there is no other benefit from participating in the study. There is no cost associated with being part of this study.

Are there any risks? There are no risks associated with taking part in this study. If you feel uncomfortable in answering a question you may not answer. You do not need to answer all the survey's questions in order to receive the gift card.

Is it confidential? Your responses will be confidential; all survey data will be anonymized. You and your responses will NOT be personally identified in any publications or presentations from this study. Data will be kept confidential by the researchers and will be stored on a password protected computer in a locked office at the University of Alberta. The researcher and the Research Ethics Committee of the University of Alberta will be the only ones with access to the data. After the completion of the study the data will be kept in a data repository in a lock office of the University of Alberta. The data gathered in this study may be used in future research but if so, it will have to be approved by a Research Ethics Board; only the anonymized data will be used and none of the identifiable information will kept for this purpose.

Can I withdraw from the study? The participation is completely voluntary. You can opt out without penalty. Even if you agree to be in the study you can change your mind and withdraw at any time.

However, you can only withdraw from the study if you provide your email address (optional) in the survey. Information can be withdrawn before the data is analysed, the last day to withdraw from the study will be May 15, 2017. If you desire to withdraw from the study you will still receive the electronic gift card.

Results of this study will be included in a Master of Science thesis prepared by Alejandra Arguelles, one of the student researchers. The findings may be submitted for publishing. If you are interested in receiving a finalized version of the report you may indicate so at the beginning of the study by informing the study personnel by email.

The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615. If you have concerns about this study, you may contact the Research Ethics Office. This office has no direct involvement with this project.

If you have any further questions regarding this study, please do not hesitate to contact Alejandra Arguelles.

Your contribution to this study will be much appreciated.

Researcher:

Alejandra Arguelles, MSc Candidate
4-398 Edmonton Clinic Health Academy
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Supervisor:

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4-370 Edmonton Clinic Health Academy
University of Alberta
Edmonton, AB
anna.farmer@ualberta.ca
W: 780-492-2693

If you agree to participate in the study, please access to the survey by clicking following URL link:

https://is.gd/program4educators1

If clicking the URL link does not work, please 'Copy' the URL link and 'Paste' it into the address bar in your web browser.

Appendix C – Informed Consent Clause

INFORMED CONSENT CLAUSE

By answering this survey:

- I agree that I have read and understood the information in the information letter.
- I understand the benefits and risks involved in taking part in this study.
- I agree that I am free to refuse to participate or to withdraw from the study at any time, without consequence, and that my information will be withdrawn at my request.
- I agree that I understand that the answers of this survey will be anonymized.
- I agree to take part in this study.

As an appreciation for taking the time to answer the survey, we are offering you an electronic coffee shop gift card. However, by accepting the gift card you are giving consent that your email address is transferred to the vendor in order to receive the gift card. No connections will be made between the answers gathered in the survey and the vendor. If you accept the gift card, it will be delivered to your email account.

If at some point you do not feel comfortable answering any question, do not feel pressure to do so. You can still submit your survey to receive the gift card even if you do not complete the survey or you decide to withdraw.

Appendix D - Surveys

a. Survey for Child Care Educators

INSTRUCTIONS

Please read carefully and answer the following questions according to your own opinions and experiences.

Email address: _____

(If you choose not to provide an email address your data cannot be removed upon request).

I accept that my email address is transferred to the vendor

- Yes
- No

QUESTIONS
1. Are you aware of the recommendations of *Eating Well with Canada's Food Guide*? o Yes o No If not, skip to question 3. 1.1 If yes, how would you rate your awareness of the *Eating Well with Canada's Food Guide* recommendations? Select one: o Very aware o Aware o Somewhat aware o Not aware
2. Do you agree with the recommendations of *Eating Well with Canada's Food Guide*? Select one: o Strongly agree o Agree o Neither agree or disagree o Disagree o Strongly disagree
Alberta Nutrition Guidelines for Children and Youth
3. Are you aware of the *Alberta Nutrition Guidelines for Children and Youth* recommendations for child cares? o Yes o No If not, skip to question 7. 3.1 If yes, how would you rate your awareness of the *Alberta Nutrition Guidelines for Children and Youth* recommendations?

Select one:

- Very aware
- Aware
- Somewhat aware
- Not aware

4. Are the recommendations of the *Alberta Nutrition Guidelines for Children and Youth* put into practice at your child care?

   - Yes
   - No

   If not, skip to question 7.

5. Is the Food Ranking System of the *Alberta Nutrition Guidelines for Children and Youth* being used at your child care?

   - Yes
   - No

   5.1 If yes, how confident your feel using the Food Ranking System?

   Select one:

   - Very confident
   - Confident
   - Somewhat confident
   - Unconfident

6. If there is room for improvement, how do you think the child care educators' knowledge of the recommendations of the *Alberta Nutrition Guidelines for Children and Youth* could be improved? Explain.

Role Modeling

7. How often do you practice the following activities at your child care?

   7.1. When possible, sit with children at meal times.

   Select one:

   - Always
   - Very often
   - Sometimes
   - Almost never
   - Never

   7.2. When possible, eat the same food children eat at meal times.

   Select one:

   - Always
   - Very often
   - Sometimes
   - Almost never
   - Never

   7.3. Encourage children to try new foods at meal times.

   Select one:

   - Always

- Very often
- Sometimes
- Almost never
- Never

7.4 Use food as a reward or punishment for children.

Select one:

- Always
- Very often
- Sometimes
- Almost never
- Never

8. If there is room for improvement, how do you think child care educators could be better role models of healthy eating behaviors to children? Explain.

Picky Eating

9. How often is children's picky eating a barrier for the promotion of healthy eating at your child care?

Select one:

- Very often
- Fairly often
- Sometimes
- Almost never
- Never

10. How confident you feel handling children's picky eating at child care?

Select one:

- Very confident
- Confident
- Somewhat confident
- Unconfident

11. If there is room for improvement, how do you think child care educators' handling of children's picky eating could be improved? Explain.

Communication with Parents

12. How comfortable are you to talk to parents about their child's eating behaviours?

Select one:

- Very comfortable
- Comfortable
- Somewhat comfortable
- Uncomfortable

13. When talking to parents about their children's eating behaviours, how confident do you feel about your healthy eating knowledge?

Select one:

- Very confident
- Confident
- Somewhat confident

- Unconfident

14. If there is room for improvement, how do you think communication between child care educators and parents could be improved? Explain.

Training

15. Do you agree that is important for child care educators to receive training in the *Alberta Nutrition Guidelines for Children and Youth*?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

    15.1. If you agree, what areas of the *Alberta Nutrition Guidelines for Children and Youth* do you think are relevant for training for child care educators?

    Check all that apply:
    - Food portion sizes
    - Food Ranking System
    - Menu planning

16. Do you agree that is important for child care educators to receive training in role modeling of healthy eating behaviours?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

17. Do you agree that is important for child care educators to receive training in proper handling of children's picky eating?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

18. Do you agree that is important for child care educators to receive training in taking to parents about their children's eating behaviors?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

Training Delivery Method

19. Please select the method that you consider more efficient for the delivery of food and nutrition training for child care educators?

    Check all that apply:

    - ○ Website
    - ○ Email
    - ○ Videos
    - ○ Handouts
    - ○ Newsletters
    - ○ Posters
    - ○ Workshops
    - ○ During meetings
    - ○ Other. If other specify: _____

b. Survey for Directors

INSTRUCTIONS

Please read carefully and answer the following questions according to your own opinions and experiences.

Email address: _____

(If you choose not to provide an email address your data cannot be removed upon request).

I accept that my email address is transferred to the vendor

- Yes
- No

QUESTIONS
1. What is your role as a director to promote healthy eating in your child care centre? Explain.
Alberta Nutrition Guidelines for Children and Youth
2. Are you aware of the *Alberta Nutrition Guidelines for Children and Youth* recommendations for child cares? o Yes o No If not, skip to question 6. 2.1 If yes, how would you rate your awareness of the *Alberta Nutrition Guidelines for Children and Youth* recommendations? Select one: o Very aware o Aware o Somewhat aware o Not aware
3. Are the recommendations of the *Alberta Nutrition Guidelines for Children and Youth* put into practice at your child care? o Yes o No If not, skip to question 6.
4. Is the Food Ranking System of the *Alberta Nutrition Guidelines for Children and Youth* being used at your child care? o Yes o No 4.1 If yes, how would you rate the child care educators' knowledge of Food Ranking System? Select one: o Excellent o Good o Fair

- Poor
- Very poor

5. If there is room for improvement, how do you think the child care educator's knowledge of the *Alberta Nutrition Guidelines for Children and Youth* could be improved? Explain.

Role Modeling

6. How often are the following activities being practiced by child care educators at your child care?

6.1 When possible, child care educators sit with children at meal times.

Select one:
- Always
- Very often
- Sometimes
- Almost never
- Never

6.2 When possible, child care educators eat the same food children eat at meal times.

Select one:
- Always
- Very often
- Sometimes
- Almost never
- Never

6.3 Child care educators encourage children to try new foods at meal times.

Select one:
- Always
- Very often
- Sometimes
- Almost never
- Never

6.4 Child care educators use food as a reward or punishment for children.

Select one:
- Always
- Very often
- Sometimes
- Almost never
- Never

7. If there is room for improvement, how do you think child care educators could be better role models of healthy eating behaviors to children at your child care? Explain.

Picky Eating

8. How often is children's picky eating a barrier for the promotion of healthy eating at your child care?

Select one:
- Very often
- Fairly often

- Sometimes
- Almost never
- Never

9. How would you rate the child care educators' knowledge in handling children's picky eating at your child care?

   Select one:
   - Excellent
   - Good
   - Fair
   - Poor
   - Very poor

10. If there is room for improvement, how do you think child care educators' handling of children's picky eating could be improved at your child care? Explain.

Communication with Parents

11. How would you rate the child care educator's confidence to talk to parents about their child's eating behaviours?

    Select one:
    - Excellent
    - Good
    - Fair
    - Poor
    - Very poor

12. How would you rate the child care educator's ability to talk to parents about their child's eating behaviours?

    Select one:
    - Excellent
    - Good
    - Fair
    - Poor
    - Very poor

13. If there is room for improvement, how do you think communication between child care educators and parents could be improved at your child care? Explain.

Training

14. Do you agree that is important for child care educators to receive training in the *Alberta Nutrition Guidelines for Children and Youth*?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

    14.1 If you agree, what areas of the *Alberta Nutrition Guidelines for Children and Youth* do you think are relevant for training for child care educators?

Check all that apply:

- Food portion sizes
- Food Ranking System
- Menu planning

15. Do you agree that is important for child care educators to receive training in role modeling of healthy eating behaviours?

    Select one:

    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

16. Do you agree that is important for child care educators to receive training in proper handling of children's picky eating?

    Select one:

    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

17. Do you agree that is important for child care educators to receive training in taking to parents about their children's eating behaviors?

    Select one:

    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

Training Delivery Method

18. Please select the method that you consider more efficient for the delivery of food and nutrition training for child care educators?

    Check all that apply:

    - Website
    - Email
    - Videos
    - Handouts
    - Newsletters
    - Posters
    - Workshops
    - During meetings
    - Other. If other specify: _____

c. Survey for Parents

INSTRUCTIONS

Please read carefully and answer the following questions according to your own opinions and experiences.

Email address: _____

(If you choose not to provide an email address your data cannot be removed upon request).

I accept that my email address is transferred to the vendor

- Yes
- No

QUESTIONS
1. Do you agree that healthy eating is promoted at your child's child care? Select one: o Strongly agree o Agree o Neither agree or disagree o Disagree o Strongly disagree
2. Are you aware of the recommendations of *Eating Well with Canada's Food Guide*? o Yes o No If not, skip to question 5. 2.1 If yes, how would you rate your awareness of the *Eating Well with Canada's Food Guide* recommendations? Select one: o Very aware o Aware o Somewhat aware o Not aware
3. Do you agree with the recommendations of *Eating Well with Canada's Food Guide*? Select one: o Strongly agree o Agree o Neither agree or disagree o Disagree o Strongly disagree
4. Do you follow the recommendations of *Eating Well with Canada's Food Guide* at home? Select one: o Always

- Very often
- Sometimes
- Almost never
- Never

Alberta Nutrition Guidelines for Children and Youth

5. Are you aware of the *Alberta Nutrition Guidelines for Children and Youth* recommendations for child cares?

   - Yes
   - No

   If not, skip to question 9.

   5.1 If yes, how would you rate your awareness of the *Alberta Nutrition Guidelines for Children and Youth* recommendations?

   Select one:
   - Very aware
   - Fairly aware
   - Somewhat aware
   - Not aware

6. Are the recommendations of the *Alberta Nutrition Guidelines for Children and Youth* put into practice at your child's child care?

   - Yes
   - No
   - Not sure

   If not, skip to question 8.

7. Is the Food Ranking System of the *Alberta Nutrition Guidelines for Children and Youth* being used at your child's child care?

   - Yes
   - No
   - Not sure

   7.1 If yes, how would you rate the child care educators' knowledge of Food Ranking System?

   Select one:
   - Excellent
   - Good
   - Fair
   - Poor
   - Very poor

8. If there is room for improvement, how do you think the child care educator's knowledge of the *Alberta Nutrition Guidelines for Children and Youth* could be improved? Explain.

Role Modeling

9. How often are the following activities being practiced by child care educators at your child's child care?

   9.1 When possible, child care educators sit with children at meal times.

   Select one:

- Always
- Very often
- Sometimes
- Almost never
- Never

9.2 When possible, child care educators eat the same food children eat at meal times.

Select one:

- Always
- Very often
- Sometimes
- Almost never
- Never

9.3 Child care educators encourage children to try new foods at meal times.

Select one:

- Always
- Very often
- Sometimes
- Almost never
- Never

9.4 Child care educators use food as a reward or punishment for children.

Select one:

- Always
- Very often
- Sometimes
- Almost never
- Never

10 If there is room for improvement, how do you think child care educators could be better role models of healthy eating behaviors to children at your child's child care? Explain.

Picky Eating

11 How often is children's picky eating a barrier for the promotion of healthy eating at your child's child care?

Select one:

- Very often
- Fairly often
- Sometimes
- Almost never
- Never

12 How would you rate the child care educators' knowledge in handling children's picky eating at your child's child care?

Select one:

- Excellent
- Good
- Fair

- Poor
- Very poor

13 If there is room for improvement, how do you think child care educators' handling of children's picky eating could be improved at your child's child care? Explain.

Communication with Parents

14 How comfortable you feel talking to child care educators about your child's eating behaviours?

Select one:

- Very comfortable
- Comfortable
- Somewhat comfortable
- Uncomfortable

15 When talking to child care educators about your child's eating behaviours, how confident do you feel about the child care educators' healthy eating knowledge?

Select one:

- Very confident
- Confident
- Somewhat confident
- Unconfident

16 If there is room for improvement, how do you think communication between child care educators and parents could be improved at your child's child care? Explain.

Training

17 Do you agree that is important for child care educators to receive training in the *Alberta Nutrition Guidelines for Children and Youth*?

Select one:

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree

17.1 If you agree, what areas of the *Alberta Nutrition Guidelines for Children and Youth* do you think are relevant for training for child care educators?

Check all that apply:

- Food portion sizes
- Food Ranking System
- Menu planning

18 Do you agree that is important for child care educators to receive training in role modeling of healthy eating behaviours?

Select one:

- o Strongly agree
- o Agree
- o Neither agree or disagree
- o Disagree
- o Strongly disagree

19 Do you agree that is important for child care educators to receive training in proper handling of children's picky eating?

Select one:

- o Strongly agree
- o Agree
- o Neither agree or disagree
- o Disagree
- o Strongly disagree

20 Do you agree that is important for child care educators to receive training in taking to parents about their children's eating behaviors?

Select one:

- o Strongly agree
- o Agree
- o Neither agree or disagree
- o Disagree
- o Strongly disagree

Training Delivery Method

21 Please select the method that you consider more efficient for the delivery of food and nutrition training for child care educators?

Check all that apply:

- o Website
- o Email
- o Videos
- o Handouts
- o Newsletters
- o Posters
- o Workshops
- o During meetings
- o Other. If other specify: _____

d. Survey for Dietitians

INSTRUCTIONS

Please read carefully and answer the following questions according to your own opinions and experiences.

Email address: _____

(If you choose not to provide an email address your data cannot be removed upon request).

I accept that my email address is transferred to the vendor

- Yes
- No

QUESTIONS
Alberta Nutrition Guidelines for Children and Youth
1. Are you aware of the *Alberta Nutrition Guidelines for Children and Youth* recommendations for child cares? o Yes o No If not, skip to question 7.
2. How often do you use the *Alberta Nutrition Guidelines for Children and Youth* on your professional practice? Select one: o Always o Very often o Sometimes o Almost never o Never
3. In general, how would you rate the adoption of the *Alberta Nutrition Guidelines for Children and Youth* in the child care setting? Select one: o Excellent o Good o Fair o Poor o Very poor
4. In general, how would you rate the child care educators' knowledge of the *Alberta Nutrition Guidelines for Children and Youth* recommendations? Select one: o Excellent o Good o Fair

- Poor
- Very poor

If there is room for improvement, how do you think the child care educators' knowledge of the recommendations of the *Alberta Nutrition Guidelines for Children and Youth* could be improved? Explain.

Role Modeling

5. In your experience, how often are the following activities being practiced by child care educators in the child care setting?

7.1 When possible, child care educators sit with children at meal times.

Select one:

- Always
- Very often
- Sometimes
- Almost never
- Never

7.2 When possible, child care educators eat the same food children eat at meal times.

Select one:

- Always
- Very often
- Sometimes
- Almost never
- Never

7.3 Child care educators encourage children to try new foods at meal times.

Select one:

- Always
- Very often
- Sometimes
- Almost never
- Never

7.4 Child care educators use food as a reward or punishment for children.

Select one:

- Always
- Very often
- Sometimes
- Almost never
- Never

6. If there is room for improvement, how do you think child care educators could be better role models of healthy eating behaviors to children at child care? Explain.

Picky Eating

7. In your experience, how often is children's picky eating a barrier for the promotion of healthy eating in child care?

Select one:

- Very often

- Fairly often
- Sometimes
- Almost never
- Never

8. How would you rate child care educators' knowledge in handling children's picky eating in child care?

   Select one:
   - Excellent
   - Good
   - Fair
   - Poor
   - Very poor

9. If there is room for improvement, how do you think child care educators' handling of children's picky eating could be improved in child care? Explain.

Communication with Parents

10. In general, how would you rate child care educator's confidence in talking to parents about their child's eating behaviours?

    Select one:
    - Excellent
    - Good
    - Fair
    - Poor
    - Very poor

11. How would you rate the child care educator's ability to talk to parents about their child's eating behaviors?

    Select one:
    - Excellent
    - Good
    - Fair
    - Poor
    - Very poor

12. If there is room for improvement, how do you think communication between child care educators and parents could be improved at child care? Explain.

Training

13. Do you agree that is important for child care educators to receive training on the *Alberta Nutrition Guidelines for Children and Youth*?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

    15.1 If you agree, what areas of the *Alberta Nutrition Guidelines for Children and Youth* do

you think are relevant for training for child care educators?

Check all that apply:

- Food portion sizes
- Food Ranking System
- Menu planning

14. Do you agree that is important for child care educators to receive training in role modeling of healthy eating behaviours?

Select one:

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree

15. Do you agree that is important for child care educators to receive training in proper handling of children's picky eating?

Select one:

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree

16. Do you agree that is important for child care educators to receive training in taking to parents about their children's eating behaviours?

Select one:

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree

Training Delivery Method

17. Please select the method that you consider more efficient for the delivery of food and nutrition training for child care educators?

Check all that apply:

- Website
- Email
- Videos
- Handouts
- Newsletters
- Posters
- Workshops
- During meetings
- Other. If other specify: _____

e. Survey for experts

INSTRUCTIONS

Please read carefully and answer the following questions according to your own opinions and experiences.

Email address: _____

(If you choose not to provide an email address your data cannot be removed upon request).

I accept that my email address is transferred to the vendor

- Yes
- No

QUESTIONS
Alberta Nutrition Guidelines for Children and Youth
1. Are you aware of the *Alberta Nutrition Guidelines for Children and Youth* recommendations for child cares? o Yes o No If not, skip to question 4.
2. In your experience, how would you rate the adoption of the *Alberta Nutrition Guidelines for Children and Youth* in the child care setting? Select one: o Excellent o Good o Fair o Poor o Very poor
3. If there is room for improvement, how do you think the adoption of the *Alberta Nutrition Guidelines for Children and Youth* could be improved in the child care setting? Explain.
Role Modeling
4. In your experience, how important do you consider the following activities to be practiced by child care educators in child care? 4.1 Child care educators sit with children at meal times. Select one: o Very important o Important o Neither important or unimportant o Unimportant o Very unimportant 4.2 Child care educators eat the same food children eat at meal times. Select one: o Very important

- Important
- Neither important or unimportant
- Unimportant
- Very unimportant

4.3 Child care educators encourage children to try new foods at meal times.

Select one:

- Very important
- Important
- Neither important or unimportant
- Unimportant
- Very unimportant

4.4 Child care educators avoid using food as a reward or punishment for children.

Select one:

- Very important
- Important
- Neither important or unimportant
- Unimportant
- Very unimportant

5. If there is room for improvement, how do you think child care educators could be better role models of healthy eating behaviors to children at child care? Explain.

Picky Eating

6. In your experience, do you consider children's picky eating a barrier for the promotion of healthy eating in child care?

Select one:

- Very likely
- Somewhat likely
- Unlikely

7. In your experience, how would you rate child care educators' knowledge in handling children's picky eating in child care?

Select one:

- Excellent
- Good
- Fair
- Poor
- Very poor

8. If there is room for improvement, how do you think child care educators' handling of children's picky eating could be improved at child care? Explain.

Communication with Parents

9. In your experience, how important do you consider communication between child care educators and parents for the promotion of healthy eating in child care?

Select one:

- Very important
- Important

- Neither important or unimportant
- Unimportant
- Very unimportant

10. If there is room for improvement, how do you think communication between child care educators and parents could be improved at child care? Explain.

Training

11. Do you agree that is important for child care educators to receive training in the *Alberta Nutrition Guidelines for Children and Youth*?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

    11.1 If you agree, what areas of the *Alberta Nutrition Guidelines for Children and Youth* do you think are relevant for training for child care educators?

    Check all that apply:
    - Food portion sizes
    - Food Ranking System
    - Menu planning

12. Do you agree that is important for child care educators to receive training in role modeling of healthy eating behaviours?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

13. Do you agree that is important for child care educators to receive training in proper handling of children's picky eating?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree
    - Disagree
    - Strongly disagree

14. Do you agree that is important for child care educators to receive training in taking to parents about their children's eating behaviours?

    Select one:
    - Strongly agree
    - Agree
    - Neither agree or disagree

- Disagree
- Strongly disagree

Training Delivery Method

15. Please select the method that you consider more efficient for the delivery of food and nutrition training for child care educators?

    Check all that apply:
    - Website
    - Email
    - Videos
    - Handouts
    - Newsletters
    - Posters
    - Workshops
    - During meetings
    - Other. If other specify: _____

Appendix E – Figures of quantitative analysis

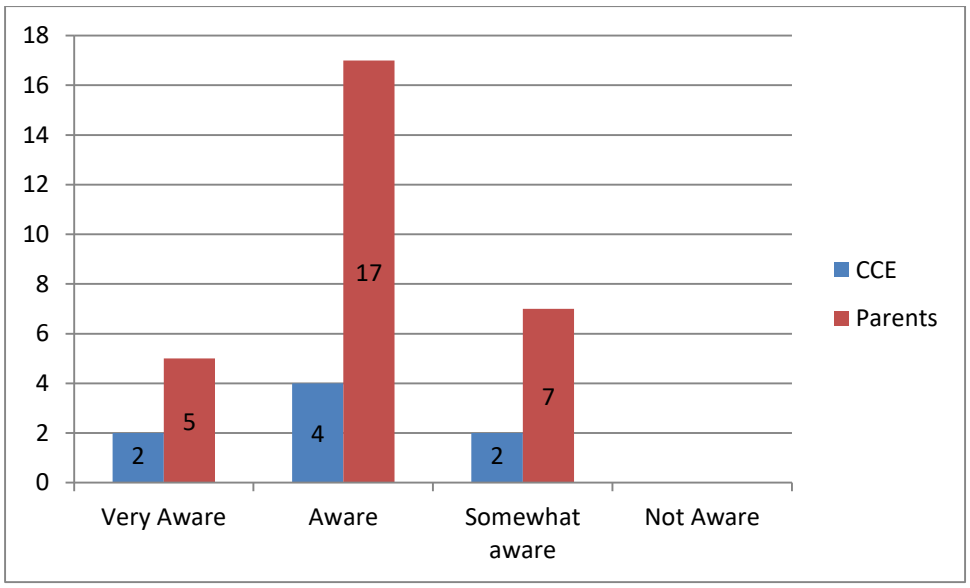

Figure 6-1. Child care educators (n=8) and parents (n=29) awareness of *Eating Well with Canada's Food Guide*

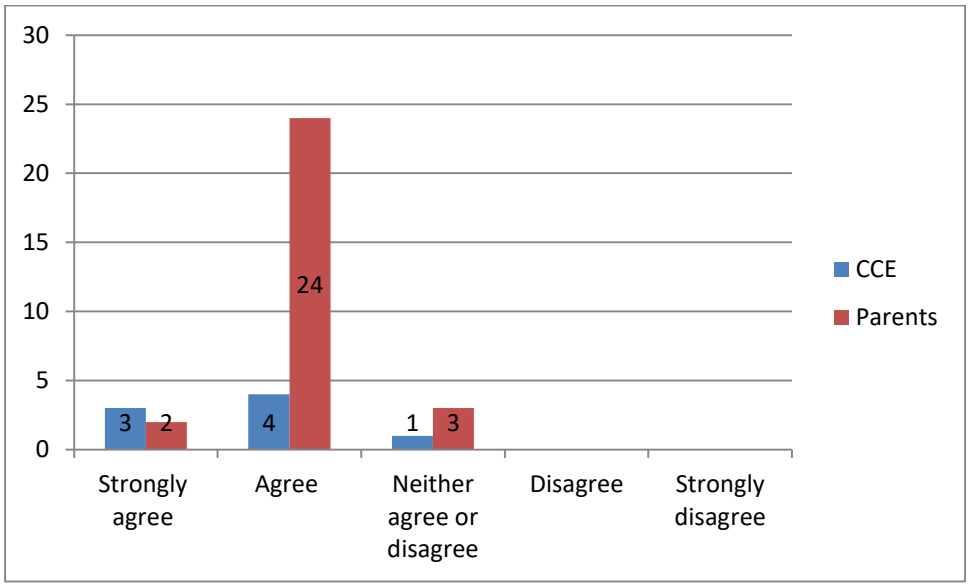

Figure 6-2. Child care educators (n=8) and parents (n=29) agreement with *Eating Well with Canada's Food Guide* recommendations

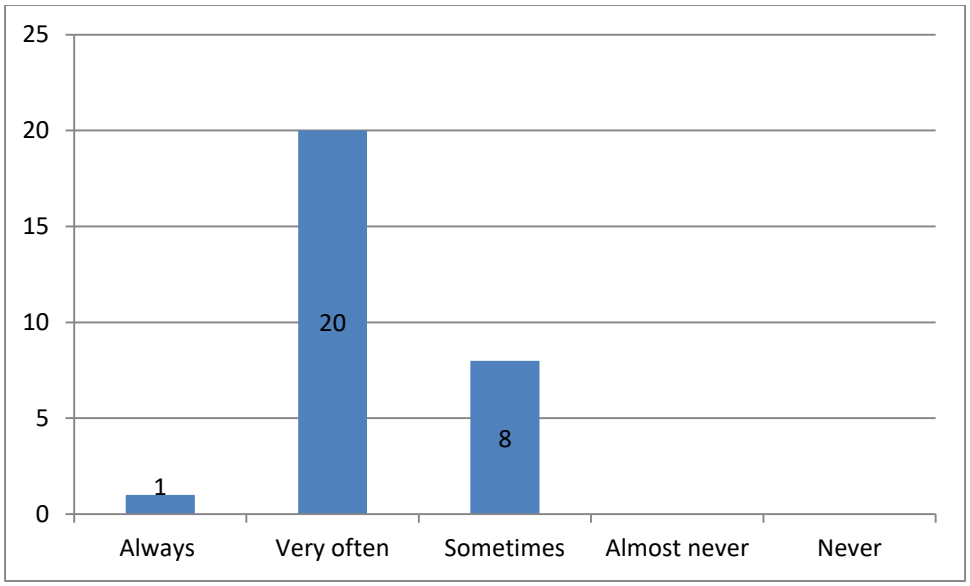

Figure 6-3. Parents' self-reports on the frequency of use of *Eating Well with Canada's Food Guide's* recommendations at home (n=29).

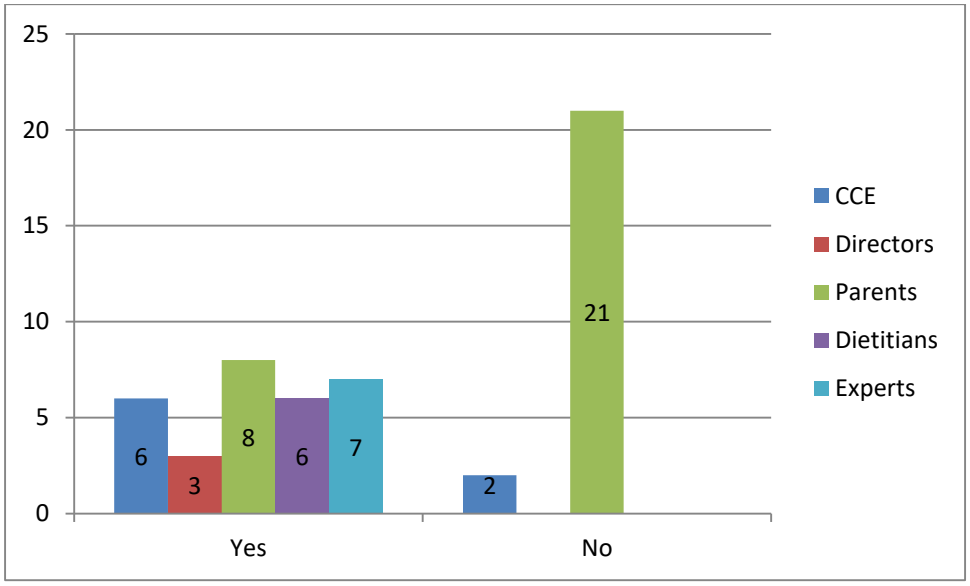

Figure 6-4. Key informant's responses to whether they were aware of *Alberta Nutrition Guidelines for Children and Youth's* recommendations for child care (n=53)

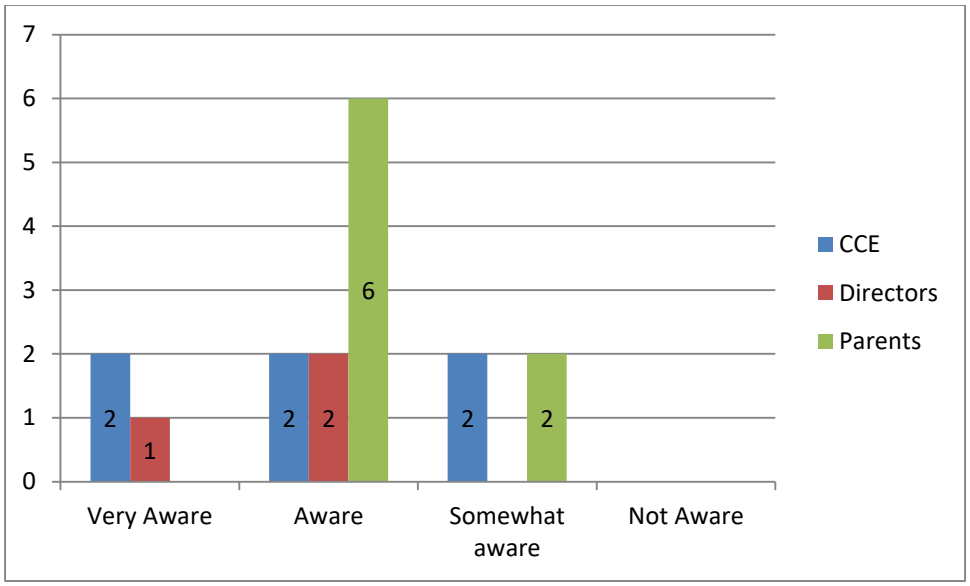

Figure 6-5. Child care educators (n=6), directors (n=3) and parents (n=8) level of awareness of the *Alberta Nutrition Guidelines for Children and Youth's* recommendations.

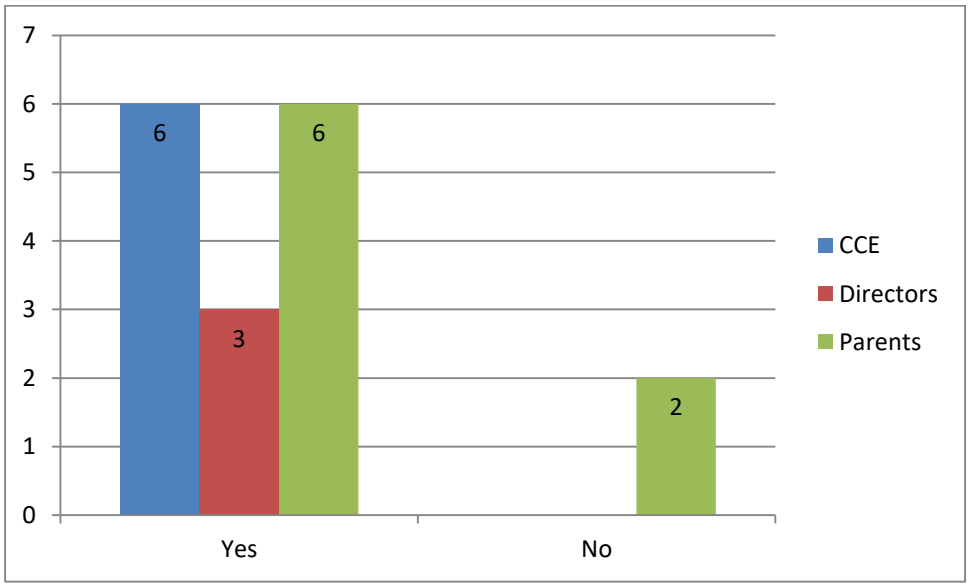

Figure 6-6. Child care educators (n=6), directors (n=3) and parents (n=8) responses to whether the *Alberta Nutrition Guidelines for Children and Youth's* recommendations where practiced in child care.

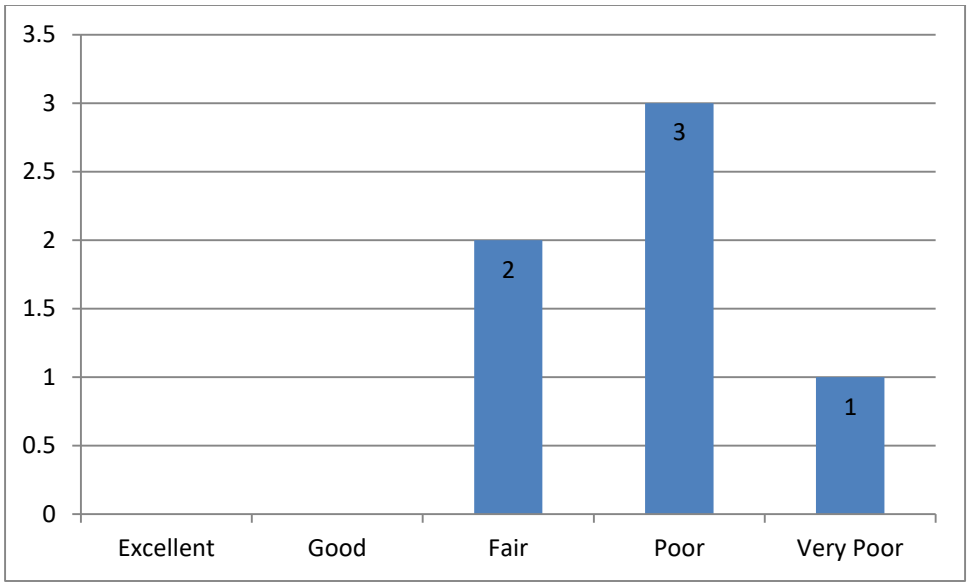

Figure 6-7. Dietitians (n=6) perceptions of child care educators' knowledge of the *Alberta Nutrition Guidelines for Children and Youth's* recommendations.

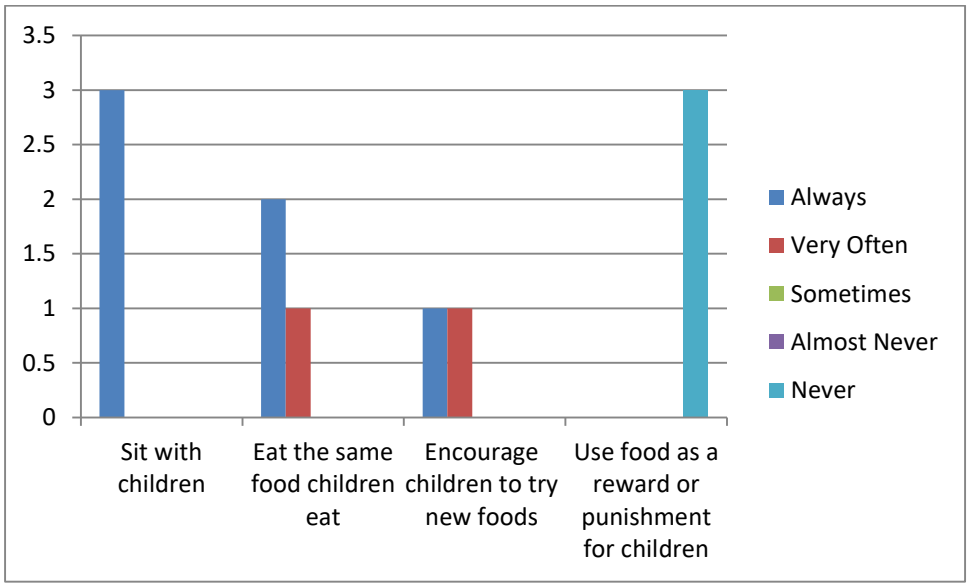

Figure 6-8. Directors (n=3) reports on child care educator's performance of role modeling behaviours in child care.

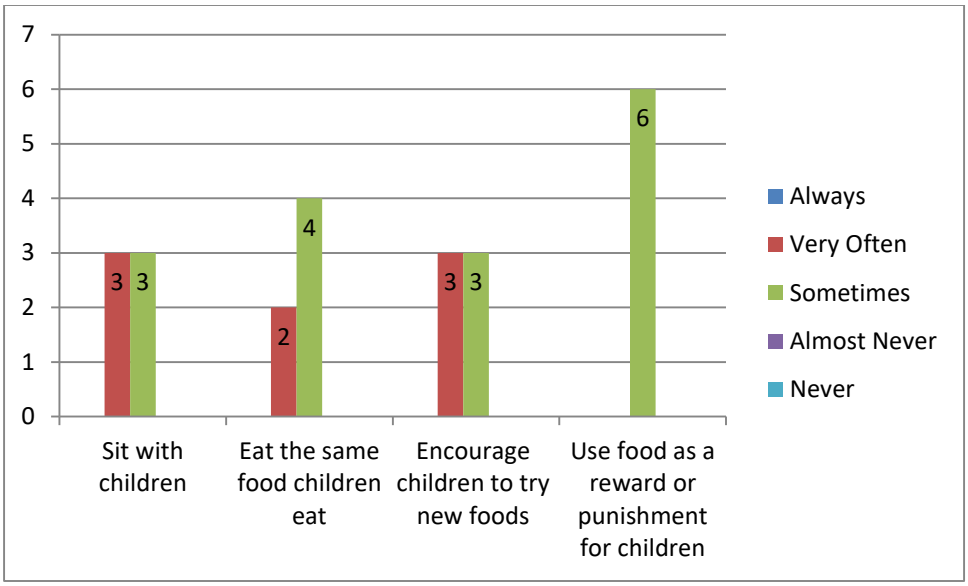

Figure 6-9. Dietitians (n=6) perspectives on child care educators' performance of role modeling behaviours in child care.

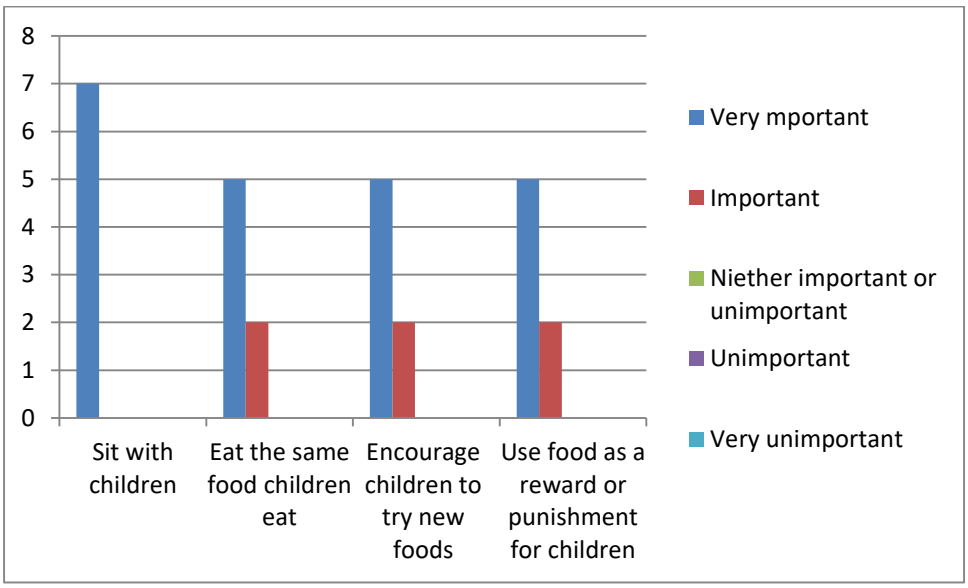

Figure 6-10. Experts' perspectives on how important were role modeling activities to be practiced by child care educators in child care (n=7).

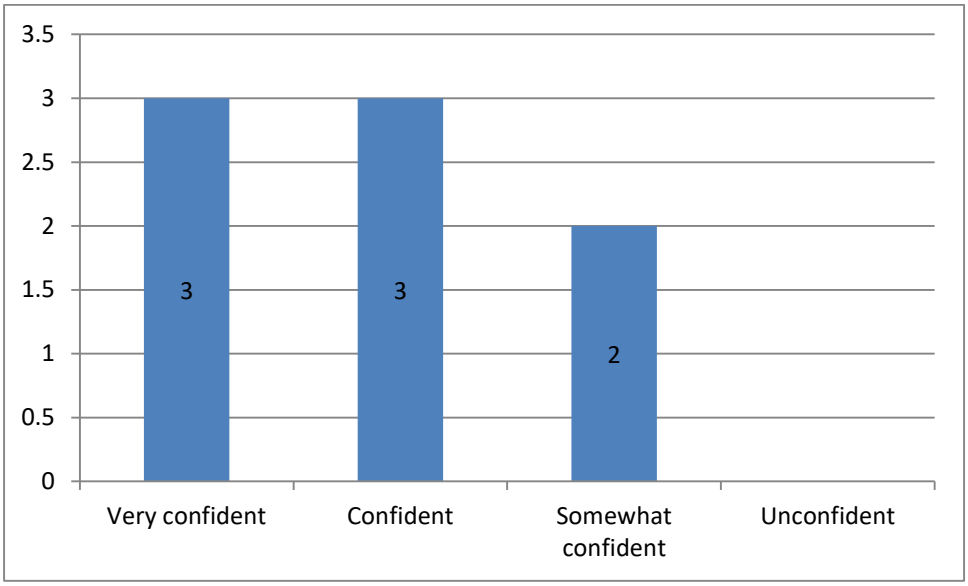

Figure 6-11. Child care educators' level of confidence in handling children's picky eating (n=8).

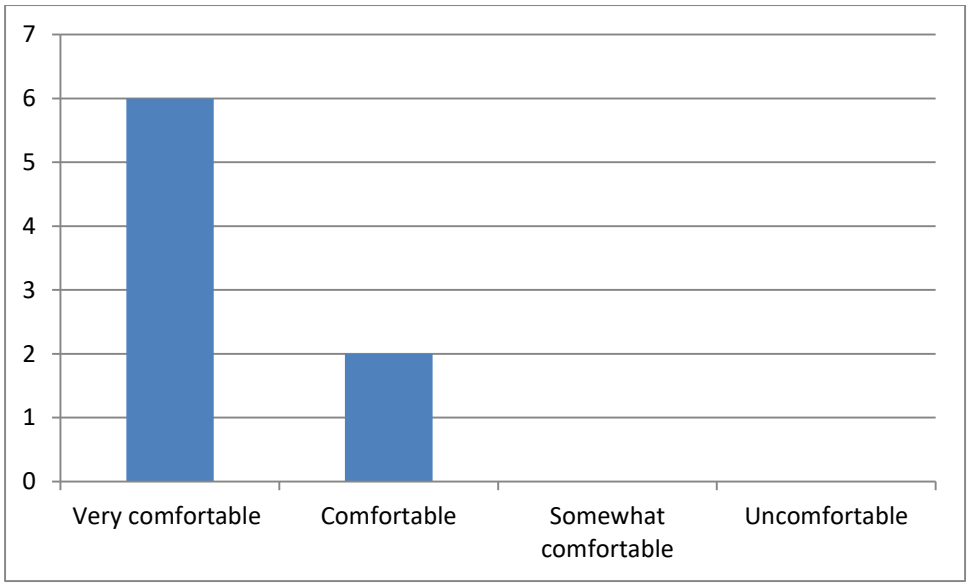

Figure 6-12. Child care educators' level of comfort when talking to parents about children's eating behaviours (n=8).

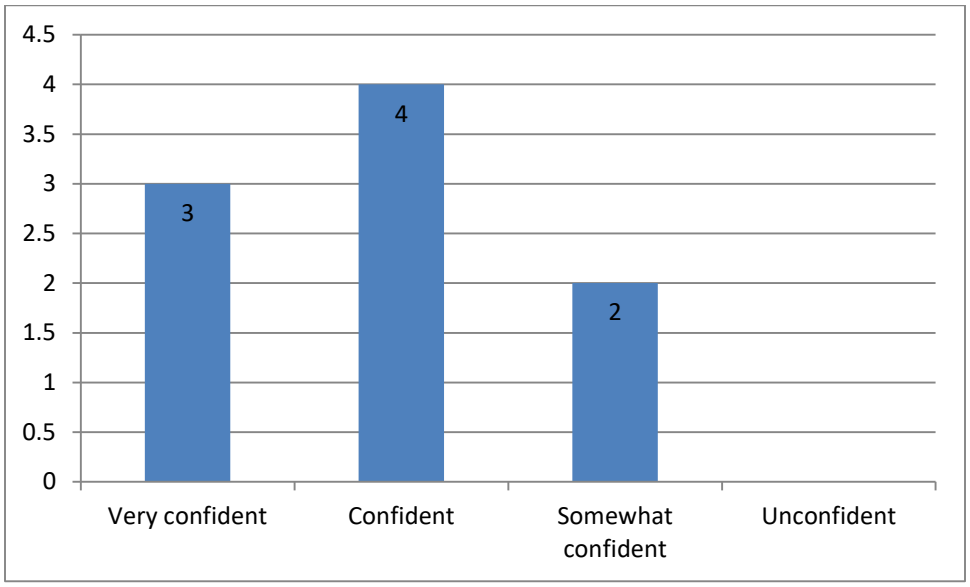

Figure 6-13. Child care educators' level of confidence on their own healthy eating knowledge when talking to parents about children's eating behaviours (n=8)

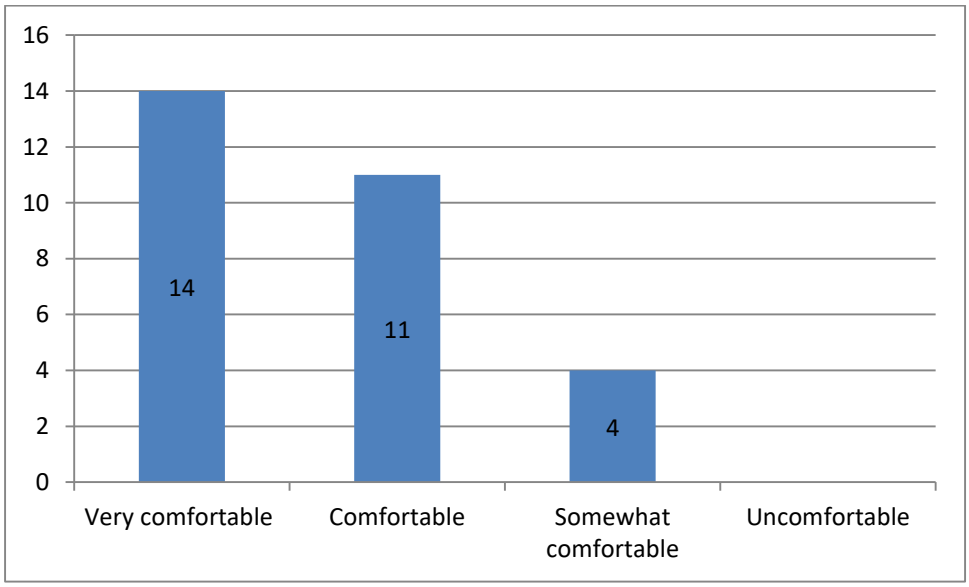

Figure 6-14. Parents' level of comfort when talking to child care educators about children's eating behaviours (n=29)

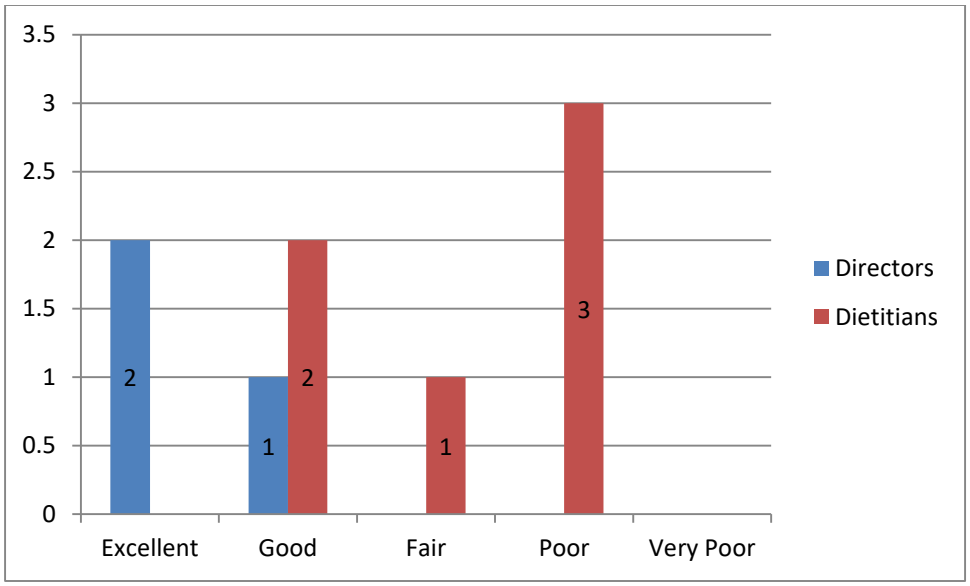

Figure 6-15. Directors (n=3) and dietitians (n=6) perspectives of child care educators' confidence in talking to parents.

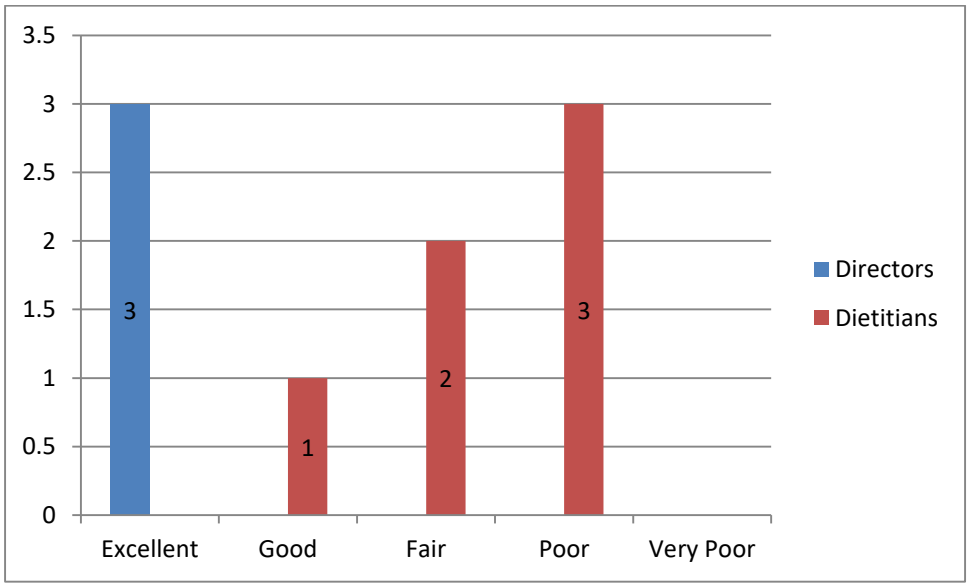

Figure 6-16. Directors (n=3) and dietitians (n=6) perspectives of child care educators' ability in talking to parents.

Appendix F – Detailed search strategies for rapid review

Key words used: 'intervention' AND 'healthy eating', 'food habits', 'diet' AND 'child care', 'preschool', 'day care', 'daycare', 'kindergarten' AND 'vegetable', 'fruit'.						
Date	**Data base**	**Search String**	**Limits**	**Search details**	**Data bases**	**Records retrieved**
May 19, 16	Pubmed	intervention AND (healthy eating OR food habits OR diet) AND (child care OR preschool OR day care OR daycare OR kindergarten) AND (vegetable OR fruit)	Filters: Full text; published in the last 10 years; Humans; English; French; Spanish; Preschool Child: 2-5 years	("Intervention (Amstelveen)"[Journal] OR "intervention"[All Fields] OR "Interv Sch Clin"[Journal] OR "intervention"[All Fields]) AND ((healthy[All Fields] AND ("eating"[MeSH Terms] OR "eating"[All Fields])) OR ("food habits"[MeSH Terms] OR ("food"[All Fields] AND "habits"[All Fields]) OR "food habits"[All Fields]) OR ("diet"[MeSH Terms] OR "diet"[All Fields])) AND (("child care"[MeSH Terms] OR ("child"[All Fields] AND "care"[All Fields]) OR "child care"[All Fields]) OR preschool[All Fields] OR ("day care, medical"[MeSH Terms] OR ("day"[All Fields] AND "care"[All Fields] AND "medical"[All Fields]) OR "medical day care"[All Fields] OR ("day"[All Fields] AND "care"[All Fields]) OR "day care"[All Fields]) OR daycare[All Fields] OR kindergarten[All Fields]) AND (("vegetables"[MeSH Terms] OR "vegetables"[All Fields] OR "vegetable"[All Fields]) OR ("fruit"[MeSH Terms] OR "fruit"[All Fields])) AND ("loattrfull text"[sb] AND "2006/05/23"[PDat] : "2016/05/19"[PDat] AND "humans"[MeSH Terms] AND (English[lang] OR French[lang] OR Spanish[lang]) AND "child, preschool"[MeSH Terms])	N/A	173
May 19, 16	Cinahl	intervention AND (healthy eating OR food habits OR diet) AND (child care OR preschool OR day care OR daycare	Limiters - Publication Date: 20060501-20161231; Full Text; Hidden NetLibrary Holdings; Full Text from ROA Narrow by SubjectAge: - child, preschool: 2-5	Association (ATLA) Historical Monographs Collection: Series 1;American Theological Library Association (ATLA) Historical Monographs Collection: Series 2;Anthropology Plus;Arctic & Antarctic Regions;Art Full Text (H.W. Wilson);Art Index Retrospective (H.W. Wilson);ATLA Catholic Periodical and Literature Index;ATLA Religion Database with ATLASerials;Audiobook Collection (EBSCOhost);Baptists, Quakers, and Independent Church Periodicals, 1797-1881;Bibliography of Native North Americans;Biography Index Past and Present (H.W. Wilson);Biomedical Reference Collection: Comprehensive;BIR Entertainment;Bloomberg Businessweek Archive;Book Index with Reviews;Book Review Digest Plus (H.W. Wilson);British Education Index;Business and General Education	All databases (Search 19.05.16 Cinahl data bases used.dox)	93

		OR kindergarten) AND (vegetable OR fruit)	years Search modes - Find all my search terms	Periodicals, 1800-1885;Business Source Alumni Edition;Business Source Complete;Business Source Elite;Business, Industrial and Professional Periodicals, 1774-1858;Business, Industrial and Professional Periodicals, 1859-1870;Business, Industrial and Professional Periodicals, 1871-1901;Canadian Literary Centre;Canadian Periodicals, 1790-1877;Canadian Reference Centre;Catholic, Lutheran, Methodist, and Episcopal Periodicals, 1797-1904;Chicano Database;Child Development & Adolescent Studies;Children's Core Collection (H.W. Wilson);College and Student Periodicals, 1806-1877;Commercial Periodicals from the Southern U.S., 1811-1877;Communication & Mass Media Complete;Congregational, Presbyterian, and Reformed Church Periodicals, 1803-1902;Criminal Justice Abstracts;Cultural Periodicals from the Southern U.S., 1797-1877;Current Biography Illustrated (H.W. Wilson);Current Events and History Periodicals, 1691-1912;Drama, Humor, and Fine Arts Periodicals, 1764-1877;eBook Academic Collection (EBSCOhost);eBook Collection (EBSCOhost);EconLit with Full Text;Education Index Retrospective: 1929-1983 (H.W. Wilson);Education Research Complete;Educational Administration Abstracts;Emerging American Religions, 1821-1895;Environment Complete;ERIC;Essay and General Literature Index (H.W. Wilson);European Views of the Americas: 1493 to 1750;Family Studies Abstracts;Fiction Core Collection (H.W. Wilson);Film & Television Literature Index with Full Text;Fireside Companions and Family Literature Periodicals, 1805-1877;Forbes Archive;Foreign Language Periodicals in America, 1684-1904;FRANCIS;Funk & Wagnalls New World Encyclopedia;Gender Studies Database;General Interest Christian Periodicals, 1743-1889;GeoRef;GeoRef In Process;Graphic Novels Core Collection (H.W. Wilson);GreenFILE;Health Policy Reference Center;Health Source - Consumer Edition;Historical Abstracts with Full Text;History of Science, Technology & Medicine;Hobbies, Socialization, and Sport Periodicals, 1775-1889;Hospitality & Tourism Complete;Human Resources Abstracts;Humanities & Social Sciences Index Retrospective: 1907-1984 (H.W. Wilson);Humanities International Complete;Index to Legal Periodicals Retrospective: 1908-1981 (H.W. Wilson);Index to		

				Printed Music;International Bibliography of Theatre & Dance with Full Text;L'Année philologique;Left Index;Legal Source;LGBT Life with Full Text;Library & Information Science Source;Library Literature & Information Science Retrospective: 1905-1983 (H.W. Wilson);Literary Periodicals of New England, 1789-1878;Literary Reference Center;MAS Ultra - School Edition;Masons, Odd-Fellows and Other Societal Periodicals, 1794-1877;MasterFILE Premier;MathSciNet via EBSCOhost;MEDLINE;Mental Measurements Yearbook with Tests in Print;Middle and Junior High Core Collection (H.W. Wilson);Middle Eastern & Central Asian Studies;Military & Government Collection;Military and Law Enforcement Periodicals, 1691-1877;Missionary and Charity Periodicals, 1793-1902;MLA Directory of Periodicals;MLA International Bibliography;Music Index;Musical Periodicals, 1781-1879;NEOS's Catalog;New Testament Abstracts;Newswires;Nonbook Materials Core Collection (H.W. Wilson);Old Testament Abstracts;OmniFile Full Text Select (H.W. Wilson);Peace Research Abstracts;Periodicals from Around the World, 1691-1880;Periodicals of the American West, 1779-1881;Periodicals of the British Empire and Its Colonies, 1702-1879;Petroleum Abstracts TULSA® Database;Philosophers Index with Full Text;Play Index (H.W. Wilson);Political Science Complete;Popular Educational Periodicals, 1758-1889;Primary Search;PsycEXTRA;Public Administration Abstracts;Public Affairs Index;Public Library Core Collection: Nonfiction (H.W. Wilson);Race Relations Abstracts;Readers' Guide Retrospective: 1890-1982 (H.W. Wilson);Regional Business News;Religion and Philosophy Collection;Religious Periodicals for Women, Children, and Families, 1804-1878;Religious Periodicals from the Southern U.S., 1801-1904;RILM Abstracts of Music Literature;RIPM - Retrospective Index to Music Periodicals;Scientific Periodicals, 1771-1901;Senior High Core Collection (H.W. Wilson);Short Story Index (H.W. Wilson);Slavery and Abolition, 1789-1887;Social Work Abstracts;SocINDEX with Full Text;SPORTDiscus with Full Text;Story Papers, Dimes and Dollar Periodicals, 1828-1877;Sunday School Periodicals, 1818-1885;Teacher Reference Center;Temperance in America, 1826-1877;Textile Technology Index;The Nation Archive;The National Review Archive;The New		

				Republic Archive;Theology and Biblical Studies Periodicals, 1760-1877;Time Magazine Archive;Urban Studies Abstracts;Violence & Abuse Abstracts;Women's Periodicals of the Eighteenth and Nineteenth Century, 1733-1844;Women's Periodicals of the Nineteenth Century, 1866-1891;World Textiles		
May 19, 16	Scopus	(intervention AND (healthy eating OR food habits OR diet) AND (child care OR preschool OR day care OR daycare OR kindergarten) AND (vegetable OR fruit))	ND DOCTYPE (ar OR re) AND PUBYEAR > 2005 AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish")) AND (LIMIT-TO (SRCTYPE , "j"))	N/A	N/A	79
May 19, 16	Web of Science	(intervention AND (healthy eating OR food habits OR diet) AND (child care OR preschool OR day care OR daycare OR kindergart	Refined by: LANGUAGES: (ENGLISH OR SPANISH OR FRENCH) Timespan: 2006-2016. Search language=Auto		Web of Science Core Collection BIOSIS Citation Index BIOSIS Previews CABI: CABI Abstracts Current Contents Connect Data Citation Index Derwent Innovations Index FSTA - the food	613

		en) AND (vegetable OR fruit))			science resource KCI-Korean Journal Database MEDLINE Russian Sciance Citation Index SciELO Citation Index Zoological Record	

Total of records retrieved: 958