

Evaluation of Planned Menus in Saskatchewan Childcare Centres which Participated in the
Healthy Start/Départ Santé Program

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ABSTRACT

Recent statistics estimate that close to one-third (29.8%) of Canadian preschoolers (ages 2-5 years) are overweight or obese. Over half (52%) of Canadian children attend childcare centres regularly, thus these facilities play an important role in shaping the eating habits of a large proportion of young children. To date, little is known about the quality of food served in Canadian childcare centres. Researchers suggest that childcare centre environments provide an opportunity to implement community-based intervention programs aimed at reducing childhood obesity. Furthermore, healthy dietary habits established in childhood can be maintained into adulthood. However, research shows that some centres are not providing children with sufficient food from each group to meet their daily nutrient requirements. In addition, there has been no research to date assessing the accuracy of menus in Canadian childcare centres in comparison to the actual food served. The purpose of this study was to evaluate the food menus of childcare centres in Saskatchewan and assess the impact of the Healthy Start/Départ Santé (HS/DS) intervention program on improving the menu planning practices and improving the congruence between planned menus and actual food served in the participating centres.

HS/DS is a bilingual non-profit population health intervention initiative. It was developed in Saskatchewan and later expanded to New Brunswick with the aim of establishing healthy eating habits and increasing physical activity levels in three to five-year-old children in early learning environments. The HS/DS intervention program was implemented in over 180 childcare centres and pre-kindergartens in Saskatchewan between 2013 and 2016. Overall, 39 licensed childcare centres were selected through a cluster randomized control trial to evaluate the impact of the HS/DS intervention. The food menus of these centres were analyzed and compared to the Saskatchewan Childcare Nutrition Guidelines (SNGN). The congruence between the planned menus and the actual food served was also assessed by comparing the food and beverages items that were served at lunch during two consecutive days with the food and drink items listed on the menus. Descriptive analysis and non-parametric tests were performed.

The results of our study indicated that only two centres met all of the SCNG recommendations throughout their cycle menus, including the guidelines for breakfast, lunch, snacks, milk, juice, and processed food (foods to limit). Furthermore, in the comparisons of pre and post intervention menus, there were trends of improvement in the adherence to the breakfast, lunch, and processed food limitation guidelines among the intervention centres. However, these improvements were not statistically significant. Conversely, there were no improvements in guideline adherence in control or usual practice centres, apart from processed food guidelines. The improvement in meeting the processed food guidelines was statistically significant (P-value = 0.035).

There was also an increase in the percentage of adherence to the written menus among intervention centres. Results from this study show that the intervention had a positive impact on improving the adherence of the HS/DS participating centres to the SCNG guidelines and to the centres' planned menus. Our findings may have implications for developing more effective strategies to improve menu planning practices in childcare centres.

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DEDICATION

This thesis is dedicated to my beloved parents and family in Libya and France to whom I owe the most for inspiring me to pursue this entire journey. Although I haven't seen them since I moved to Canada in August 2013, their love, infinite support and encouragement were the driving force that allowed me to finish this work. I also dedicate this thesis to my amazing brother who lives in Toronto and is a constant source of motivation and inspiration.

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LIST OF ACRONYMS & ABBREVIATIONS

BMI	Body Mass Index
CFG	Canada's Food Guide
CACFP	Child and Adult Care Food Intervention Program
DRI	Dietary Reference Intake
FFQ	Food Frequency Questionnaires
HS/DS	Healthy Start-Départ Santé program
HFHF	Having Fun with Healthy Foods Daycare Menu Planning Manual
NAP SACC	The Nutrition and Physical Activity Self-Assessment for Child-Care, environmental self-assessment instrument
PDTK	Pulse Discovery Tool Kit
QLSCD	Quebec Longitudinal Study of Child Development
RQ	Research Question
SCNG	Saskatchewan Childcare Nutrition Guidelines
SPSS	Statistical Package for Social Science
TGM	The Test of Gross Motor Development
U.S/USA	United States of America
WHO	World Health Organization

DEFINITIONS & TERMS

Acceptable Substitution: Provided food items given as replacements for planned food and which belongs to the same food group category.

Addition: Number of different food items given but not listed on the planned menu.

Characteristic of the menus: In this study, a menu characteristic refers to a trait that contributes to the overall quality/clarity of the menu information.

Cycle menu: A cycle menu is “a series of menus planned for a specific period of time,” during which one day’s menu is different from the previous day’s or week’s menu. The menu is repeated at the end of the cycle (National Food Service Management Institute, 2013).

Food deprivation area: This term refers to an area characterized by low accessibility to healthy foods and a high density of fast foods or other affordable (energy-dense and nutrient-poor) foods (Cetateanu & Jones, 2014).

Food served/offered: The food served to children during the day of observation, which might be the same as the planned menu or different than the planned menu.

Household food insecurity: Food insecurity is “when people do not have adequate physical, social or economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (Food and Agriculture Organization of the United Nations, 2003, p. 2).

Match: Number of items (food and beverages) served that matched the items listed on the planned menus.

Omission: Number of items (food and beverages) that are listed but not served.

Planned menu: The term “planned menu” refers to a written menu collected from a participating centre. The planned menu can be a cycle menu or a menu prepared on a weekly basis.

Preschool-age children: Children between two and six years of age (Human Resources and Skills Development Canada, 2010).

Processed Food: The term processed food refers to “Foods to Limit”. Based on the CFG and SCNG recommendations, foods to limit are high in calories, fat, salt or sugar. Those foods should be offered in limited quantities and include pastries, cakes and cookies, granola bars, chocolate, doughnuts, ice cream, frozen desserts, potato chips, French fries, salty snacks, soft

drinks, sports drinks, and fruit-flavoured sweetened drinks (Government of Saskatchewan, 2010).

Quality/clarity of menu information: The quality and clarity of menu information refers to the way that meal and snack information is described. Menus that define the types of food items, such as whole wheat bread, 1% milk, type of fruit and vegetables, and serving size for each meal and snack are considered to be meeting a higher degree of clarity as compared to menus which do not (Henderson et al., 2011).

CHAPTER 1

INTRODUCTION

1.1 Background

Throughout human history, obesity was a relatively uncommon occurrence, since food consumption was usually balanced with physical activity (Konner & Eaton, 2010). Over the last 200 years, humans have increased their consumption of unhealthy and processed food and decreased their physical activity, which has resulted in a dramatic increase in obesity rates (Popkin, Adair, & Ng, 2012). The increased level of obesity is evident in every geographical region of the world and affects people regardless of gender, age, or race (World Health Organization, 2015). Globally, obesity causes approximately three million deaths (Stevens et al., 2012) and about 35.8 million cases of disability annually (Yoong et al., 2015).

Besides taxing the health care system, the economic burden of treating illnesses associated with the increased number of overweight and obese people is immense. The U.S. Department of Health and Human Services estimates that in 2001 the economic costs associated with treating overweight and obese Americans was approximately US \$117 billion (Nguyen & El-Serag, 2010). Canada estimates that in 2006 overweight and obesity accounted for \$6 billion in medical care costs (e.g., physician and emergency room visits, medications and hospitalizations) and \$5.1 billion in indirect costs (e.g., productivity loss due to premature death or illness and disability) for Canadians (Janssen, 2013).

Childhood obesity is considered a major health problem that can be a predictive factor for adult obesity and its resulting long-term health complications (Araújo & Ramos, 2017). Over the course of the last few decades, the prevalence of overweight and obese children has increased at an alarming rate which has adversely affected the entire population (Trost, Sirard, Dowda,

Pfeiffer, & Pate, 2003; Yoong et al., 2015). The World Health Organization (WHO) (2017) estimates that more than 41 million infants and young children below the age of five were overweight or obese in 2016. In Canada, the prevalence of overweight or obese children increased dramatically from 15% to 26% between 1979 and 2004 (Wheeler, 2013). A recent Canadian study sampled 19,026 2-5 year old Canadian children and found that 29.8% were overweight or obese (Kakinami, Barnett, Séguin, & Paradis, 2015). Furthermore, many health problems, such as heart disease, type 2 diabetes, hypertension, stroke, gallbladder disease and certain types of cancers, which were previously common to only obese adults, are now affecting children (Sahoo et al., 2015).

In addition to genetic etiology, other complex factors need to be addressed as we attempt to understand and control the epidemic of childhood obesity. Modifiable factors, such as relevant environmental, social, and behavioural patterns, play a role in childhood obesity (Public Health Ontario, 2013). Unhealthy eating habits, inadequate physical activity, hormonal disturbances, and family history of obesity are some of the most common causes of childhood obesity (Harris, Pomeranz, Lobstein, & Brownell, 2009).

Statistics Canada reports that over 58% of employed parents of children four years of age and under are using childcare services (Sinha, 2014). According to the same source, licensed childcare centres are the most popular type of childcare facilities that parents rely on, while home and private childcare services are less commonly used (Sinha, 2014). These childcare environments may have an influence on the weight and eating habits of children who spend an average of 22.5 hours per week in these settings (Lyn, Maalouf, Ever, Davis, & Griffin, 2013). Given that children consume a significant amount of their daily nutrient requirements at these

centres, (Korenman, Abner, Kaestner, & Gordon, 2013), it is reasonable to assume that the food children consume in these settings has an impact on their weight.

Research indicates that children who spend time in childcare facilities consume one to two-thirds of their daily recommended nutrition requirements at these facilities on the days that they attend (Henderson et al., 2011). Notably, other studies recommend that children who attend centres on a full-time basis consume one-half to two-thirds of their daily required nutrition at the centre (Erinosho, Ball, Hanson, Vaughn, & Ward, 2013; Padget & Briley, 2005). The US federal guidelines state that childcare centres should serve full-time children food that provides 67% of their recommended daily allowances (Crenshaw, 2004). The *Day Care Act* of Nova Scotia states that childcare facilities must “provide the children who stay over the regular meal period a nutritionally adequate meal providing 1/3 of the daily nutrition requirements. A nutritious snack shall be served in the morning and afternoon” (Romaine, Mann, Kienapple, & Conrad, 2007, p. 7). Many researchers have expressed concern that the food served at childcare facilities does not meet daily nutrition requirements (Erinosho et al., 2013; Henderson et al., 2011).

In developed countries, 60% to 80% of young children are enrolled in childcare centres; the foods they consume and the physical activities they perform while at the centres clearly have an effect on these children’s health (Yoong et al., 2015). The behaviours children learn from their care providers (Larson, Ward, Neelon, & Story, 2011), and the foods they consume while there, have a bearing on the attitudes, lifestyle choices, and health of these children when they become adults (Alkon et al., 2014; Bower et al., 2008; Lyn et al., 2013; Temple, Naylor, Rhodes, & Higgins, 2009). Given the importance of childcare centres, these settings have become target locations for researchers looking to implement community-based intervention programs aimed at improving the nutrition of preschool children (Lyn et al., 2013; Padget & Briley, 2005).

1.2 The Healthy Start/Départ Santé program

Healthy Start/Départ Santé (HS/DS) is a bilingual non-profit initiative aimed at improving eating habits and physical activity in preschool children three to five years old in early learning environments (Healthy Start/Départ Santé [HS/DS], 2014). HS/DS was developed in Saskatchewan and later expanded to New Brunswick (HS/DS, 2014). This program was designed to guide wellness policies in early learning settings, and to train caregivers and families to integrate healthy eating and physical activity into the daily lives of preschoolers (HS/DS, 2014). HS/DS provides free training, resources, and tools for school principals, directors, caregivers, cooks, and families (HS/DS, 2015).

The development of this program was based on a population health approach and guided by the ecological model (Froehlich-Chow, Leis, Humbert, Muhajarine, & Engler-Stringer, 2016). The population health approach focuses on the interrelated factors and conditions that affect the health of populations, identify their patterns of occurrence, and develop actions and policies based on these findings to improve overall health and well-being of the targeted population (Public Health Agency of Canada, 2004). Researchers underlined the needs for a multilevel population health approach in obesity prevention efforts to produce a large-scale change and improve individuals' eating behaviours and physical activities levels (Kumanyika et al., 2008). Population approaches are used to enhance the long-term positive outcomes of obesity prevention interventions because they "foster environmental and policy changes" and reduce social and material inequities (Kumanyika et al., 2008). A variety of models have been developed to guide the planning, implementation, and evaluation of health promotion interventions at a population level (Huynen, Martens, & Hilderink, 2005; Institute of Medicine, 2012). The implementation of HS/DS was guided by McLeroy's ecological model (Froehlich-

Chow et al., 2016). This model suggests multilevel factors that influence the individual’s health-related behaviours “including the intrapersonal realm, interpersonal processes, organizational processes, community, and public policy” (Richard, Gauvin, & Raine, 2011). The ecological model posits that multiple “levels” or “layers” of elements influence the individual's eating behaviour and physical activity level (Evans, Christoffel, Necheles, & Becker, 2010), and recognizes the links and interactions between these elements (U.S. Department of Agriculture & U.S. Department of Health and Human Services, 2010). Figure 1.1 shows the ecological model elements and factors that influence eating behaviours and physical activity levels within each element. This approach has been used to enhance healthy weights and reduce obesity risk factors through targeting food, physical activity, and the socioeconomic environments (Evans et al., 2010). Furthermore, this approach addresses the “underlying determinants of health and social equity in society” (World Health Organization, 2012), and emphasizes the potential impact of environmental settings (e.g., home, school, childcare), social and cultural norms and values, and a various sectors’ on obesity prevention efforts (U.S. Department of Agriculture & U.S. Department of Health and Human Services, 2010).

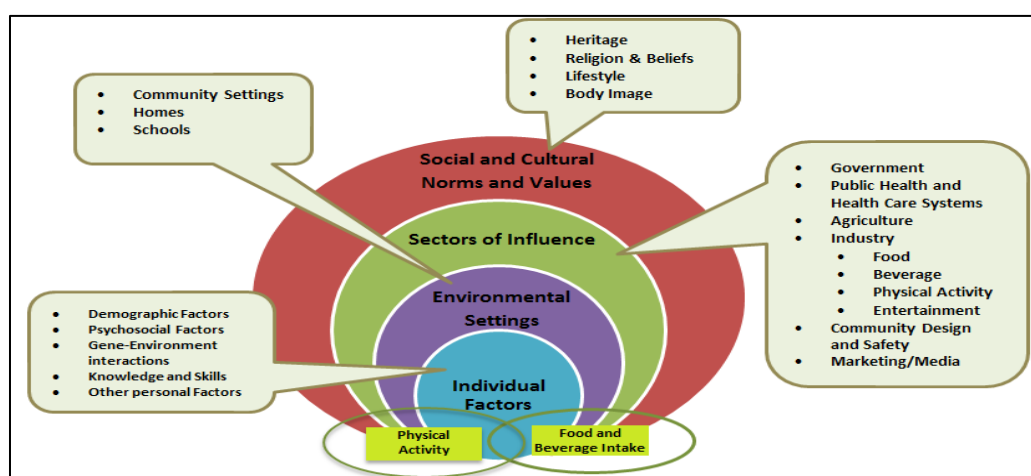


Figure 1.1: The ecological framework for nutrition and physical activity interventions. Source: Adapted from the U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010, page 56.

Underpinned by the ecological model and a population health approach, HS/DS considered the first systematic programming project to intervene in and monitor children's eating practices and physical activity levels in early learning centres in the province of Saskatchewan (HS/DS, 2012). The HS/DS program consists of the following six components:

- **The Healthy Start Implementation Manual:** This manual is a step-by-step guide developed to support caregivers (educators and parents or primary caregivers) in their efforts to integrate healthy eating and physical activity into the daily lives of children. This guide provides useful tools for tasks such as self-assessment and action planning templates, and suggestions for developing healthy eating and physical activity guidelines (Bélanger et al., 2016; Sari, Muhajarine, & Froehlich Chow, 2017).

- **Training, Modeling, and Monitoring:** This component included a two-hour on-site customized training session delivered by the HS/DS team. Trainers introduce educators to the HS/DS objectives and strategies and familiarize them with resources associated with the project. The training session is followed by booster sessions three to six months after the initial session (Bélanger et al., 2016; HS/DS, 2014).

- **Evidence-Based Resources:** After receiving the training, each centre is fully equipped with evidence-based resources including manuals from LEAP-BC (*Literacy, Education, Activity and Play*), which is an evidence-based resource developed in British Columbia in 2010, designed to help families and educators support the development of healthy eating habits and physical activity in children. Three LEAP-BC manuals are supplied to the participating centres: *The Food Flair Handbook*, *HOP - Healthy Opportunities for Preschoolers family resource* and the *HOP - Early Learning Practitioner handbook*. The HOP manuals focus on integrating healthy eating habits, physical literacy, and physical activity in the daily lives of young children. *The Food*

Flair Handbook provides information on creating healthy eating environments and includes a variety of healthy recipes and food-related activities for children (Sari et al., 2017).

- **Additional Resources:** Supplementary resources were made available to centres, families, and communities. These materials were provided through a partnership with the Saskatchewan Ministry of Education (information was available in *Active Solutions* information sheets) and New Brunswick's Active Kids program (in the *Play and Playfulness* and *Active Kids* toolkits) (HS/DS, 2012).

- **Communication, Knowledge Development, and Exchange:** “A communication strategy” was implemented to raise awareness of the program and engage parents, communities, and organizations. This strategy included social media engagement and website-based resources (Bélanger et al., 2016).

- **Inter-Sectoral Partnerships:** These partnerships aim to promote healthy weights for children in early learning settings and in the wider community (HS/DS, 2014). The HS/DS initiative cultivated partnerships with many community and governmental organizations at the local and national levels. Through community engagement and partnership support, the intervention was delivered and monitored over the course of six to eight months (Bélanger et al., 2016). Further details about the HS/DS intervention design, tools, and measurements are provided in Chapter 3.

1.3 The Purpose of the Study

The HS/DS intervention was implemented in over 180 childcare centres and pre-kindergartens in Saskatchewan between 2013 and 2016. The HS/DS team randomly selected 39 licensed childcare centres to evaluate the impact of the intervention. Comprehensive data were collected in those centres, including the baseline menus. The purpose of this study was twofold:

1) to assess the extent to which the planned menus in licensed childcare centres adhere to the Saskatchewan Childcare Nutrition Guidelines (SCNG) at the baseline prior to intervention; and
2) to assess the impact of the HS/DS intervention on improving the menu and food served in the participating centres. Accordingly, the following research questions (RQ) were explored.

1.4 Research Questions

1. What were the characteristics of the menus of the licensed childcare centres selected for evaluation before the HS/DS Program was implemented?
2. Do the centres' menus follow the SCNG in relation to the serving numbers and diversity of foods from the main food groups?
3. What impact did HS/DS have on menu planning and food groups' serving practices? This question was addressed through a comparison between the intervention and usual practice centres at the baseline and endpoint of the intervention from the following perspective:

1.4.3.1 Adherence of planned menus to SCNG

Hypothesis: The percentage of adherence to the SCNG in the intervention centres is higher compared to the usual practice centres.

1.4.3.2 The congruence between planned menus and actual food served on specific days as measured through a plate-waste study

Hypothesis: Compared with usual practice centres, the actual food served at HS/DS intervention centres will more closely reflect what is listed on centres' menus.

1.5 Significance of the Study

Menu analysis is an integral part of evaluating the success of a nutrition intervention in childcare centres (Neelon, Copeland, Ball, Bradley, & Ward, 2010). To our knowledge, no study

has yet evaluated childcare centres' menus across Saskatchewan. This study provided a comprehensive understanding of the extent to which menus in these settings adhere to the SCNG. The study design for the HS/DS was a cluster randomized controlled trial, which is accepted as the gold standard design for acquiring credible and scientifically valid data (Baron, 2004). This study provided evidence about the degree of consistency between the planned menus and the actual food served to children in childcare centres. Furthermore, findings from this study will contribute to the development of a standard cycle menu template along with an assessment tool for stakeholders, such as Public Health Dietitians, the Ministry of Health, and childcare menu-planners. This study provides insight into current nutritional practices in childcare centres and highlights the need for more comprehensive menu-planning policies and regulations.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Childhood obesity is a worldwide health challenge (Lehnert, Sonntag, Konnopka, Riedel-Heller, & König, 2013). Over the course of the past few decades, this issue has grown into a global epidemic, both in developing and industrialized countries (Fruhstorfer, Mousoulis, Uthman, & Robertson, 2016). Consequently, the prevalence of chronic diseases, death from obesity complications, and healthcare costs are rising (Wallinga, 2010). In North America, for example, the rate of children who are overweight and obese has doubled over the past 20-30 years (Wang & Lim, 2012). This highlights a major threat to the health and wellbeing of present and future generations.

The etiology of childhood obesity is undoubtedly multi-factorial, which makes addressing this growing epidemic complex (Cetateanu & Jones, 2014). Therefore, multiple levels of intervention coupled with policy changes in the global food system are necessary to prevent childhood obesity. Globally, the increasing prevalence of childhood obesity has had an adverse effect on the health of the entire population (Saeidlou, Babaei, & Ayremlou, 2014), due to childhood obesity's short and long term social, emotional, and physical consequences (Karnik & Kanekar, 2012). Theoretically, weight gain in children occurs mainly as a result of an imbalance between energy intake and energy expenditure (Ewing, Meakins, Hamidi, & Nelson, 2014). There is growing evidence emphasizing that changes in children's environments, including homes, neighbourhoods, and schools, have negatively impacted the eating habits and rate of physical activity of children (Nestle, 2006). These obesogenic environments are thought to

encourage the overconsumption of unhealthy food and to discourage physical activity (Engler-Stringer, Muhajarine, Del Canto, Le, & Ridalls, 2014). Nestle (2006) linked the increase in childhood obesity rates with the imbalance of diet and physical activity, noting, “Children routinely consume more calories than they expend in physical activities” (p. 2527). Other researchers have linked the prevalence of childhood obesity with a change in diet structures or the “nutrition transition” that resulted from rapid urbanization and globalization (Popkin et al, 2012). This transition is mainly characterized by a greater consumption of fatty and high sugar foods, processed carbohydrates and a lower consumption of fruits and vegetables (Nantapo et al., 2015; Popkin & Gordon-Larsen, 2004).

A growing body of evidence relates the increased prevalence of childhood obesity with food insecurity, coupled with an unhealthy diet and reduced physical activity. Income has been identified as an important determining factor for food security (Power, 2005). As family incomes decrease, the prevalence of food insecurity increases (Kirkpatrick & Tarasuk, 2008). Many studies have linked higher rates of child and adult obesity in low-income communities with socioeconomic factors (Drewnowski, 2009). These communities mostly attract fast-food outlets and convenience stores that offer more affordable, energy dense, and nutrient poor food and fail to attract providers of fresh and healthy food (Power, 2005). Fraser and colleagues (2010) investigated the association between the prevalence of childhood obesity and geographical area in the UK. Their results indicated that there was a significant association between the rates of overweight and obese children and the location of fast food outlets. They noted that children who live in deprived areas in low-income communities are at higher risk of being overweight or obese (Fraser & Edwards, 2010). Childcare centres in low-income and remote communities may also suffer from poor availability and accessibility of healthy food within their communities. This

may negatively impact the incorporation of healthy food in the centres' menus and hinder their ability to meet nutritional recommendations. No study exists in Saskatchewan that assesses the food provided in childcare centres in rural and remote areas from the perspective of availability and accessibility.

Obese children are not only more likely to be obese in later life but are also at a higher risk of developing serious health problems such as cardiovascular diseases (Zhang et al., 2015). These children are up to eight times as likely to experience heart disease and ten times as likely to suffer from type-2 diabetes compared to their non-obese peers (Yoong et al., 2015). Other diseases and health issues, such as sleep apnea, asthma, fatty liver, heartburn, gallstones, joint problems, and psychological stress are also common among obese children (Bazzano et al., 2016; Zhang et al., 2015). A recent review of the effects of sedentary behaviour and obesity in children observed that children who were sedentary and obese suffered significantly compromised psychosocial and cardiometabolic health, as well as bone, motor and cognitive development (LeBlanc et al., 2012). Furthermore, there is some evidence supporting the hypothesis that obesity in younger children is especially difficult to reverse (Robson, Khoury, Kalkwarf, & Copeland, 2015). This body of research highlights the need for action, but the question is, how do we stop childhood obesity at the local, national, and international levels? Overall, we need to develop better policies and preventive strategies for ensuring we can provide healthy lifestyles for children.

2.2 Food Consumption Patterns of Canadian Children

There have been a few studies conducted to track the dietary patterns of Canadian children through parental questionnaires. One of these studies was conducted in Alberta between 2005 and 2007 and aimed to investigate the food consumption patterns of preschool children

(four to five years old) and determine whether their food group intake met *Canada's Food Guide* (CFG) recommendations (Pabayo, Spence, Casey, & Storey, 2012). Around 2,015 preschool children attending twelve public health immunization units in the Edmonton region were recruited for the study. Surprisingly, the results indicated that only 29.6% of children consumed the minimum recommended daily servings of fruits and vegetables, and only 23.5% consumed the recommended daily servings of grain products (Pabayo et al., 2012). These findings revealed the consumption pattern of a large group of children and pointed to a need for further research into the main causes of these dietary shortcomings. They also revealed a pressing need for proper intervention measures to address the observed shortcomings. However, the Pabayo et al., (2012) study had an important limitation in that a disproportionate segment of the sample was recruited from high-income neighbourhoods and underrepresented children from middle and low-income neighbourhoods (Table 2.1). This suggested that the consumption data reported may not be representative of the wider Canadian population.

Another cross-sectional health survey, conducted between 2007 and 2008, assessed the dietary intake and eating habits of 388 preschool children (three to five years old) from 16 different communities in Nunavut, Canada (Johnson-Down & Egeland, 2010). Findings from this study indicated that 35% of the children's energy intake came from food with low nutrient density (high fat and/or sugar food) and less than 10% of the children consumed the minimum daily servings of fruits and vegetables recommended by CFG - First Nations (Johnson-Down & Egeland, 2010). The researchers linked the insufficient fibre intake that often results from lower fruit and vegetable consumption to the higher rates of overweight children observed in these communities. However, this study was subject to a major limitation (Table 2.1) in that the Food

Frequency Questionnaires (FFQ) were completed by parents who might not have had the opportunity to observe the food their children consumed in childcare environments.

Another study conducted via the Quebec Longitudinal Study of Child Development (QLSCD) 1998-2010 came to a similar conclusion. Dubois and colleagues (2011) found that only 17% of 1,549 participant children (four years of age) consumed the recommended daily servings of fruits and vegetables or grain products. Less than 48% of children met the recommended servings of milk and alternatives, and just 39% of participants consumed the recommended daily servings of meat and alternatives (Dubois, Farmer, Girard, Burnier, & Porcherie, 2011). Danyliw and colleagues (2012) investigated the relationship between the beverage intake patterns of children and adolescents and their risk of becoming overweight or obese. This study used the cluster data analysis method from the Canadian Community Health Survey Cycle 2.2 and sampled 13,824 two- to eighteen-year-old children. The food and beverage intake for children under six years of age was reported by their parents or caregivers. A single 24-hour recall was used to assess childrens' intake (Danyliw, Vatanparast, Nikpartow, & Whiting, 2012). Findings from this study indicated that Canadian children and adolescents were exceeding the recommendations for sweetened beverage (fruit drinks and soft drinks) consumption (Danyliw et al., 2012). Although the results indicated that there was no significant association between higher consumption of sweetened beverages and children under six years of age becoming overweight or obese, developing such behaviour in early life may lead children to develop a preference for unhealthy food and drinks later on.

The research literature indicated that there is an urgent need to track unhealthy eating patterns in Canadian children and intervene to reverse current damaging trends. At the same time, the data used in these studies were drawn from questionnaires conducted with parents. As a

result, more objective and comprehensive studies may be needed. Future studies should include a combination of qualitative and quantitative measurements, and take into account the fact that children receive meals and snacks in care settings outside of the home.

2.3 Childcare Settings and Nutrition of Children

In most industrialized nations, children now spend more time outside of the home than they did twenty years ago (Ulijaszek & Lofink, 2006). In 2011, 54% of Canadian children between six months and five years old were enrolled in some type of childcare (Sinha, 2014). On average, these children are spending a minimum of 30 hours a week in childcare (Sinha, 2014). Since more than half of Canadian children eat meals and snacks at childcare centres, the role these environments play in shaping children's eating habits should not be underestimated.

According to many researchers, childcare environments provide a unique and strategic opportunity to implement community-based intervention programs aimed at reducing childhood obesity (Benjamin et al., 2007; Larson et al., 2011; Maher, Li, Carter, & Johnson, 2008; Neelon & Briley, 2011). Studies indicate that healthy habits established in a child's early life tend to last into adulthood (de Silva-Sanigorski et al., 2010; Jessri, Nishi, & L'Abbe, 2016). Thus, the quality and quantity of food served in childcare settings is critically important and has a bearing on lifelong food preferences and eating habits (Briley & McAllaster, 2011). Hypothetically, focusing on young children in these settings and prioritizing childhood intervention will reduce adult obesity and related chronic diseases (Yoong et al., 2015; Zhang et al., 2015). Notably, many previous studies in other countries have shown that childcare centres do not offer children enough food from the basic food groups to meet daily nutritional requirements (Maalouf, Evers, Griffin, & Lyn, 2013; Pabayo et al., 2012; Schwartz et al., 2015).

In the United States, several recent studies conducted in licensed childcare centres have found that young children are not provided with the recommended quantities of nutritious food (Alkon et al., 2014). For instance, in 2008, Ball and colleagues examined the portion size of foods from each food group served and consumed at 20 childcare centres in North Carolina (Ball, Benjamin, & Ward, 2008). The researchers compared the nutrient content of the food with MyPyramid food group recommendations which advises that two to five year old children who attend full-time childcare should be served from half to two-thirds of their daily nutritional requirements at the centre. The study observed, however, that of the basic food groups, only milk was served in quantities that fulfilled recommendations while all other food groups' servings fell below recommended levels. Furthermore, over 50% of milk served was whole milk, and 75% of the meat was high in fat (fried). Findings also suggested that children who attend childcare on a full-time basis were consuming excessive amounts of added sugar and saturated fat at their childcare centres (Ball et al., 2008). The latter may indicate that childcare centres are contributing to childhood obesity. However, this assessment was conducted via direct observation, which may be less reliable than the plate waste data-collection method which provides a precise measure of food served and consumed. Additional details about this study can be found in Table 2.1.

In a 2015 study, an assessment was carried out to determine the quality of food served at 38 American childcare centres (Schwartz et al., 2015). In this observational study, all food served at lunch was observed and compared with federal Child and Adult Care Food Program recommendations. It was found that vegetables and milk were not served in quantities that met recommendations and that meals that included both vegetables and fruit resulted in higher produce consumption than meals that only provided one or the other (Schwartz et al., 2015)

(Table 2.1). These results showed the importance of closely tracking the food served in these settings so that researchers can better understand the role childcare centres play in enhancing the healthy eating habits of children.

To date, there is little known about the quality of food served in Canadian childcare centres. However, findings from current literature are consistent with American findings. A study conducted between 2006 and 2010 evaluated the impact of a nutrition intervention program on dietary patterns on 217 one to four year old children who attended childcare centres in 10 Nunavik communities (Gagné et al., 2013). The dietary intakes of these children were reported using a 24-hour dietary recall assessment tool. The assessments were completed by Registered Dietitians who worked with parents and primary caregivers, educators, and the centre's cooks. Comparing children's intake with *CFG* recommendations, the authors reported that only 7.4% of the participants (16 children) consumed the recommended servings of the four food groups. The majority of these children (13) attended the childcare centres on the day of data collection, and they were considered an intervention-received group. The remaining children (3) did not attend childcare on the day of data collection and they were designated as the control group (Gagné et al., 2013). The study indicated that the intervention group consumed twice as much nutritious food as the control group. These results suggested that the implementation of the nutrition program at childcare centres has a positive impact on children's nutritional intake (Gagné et al., 2013). However, in order to evaluate the effectiveness of this intervention program, more research has to be conducted to directly compare the intervention centres with the centres that did not receive the nutritional intervention.

Needham and colleagues examined the eating habits of young children at childcare centres in Ontario, Canada in 2007 (Needham, Dwyer, Randall-Simpson, & Heeney, 2007).

Researchers reported several challenges that interfered with the healthy eating pattern of children in childcare centres. One of these challenges was the lack of access to healthy food at the centres. In addition, the researchers reported that children frequently brought in and preferred to eat less healthy foods that have low-nutritional value. As a result, they often refused to eat healthy meals and snacks at the centres. Lack of parental encouragement was a reported challenge (Needham et al., 2007). Hence, it is important to emphasize the role parents can play in helping children develop healthy eating habits, alongside childcare staff.

The findings from these studies have revealed the need for more detailed investigations of the quantity and quality of nutrition in Canadian childcare environments. There is a clear and definite need for health promotion programs that target parents as well as educators at childcare centres. These programs can increase the understanding and awareness of food group guides and recommendations for educators, parents, and children. Such initiatives emphasize the importance of meeting nutritional recommendations to maintain the weight and overall health of children.

2.4 Food Menus of Childcare Centres

A childcare centre's food menu is a resource that provides comprehensive information about its food services. This resource can be adapted to meet the nutritional needs of children (Florida Department of Health Bureau of Child Care Food Programs, 2013) and must reflect all of the food and beverages served in a centre (Neelon et al., 2010). A childcare centre menu usually consists of two meals (breakfast and lunch) and two snacks (morning and afternoon). Some centres offer only one meal (lunch) and two snacks. Since each centre plans and organizes its own menu (Crenshaw, 2004), it is the responsibility of the childcare providers to ensure that children in the centre have access to a variety of healthy food in adequate quantities (Romaine, 2003).

Children are very curious about new food (Leeds Grenville & Lanark District Health Unit, 2016) and can often be influenced by the food served at the centres they attend (Romaine, 2003), by other children, and by the behaviour of educators towards new food (Moore et al., 2005). One study has shown that some children refuse to eat certain vegetables at home but will accept them at their childcare centre (Romaine, 2003). Moreover, some research suggested that serving a variety of healthy food, such as fresh fruit and vegetables, at childcare centres makes children more willing to accept healthy food choices (Nicklas et al., 2001; Romaine et al., 2007). Thus, one of the nutrition standards set by the American Dietetic Association for childcare settings is that “caregivers should receive appropriate nutrition and food service training” (Needham, 2005, p. 172). This recommendation emphasized the important role menu planners’ play in creating healthy and acceptable menus based on the available tools and resources.

Previous studies have shown that some menus in childcare centres do not provide children with their recommended daily nutrient requirements (Frampton et al., 2014; Maalouf et al., 2013; Neelon, Reyes-Morales, Haines, Gillman, & Taveras, 2013). Table 2.1 provides a summary of some relevant studies. In a 2012 study of 54 menus used by 142 government-sponsored childcare centres in Mexico, researchers compared menus with the USDA MyPlate food group recommendations on the basis of age (Neelon et al., 2013). The study found that the centres’ menus provided an excessive amount of calories, showing that a large percentage of this energy was derived from excessive protein sources and beverages. The same study also found that these menus provided insufficient amounts of whole grains, and high quantities of full-cream milk, fruit juices and sweetened beverages (Neelon et al., 2013).

An American study conducted in Georgia analysed 120 food menus from 24 centres. The study reported that the menus for the childcare centres were deficient in some micronutrients,

such as iron and fibre, and were high in sodium, saturated fat, and sweet snacks (Malouf et al., 2013). Furthermore, the findings indicated that only seven out of 24 centres listed fresh (not fried) vegetables daily on their menus (Malouf et al., 2013). Another study reported that most childcare menus in the United States provide less quantity and variety of fruit than official guidelines recommend, but provide an acceptable variety of vegetables (Nicklas et al., 2001). The same authors noted that some centres served small quantities of food to children and that these quantities did not meet the Recommended Dietary Allowances (RDA) for many nutrients (Nicklas et al., 2001).

Only a few studies have examined the food menus and the quality of children's diets in Canadian childcare centres. In 2007, Romaine and colleagues analyzed the quality of the menus at 35 licensed childcare centres in Nova Scotia (Romaine et al., 2007). Findings from this study indicated that the centres frequently used processed meat such as hot dogs and did not meet the Having Fun with Healthy Foods Daycare Menu Planning Manual (HFHF) guideline criteria for meat and meat alternatives. However, the same study showed that 75% of the centres met the recommendations for fruit and vegetables and 82% met recommendations for milk and alternatives. The authors ascribed the lack of variety within the food groups listed and the overuse of processed food to a lack of useful menu planning resources and training opportunities (Romaine et al., 2007). These findings emphasized the importance of having a comprehensive set of menu-planning resources and guidelines. The findings also highlighted the importance of regular training sessions for licensed childcare centres at both the provincial and federal levels.

Another study conducted in Alberta in 2012 compared the menus in two childcare centres to provincial guidelines (Nikolopoulos, 2012). The guidelines stated that "meals must include all four food groups; snacks must include two food groups" (Nikolopoulos, 2012, p. 44). The results

of the study showed that neither centre met the recommended servings of food groups as outlined in Alberta's Nutrition Guidelines for Children in childcare settings (Nikolopoulos, 2012).

However, because this study was scope-based, these results cannot be generalized to all Alberta childcare centres. A more in-depth study with a larger sample size would provide a complete picture of childcare menu practices across the province.

In 2014, Froehlich-Chow assessed the menus of six rural childcare centres in Saskatchewan that participated in a pilot study aimed at evaluating the HS/DS intervention (Froehlich-Chow et al., 2016). The assessments were conducted at three points throughout the intervention; baseline, midpoint and post-intervention. Three centres received the intervention and the remaining three were designated as control centres. The assessment looked at a single week-long menu at each centre and compared the menus with provincial childcare nutrition guidelines. The findings from this pilot study indicated that no centres in either group met 100% of the guidelines. Furthermore, the percent of centres that met the provincial nutrition guidelines in the control group decreased from 94% at the baseline to 92% at the endpoint of the study. In contrast, the intervention group saw an increase in guideline adherence from 78% at the baseline to 83% at the endpoint of the intervention. However, this improvement was not statistically significant and may have been due to the small sample size. Consequently, these findings cannot be generalized.

To the best of our knowledge, no other studies have evaluated the nutrition quality of menus in childcare centres in Saskatchewan. Nevertheless, the findings from the studies described above impress the need to evaluate current menu practices in Saskatchewan and other Canadian provinces as well. The existence of updated information on the current nutritional practices of childcare centres in Saskatchewan will have a positive impact on the implementation

and adoption of nutrition-based intervention programs. More importantly, most of the available studies in this section rely solely on menu content. In order to have an accurate assessment of nutritional practices in childcare centres, assessment of the actual food served in these centres side by side with their menus is critical.

2.5 Menu-Planning Guidelines of Childcare Centres

Menu-planning guidelines and regulations play an important role in ensuring that preschool children consume nutritious meals and snacks (Nikolopoulos, 2012). A balanced diet at a young age, featuring a variety of nutrients is essential for child health and proper growth (Briley, Jastrow, Vickers, & Roberts-Gray, 1999; Crenshaw, 2004). Menu guidelines provide menu planners with the opportunity to select a variety of healthy food that meets the daily nutrition requirements of children. Although each province in Canada has its own menu-planning policies and regulations, most provinces follow the basic food group recommendations that have been set by Health Canada. However, the strictness of the regulations and quality guideline resources varies by region. Nova Scotia and Ontario have comprehensive guidelines, while other regions, such as Saskatchewan and the Yukon, follow only the basic recommendations relating to food groups and childcare nutrition regulations.

There is no uniform menu-planning resource at the federal level (Romaine, 2003). Thus, a study in Nova Scotia conducted by Romaine (2003) reported that lack of uniformity in guideline resources was the main reason centres were reluctant to update and change their menus. The same source mentioned that, in 2000, a survey was conducted in Nova Scotia that included 14 childcare centres, which was aimed at assessing nutrition and menus (Romaine, 2003). About 56% of participating centres reported that they update their menus on a seasonal basis, while 27% do so on a yearly basis and 33% updated their menu every one-to-three years.

These numbers highlight the importance of having menu-planning guideline resources and manuals, as well as training sessions, to encourage menu planners to update and improve their menus. It is worth noting that using the same menus for long periods of time can impact the healthy food choices of children because they may not offer much food variety.

Eating Well with Canada's Food Guide (CFG) is considered the main resource that provides recommendations for the types and serving sizes for foods from each group required by children every day (City of Ottawa, 2016; Katamay et al., 2007). This tool is suitable for planning snacks and meals for children two years old and older and helps caregivers meet children's daily nutritional requirements (Leeds Grenville & Lanark District Health Unit, 2016). The guide is available in 12 different languages (Health Canada, 2013) and tailored nationally to reflect First Nations, Inuit, and Métis traditional foods and culture (Health Canada, 2010). In this guide, the four food groups are represented by a rainbow of varying colours: vegetables and fruits, grain products, milk products, and meat and alternatives. The guide classifies food and beverages that provide high calories and low nutritional value as "Foods to Limit." (Government of Saskatchewan, 2010). Based on the CFG recommendations, foods to limit are those that should be offered in limited quantities and include pastries, cakes and cookies, granola bars, chocolate, doughnuts, ice cream, frozen desserts, potato chips, French fries, salty snacks, soft drinks, sports drinks, and fruit-flavoured sweetened drinks (Government of Saskatchewan, 2008a, 2010).

According to the Ottawa Healthy Eating resource, a childcare menu should provide three-quarters of the daily CFG servings of recommended food groups for a child attending on a full-time basis (City of Ottawa, 2016). The Day Nurseries' Act (DNA) provides detailed descriptions of serving sizes for each food group based on CFG recommendations. The act states that

childcare centres should meet the following nutritional requirements for full-time children who attend for six hours daily or more:

- 2-2½ whole fruit or 1-1¼ cups (250 to 300 mL) of vegetables or fruit, which is equal to two to two and a half of CFG servings.
- 1½ -2½ cups (250-375mL) of milk and alternatives, which is equivalent to one and a half to two and a half of CFG servings.
- 2-3 oz. (60-90g) of meat and alternatives, which is equivalent to three-quarters or one and one-quarter of CFG servings.
- 1½-2½ slices or ¾-1¾ cups (175-450mL) of grain products, which is equivalent to one and a half to two and half of CFG Servings (Haliburton, Kawartha, Pine Ridge District Health Unit, 2012).

Planning a cycle menu is considered the most effective way to enable young children to experience a wide variety of healthy foods. Thus, adopting several seasonal cycle menus is commonly recommended (Government of Saskatchewan, 2012). A cycle menu is “a series of menus planned for a specific period of time” (National Food Service Management Institute, 2013, p. 1). Many childcare menu-planning resources recommend planning cycle menus that are a minimum of three or four weeks in length and where the meals provided each day during the cycle are different (Haliburton, Kawartha, Pine Ridge District Health Unit, 2012; Leeds Grenville & Lanark District Health Unit, 2016; National Food Service Management Institute, 2013). The rotation of the cycle menu depends on the cycle length. For example, with three-week cycle menus, the menu rotates every three weeks so that in the fourth week, the first week of the cycle is repeated. Additional benefits of cycle menus are the time saved by standard purchasing

procedures and lower food costs associated with taking advantage of seasonal foods (National Food Service Management Institute, 2013).

In Saskatchewan, childcare nutrition regulations and menu-planning guidelines are delineated in Childcare Regulations, 2015(Section 24). Menu-planning guidelines are adapted from the current edition of CFG in order to ensure that children over two years of age are meeting their daily nutritional requirements with the appropriate amounts and types of food from the four main food groups (Government of Saskatchewan, 2016) (Appendix A). These guidelines recommend that:

- “Snacks consist of two or more food groups, including a serving of vegetables or fruit, plus, at least, one other food group in designated amounts.
- Breakfast consists of three or more food groups in designated amounts.
- All other meals consist of four food groups in designated amounts.
- Milk should be offered at least twice a day.
- If **juice** is offered:
 - It should be 100% unsweetened.
 - It should be offered not more than 3 times per week. **Water** for thirst should be offered.
- Foods to be limited, if offered:
 - Should appear on the menu not more than 3 times a week.
 - They should be offered in addition to the recommended food groups” (Government of Saskatchewan, 2016, p. 5-14).

These guidelines are also available in a check-list format and menu planning template, prepared by the Early Learning and Childcare Department of the Saskatchewan Ministry of Education

(Appendix B & C).

Saskatchewan Childcare Regulations and Policies provide some specific guidelines which are intended to ensure that licensed childcare centres provide children with meals and snacks that meet their “overall daily nutrition needs” (Government of Saskatchewan, 2016). These guidelines also ensure that children are provided with high-quality food in sufficient quantities “at appropriate time intervals” not exceeding three hours between the previous snack or meal. Regulations state that menus must be prepared and posted at least a week in advance of serving; they must appear in a highly-visible location that is accessible and frequented by parents (Government of Saskatchewan, 2016). Posted menus help parents monitor what their children are served so that they do not provide the same meals or snacks at home (Needham, 2005). Menus prepared by the centres should also include a variety of textures, flavours, colours, sizes, shapes, and temperatures (Government of Saskatchewan, 2016). However, there is an absence of evidence reporting how childcare centres adhere to these policies and regulations.

The lack of comprehensive childcare menu-planning tools and resources that could potentially serve as guidelines at the provincial level (including creative recipe ideas and examples of healthy food choices for the childcare centres) is an issue that needs to be addressed in additional research. It is also important to emphasize the need for regular and planned evaluations of menus and menu-planning practices in childcare centres. These evaluations will do more than help ensure that centres follow proposed guidelines accurately; they will support the improvement of current guidelines and regulations.

2.6 Comparison of the Menus with the Actual Food Served

The menus used in childcare centres are important resources of information for caregivers, parents, and researchers (Neelon et al., 2010). There are a limited number of studies

that assess the accuracy of the actual food served to children at childcare centres in comparison with the menus. Table 2.2 provides a summary of existing studies, which indicate that menus might not accurately reflect what children are being served (Ball et al., 2008; Fleischhacker, Cason, & Achterberg, 2006). An investigation into the consistency of menus compared with what is being served provides an opportunity to examine the reliability of the information on childcare menus.

Fleischhacker and colleagues (2006) compared the types of actual food served at Head Start childcare centres in the USA with the centres' planned menus. Findings from 77 days of observation indicated that out of 269 lunches and snacks observed and compared, only three complete breakfasts and one "ethnic day" meal matched the meals listed on the menu (Fleischhacker et al., 2006). The authors also compared the individual food items served to the children with the food items listed on the menus and reported that out of 895 food items listed on the menu, 861 were offered, and only 74 items served matched what was listed on the menu (Fleischhacker et al., 2006). However, one of the limitations of this study was that the sample recruited from one Head Start centre may not have reflected the food practices in other centres in different locations.

Similar results were found in a study conducted in North Carolina in 2005. In this cross-sectional study, 84 licensed centres were recruited and researchers monitored the served food and beverages against the planned menus (Neelon et al., 2010). Results indicated that out of the 245 meals served (lunches and snacks), only 52% (131 meals) entirely matched the meals listed on the planned menus. Individual food items and beverages were also examined. Out of the 820 individual items, 86% (710 items) matched what was listed on the menus. Overall 110 food and beverages items that were served to the children were not listed on the menus. Notably, some

food groups, such as vegetables and grains, were served less frequently than stated on the centres' menus while other foods, such as milk and alternatives, fruits, and food with low nutritional value, were served more frequently than they were listed on the menus (Neelon et al., 2010). However, this study was based on a one day of observation in each centre, which makes it subject to day-to-day variations. This may be problematic since most of the data were collected around days of celebration, special events, and holidays so that food that was atypical of the normal routine may have been served.

In a recent more comprehensive study, Breck and colleagues (2016) carried out a multi-method, cross-sectional study aimed at evaluating the extent to which planned menus correspond with actual food and beverages served to children in 95 childcare centres (Breck, Dixon, & Khan, 2016). The results of this study indicated that out of 524 meals and snacks served; more than 60% matched the items listed on planned menus. About 14% of items were acceptable substitutions (meaning they belonged to the same food groups as the items they replaced), and 12% of the items listed on planned menus were not served. Around 13% of additional food and beverages served were not listed on the menus. From the listed food groups, vegetables and fruit were omitted most frequently, while grains were served most often as additional items (Breck et al., 2016). However, 10% of participating centres did not provide their menus and some centres provided the food service companies and catering invoices instead of the actual menus. As a result, the authors concluded that the study overestimated the rates at which food served and planned menus matched.

To our knowledge, there has been no study that has assessed the accuracy of the menus in Canadian childcare centres with regard to actual food served. This gap in literature may have some implications for future assessments of childcare nutrition practices which may currently

rely solely on planned menus. Available studies have indicated that the food offered does not correspond with the items on the planned menus (Alves & Morais, 2015; Ball et al., 2008; Fleischhacker et al., 2006; Neelon et al., 2010). In fact, the large discrepancies that these studies have shown may impact not only the assessment of the adequacy and quality of food listed on the menus but also the expectations of parents who believe their children are served the food that is described on the posted menus. Therefore, we believe that assessments of menus that do not monitor what is actually being served to children can skew assessment results.

Table 2.1: Summary of Studies on childcare nutrition and menu practices

Reference, location of study	Number of subjects and their ages	Study design	Study description/aims	Data collection method/nutritional analysis	Major findings	Major limitations
Ball et al., 2008. US	117 children 2 -5 years old; 20 childcare centres.	Direct observation and recording of dietary intakes. The data was collected in the fall and winter of 2005.	To assess whether childcare centre supplied meals meet the benchmark of supplying one-half to two-thirds of daily MyPyramid food group recommendations for children between the ages of 2 and 5.	The amount and type of food served and consumed were recorded through direct observation. The assessment was conducted by using Nutrition Data System for Research (NDS-R) software. Food group serving sizes were then compared with the new MyPyramid food group recommendations. SAS statistical software was used for data analysis.	Food group consumption among participating children was significantly lower than the requirement. The consumption of whole grains was less than 13% of the MyPyramid recommendation. The consumption of dark green vegetables was less than 7% falling far short of recommendations. Children also consumed less than the recommended amounts of fruit (excluding 100% fruit juice). They consumed excessive amounts of saturated fat and added sugar.	Assessments were conducted by direct observation, which may be considered less reliable than using plate-waste techniques. The data was collected from one classroom in each centre. All observations took place in childcare centres; the study excluded family-run childcare facilities, where large proportions of American children are enrolled.
Erinosho et al., 2013. US	120 children from, 48 centres. Ages ranged from 3-5 years.	Cross-sectional study, conducted between July 2005 and January 2006	To assess the quality of food and drinks offered to children at childcare centres using The Healthy Eating Index (HEI)-2005	A nutrition and physical activity self-assessment instrument was used to evaluate 48 childcare centres. A subsample of 20 centres was randomly selected. Two-day dietary observations were conducted at each centre for 120 children. The Nutrition Data System for Research Software was used to generate food ingredients, food groups, energy, and nutrients.	Total HEI-2005 indicated that the quality of the food and beverages that were offered to children need improvement. Centres provided vegetables, legumes, grains, and meat in amounts significantly lower than recommended. Total calories, solid fat and added sugars were offered in amounts higher than recommended.	The sample size was small and convenience based, which limited generalizability of the findings. There was a possibility of alterations to the centres' daily nutritional practices due to pre-observation notice.
Erinosho et al., 2011. US	240 children, ages 3 to 4 years; 40 centres participated	Surveys and direct observation. Data collection took place in 2005 and 2006	To evaluate childcare centres' nutritional practices and assess whether dietary intakes of children at centres in New York City meet nutrition recommendations	Out 40centre, one week of menus were collected from 33centres. Food and beverages served and consumed by children were observed and assessed to determine whether they met 50% of the children's daily requirements for the five main food groups, as well as energy and nutrient requirements as specified in MyPyramid and the dietary reference intakes. Researchers also conducted a supplemental directors' survey.	Most food and beverages listed on the menus complied with the national guideline recommendations. Some centres served high-fat milk (reduced fat 2% and whole fat milk) and sugar-sweetened beverages. More than 80% of the observed children in this study did not consume 1/2 of their daily recommended vegetables; a large proportion of them did not meet 1/2 of the daily recommendation for vitamin E. Almost 1/2 of the centres did not provide drinking water to children at mealtimes.	Children's dietary intakes were observed for one day only, which limits the generalizability of the results for other days. The portion sizes were visually estimated and the reliability for the estimation measures was not determined.

Fleischhacker, 2006. US	Six Head Start centres. Each centre served 20 children (who were 3 to 5 years old)	77 days of direct observation from January to June 2002	To compare the actual food items served at Head Start childcare centres with the food listed on centres' monthly menus.	Direct observation of 269 snacks and meals; analysis of centres' monthly menus over the course of six months.	Out of 269 lunch meals and snacks observed and compared, only three complete breakfast meals and one "ethnic day" meal completely matched those listed on the menu. The authors also compared the individual food items served to the children with the items listed on menus. Out of 895 food items listed on the menu, only 861 were offered; only 74 items completely matched what was listed on the menu. Some food items were listed on the menus but were not served. There were a total of 75 incorrectly-listed items.	Samples were collected only from Head Start centres and nutrient content of the foods was not analyzed.
Frampton et al., 2014. US	314 children in 83 childcare centres; children were 2 to 5 years old	Cross-sectional study. Data collection took place in in spring of 2012	To examine the nutritional quality (macro and micronutrient content) of food and beverages listed on the childcare centres' menus. Menus were compared to 1/3 of DRIs.	Telephone interviews with childcare centre directors were conducted and a self-reported survey was circulated. Two months of menus were collected. Five lunches from the first week of each month were analyzed using Food Works Nutrients Analysis Software.	Centres' menus provided insufficient quantities of important macro and micronutrients such as carbohydrates, fibre, iron, vitamin D, vitamin E, and calcium for some age groups. Folate and sodium were higher than recommended for some age groups.	This study may be susceptible to sample selection bias as most of the included centres had previously participated in research related to nutrition and physical activity. Furthermore, most centres were located in rural areas, so findings might be different in urban areas. The nutritional analysis was based on the menu; the actual food intake was not observed to ensure menus accurately reflected food served. Portions sizes were not provided by most centres.
Johnson-Down & Egeland, 2010. CA	388 Inuit children, 3-5 years old	A cross-sectional health survey conducted in 2007 and 2008	To assess Inuit children's dietary intake and eating habits	Food frequency data were collected by parents/caregivers for 381 children. Twenty-four-hour recalls were obtained for 374 children; a second recall was conducted with a subsample of 74 individuals (19.8% of the sample). Anthropometric measurement, weight, height and BMI were obtained from participating children.	Findings from this study indicate that 35% of the children's energy intake was from food with low nutrient density (high fat and/or sugary foods) and 15% was from high-sugar beverages. Less than 10% of children met the minimum recommended daily servings of fruits and vegetables in Canada's Food Guide: First Nations.	The questionnaires were completed by parents/ primary caregivers who may not have had the opportunity to observe the food consumed by their children in childcare. The nutrient values for some foods were imputed because they weren't available in the Canadian Nutrient File. Physical activity data were not collected.

Lyn et al., 2014. US	2,042 2 to 5-year-old children at 20 childcare centres	Semi-structured interviews were conducted with the directors of 20 childcare centres.	To understand the implementation process of a nutrition and physical activity (PA) program as experienced by childcare centre directors and to aid in the identification of supports and barriers to such programs.	Directors were interviewed and recordings were transcribed and imported into N Vivo 9 Qualitative Software for data analysis.	Overall, children accepted the nutrition and PA changes. The majority of directors reported that the process of changing menus to include healthier items was not difficult once they understood which unhealthy food categories could be replaced with healthier options. Increases in the time children spent performing physical activities were also effective.	The data was collected through interviews with centres' directors only. As such, the data might not provide a complete picture of the experiences of other educators. Most of the interviewed directors participated in the program's implementation. The study was based on verbal communications so the lack of visual observations data may have affected the results.
Lyn et al., Jan 2013. US	24 childcare centres served 2,042 children aged 2-5 years old	Observational study. Pre/post-intervention Environmental Policy Assessment and observation instruments were used from Feb 2010 to April 2011	To determine the impact of a wellness policy and training program in childcare centres within the state of Georgia	Centres performed self-assessment reporting using (EPAO) instrument; data was collected to identify food service changes and staff behaviours and to detect the areas related to physical activity and nutrition that needed improvement. One-day direct observation (nutrition and physical environment) took place. Centre menus, lesson plans, staff handbooks, fundraising documents, nutrition & physical activity policies and curricula were reviewed alongside other centre data.	Significant improvements in nutritional the environment, physical activity environment, staff behaviour, nutrition education and training, and physical education and training were noted.	The sample size was small. The data was collected from intervention centres only; there was no comparison group.
Maalouf et al., 2013. US	2,042 children at 24 childcare centres.	Cross-sectional Study. Data collection took place between April 2010 and September 2010	To perform a state-wide assessment of the nutritional quality of meals served at childcare centres in the state of Georgia.	The nutritional environments of centres were observed for one full day using the Environment and Policy Assessment and Observation Instrument. Five-days of menus were collected from each centre at the baseline of the study. Researchers performed a quantitative analysis of 120 menus across the 24 centres. This analysis tracked energy and 11 major nutrients (carbohydrates, protein, total fat, saturated fat, cholesterol, fibre, sodium, calcium, iron,	Menus were compared with the DRIs for 3 to 5-year-old children. The centres' menus provided 1/2 to 2/3 of the DRI for energy, protein, carbohydrates, and vitamins A & C. Menus were deficient, however, in fibre and iron. Furthermore, excessive amounts of saturated fat (whole milk and high-fat or fried meats), sodium, and sweet snacks were prevalent in the centres' menus.	The menus may not be truly representative of the food served to the children since the actual food served to and consumed by children was not assessed in this study. The data were collected from centres located in small cities and rural areas. Results may not reflect the situation in urban areas.

Mier et al., 2007. US (Texas-Mexico Border)	198 Mexican-American preschoolers; 3 to 5 years of age; attending two full-day Head Start centres	A self-administered, pre-coded 24-hour recall questionnaire	To determine if meals served to children attending border region Mexican-American preschools meet the Recommended Dietary Allowances.	and vitamins). NutriKids Menu Planning & Nutritional Analysis software was used for menu analysis. The food group contents of menus were compared with MyPlate food group standard recommendations for preschoolers. A weekday and a weekend 24-hour recall questionnaire were completed by children's parents. The centres' daily menus were collected. Dietary intakes were analyzed by NutriPac software to compute energy, macronutrients, and micronutrient contents of foods. χ^2 test, <i>t</i> -test and SAS software program were used for data analysis.	Children's food exceeded recommendations for carbohydrates, protein, total energy, saturated fat, and sodium, but was significantly deficient in vitamin A, potassium, and fibre. Large portions of the children's meals and snacks were composed of processed and sugary foods.	Self-reporting was used in data collection. The reliability and validity of this method were not assessed. The actual food intakes were not observed. Recruitment of participants was based on a convenience sampling technique, which limited the generalizability of the findings.
Neelon et al., 2013. Mexico	54 days of menus used by 142 government-sponsored child-care centres, served children aged 4 months to 6 years	Cross-sectional study (menu assessment)	To determine the nutritional quality of meals listed on menus at Mexican government-sponsored childcare centres throughout the country.	All food and beverages listed on the centres' menus were analyzed. Food group content and food portion sizes were compared with My Plate recommendations. Sugar, fibre, and macronutrients in food and beverages were compared with daily reference intake standards.	Menus for the centres provided large quantities of energy and a high percentage of this energy was made up of excessive protein sources. Menus also provided insufficient quantities of whole grains, excessive amounts of fruit juice, sweetened beverages and full-fat milk. Menus provided very limited grains.	The assessment was set in government-sponsored childcare centres, which represent only 1/3 of Mexican childcare centres. Results may not accurately represent other centres' menus. This assessment was based only on menus analysis - not actual food & beverages served or consumed. The portion sizes were compared to US MyPlate recommendations. There were no national nutritional standards in Mexico at the time of the study.

Pabayo et al., 2012. CA	2,015 4 to 5-year-olds at 22 childcare centres	A longitudinal cohort study carried out between November 2005 and August 2007	To investigate the food consumption patterns of preschool children (4 to 5 years old)	The questionnaire included 20 questions that measure a child's dietary intake based the Canadian Community Health Survey and the Behavioral Risk Factor Surveillance System (US). The questionnaire also included questions about eating behaviours and physical activity.	Only 29.6% of participating children consumed the minimum daily servings of fruits and vegetables recommended in Canada's Food Guide. Only 23.5% consumed the recommended daily servings of grain products.	Higher proportions of the sample were recruited from high-income regions. Children's dietary intakes reported through parental questionnaires may have been subject to error and bias as parental opportunities to observe children in childcare is very limited. Furthermore, the authors reported that the parents were "motivated to provide socially desirable responses" which may also constitute a bias.
Padget et al., 2005. US	50 children, aged 3 to 5 years old	Dietary records of three-days period (analysis of records); study conducted over an 18-month period	To measure the dietary intake of children who attend child-care centres and assess findings within the context of the Food Guide Pyramid for young children.	Researchers examined dietary records for three consecutive days during which time children's dietary intakes were observed and measured by a trained researcher. Measurements were calculated in cups to estimate the amount of food served and left uneaten on plates. Concurrently, parents measured the children's food intake at home. The energy intakes were calculated by using Food Works software and analyzed using the SPSS Statistical Package.	Children did not consume enough grains and vegetables during childcare hours, nor did their home food intake compensate for these shortcomings. Only 5% of four-year-old children and 25% of five-year-old children met 2/3 of their estimated energy requirements. Children at centres that served breakfast performed better than those who were only served a morning snack.	The sample size was quite small and participants were recruited from one geographical area. The calculations of the children's estimated energy requirements were based on reference heights and not their actual heights. Some of the three-day dietary intake data were recorded by parents.
Schwartz et al., 2015. US	204 children 2.5 to 5.7 years old	Cross-sectional study	To compare current practices to the proposed meal pattern recommendations and assess the food quality of lunches served at 38 childcare centres.	Before lunch, three tables were randomly chosen for observation. The quantities of food served and consumed were measured through visual estimates. More detailed information about cooking methods and ingredients was collected from the cooks, including the added fat, salt, etc. The serving sizes of food offered and consumed were analyzed using the Food Processor SQL.	The findings from nutrient analyses indicated that children were served meals that had low quantities of vegetables, milk, and fibre. Grain and meat were served in higher quantities than the Institute of Medicine (IOM) recommends. As a consequence, the food served to children was high in saturated fat, protein, and sodium. Overall energy intake was appropriate, but the amount of energy consumed from saturated fat exceeded IOM recommendations.	The data collection (one day of visual observation) may not have been representative due to day-to-day variation. Visual estimation of servings and portion sizes may have been less accurate and reliable than advanced techniques such as the plate waste data collection methods. The study covered only one state, and over half of the centres that participated in Head Start had their own nutritional requirements.

<p>Turner-McGrievy et al., 2014. US</p>	<p>200 children aged 6 weeks and older</p>	<p>An observational study included parental surveys and menu analysis pre/post-policy implementation. Data collected June and December 2012</p>	<p>To examine changes in the nutritional content of menus pre/post-implementation of the new nutritional standards. The study analyzed the impact of vegetarian meals on the nutrient content of the centres' menus and explored parental opinions regarding the new nutritional standards.</p>	<p>A parental survey was developed and circulated. Analyses of the menus' nutrient content pre/post-nutrition policy change were conducted. Two consecutive weeks of menus were analyzed using the US Department of Agriculture Nutrient Database for Standard Reference (Nutrient Data Laboratory). Food ingredients, preparation methods, and portions sizes served for 3-5 years old children were provided by the kitchen supervisor.</p>	<p>Adding vegetarian items enhanced the nutrient contents of menus; furthermore, energy intake, cholesterol and saturated fat levels, and sodium achieved optimal levels after this change. Parents supported the standard of serving children at least 2 vegetables and 2 fruits every day.</p>	<p>The observational data were collected from one centre and the survey instrument was not validated. The analysis of nutritional contents was based on menu data, but actual food consumed was not assessed.</p>
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2.7 Methodological Approaches for Menu Analysis

Researchers have used different approaches for menu analyses. Table 2.2 presents menu analysis approaches based on the available literature. These studies were conducted in the USA, Mexico, the Texas-Mexico Border region, and Brazil. The main focus of the first two studies in Table 2.2 was assessing the consistency of the planned menus with the food actually offered to children. The percentage of adherence to dietary recommendations was assessed in the second, third and fourth studies. The last study examined the changes in the nutritional content of menus pre and post-implementation of the new nutritional standards. As explained in Chapter 3: Research Methods, for the purpose of this study, an exploratory analysis was performed to select the most comprehensive approach based on the type of data available from the HS/DS program.

Table 2.2: Summary of Studies Related to Childcare Centres Menu Analysis

Author, location of study	Number of subjects, age	Study design/ approach used	Study description/aims	Main statistical approaches	Main outcome	Major findings
Alves & Morais, 2015. Concordia, Brazil	7-24-months-old 14 Childcare centres	Observational/longitudinal study. Six consecutive weeks of menus for fall, winter, spring and summer menus were collected for the analysis	To discover how closely meals served to infants (7 to 12 months of age and 13 to 24 months of age) correspond with menus at childcare centres and to assess whether the meals meet current nutritional guidelines for infants.	Descriptive statistics (percentages and frequencies)	Percentage of adherence of planned menus to the guidelines and the percentages/ frequencies of compliance between the written menus and actual food served at lunch were determined.	Only 20% of food served entirely matched the planned menus for the 13-24 month age group. For 7-12 month age group, none of the served food matched what was listed on the planned menu. The percentage of compliance to the recommended guidelines was higher in the planned menus than it was in the actual food served, except fruit (both planned and served were zero).
Breck et al., 2016. NY, US	95 childcare centres 3 to 4 years of age	A multi-method cross-sectional study	To evaluate the extent to which the planned menus correspond with actual food and beverages offered to children at childcare centres.	Frequencies and percentages of five variables, matches, substitution, omission, addition were calculated Multivariable regression analyses were performed.	The study calculated proportion (matches, substitution, omission, addition) of food served with planned menu was determined.	More than 60% of the observed food and beverages matched the listed items on the planned menus. About 14% of items were acceptable substitutions. Twelve percent of items listed on planned menus were not served. Around 13% of additional food and beverages served were not included on the planned menus.
Fleischhacker, 2006. US	Six Head Start centres. Each centre served 20 children (who were 3 to 5 years old)	77 days of direct observation from January to June 2002	To compare the actual food beverages served at Head Start childcare centres with the food & beverages listed on centres' monthly menus.	Descriptive statistics (percentages and frequencies)	Percentages/ frequencies of compliance between the written menus and actual food served	Out of 269 lunch meals and snacks observed and compared, only three complete breakfast meals and one "ethnic day" meal completely matched those listed on the menu. The authors also compared the individual food items served to the children with the items listed on menus. Out of 895 food items listed on the menu, only 861 were offered; only 74 items completely matched what was listed on the menu. Some food items were listed on the menus but were not served. There were a total of 75 incorrectly-listed items.

Mier et al., 2007. US (Texas-Mexico Border)	198 Mexican-American preschoolers; 3 to 5 years of age; attending two full-day Head Start centres	A self-administered, pre-coded, 24-hour recall questionnaire	To determine if meals prepared in preschools in Mexican-American border region schools meet Recommended Dietary Allowances.	χ^2 test / Fisher's exact test was conducted. "A <i>t</i> -test was used to compare nutrient contents of dietary patterns with recommendations"	The differences in nutrient contents between diets, both at home and at school, were assessed. In addition, the degree of adherence to recommendations was calculated.	Children's food exceeded recommendations for carbohydrates, protein, total energy, saturated fat and sodium, but was significantly deficient in vitamin A, potassium and fibre. Large portions of the children's meals and snacks were composed of processed and sugary foods
Neelon et al., 2013. Mexico	54 days of menus used by 142 government-sponsored child-care centres	Cross-sectional study (menu assessment)	To determine if menus in Mexican government-sponsored childcare centres meet nutritional standards.	Descriptive statistics	This study calculated the percentage of adherence of planned menus' food group content and portion sizes with MyPlate recommendations and Daily Reference Intake standards.	Menus for the centres provided large quantities of energy and a large percentage of this energy was comprised of excessive protein sources. The menus also provided insufficient quantities of whole grains, large amounts of full-fat milk, and a large amount of fruit juice and sugar-sweetened beverages.
Neelon et al., 2010. US	84 licensed centres were recruited	Cross-sectional study (menu assessment)	To evaluate the extent to which the planned menus correspond with actual food and beverages offered to children at childcare centres.	Descriptive statistics	Percentages/ frequencies of compliance between the written menus and actual food served	Out of the 245 meals served (lunches and snacks), only 52% (131 meals & snacks) entirely matched what was listed on the planned menus. Individual food and beverages items were also evaluated. Overall, 87% of individual items matched the items listed on the planned menus. Around 110 of additional food and beverages items served were not included on the planned menus.
Turner-McGrievy et al., 2014. US	200 children aged 6 weeks and older; data collected June and December 2012	An observational study included parental surveys and menu analysis both pre/post-policy implementation	To examine changes in the nutritional content of menus pre/post-implementation of the new nutritional standards, to look at the impact of vegetarian meals on the nutrient contents of centres' menus, and to explore parental opinions regarding these changes	Independent sample <i>t</i> -tests were used to compare nutrient values for pre/post menu changes. ANOVA was used to assess the differences among the four menu groups. Post hoc analyses were conducted using Turkey's honestly significant difference test	Differences in the nutritional content of menus pre/post implementation of the new nutritional standards were assessed.	Supplying the menus with more vegetarian items enhanced the nutrient content of menus. Furthermore, energy intake, cholesterol, saturated fat levels, and sodium achieved optimal levels after this change. Parents supported the standard of serving children at least two vegetables and two fruits.

Table 2.3: Some Highlights from the Literature Review

What we know	What we do not know
<ul style="list-style-type: none">• Findings from the aforementioned studies indicate that there is an urgent need to track unhealthy eating patterns in preschool-aged children.• Large proportions of young children attend childcare settings; therefore, nutrition practices in these settings may have a great impact on the development of children’s healthy eating habits (Erinosho et al., 2011).• These facilities are an ideal environment for implementing nutrition intervention programs (Benjamin et al., 2007).• A regular evaluation of menus and menu planning practices in childcare centres is crucial to ensure that these facilities offer children food of appropriate quality and quantity (Frampton et al., 2014).• The findings also indicate that most menus in childcare centres do not comply with the applicable nutritional guidelines. Furthermore, a discrepancy between the planned menus and the actual food served has been reported (Breck et al., 2016; Fleischhacker et al., 2006; Neelon et al., 2010).	<ul style="list-style-type: none">• The nutritional practices in childcare centres in Saskatchewan (to what extent the menus in Saskatchewan childcare centres adhere to the provincial nutrition guideline recommendations.• The extent to which planned menus in childcare centres in Saskatchewan correspond with the actual food and beverages served. There has been no study that has assessed the accuracy of the menus in Canadian childcare centres with regard to actual food served.• The impact of the Healthy Start program on menu planning practices of the participating centres.

CHAPTER 3

RESEARCH METHODS

This chapter consists of three main sections. Section 3.1 provides information on the general design of the HS/DS evaluation study. In section 3.2, the researcher describes her experience with HS/DS. The methodological approaches specifically used to address the research questions in this study (menu evaluation study) are described in section 3.3.

3.1 Healthy Start/Départ Santé Study

3.1.1 Participants and Design

From October 2013 to June 2016, a delayed cluster randomized control trial was carried out in 63 childcare centres enrolled in the HS/DS intervention program (39 centres in Saskatchewan and 24 in New Brunswick). The participating centres were randomly assigned as either intervention centres or control centres. Centres were stratified further by location (urban or rural) and language (anglophone or francophone). Over a six to eight-month period, the intervention centres received training support and resources, while the control centres remained on usual practice and received the intervention after the evaluations (Bélanger et al., 2016). Prior to the endpoint of data collection, it was found that two participating centres were managed by the same director, thus they were considered one centre. Another centre was excluded before the endpoint due to a massive drop in enrollment. Figure 3.1 shows the distribution of participating centres in the province of Saskatchewan based on geographical location.

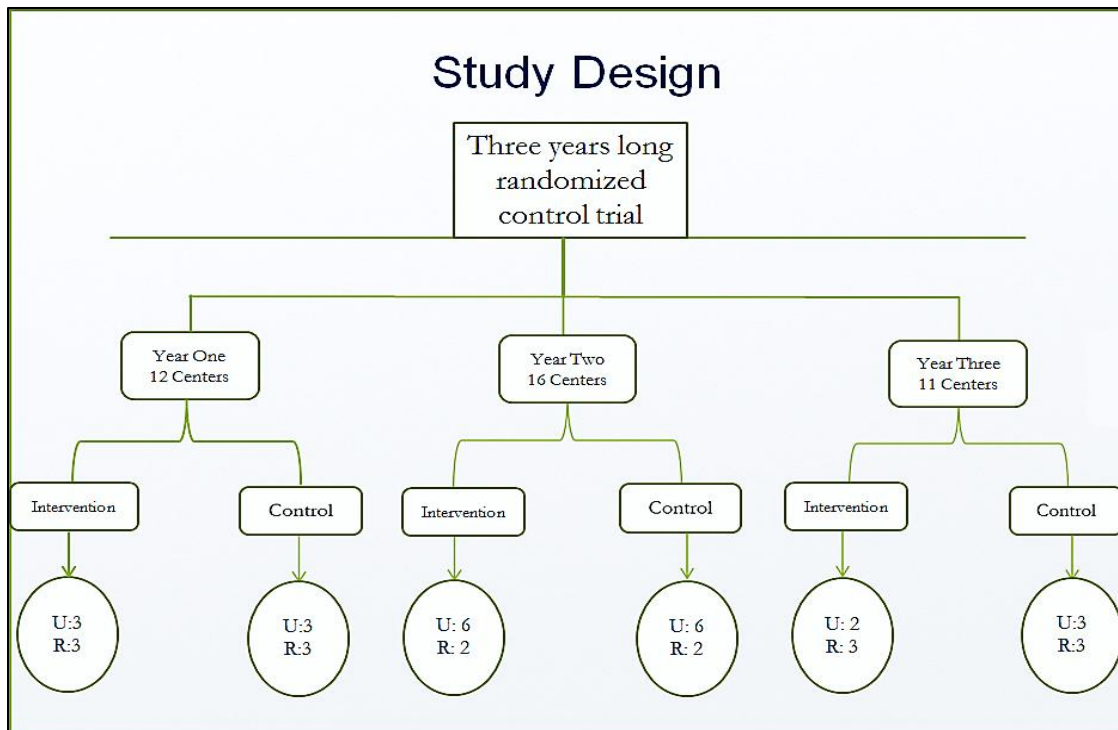


Figure 3.1: Distribution of participating centres in the province of Saskatchewan
 *U: centres that are located in urban areas. R: centres that are located in rural areas
 * $n= 39$

3.1.2 Criteria for Inclusion and Exclusion of Centres

All participating centres met the following criteria:

- Must have at least 20 three to five years old children who are attending full-time during the data collection year.
- Must not have received any previous nutrition or physical activity intervention.
- Must be preparing and offering lunches to preschoolers.

The following criteria concerning the availability of educators at the centres also were considered:

- Educators should be available during the study and should be willing to participate.

- Directors, educators and the participants’ parents must sign a consent form to indicate their commitment to the evaluation (Bélanger et al., 2016).

3.1.3 Data Collection Tools and Measurements

In order to track and evaluate the impact of the HS/DS intervention on improving healthy eating and physical activity opportunities, data collection took place over three years at two points: one pre-intervention (baseline) and one post-intervention (endpoint), for both the intervention and comparison centres. Trained research assistants were recruited for data collection on pre-determined days. Figure 3.2 summarizes the relevant variables of interest for the HS/DS assessment and the tools and measurements used for data collection.

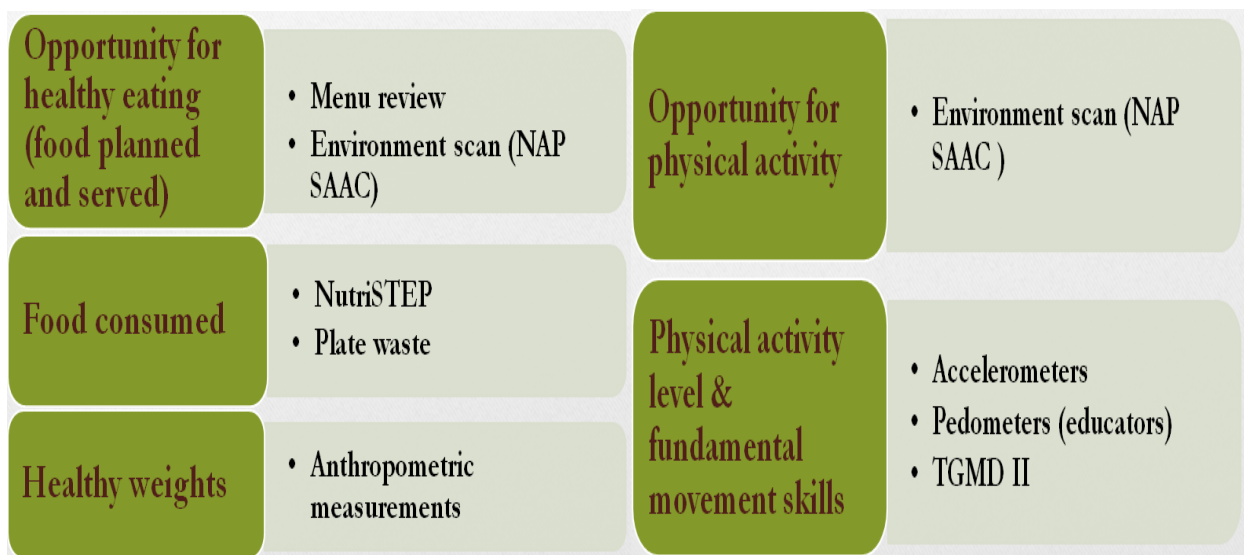


Figure 3.2: Healthy Start/Départ Santé intervention; the main tools, measurements and variables of interests

In order to assess the servings of required food groups based on the guidelines for each meal and snack, pre and post intervention menus of the participating centres were collected and reviewed.

This review gave an in-depth insight into the impact of the intervention on improving centres’

menu planning practices. Additional details about the menu evaluation are described in section 3.3.

The NutriSTEP questionnaire was used to assess the children's usual eating habits to evaluate their daily intake of the four main food groups in both the home and childcare environments (Sudbury & District Health Unit, 2015). NutriSTEP is an acronym that stands for The Nutrition Screening Tool for Every Preschooler. It has been developed and validated in both English and French and has been translated into six other languages (Sudbury & District Health Unit, 2015). This screen tool was previously tested- re-tested for reliability by using intraclass correlation and Kappa percent of agreement (Rysdale, 2005; Simpson, Keller, Rysdale, & Beyers, 2008). It is a simple and useful tool to assess the eating habits of children and to identify nutritional risks for 3-5 year olds by scoring child nutrition status into one of three levels: a child with a score of 20 or less has a low nutritional risk or few nutritional problems; a child with a score of 21 to 25 is exposed to some nutritional risks; and, a child with a score of 26 or higher is subject to high nutritional risks. This questionnaire screening tool consists of 17 questions. Five questions focus on the intake of the four main food groups according to CFG (fruits and vegetables, milk and alternatives, meat and alternatives, grain products), as well as the consumption of fast food. The remaining questions cover three other important areas: physical activity and sedentary behaviour, physical growth, and factors affecting eating behaviour (Rysdale, 2005; Simpson et al., 2008; Sudbury & District Health Unit, 2015). Through assessing these scores, the researchers will detect any nutritional problems in both groups (intervention and control) and compare the scores to determine if the intervention is effective in improving the children's overall scores.

Anthropometric measurements were used to assess the weight status of children. These measurements specify children's weight, height, waist circumference, and body mass index. The measurements were collected by a trained researcher at the established time points: baseline and endpoint. By calculating the children's BMI and by comparing the children's height, weight, age and gender-specific standard percentiles, researchers could assess the present levels and monitor any increase or decrease in the prevalence of overweight and obese children.

Furthermore, the physical activity level and physical literacy of each participating child was assessed using an Actical accelerometer and a Test of Gross Motor Development (TGMD-II). The Actical accelerometer is a small device worn by the participating children for five consecutive days in the childcare setting. This device was used to measure children's activity levels. The Actical accelerometer "correlates at $r = 0.89$ with directly measured oxygen consumption in preschoolers" (Ward et al., 2017). The pedometers were used to measure the educators' physical activity levels. This device records the number of steps taken by the educators during the same consecutive five day period (Bélanger et al., 2016). The Test of Gross Motor Development (TGMD-II) is a standard test that measures the development of children's gross motor skills. This test consists of two sub-tests to measure the fundamental movement skills for 3 to 10 year old children (Bastik, Kalkavan, Yamaner, Sahin, & Gullu, 2012).

The Nutrition and Physical Activity Self-Assessment for Child Care questionnaire (NAP SAAC). This questionnaire was a third party observational tool that was used to evaluate improvements in the healthy eating and physical activity opportunities in the childcare centres (Froehlich Chow, 2014). The reliability and validity of NAP SAAC has been tested in the child care environment and results showed it is accurate and stable observational measure (Benjamin et al., 2007). The directors' and educators' questionnaires were also conducted in each centre at

both baseline and endpoint of the study. These questionnaires helped evaluate improvements in the knowledge, attitudes, and self-efficacy of educators and directors (Bélanger et al., 2016).

In the HS/DS evaluation study, digital-photography enhanced weighted plate waste assessment tool was used to measure the type and amount of food and beverages that were served and consumed by children at the childcare centres. Each centre was visited by trained, tablet-equipped researchers for two consecutive days at the baseline and endpoint. During the visit days, foods and drinks (except water) that were served to each child at lunch and the leftovers were measured. The children's plates were coded and placed on food weigh scales. A digital photo of the food was taken using the plate wasting Android app installed on tablets "ASUS Memo Pad HD7," both before and after the children had consumed their desired food. (Bélanger et al., 2016). The plate wasting Android app was developed by a research team in collaboration with Professor Nathaniel Osgood from department of Computer Science at the University of Saskatchewan. By subtracting the amount of food discarded from the amount served, the amount of food consumed was obtained. This provided researchers with an accurate food weight in grams. Not only did the process provide a precise measure of food served and consumed, it also proved very useful in assessing the consistency of what was served and what was written on the menus. Further details about using the plate waste measure for assessing the consistency of planned menus with the actual food served can be found in section 3.3.5.

The menus of the participating centres were collected at two points in time: the baseline and endpoint of the study. One aspect of evaluating menus in childcare centres is ensuring that the meals and snacks given to children comply with provincial childcare nutrition guidelines. An analysis of these menus determined the consistency and quality of food served to children in early-learning settings. This was measured by analyzing the level of adherence to the SCNG.

As explained above, each part of the collected data in the HS/DS study was assigned specific objectives. This research focuses on only the nutritional aspects of assessment, specifically the menu analysis. Furthermore, this analysis represents a sub-set analysis of the main HS/DS study which includes menu data from New Brunswick and Saskatchewan. Our study only assessed the menus from the centres in Saskatchewan. More details about the menu evaluation and analysis are described in section 3.3.

3.2 My Journey as An International Graduate Student with Healthy Start Intervention Program

I am a nutritionist who graduated in 2008 with a Bachelor of Science in Public Health Nutrition from the University of Benghazi (U of B), Libya. After graduation, I worked as the head of the Department of Nutrition at the River Eye hospital in Benghazi and as a teaching assistant in the Community Health Education department at the U of B. In 2013, I was nominated by the Libyan Ministry of Higher Education and U of B for a three-year scholarship supporting a one-year academic English program and a two-year master's program. I arrived in Saskatoon in May of 2015, where I began my MSc in Nutrition at the College of Pharmacy and Nutrition at the University of Saskatchewan (U of S).

When I started my program, the HS/DS intervention was in its second year of evaluation. I attended a data collection training session on the day after my arrival and participated with the HS/DS team in the year-two endpoint data collection in Regina. I helped collect the following data: plate waste measurements, anthropometric measurements, educators' questionnaires, and environmental scan questionnaires. After the research trip, I worked with the HS/DS team on data entry and data cleaning (which ran from the end of May to the end of August 2015). Using the Food Processor software program data, I calculated the plate waste data (food served and

consumed) which included the serving numbers and size of food group. I also helped transfer the coded data to the master nutrient calculation sheet and attended regular meetings with the HS/DS teams (the Saskatchewan and New Brunswick teams) held at the U of S.

I participated in the data collection and entry process to familiarize myself with the data as it was to be a part of my master's thesis. In April 2016, the focus of my research proposal objectives shifted from the evaluation of the impact of HS/DS on children's eating patterns to the evaluation of the food menus planned at the participating centres. Soon after, I started directly collecting information related to the participating centres' menus. With the help of my supervisor and the HS/DS coordinator, and after a long search in HS/DS participating centres' folders (hard copies and digital copies), I found 38 of the 56 baseline and endpoint menus. These menus represent the baselines and endpoints for years one and two of the program. Our team anticipated having access to the complete collection of menus from each centre, so the omitted and incomplete menus posed an unexpected challenge. Shortly afterwards, we had a meeting with the HS/DS implementation team. During our meeting with Gabrielle Lepage-Lavoie, the HS/DS project manager, we discussed methods for filling the information gaps by designing a questionnaire to help us understand the status of the menus. I created a simple questionnaire which was discussed in-depth during the follow-up meetings. These meetings led to some modifications to the questionnaire (Appendix D). After receiving the final approval from the team, I prepared a list of all missing menu information for each centre. The list included the name of the centre, the date of data collection (the year, baseline or endpoint), the contact information for the centre, and the director's name. I submitted this information to the project manager. She assigned a research assistant, Melissa Leduc, to contact each centre and record and tabulate the responses to the questionnaire. Melissa also collected most of the missing menus,

which were delivered via email, fax, or post directly to the project manager's office. A few centres did not initially supply menus or complete the questionnaire. The team contacted these centres directly to collect the required information.

This section was written to provide a summary of my journey with the HS/DS intervention program. I wanted to clarify my reasons for participating in this project and also emphasize that I was invited to participate in this project by my supervisor. Finally, it should be noted that throughout my experience collecting data for the HS/DS evaluation, I was able to participate in plate-waste data collection of the Pulse Intervention Project in Saskatoon. My participation occurred from April to June 2016 and was a part of my research assistant work. My motivation for this work was to learn more about nutritional assessments in childcare centres. This project was organized by Dr. Henry. We used a plate-waste tool that originally was developed for and used in HS/DS program. By participating in that study, I gained more insight into the use of data collection tools in similar settings. I would like to thank the HS/DS team as well as my supervisor, Dr. Vatanparast, for giving me the opportunity to be a part of this project. I am grateful for the help received while pursuing this research.

I found my exposure to childcare centres profoundly interesting on both a personal and academic level. On a personal level, as a mother of two young children from a country that recently experienced a civil war and widespread childhood malnutrition, I was exposed to another side of childhood nutrition problems: prevention plans for overeating, unhealthy diets, and obesity. On an academic level, after moving from a clinical setting as a dietitian to a community setting as a researcher, I now appreciate the complexity of working with the general population for prevention of disease rather than working with the clinical population where specific protocols are used for treatment and control of diseases. During the course of this

research, I believe that I learned a great deal that will enhance my professional, academic and family life.

3.3 Evaluation of the Childcare Food Menus

3.3.1 Research Participants, Design and Data Collection Methods

This study evaluated the meals and snacks listed on the cycle menus of the 39 licensed childcare centres in Saskatchewan that participated in the HS/DS evaluation using a cluster randomized controlled trial. Since all relevant menus were not collected from all participating centres, follow-up questionnaires were developed and conducted via telephone by the HS/DS team. As a result, the necessary information was collected from the centres with missing menus. A second call was placed to centres that did not initially submit their menus and/or complete the questionnaire information.

This study received ethics approval from the Behavioral Research Ethics Board of the University of Saskatchewan (BEH#16-386) (Appendix E).

3.3.2 Telephone Interviews

A short telephone interview consisting of five questions was designed. Each call with a childcare centre director lasted about five minutes (Appendix D). The primary purpose of this questionnaire was to collect any missing or incomplete menu information from participating centres. It was developed to obtain more basic information relevant to the menus. The targeted basic information included areas such as keeping records of past menus, rotations of menus, changes in the menus between baseline and endpoint date, and the impact of the HS/DS intervention program on menu revisions. Twenty-nine centres were interviewed by the HS/DS

team (explained above in 3.2), including those with missing or incomplete menu cycles. One centre was contacted via e-mail.

3.3.3 Primary Outcomes and Main Indicators

The outcomes are based on the following factors: to what extent the menu adhered to SCNG, how consistently the menus accurately reflected the served food, and the impact of the intervention on the centre’s menu (Table 3.1).

Table 3.1: Variables of interest and the primary outcomes

Outcome	Main Indicators for each research question
The degree of adherence of menus in childcare centres at baseline to the SCNG.	The percentage of centres that met the provincial childcare nutrition guidelines was calculated through scoring the menus of each centre from 0 to 100% based on number of instances and days that the centres met the SCNG.
The degree of improvement in planned menus according to SCNG.	Improvement was determined by evaluating centres’ adherence to the guidelines score and examining the difference between/within the intervention and usual practice centres from the baseline to the endpoint of the intervention.
The degree of improvement in the congruence between planned menus and actual food served.	The frequency and percentage of the congruence between planned menus and actual food served were measured through assessing five variables: food and beverages item match, substitution, omission, addition, and total match items. In addition, the difference between/within the intervention and usual practice centres from the baseline to the endpoint of the intervention was determined.

3.3.4 Menu Analysis

Complete cycle menus for each centre were analyzed. Three research assistants, two of whom were registered dietitians, helped enter the menu data into an Excel spreadsheet. All listed foods and beverages for each occasion (meals and snacks) was coded according to the provincial food reference group categories: vegetables and fruit, grain products, milk and alternatives, meat and alternatives, foods to limit (e.g. cake, salted snacks, and cookies), fluid milk, and 100% fruit juice. Assumptions were made to categorize the mixed dishes or the food and beverages that contained multiple components (Appendix F). Frequencies and overall percentages of the above categories were calculated for the listed meals and snacks. These findings were compared with the required servings based on SCNG. This comparison was made in order to examine to what degree within a centre and the proportion of centres that adhere to the provincial recommendations based on the number of days/weeks of the cycle menus. In the study, centres received a 100% adherence score if they listed the recommended servings of food groups for each meal and snack. For example, in the case of a three-week cycle menu, if the centre's planned menus listed the four required food groups at lunch on 15 days/3 weeks; the centre received a score 100% for meeting the lunch guidelines.

A total of 39 centres' menus were analyzed at the baseline to assess the degree of the adherence to nutrition guidelines prior to the HS/DS intervention. At the endpoint, 34 centres provided complete menus, while two centres provided only lunch menus. In order to assess the impact of the HS/DS intervention on centres' menu planning practices, a comparison was made using the data from the 34 centres that provided complete menus twice. Since the lunch menus for 36 centres were available, these menus were matched with the plate waste data to assess the

congruence between the planned menus and the actual food served. The methods used to address each research questions are described below in detail

3.3.5 Methods Used to Address Research Questions

RQ 1. What were the characteristics of the menus of the licensed childcare centres selected for evaluation, before the HS/DS Program was implemented?

Menus from the participating centres were collected and evaluated. The characteristics of the menus were determined in terms of the clarity of the description of the meal and snacks. Relevant information included a number of meals and snacks, serving sizes, types of milk and beverages, frequency of serving processed food and availability of a variety of choices of fruits and vegetables. The average length of the cycle menus (one week, two weeks, one month, etc.) and changes or updates to the cycle menus (whether those changes are seasonal, yearly, or monthly) were also determined based on the information on menus and complementary information collected through the telephone interviews. A detailed description of the telephone interview can be found in section 3.3.2. Data at this stage was mainly descriptive and is presented as frequencies.

RQ 2. Do the menus of the centres follow the SCNG in relation to the serving numbers and diversity of food from the main food groups?

The baseline cycle menus of the participating centres were coded and entered into an excel spreadsheet. All foods and beverages listed on the menus of the centres (meals and snacks) were categorized on the basis of the food reference group as classified in the SCNG, as noted above. Each meal and snack on a menu was evaluated separately. Next, the food groups included in the menus were compared with the recommended guidelines. This comparison allowed us to

determine the extent to which the childcare centres in Saskatchewan adhere to the SCNG recommendations. This method is based on a previous study conducted in 2012 in Alberta by Nikolopoulos. Points were awarded to each centre based on the number of required food group servings listed for each meal and snack per day as well as the number of days that the centres met nutrition guidelines. For example, if a centre's menu listed the four required food groups at lunch (4/4 food groups), the centre received one point. If in a two-week cycle menu the centre's accumulative points for lunch meals were 10/10 days, the centre would be awarded a score of 100% for having met the provincial guidelines for lunch. If the centres' cumulative points were 5/10 days, the centre would be awarded a score of 50%. For the snacks, each centre was awarded two points per snack if the snack consisted of two food group including one serving of fruit or vegetables. In addition, each centre was awarded two points if the menu listed milk two times per day. Lastly, each center was awarded one point per week if the menu listed juice or processed food less than three times per week. For example, if in a four-week cycle menu the centre's cumulative points for processed food were 3/4 per week, the centre would be awarded a score of 75% for meeting the processed food. Overall, the distribution and proportions of the above categories were calculated. Comparisons were made between the groups and within each group to assess the impact of the intervention.

RQ 3. What impact did HS/DS have on the menu planning and food groups serving practices? This information will be determined through a comparison of the intervention versus usual practice centres from the following perspective.

RQ 3.1. Adherence of the planned menus to the guidelines

RQ 3.2. Congruence between planned menus and actual food served on specific days as measured in the plate-waste study

Our menu analysis plan was not limited to comparisons between food listed in the centres menus and the guidelines. The study also monitored any changes in menus over the course of the intervention and assessed any improvement in supported childcare centres' menus. In this stage, we assessed the improvements in terms of adherence to guidelines by creating guidelines' adherence scores. In addition, the impact of the HS/DS intervention on improving the centres' menus was subjectively assessed via a short questionnaire conducted with a sub-sample of 29 centres through telephone interviews. The details about the questionnaire are described in section 3.3.2.

During the HS/DS evaluation data collection, the lunch served to 3-5 years old children was observed in each centre for two consecutive days at the baseline and endpoint of the intervention. During these two days, trained and tablet-equipped researchers measured and digitally recorded the food and beverages served and consumed (through digital plate-waste measures) at each centre. Furthermore, the researchers documented all specific information during the data collection process, including the method of preparation and a log of recipes. This recorded and documented information was used to assess and ensure the accuracy of the food served in comparison with the planned menus on the two specific days at the baseline and endpoint of the intervention. Although the centres' educators and directors were aware that the data collectors would observe and record all of the food and beverages they served to children at lunch, they were not aware that this recorded information would be compared with the food listed on the planned menus.

During plate-waste data collection in HS/DS study, 148 lunches were observed and digitally recorded in 39 centres at the baseline and 37 centres at the endpoint. A total of 36 centres that had a completed or partially completed menu data were included in this phase of the

study. Three centres with missing menu data were excluded. In this step, the food and beverages listed on the planned menus and the food that was actually served were categorized based on SCNG food reference group including vegetables and fruit, grain products, milk and alternatives, meat and alternatives, fluid milk, and juice. The processed food, condiments and side dishes were categorized as other food. The food and beverages that contained multiple components were categorized as mixed dishes. The items that were brought from home or served on a special occasion, such as a child's birthday, or served for a single child who had a dietary restriction, and water were excluded. Comparisons were made between the planned menus and food/beverages actually served at both intervention and control centres. The frequencies and percentages of the five indicators were determined for all participating centres based on the most recent literature, which was published in October 2016 (Breck et al., 2016):

1. Number of the items that are listed on the planned menus and served to the children/number of times those items were served $\times 100$ (percent of match);
2. Number of food items that are listed but not served / number of times those foods and beverages were listed on the menus $\times 100$ (percent of omissions);
3. Number of different food items given but not listed on the planned menus/number of times those items were served $\times 100$ (percent of additions);
4. Number of different food items given as replacements for listed food that belong to the same food group category on the planned menus/number of times those items were served $\times 100$ (percent of substitutions); and
5. Number of served items that match the menu + number of "acceptable substitutions" / total number of all items served $\times 100$ (percent of total match).

The following diagram provides an example of the comparisons between the planned menus and actual food served.

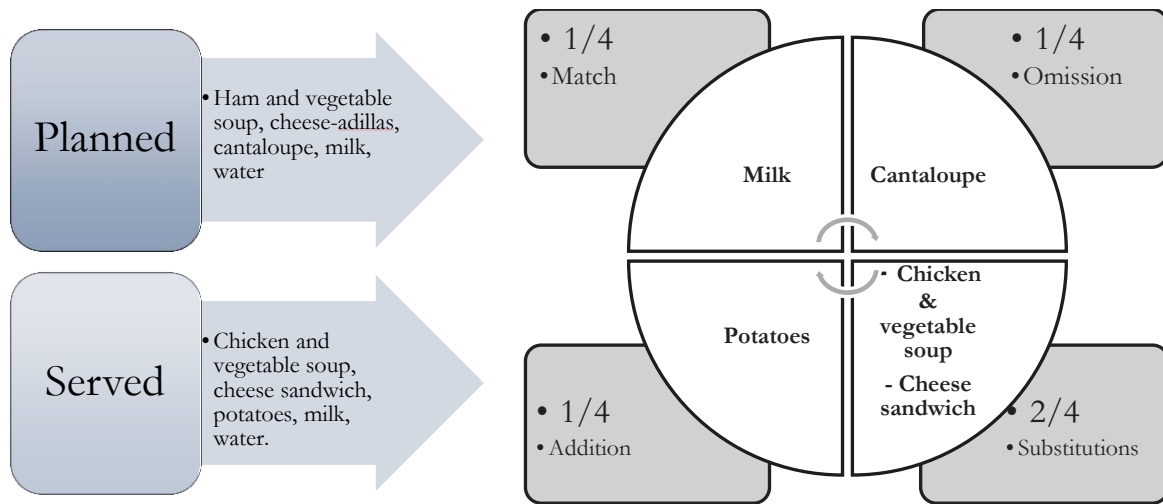


Figure 3.3: An example of the comparison of the planned lunch versus the served one

The overall percentages of these indicators were calculated for all the participating centres. Next, a comparison was made between the above indicators at the baseline and endpoint of the intervention in order to assess any differences between and within the intervention and usual practice centres. From these comparisons, we assessed whether the intervention had an impact on improving the consistency between the planned menus and the actual food served. This is further described in Figure 3.4.

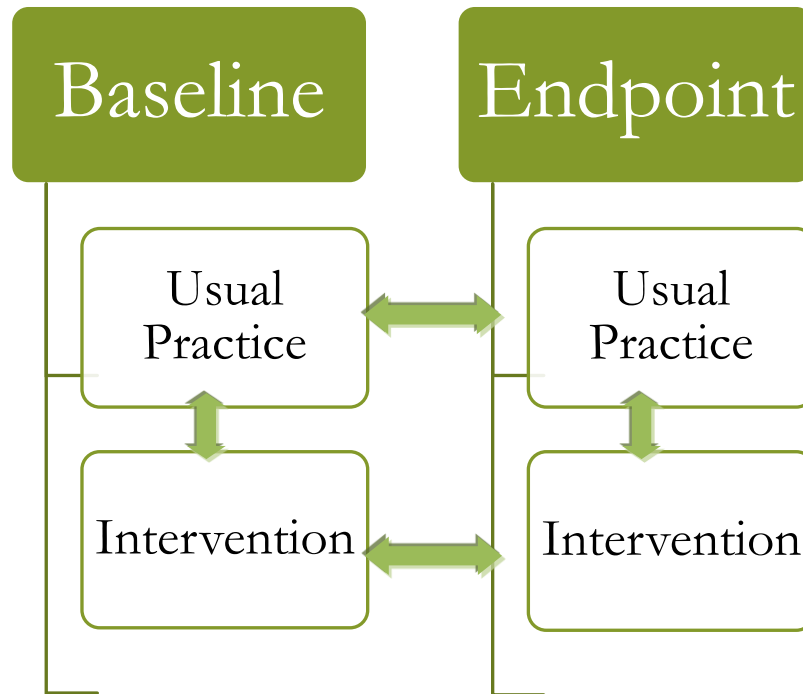


Figure 3.4: The comparisons that were completed to assess the impact of the intervention on the participating centres' menu-planning and food serving practices

3.4 Statistical Analysis

All data collected from the menus were entered into Microsoft Excel for Windows version 2010. For further analysis, the data was transferred to Stata ES (14.2). Descriptive analyses were performed to determine the characteristics of the menus, percentage of adherence to the guidelines, and frequency of adherence to the written menus. The data were assessed using the Tukey ladder of transformations to assess the possibility of achieving normal or approximately normal distributions. Since none of the transformation results indicated normal distributions, non-parametric tests were used.

The Wilcoxon rank-sum test (also called the Wilcoxon–Mann–Whitney test) was applied to assess any significant difference between the groups (intervention centres and usual practice centres). The Wilcoxon rank-sum test is a nonparametric test of the null hypothesis that a

randomly selected observation from one independent sample will be lower than or higher than a randomly selected observation from a second sample (LaMorte, 2017a). The test detects not only the difference in location but also a difference in dispersion or shape (Mohais, Mendes, Ward, & Posthoff, 2005). The Wilcoxon rank-sum test is valid for data from any distribution, whether it's normal or not. Furthermore, we used the Fisher exact test to compare the proportions of intervention and usual practice centres at the baseline of the study that achieved at least 75% of the food guidelines. Since only two centres met 100% of the provincial guidelines at both the baseline and endpoint of the intervention, we used a 75% benchmark as an indicator to assess any improvement in adherence to the guidelines. The same approaches were also used to compare the centres at the endpoint of the study.

The Wilcoxon-sign rank test was applied to assess the difference within groups. This test is a nonparametric test of the null hypothesis that a randomly selected observation from one sample will be lower than or higher than a randomly selected observation from the same sample at different time points (LaMorte, 2017b). Also, the McNemar test was used to compare the proportions of centres that adhere 75% or more to the guidelines at baseline to the proportion of centres that achieved 75% or more adherence to the guidelines at the endpoint. The McNemar test is the equivalent of the Chi-Squared test for paired or dependent proportions.

CHAPTER 4

RESULTS

This section includes the study's findings organized by research questions.

RQ 1. What were the characteristics of the menus of the licensed childcare centres selected for evaluation before the HS/DS Program was implemented?

A total of 39 centres' menus were reviewed at the baseline of the study in order to evaluate the characteristics of the menus before the HS/DS Program was implemented. Among these centres, only five centres had listed two meals (breakfast and lunch) and two snacks. Eight centres listed two meals and only one snack (afternoon snack), while the rest of the participating centres listed one meal (lunch) and two snacks. One centre offered afternoon and evening snacks instead of morning and afternoon snacks (Table 4.1). Only one centre posted the serving sizes of the food and beverages on its menu.

Table 4.1: Distribution of meal and snack types listed on the participating centres' menus

Meal and snack type	Number of centres <i>n</i> =39	%
Two meals (breakfast and lunch) and two snacks (morning and afternoon)	5	12.8%
Two meals (breakfast and lunch) and one snack (afternoon)	8	20.5%
One meal (lunch) and two snacks (morning and afternoon)	25	64.1%
Two meals (breakfast and lunch) and two snacks (afternoon and evening)	1	2.6%

None of the centres consistently listed the names of the fruits and vegetables offered on their menus. This inconsistency restricts this study's ability to measure the diversity within each food group. Furthermore, none of the centres listed the fat content of their milk and milk

products on their menus. Vegetables were mainly listed for lunch, while fruits were more frequently listed for breakfast and snacks. At the baseline, seven centres listed juice 41 times, mainly for breakfast (17 times) and morning snacks (17 times), but neglected to mention the type of juice. Only two of these centres mentioned the juice type (apple and orange juice). Four centres listed juice as an alternative to the fruit serving (22 times). Foods to include in limited quantities (processed food), such as cookies, nachos, granola bars, and cinnamon buns, were most commonly listed as an afternoon snack (275 times), whereas on the morning snack and lunch menus, processed food was listed 69 times and 66 times respectively. Figure 4.1 shows the distribution of processed food per meal and snacks. Only nine centres had used the menu planning template provided by the Saskatchewan Ministry of Education, Early Learning & Childcare. This template lists the required servings of food groups for each meal and snack that menus should follow to meet the SCNG (Appendix C). None of these centres, however, met 100% of the guidelines.

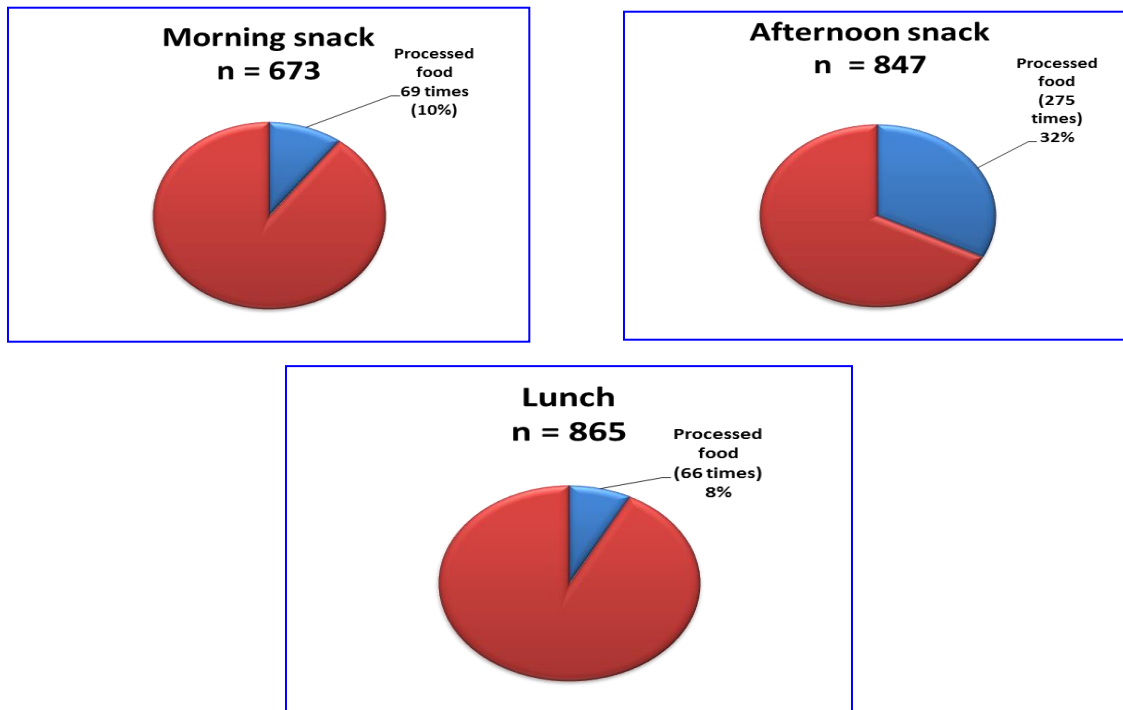


Figure 4.1: Distribution of processed food per meals and snacks for the participating centres

The length of the cycle menus varied from one week to twelve weeks, with a median length of four weeks per cycle. Of the centres that participated in the telephone interview questionnaire, 31% reported that they were revising their menus on an annual basis. Of the total respondents, 13.8% reported that they had changed their menus one time during the last two to three years. Two centres reported that the menu had not been changed since the directors started working in these centres within the last two to three years. Table 4.2 summarizes the frequency of menu revisions for the 29 centres that responded to the questionnaires.

Table 4.2: Distribution of menu revisions

Time Period	Number of Centres	%
	<i>n=29</i>	
Weekly	3	10.3
Monthly	3	10.3
Seasonal (Two to Four times/year)	5	17.2
Annually	9	31.0
One time during the last two to three years	4	13.9
Minor Changes	3	10.3
No Changes	2	7.0

RQ 2. Do the menus of the centres follow the SCNG in relation to the serving numbers and diversity of foods from the main food groups?

The baseline menus of the 39 centres were compared with the SCNG. Only 15% of the centres met the lunch and snacks guidelines. Overall, 61.5% of the centres met the milk guideline and 36% met the processed food limitation recommendations. Furthermore, among the centres that listed breakfast meals on their menus, 69% met the breakfast guideline recommendation. All

the participating centres met 100% of the juice guidelines. However, none of the centres disclosed whether their juice had added sweetener. These results were based on the percentage of centres that met each guideline separately. Only two centres met all of the SCNG recommendations throughout their cycle menus, including the guidelines for breakfast, lunch, snacks, milk, juice, and processed food. Table 4.3 presents the percentages of centres that completely met each guideline. None of the centres listed the names of the fruits or vegetables offered on their menus in a consistent manner. This omission restricts the ability of this study to measure the diversity within each food group.

Table 4.3: Percentage of centres that completely met each guideline for each meal and snack occasion

Guidelines	Number of centres <i>n</i>=39	Percentages
Breakfast	9*	69.0%
Lunch	6	15.3%
Snacks	6	15.3%
Milk	24	61.5%
Juice	39	100%
Foods to limit (Processed food)	14	35.9%

*Nine out of 13 centres that listed breakfast on their menus met the breakfast guideline at the baseline of the study.

RQ 3. What impact did HS/DS have on menu planning and food groups serving practices? This information will be determined through a comparison of the intervention versus usual practice centres from the following perspective:

RQ 3.1. Adherence of the planned menus to the guidelines

Hypothesis: The percentage of adherence to the provincial SCNG in the intervention centres is higher compared to the control group.

Among the 39 participating centres, the menus of 34 centres were analyzed at two points of time. Sixteen of these centres belong to the intervention group and 18 belong to the control or the usual practice group. Five centres with missing or incomplete information were excluded from this analysis. The results of the descriptive analysis showed improvements in the adherence to the breakfast (from 80% to 100%), lunch (from 12.5% to 18.8%), and processed food limitation guidelines (from 37.5% to 43.8%) among the intervention centres. Conversely, there were no improvements in the adherence to guidelines for control centres, with the exception of the limiting processed foods guideline (from 22.8% to 44.4%) (Table 4.4 and Figure 4.2, 4.3).

Table 4.4: Percentage of centres that met the guidelines at the baseline and endpoint of the study

Intervention Centres (n=16)						
	Breakfast G.	Lunch G.	Snack G.	Milk and Alt. G.	Juice G.	Processed Food G.
Baseline	80.0%	12.5%	6.3%	56.3%	100%	37.5%
Endpoint	100%	18.8%	6.3%	56.3%	100%	43.8%
Usual Practice Centres (n=18)						
	Breakfast G.	Lunch G.	Snack G.	Milk and Alt. G.	Juice G.	Processed Food G.
Baseline	66.7%	22.2%	27.8%	66.7%	100%	27.8%
Endpoint	60.0%	22.2%	16.7%	61.1%	100%	44.4%

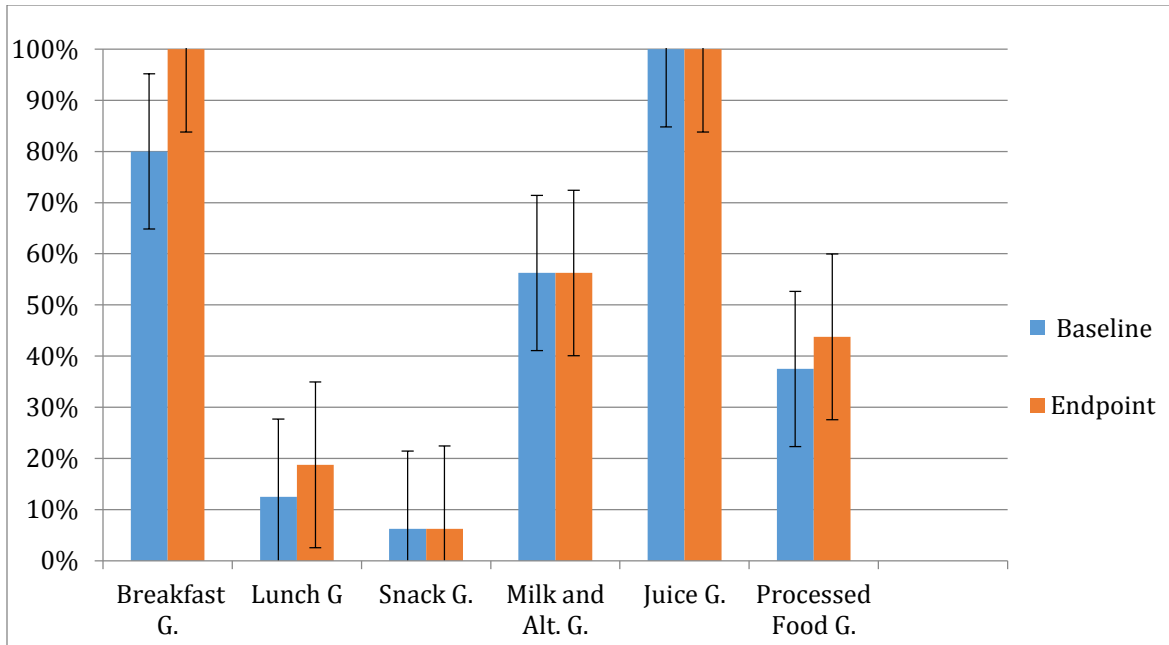


Figure 4.2: Percentage of intervention centres that met the guidelines at the baseline and endpoint of the study

* \bar{x} = Standard Error, $n = 16$

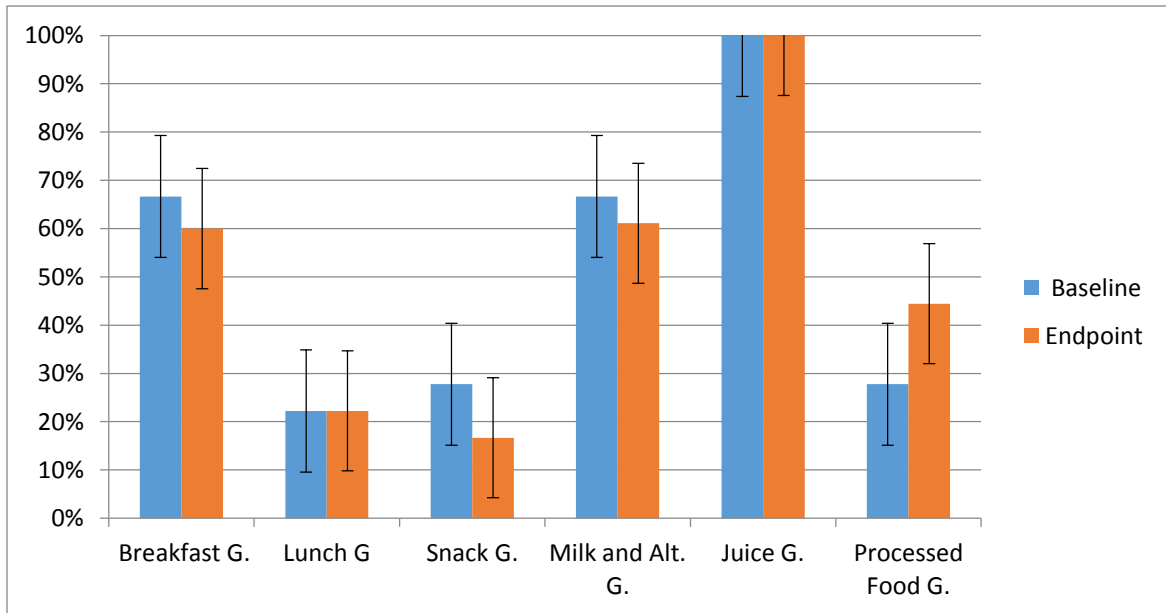


Figure 4.3: Percentage of usual practice centres that met the guidelines at the baseline and endpoint of the study

* \bar{x} = Standard Error, $n = 18$

As explained above (section 3.4), the differences in the distribution and the proportion of centres that adhere to 75% or more of the guidelines were assessed between the groups using the Wilcoxon rank-sum test and the Fisher exact test. Within each group, the Wilcoxon-sign rank test and the McNemar test were used to report any significant differences. No significant differences were observed between the two groups (the intervention and usual practice centres) in the distribution and the proportion of centres that adhere to 75% or more of the guidelines. Within each group, however, there were significant differences in centres that met the processed food guideline among the usual practice centres (P -value = 0.035). Generally, the percentage of adherence to the lunch, snack, and milk guidelines was higher among the usual practice centres than the intervention centres, shown in Table 4.4. Therefore, these findings provide clear evidence to reject our hypothesis that “the percentage of adherence to the provincial childcare nutritional guidelines in the intervention centres is higher compared to the control group.”

Directors’ interviews: One of the questions that the researchers asked the centres’ directors was “Has HS/DS had an impact on the revisions of your menus? If yes, what changed?” Of the 29 directors who answered this question, 59% stated that the HS/DS had an impact on decisions made while revising and updating their menus. Thirty-four percent stated that the intervention had no impact on their menu planning practices. Two directors preferred not to answer the question because they were new to their role and could not speak to the effect of the intervention on their centres’ menus. Table 4.5 and Figure 4.4 summarize the directors’ responses to the above-noted question.

Table 4.5: The directors’ responses to the question “Has HS/DS intervention had an impact on the revisions of menus in your centre?”

Responses	Intervention Centres	Usual practice centres	Total
Yes	11	6	17
No	3	7	10
No answer	1	1	2
Total	15	14	29

* $n=29$

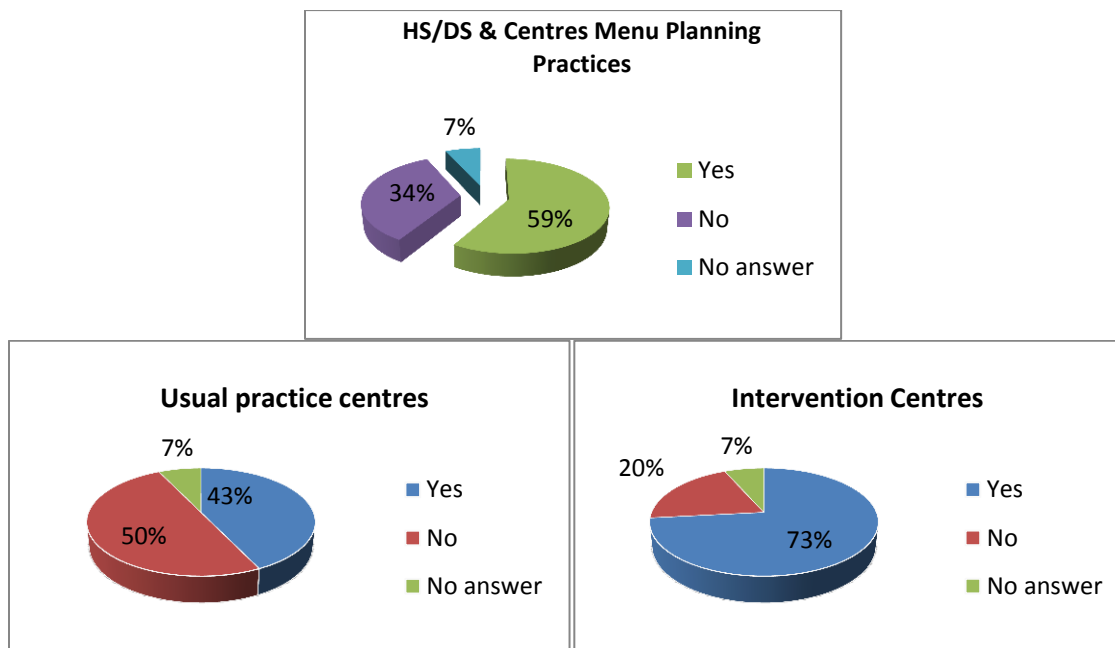


Figure 4.4: The directors’ responses to the question “Has the HS/DS intervention had an impact on the revisions of menus in your centre?”.

* $n=29$

During the interview, not all the centres’ directors commented on the impact of the intervention, but those who did stated that the impact of the intervention was mainly through the recipe books, guidelines, and resources that HS/DS provided. One director commented that “Yes, we use the resources, guidelines, and pulse book with many lentils and quinoa recipes that HS/DS provided.” Another director stated that “Yes, HS/DS had an impact on revising the menus. We have changed the menu and added a full portion of veggies at lunch, less of baked

goods, less of treats, and more fruits and veggies as a snack.” One of the directors mentioned that “HS had an impact on the changes in the menu. We made tremendous changes in the past years, and the whole menu was changed.” Another director commented that the “HS/DS had an impact. We have a cook who follows the HS/DS guideline closely.” For the centres that stated that the intervention had no impact, the top five responses were: “HS/DS had an impact on the children but not on the menu revision.” Another director stated that “HS/DS had no impact on the menu, we did not change the menu at all.” One director said “HS/DS had no impact on revising the menus; we did not change it significantly; we only did minor changes.” Another director stated “HS/DS did not have an impact on the changes in the menu as the kids were used to certain foods and they prefer finger foods.” One director said “we make changes for the summer and have an alternative 5-weeks menu for this season. We did try the proposed changes from healthy start and it did not work out.”

RQ 3.2. Congruence between planned menus and actual food served as measured in the plate-waste study

Hypothesis: Compared with usual practice centres, the actual food served at HS/DS intervention centres more closely reflects what is listed on centres’ menus.

A total of 142 lunch meals were observed at 36 centres during the observations. Eighteen of these centres belong to the intervention group and 18 belong to the usual practice group. Observations took place over the course of two days at 35 centres and one day at one centre at both the baseline and endpoint of the study. Of the meals observed on those days, only 32 meals (22.5%, including different food items) entirely matched the meals that were listed on the menus. A total of 617 food and beverage items were served at lunch to children (308 items at the baseline and 309 items at the endpoint) while only 511 items were listed on the prescribed menus

(258 items at the baseline and 253 items at the endpoint). Overall, 467 (76%) of items matched or were deemed to be acceptable substitutions. Forty-eight items (9.3%) that were listed on menus were omitted from the served meal while 150 additional items (24.3%) were served but not listed on the prescribed menus. Table 4.6 presents the general distribution of these variables for both groups at the baseline and endpoint.

Table 4.6: Frequency of food and beverage items listed on menus vs. the frequency of items served in participating centres.

Food Items	Match		Substitutions		Omission		Addition		Total match with 617 items served	
	n	%	n	%	n	%	n	%	n	%
Total	413	66.9	54	8.8	48	9.3	150	24.3	467	75.7
Vegetables	78	59.5	19	14.5	12	11.0	34	26.0	97	15.7
Fruit	28	73.7	3	7.9	3	8.8	7	18.4	31	5.0
Grain Products	49.5	60.0	9	10.9	9	13.3	24	39	58.5	9.5
Milk & Alt.	111	79.3	1	0.7	4	3.4	28	20.0	112	18.2
Meat & Alt.	41.5	72.2	4	7.0	7	11.7	12	20.9	45.5	7.4
Juice drink	0	0.00	0	0.00	1	100	0	0.00	0	0.00
Mixed dishes	96	77.4	17	13.7	7	5.8	11	8.9	113	18.3
Others	9	20.5	1	20.5	5	33.3	34	77.2	10	1.6

* $n=36$

Vegetables, milk, grains, and “others” were the most frequent items that served as an addition. "Others " were often processed food and side dish items, such as tortilla chips and tater tots, condiments including ketchup, soy sauce, mayonnaise, ranch dressing, salad dressing, miracle whip, sour cream, gravy, and mustard. Milk was omitted four times and served as an additional item 28 times. Frequencies and percentages of the items that matched the menu or were substituted, omitted, and added were statistically analyzed to assess significant differences between and within each group. Table 4.7 and 4.8 shows the distribution of these items at the baseline and endpoint for the intervention and usual practice centres.

Table 4.7: Frequencies of food and beverage items served vs. listed on the menus at the baseline of the study

Food Items	Intervention Centres									
	Match		Substitutions		Omission		Addition		Total match with 153 items served	
	n	%	n	%	n	%	n	%	n	%
Total	96	62.7	24	15.7	12	9.1	33	21.6	120	78.4
Vegetables	16	51.6	8	25.8	2	7.7	7	22.6	24	15.7
Fruit	7	70.0	1	10.0	2	20.0	2	20.0	8	5.2
Grains	10	47.6	5	23.8	3	16.7	6	28.6	15	9.8
Milk & Alt.	30	85.7	0	0.00	0	0.00	5	14.3	30	19.6
Meat & Alt.	10	66.7	3	20.0	2	13.3	2	13.3	13	8.5
Juice drink	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Mixed dishes	23	71.9	6	18.8	1	3.3	3	9.4	29	19.0
Others	0	0.00	1	11.1	2	66.7	8	88.9	1	0.7

* n=18

Usual Practice Centres

Food Items	Match		Substitutions		Omission		Addition		Total match with 155 items served	
	n	%	n	%	n	%	n	%	n	%
Total	96	61.9	12	7.7	16	12.9	47	30.3	108	69.7
Vegetables	22	61.1	4	11.1	5	16.1	10	27.8	26	16.8
Fruit	6	7.5	0	0.00	0	0.00	2	25	6	3.9
Grains	14	58.3	2	8.3	2	11.1	8	33.3	16	10.3
Milk & Alt.	26	72.2	1	2.8	2	6.9	9	25	27	17.4
Meat & Alt.	10	52.6	0	0.00	3	23.0	9	47.4	10	6.5
Juice drink	0	0.00	0	0.00	0	0.0	0	0.00	0	0.00
Mixed dishes	17	70.8	5	20.8	4	15.4	2	8.3	22	14.2
Others	1	12.5	0	0	0	0	7	87.5	1	0.6

* $n=18$

Table 4.8: Frequencies of food and beverage items served vs. listed on the menus at the endpoint of the study

Food items	Intervention Centres									
	Match		Substitutions		Omission		Addition		Total match with 161 items served	
	n	%	n	%	n	%	n	%	n	%
Total	123	76.4	6	3.7	8	5.8	32	19.9	129	80.1
Vegetables	19	67.9	3	10.7	2	8.3	6	21.4	22	13.7
Fruit	9	69.2	2	15.4	0	0.00	2	15.4	11	6.8
Grains	18	75.0	0	0.00	2	10.0	6	25.0	18	11.1
Milk & Alt.	30	90.9	0	0.00	1	3.2	3	9.1	30	18.6
Meat & Alt	12	92.3	1	7.7	0	0.00	0	0.00	13	8.1
Juice drink	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Mixed dishes	31	93.9	0	0.00	1	3.1	2	6.1	31	19.3
Others	4	23.5	0	0.00	2	33.3	13	76.5	4	2.5

* $n=18$

Usual Practice Centres

Food items	Match		Substitutions		Omission		Addition		Total match with 148 items served	
	n	%	n	%	n	%	n	%	n	%
Total	98	66.2	12	8.1	12	9.8	38	25.7	110	74.3
Vegetables	21	58.3	4	11.1	3	10.7	11	30.6	25	16.9
Fruit	6	85.7	0	0.00	1	14.3	1	14.3	6	4.1
Grains	7.5	55.6	2	14.8	2	17.4	4	29.6	9.5	6.4
Milk & Alt.	25	69.4	0	0.00	1	3.8	11	30.6	25	16.9
Meat & Alt.	9.5	90.4	0	0.00	2	17.4	1	9.5	9.5	6.4
Juice drink	0	0.00	0	0.00	1	100	0	0.00	0	0.00
Mixed dishes	25	71.4	6	17.1	1	3.1	4	11.4	31	20.9
Others	4	40%	0	0	1	20.0	6	60.0	4	2.7

* *n=18*

There were no significant differences between the intervention and usual practice centres at the baseline in the accuracy of the planned menus with actual food served. The only variable that was significantly different at the endpoint was the proportion of omission (P -value = 0.039). Figure 4.5 shows the difference in the distribution of the omitted items and indicates that the percentage of omission among the intervention group was lower than the percentage of omission in usual practice group at the endpoint of the study.

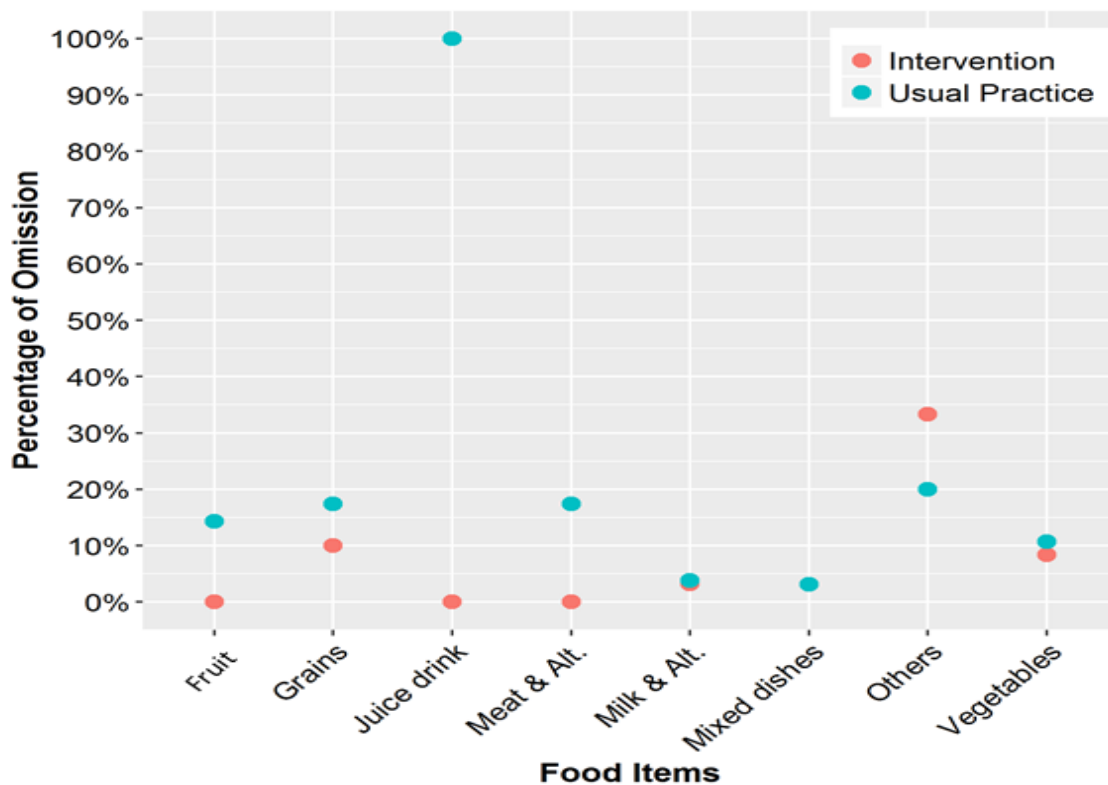


Figure 4.5: Comparison of the percent of omission between intervention and usual practice groups at the endpoint of the intervention

* The percent of omission of fruits, grains, juice, meat and alternatives, and vegetables were higher among the usual practice centres at the endpoint.

Comparisons showed significant differences in the proportions of match and addition within the group that had received the intervention: P -value = 0.029 and 0.014 respectively. The

P-value for the proportion of substitutions (0.056) bordered on significant. The scatter plot in Figure 4.6 shows the difference in the distribution of the matched items' proportions among the intervention group. Figure 4.7 illustrates the difference in the distribution of the additional items' proportions among the intervention group. No significant difference was observed within the usual practice centres from baseline to the endpoint.

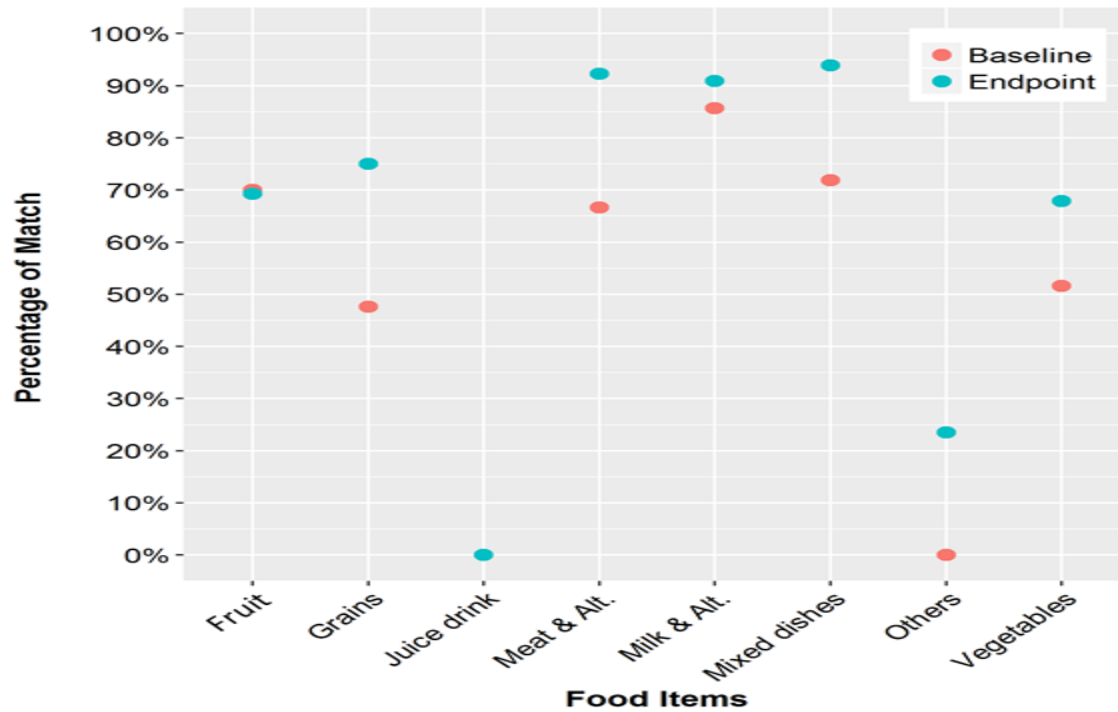


Figure 4.6: Comparison of the percent of items that matched the menu within the intervention group

*The percent of match of the grains, meat and alternatives, milk and alternatives, mixed dishes, others and vegetables was greater at the endpoint.

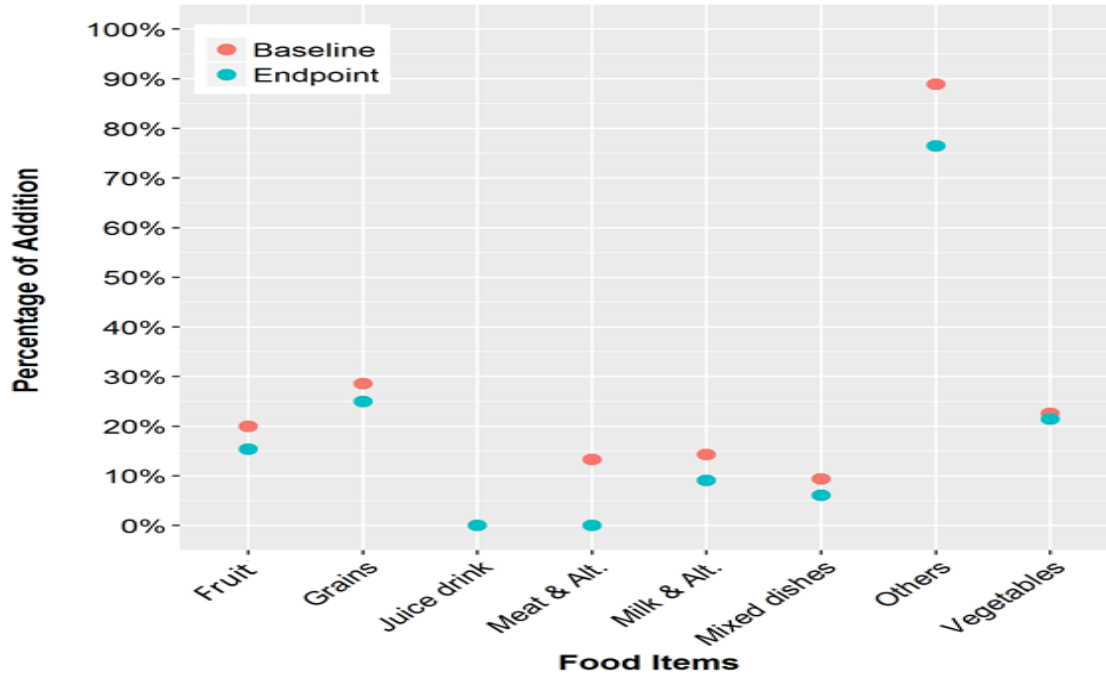


Figure 4.7: Comparison of the percent of addition within the intervention group

*The percent of addition among all food items, except juice, was lower at the endpoint of the intervention.

The proportion of served items that matched the menu among the intervention centres at the endpoint of the study, including items such as grains, meat and alternatives, milk and alternatives, mixed dishes, others and vegetables, was greater than at the baseline. The proportion of additional items among the intervention centres at the endpoint was lower than at the baseline of the study. These results indicate that there was an increase in the percentage of adherence to the written menus among the centres that received the intervention. Thus, we can consider these findings as evidence and accept the hypothesis that “Compared with usual practice centres, the actual food served at HS/DS intervention centres more closely reflect what what is listed on centres’ menus.”

CHAPTER 5

DISCUSSION

This study assessed the compliance of the planned menus in licensed childcare centres in Saskatchewan with the SCNG. In addition to evaluating the impact the HS/DS program on improving menu planning practices, this study was the first to use advanced technology to evaluate the congruence between the planned menus and the actual food served in Canadian childcare centres. Results showed that most of the menus in participating centers are not meeting the SCNG. Out of 124 lunch meals observed, only 32 meals perfectly matched the meals listed on centres' menus. Furthermore, our results illustrate that the intervention had a positive impact on improving the adherence of the HS/DS participating centres to their planned menus. These outcomes, in addition to the characteristics of menus, are discussed in detail below.

5.1 The Characteristics of the Menus

Since a growing proportion of young children spend a considerable amount of time in childcare facilities, the quality of menus and nutritional services in these settings has become of great concern. Previous studies suggest that childcare centres' menus should provide children with a minimum of one-half of their daily servings of each food group (Gerritsen, Dean, Morton, & Wall, 2017; Padget & Briley, 2005). Serving children the recommended servings of food groups will not only ensure that children are offered at least one-half to two-thirds of their daily nutritional requirements, but may also reduce the risk of obesity and promote children's optimal growth (Erinosho et al., 2013). On average, serving two meals and two snacks, or one meal and three snacks, is recommended for children who attend childcare facilities on a full-time basis (American Academy of Pediatrics & American Public Health Association, 2011). However,

there is no supervising organization for childcare centres in Saskatchewan; each centre is responsible for their own meals and snacks (Government of Saskatchewan, 2008b).

In this study, the distribution of the meals and snacks varied from centre to centre. The majority of participating centres (64.1%) served only one meal (lunch) and a morning and afternoon snack. A previous study conducted in the USA found that, when compared to children's food group consumption from centres serving one meal, children in centres that served two meals (breakfast and lunch) fared better in terms of food group and energy intake (Padget & Briley, 2005). Out of 39 centres that participated in our study, only one centre served two meals and two snacks; one snack was served at 2:30 p.m. and the second in the evening at 5:30. This centre provides twelve service hours per day, from 6:00 a.m. to 6:00 p.m., and offers meals and snacks every three hours based on the provincial regulations, starting with breakfast at 8:30 a.m. The centres that provide one meal and two snacks a day may have different service hours. Furthermore, these childcare centres might still abide by the provincial regulation that states that "A meal or snack shall be served within three hours of the facility opening each day and not more than three hours shall elapse between the provision of another meal or snack" (Government of Saskatchewan, 2016).

Compared to American regulations, Saskatchewan's regulations are similar in some instances but diverge in their specificity. For instance, American regulations state that children who stay at centres for eight hours or less should be served at least two meals and one snack or one meal and two snacks daily (American Academy of Pediatrics & American Public Health Association, 2011). Children attending more than eight hours a day "should be offered at least two meals and two snacks or three snacks and one meal" (American Academy of Pediatrics & American Public Health Association, 2011, p. 156). The regulations in Saskatchewan seem to

assume that childcare centres generally operate for eight hours a day. These regulations do not specify which meals and snacks should be provided to children who stay at centres longer than eight hours. As is true in Saskatchewan, American standards recommend that children below the age of six need to be served food every two to three hours. American and Saskatchewan regulations state that juice should be unsweetened, and a variety of meals and snacks should be offered to children.

In Canada, there is no national regulation specifying the required number of meals and snacks that childcare centres should offer; each province is responsible for developing its own regulations. For instance, in provinces such as Newfoundland and Labrador, Saskatchewan, and Alberta, the regulations emphasize that the care provider should serve regular meals and snacks at least every three hours (Government of Alberta, 2012; Government of Newfoundland and Labrador, 2017; Government of Saskatchewan, 2016). Some provinces, such as Ontario, New Brunswick, and Prince Edward Island regulate the number of meals and snacks based on children's hours of attendance. For example, Ontario's regulation section 42 states "Where a child receives child care for six hours or more, the licensee or provider shall ensure that the total food offered to the child includes, in addition to any meals provided, two snacks" (Government of Ontario, 2014). In the Northwest Territories and Nunavut, the regulations base the spacing of meals and snacks on the child's age. Section 35 of their regulation states "There must be no more than (a) three hours between meals or snacks, for children over 10 years of age; and, (b) 2½ hours between meals or snacks for children 10 years of age and under." (Government of Northwest Territories and Nunavut, 2013). Overall, regulations could be more useful if in all provinces and territories the number of meals and snacks that centres served were adjusted based

on a child's attendance hours. A lack of uniform regulation in the childcare industry at the federal level is problematic and needs to be addressed in future research.

Several studies have also examined the distribution of specific food items across snacks and meals served at childcare centres. In our study, foods to limit (processed food), such as cookies, granola bars, and chips were most commonly served as afternoon snacks. Overall, 275 (32%) of the items that were served during the 847 afternoon snacks were processed food. Similar results were found in two previous studies conducted in the USA. The first study, conducted in 2010 in North Carolina, compared the menus of 48 centres with the actual food served. The authors reported that processed food and juice were the most common items offered as afternoon snacks (Neelon et al., 2010). The second study was conducted in Ohio in 2013, and analysed 170 menus. This study found that 87% of the afternoon snacks consisted of processed food. In the same study, over 30% of the participating centres listed unsweetened juice as a snack which was offered at least three times a week. Vegetables and fruits were rarely listed as snacks but were part of lunch (Copeland, Neelon, Howald, & Wosje, 2013). On one hand, there are similarities in the distribution of processed food, juice and vegetables between the Ohio study and our study, with the caveat that the fruit in our study was most often listed as being part of a snack rather than lunch. Generally, the distribution of fruit and vegetables (fruit at snack time and vegetables at lunch) was balanced in our study as compared to the American studies. More attention should be given to snacks since the largest proportion of processed food seems to be served during these times of the day.

Although there is no standard recommendation for the length of cycle menus at either the provincial or federal level, many menu planning resources suggest planning at least three to four-week long cycle menus (Leeds Grenville & Lanark District Health Unit, 2016; Haliburton,

Kawartha, Pine Ridge District Health Unit, 2012). In order to ensure that menus offer a variety of choices throughout their cycle, a number of sources recommend adopting seasonal cycle menus (Government of Saskatchewan, 2012; Romaine et al., 2007) as this will allow the children to experience a variety of foods based on their seasonal availability. In this study, there was a large variation in the length of cycle menus ranging from weekly to twelve weeks, with a median cycle length of four weeks. Over half (n=21; 53.8%) of the participating centres had four week cycle menus. There was also a distinct variation in the way the menus were written, including handwritten menus (on paper or whiteboard) and computer printed copies. The majority of the centres that participated in the telephone interview reported that they were revising their menus on an annual basis. Similar results were reported in a Nova Scotia study in which 71% of participating centres (n=34) reported that they were revising their menus annually (Romaine, 2003). A lack of revision limits children's opportunities to experience new items and different textures and flavours throughout the year. As a consequence, limited menu revisions will impact children's food preferences and limit their acceptance of new foods and recipes.

5.2 Meeting the Provincial Guidelines

Nutrition guidelines for childcare centres are of crucial importance in ensuring that young children have access to healthy food choices (Olstad, Raine, & McCargar, 2012). These guidelines aim to provide menu planners support for choosing healthy meals and snacks. Thus, it is recommended that all childcare centres in each province follow their provincial nutrition regulations and guidelines. Generally, nutrition guidelines can be used to emphasize the quality and quantity of foods served in the childcare setting. The Saskatchewan childcare nutrition guidelines are very basic guidelines that focus only on the serving numbers from each food group, limiting the processed food, and restricting sugar containing beverages (Government of

Saskatchewan, 2008b, 2012, 2016). These guidelines have the potential to improve the quality of children's dietary intake by increasing healthy food and reducing unhealthy food and beverages in their diets. Nevertheless, other important nutritional aspects, such as serving size, nutrient requirements, the variety of food options on the menus, the optimal number of meals and snacks to serve at centres, menu planning resources and frequency of menu updates, are missing.

Of the 39 centres that participated in the present study, only two met all the listed guidelines for meals and snacks, milk, processed food, and juice. Furthermore, the analysis of the rate of adherence to each guideline showed that both the lunch and snacks guidelines are the benchmark that centres most frequently failed to meet. Similar results were found in a case study conducted in two Alberta childcare centres that adopted the Alberta Nutrition Guidelines for Children and Youth (Nikolopoulos, 2012). Also, an American study conducted in 50 home childcare settings found that no home childcare settings met the standard recommendations (Igoe, 2012). These findings are also consistent with studies conducted in Australia and New Zealand. One such study assessed the menus of 46 childcare centre settings and found that none of the participating centres' menus adhered 100% to the Australian Dietary Guidelines (Yoong, Skelton, Jones, & Wolfenden, 2014). In a New Zealand study, 57 childcare centers' menus were analyzed and compared with the New Zealand Food and Nutrition Guidelines. The results indicated that only three centres met the national guidelines (Gerritsen et al, 2017). This may be because of a lack of resources and proper training to support menu planners and improve their nutritional knowledge.

Although nine of the participating centres had used the Saskatchewan government's menu planning template, none of these centres met all the listed guidelines. It is noteworthy that more than half of the centres were providing processed foods at levels above the

recommendations of both the Saskatchewan government and *CFG*. Given that this study was investigating centres' adherence to the SCNG by assessing the centres' food menus, the reasons behind these disparities in adherence to the guidelines are still unclear. Future studies are needed to investigate the barrier that prevents the adoption of the SCNG.

It is important to note the difference between nutritional guidelines and regulations. Following the guidelines is voluntary, not compulsory, but necessary to improve centres' nutritional practices. Conversely, nutritional regulations or policies are mandatory and enforced in centres under the regulation's mandate (Nikolopoulos, 2012). If nutritional guidelines were deemed mandatory, each centre would be forced to apply them to their menus (Erinosho et al., 2011). More specific nutrition guidelines and regulations that emphasize the importance of consuming a variety and diversity of nutrients from different food groups, as well as describing serving/portion sizes, need to be established at the provincial level. Furthermore, the provincial government needs to legislate the adoption of these guidelines and regulations for all licensed childcare providers in the province.

Also, it is imperative to emphasize that the provincial menu planning regulations should also provide some structure for menu planning practices, menu revisions and the number of meals and snacks that centres offer. Additionally, having the centres' menus reviewed by community nutritionists or dietitians may have an impact on improving the quality of the menus and ensuring that centres' menus meet the SCNG and applicable regulations. These changes could be implemented by creating a network of the centres' menu planners and nutrition professionals under the supervision of the Saskatchewan Ministry of Education, Early Learning and Childcare. This network could facilitate menu reviews and provide proper guidance and advice to menu planners. The nutritional professionals could also organize and deliver specific

training for childcare providers and cooks to create greater awareness of the nutritional needs of preschool age children and promote the adherence to the SCNG.

5.3 The Impact of the Intervention in Improving the Adherence to the SCNG

Analysis of pre and post intervention menus for both groups (intervention and usual practice centres) showed no significant difference between the groups with respect to meeting the SCNG. However, findings from this study indicate that the usual practice centres met the SCNG more often than the intervention centres. Although there was an improvement in the percentage of intervention centres that met most of the guidelines, these improvements were not statistically significant. Similar results were noted in the pilot study conducted earlier in Saskatchewan childcare centres (Froehlich-Chow et al., 2016). These findings are also consistent with studies conducted in the USA. One study assessed the menus of 53 childcare centres and 49 home childcare settings that received the Child and Adult Care Food Intervention Program (CACFP). This study found that none of the participating centres' menus adhered 100% to the CACFP (Kuratko, Martin, Lan, Chappell, & Ahmad, 2000). Another study looked at the menus of 40 New York City childcare centres that had received the CACFP and reported some disparities between the food groups listed in the CACFP guidelines and the food and beverages listed on the centres' menus (Erinosho et al., 2011; Korenman et al., 2013). Future research should address the barriers that prevent childcare providers from following these guidelines.

In 2012, a longitudinal study conducted in the USA compared nutrition related information for children enrolled in licensed childcare centres participating in the CACFP intervention and children enrolled in non-participating childcare centres. Although the results showed an improvement in the serving numbers and consumption of milk and vegetables among the CACFP participants, non-participants in CACFP were more likely to meet the recommended

servings of fruit and vegetables, milk, juice and were also more likely to limit the processed food and sweetened drinks on their menus. The authors attributed these findings to the fact that the majority of the CACFP participating centres were in low income neighbourhoods and had a large number of low-income, food insecure children (Korenman et al., 2013). Other factors such as children's food preferences and educators' nutritional knowledge may also play role in these findings.

In effect, the HS/DS intervention is a multicomponent intervention focused on improving different aspects of children's health, including improving children's fundamental movement skills and increasing physical activity, introducing and encouraging childcare centre cooks to use healthy food recipes, engaging educators in creating healthy eating environments, and involving children in gardening and food preparation activities. One of the nutrition resources that HS/DS offers to participating centres is a menu planning template that lists all of the SCNG. However, the results from this study show that using this template was not sufficient to encourage centres to meet the proposed guidelines.

The exact explanation for why the majority of these centres did not comply with the SCNG is difficult to precisely identify. Lack of menu planning training and resources, menu planner education levels, children's food preferences and acceptance, centres' locations and healthy food accessibility, and food budgets are all factors that may have had an impact on guideline adherence. More investigation regarding the barriers that lead to the failure of these centres to adopt the SCNG, as well as how and why only two centres were able to meet the required guidelines needs to be conducted.

5.4 Congruence between the Planned Menus and Actual Food Served

The childcare centres' menus were used in several studies to evaluate children's dietary intake, nevertheless, some studies reported that the menus might not accurately reflect what the children were served (Fleischhacker et al., 2006; Neelon et al., 2010). Lack of consistency between the planned menu and actual food served may lead to the centres serving children either inadequate or excessive energy and nutrients (Alves & Morais, 2015). There is a gap in the literature regarding the accuracy of the food served compared to planned menus in Canadian childcare centres. In order to address this gap and to evaluate the menus' compliance to the recommended guidelines, this study was designed to assess the variation between the planned menus and actual food served to the children.

In the present study, out of 124 lunch meals observed in 36 centres, only 32 meals perfectly matched the meals listed on centres' menus. This means only 32 meals were served exactly as they were listed on the menus without any omissions, additions or substitutions. Similar results were reported in a study conducted in Brazil where 60 lunch meals were observed, but only 20% of the served meals entirely matched the written menus (Alves & Morais, 2015). The discrepancy between the planned menus and the actual food served may have serious implications not only for researchers in that they cannot rely on menus alone to provide meaningful and valid data, but also for parents who believe that their children are served what is written on the menus.

Our results illustrate that the menus of participating centres were reasonably accurate in terms of individual food and beverage items served to the children. Overall, 76% of the served items matched the menu or were deemed acceptable substitutions. However, 9.3% of listed items were omitted and 24.3% of additional items were served but not listed. Our findings showed that the percent of total match among the individual food and beverage items was slightly lower

compared with two previous studies conducted in USA by Breck and colleagues (2016), and Neelon and colleagues (2010). In both studies, 87% of individual items completely matched the menu (Breck et al., 2016; Neelon et al., 2010). The percentage of total matched items for most of the food groups in both studies was also higher when compared with our study. For example, in both studies the percentage of total match for grain was 20% and for milk it was 19%; our findings showed 9.5% and 18.2% respectively. The percentage of total match for fruit in our study was 5.0%, compared to Breck et al.'s results of 15.6% and Neelon et al.'s results of 11.6%. However, the percentage of total match for vegetables in our study was higher 15.7% compared with 14.5% and 9.6% in the Breck et al. and Neelon et al. studies. In our study, 150 additional items were served but not listed on the menus compared to 110 in Neelon et al.'s study. In our study, other food items, such as condiments and side dishes, were more frequently served as additions than foods from the major food groups, which is consistent with Neelon's findings. It is imperative to note that Neelon's and Breck's results are based on comparisons of the planned menus with all meals and snacks served during the days of observation, while our results are only based on lunch.

5.5 The Impact of the HS/DS Intervention on Improving the Congruence between the Planned Menus and Actual Food Served

The present study assessed the impact of the HS/DS intervention on improving the consistency of the planned menus with the actual food served. Overall, a comparison between the groups was made at two points of time. The results demonstrated that the percentage of match and total match were slightly higher, while the percent of addition and omission were lower among the intervention centres at both the baseline and endpoint of the study compared to the usual practice centres. However, the only significant difference observed was in the proportion

of omission at the endpoint of the study. In the comparisons within each group (intervention and usual practice centres), the improvements were obvious among the intervention centres in the percentage of match (62.7% at baseline v. 76.4% at the endpoint). Also, there was an improvement in the percentage of substitutional items (15.7% v. 3.7), omissions (9.1% v. 5.8%) and additions (21.6% v.19.9). The improvements in the proportions of match and addition were statistically significant among the intervention centres. No significant improvement was observed within the usual practice centres from baseline to the endpoint of the study. Our results illustrate that the intervention had a positive impact in improving the adherence of the HS/DS participating centres to their planned menus. However, more effort is needed in stage three of the intervention in order to ensure that all the participating centres more closely adhere to the SCNG guidelines and their planned menus.

5.6 Study Strengths and Limitations

This study benefits from the delayed cluster randomized controlled trial that was used to evaluate the HS/DS intervention. This design allowed us to track the impact of the HS/DS on the menus of the centres that received the intervention compared to the centres on usual practice. This study also benefits from the wide variety of participating centres' locations across Saskatchewan. To our knowledge, this is the first study that has examined the menus of a random sample of childcare settings from throughout the province of Saskatchewan. The second strength of this study is that the data collection in the HS/DS evaluation study was based on an advanced observation system and actual measurement of food provided and consumed. This collection method gives us the opportunity to compare what was listed on the menus with what the children were actually served. Furthermore, this study is considered the first study in Canada to assess the

consistency of the planned menus and actual food served to children in Canadian childcare centres.

The limitation of this study was its small sample size. Thirty-nine centres participated at the baseline of the study and 37 centres remained at the endpoint. With the exclusion of the centres with missing menus, only 34 centres' menus had complete cycle information at the endpoint of the intervention. Although the centres were enrolled in the study at random, in several instances the usual practice centres met the SCNG more often than the intervention centres at the baseline. A second limitation was the omission of important information from the menus, such as the names of the fruits, vegetables and juice types. It is unknown whether the vegetables and fruit that the centres served were fresh or canned, and whether the juice was unsweetened. This omission restricts the study's ability to measure the diversity within each food group. Additionally, during the data collection, not all the participating centres shared their menus. To address this limitation, a follow-up telephone interview was conducted with 29 centres, including those with missing or incomplete menu cycles. As a result, sixteen missed menus were received. Most of these menus were dated with a month and a year in which the HS/DS intervention data was collected. These menus were matched further with plate waste photos to confirm that the correct menus were supplied. Lastly, the questionnaire that was designed to collect missing menus and basic information, such as the impact of the intervention on the centres' menus and frequency of menu revision, was not validated. Moreover, answers on to the questionnaire depended on the directors' memory and may subject to self-report bias.

5.7 Implications of the Study for Future Research, Policy and Practice

The present study has expanded our knowledge about food menu and nutrition practice in licensed childcare in Saskatchewan specifically, and in Canada generally. The present study has

found that the majority of childcare centres serve only one meal and a morning and afternoon snack. With a lack of supplied data detailing the serving sizes of the listed food and beverages, we do not know if the meals provide children enough calories to meet the two-thirds of DRI recommended by numerous agencies and researchers. In addition, it was found that processed foods are often provided to children as snacks, perhaps because menu planners misunderstand what constitutes the foods to limit. The implication of this is that further studies should be conducted to assess if these results reflect common practice and, consequently, may lead to the excessive consumption of processed food by children attending childcare centres. More research is needed to determine what impact these practices have on children's food preferences.

This study also found that about one-third of the centres that participated in the interview revise their menus annually. This may be unacceptable as using the same menu for a long time may limit food variety and discourage children from trying new foods. Additionally, it was found that only two of the 39 centres that participated in the present study met all of the SCNG guidelines for meals and snacks, milk, processed food, and juice guideline. This may also mean that children are not reaching their DRIs of macro and micronutrients. In fact, given the high percentage of children who are overweight and obese, it is important to determine if by not meeting food guidelines childcare centres are adding to the epidemic of obesity. This study also found that the usual practice centres met the SCNG more often than the intervention centres, although there was an improvement at the intervention centres, likely due to the intervention itself. This implies that interventions may be effective in improving practices at childcare centres. This study did not assess the children's food consumption, but future research may explore children's food intake, specifically what the children are consuming and if they are meeting or exceeding their age-appropriate DRI. Overall, these findings reveal an urgent need

for further research addressing the barriers that prevent centres from adopting the national guidelines.

The policies and regulations that guide menu planning could have a great impact on improving menu planning practices. Findings from this study suggest that the SCNG should be improved to provide more specific guidelines and should be enforced as a part of mandatory regulations. Policy makers should also consider adopting comprehensive menu planning training tools and resources that emphasize quality, quantity, and variety of foods on menus and provide examples of nutritious recipes. Regular training sessions and workshops that focus on promoting the provincial regulations and improving menu planners' nutritional knowledge are crucial to increase awareness and encourage the adoption of the guidelines. Collaboration between policy makers, researchers, and childcare menu planners needs to be established to facilitate these workshops and monitor the improvement of menu planning practices. The government should continue to support health promotion organizations and initiatives that aim to improve the nutritional practices in early learning settings.

5.7.1 Next Steps (HS/DS Intervention Phase III)

Given that the present study was conducted between the second and third stage of the intervention, the findings may have implications for developing more effective strategies to improve menu planning practices during the next stage of the intervention. Thus, under the supervision and guidance of Dr. Vatanparast, our team has developed several resources and tools to improve childcare centres' menu planning practices at the provincial level. The team developed the *Menu Planning Resource Toolkit* which focuses on guiding caregivers in providing healthy and nutritious food to children based on *Canada's Food Guide* and provincial childcare

nutrition guidelines. This toolkit covers important aspects of planning healthy menus, such as planning meals on a budget and buying healthy food in remote areas. The toolkit also includes recipes from different cultures and information about dietary restrictions and food safety.

The team also designed the *Smart Menu App Tool*, which is a menu planning toolkit and training module that features an annual menu calendar template and offers advice to menu planners in case of they have missed any part of provincial nutrition guidelines. Furthermore, the team created the *Healthy Menu Certificate* which will be offered to centres that meet the provincial childcare nutrition guidelines' recommendations for three consecutive months.

These tools and resources will be employed in Phase III of the intervention. Following the implementation of these resources, an evaluation should be conducted to assess centres' progress in meeting nutrition guidelines and to determine the effectiveness of the newly implemented tools.

5.7.2 Some Suggestions to Improve Menu Planning Practices in Phase III of the Intervention

Based on our study results, below are some suggestions that could be discussed with centres' menus planners during the training sessions:

- Emphasize the importance of meeting the current provincial regulations especially:
 - Serving number and variety of food groups.
 - The timing of meals and snacks.
 - E.g., the regulation states that “A meal or snack shall be served within three hours of the facility opening each day and not more than three hours shall elapse between the provision of another meal or snack”. Therefore, the centres should

determine the number of meals and snacks that they offer based on their operation hours.

- Post written menus in an area where they are highly visible to parents.
- Re-introduce the menu planning template that lists the SCNG and emphasize the importance of meeting these guidelines, since none of the centres that used the template in phase II met the guidelines entirely.
- Discuss any possible barriers that may prevent the adoption of the SCNG and possible solutions. (E.g., lack of knowledge and experience, lack of menu planning resources, availability and accessibility of the required food group, centre budget, children's preference etc. These barriers could be discussed in the directors and educators questionnaire).
- Introduce some recommendations for menu planning practices:
 - Recommend that planners create cycle menus that are at least three to four weeks long. This cycle length will allow children to experience a variety of foods on a daily basis.
 - Suggest that planners revise and plan menus on a seasonal basis. Adopting several seasonal cycle menus is commonly recommended for two main reasons:
 - Lower food costs are associated with taking advantage of seasonal foods.
 - A lack of revision limits children's opportunities to experience new items and different textures and flavours throughout the year. As a consequence, limited menus revisions will impact children's food preferences and limit their acceptance of new foods and recipes.
 - Introduce planners to the category of processed food "foods to limit". These foods should be served no more than three times a week. Foods to limit should be categorized

as an additional item on menus and should not be served as an alternative to a required food group. Also, juice should be offered no more than three times per week and should be unsweetened. Menus should state whether the juice is 100% unsweetened or not (this could be listed in a footnote behind the menu).

- Menus should list:
 - The names of the fruits and vegetables indicating whether they are fresh or canned.
 - Milk and juice types (the percent of fat on the milk could be listed in a footnote behind the menu).
- Recommend that menu planners adhere to the written menus and report any substitutions, omissions or additional items.
- Emphasize the importance of food diversity within each food group, and highlight the importance of not repeating the same foods throughout the cycle.

5.8 Conclusion

Children's preschool years are a critical age for shaping their life-long food and beverages preferences. These preferences will very likely impact children's eating habits throughout their childhood and into their adult years (De Cosmi, Scaglioni, & Agostoni, 2017). Knowing that a significant portion of preschoolers attend childcare centres, the quality of food served at these centres is of crucial importance (Crenshaw, 2004; Briley & McAllaster, 2011). Furthermore, a lack of nutritional balance in childcare centres' menus that fail to provide children the required nutrients will have negative impacts on children's health and nutrition status (Alves & Morais, 2015). In this study, the menus of childcare centres were compared with the SCNG. The findings from this study have shown that the menus planned in childcare centres

across the province fall short of meeting the SCNG. As shown in this study, the percentage of adherence to the lunch, snack, and milk guidelines was higher among the usual practice centres than the intervention centres. Overall, there were improvements in the percent of intervention centres that met the guidelines from the baseline to the endpoint of the intervention for breakfast, lunch, and processed food guidelines. However, these improvements were not statistically significant. Among the usual practice centres, there was significant improvement in the percent centres that met the processed food guideline from the baseline to the endpoint of the study. Regarding the consistency of the planned menus and actual food offered, there was a significant increase in the percentage of adherence to the written menus among intervention centres. Nevertheless, more attention should be given to menu planning in Phase III. Findings from this study will contribute to the overall evaluation of the nutrition practices at childcare centres and to ongoing studies aimed at improving the menu planning and the food served throughout Phase III of the HS/DS intervention.

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APPENDIX A

Saskatchewan Childcare Nutrition Regulations and Guidelines

The Child Care Regulations, 2015

PART III - Standards for Facilities	SUBJECT - Nutrition	PAGE	5-14
DIVISION 3 - Health and Safety		DATE	February 12, 2016

SECTION 24

- (1) Subject to subsection (3), a licensee must provide meals and snacks for children attending the facility who are six months of age or older.*
- (2) A licensee must ensure that:*
- (a) subject to subsection (3), the meals and snacks provided meet the nutritional needs of the children attending the facility; and*
 - (b) the manner in which children are fed is appropriate to their ages and levels of development.*
- (3) Subject to subsection (4), a licensee is not required to provide:*
- (a) infant formula or baby food; or*
 - (b) meals and snacks for a child who requires a special diet or whose parent requests a special diet.*
- (4) A licensee of a teen student support centre or a teen student support family child care home must provide any foods, other than infant formula, required by an infant under the age of six months.*

22 May 2015 cC-7.31 Reg 1 s24.

INTENT

The intent of this section is to ensure:

- Meals and snacks provided meet the overall daily nutritional needs of children for the time they are in the licensed facility; and
- Children receive sufficient quality and quantity of foods at appropriate time intervals.

POLICY

Menus shall be prepared in advance and posted in a conspicuous location for the information of parents. A “conspicuous location” is an area accessible, highly visible, and frequented by parents.

A meal or snack shall be served within three hours of the facility opening each day and not more than three hours shall elapse between the provision of another meal or snack except during hours of care provided at night.

Approved by Executive Director

CDC Licensee’s Manual

The Child Care Regulations, 2015

PART III - Standards for Facilities	SUBJECT - Nutrition	PAGE	5-14
DIVISION 3 - Health and Safety		DATE	February 12, 2016

Where a facility provides child care services for a 24 hour period, the licensee shall ensure that where a child attends during the night, a meal is served to the child within one hour of waking in the morning.

Where a facility provides child care services to school-age children on school days, the licensee shall ensure:

- Where the child attends during the noon period, a meal is served to the child; and
- Where the child attends after school hours, a snack is served to the child within half an hour of return from school.

GUIDELINES

The current Canada's Food Guide (*refer to the Appendices*) is used as a guideline to determine adequate variety and amounts of foods from the four food groups for children over age two.

- Snacks consist of two or more food groups including a serving of vegetables or fruit plus at least one other food group in designated amounts.
- Breakfast consists of three or more food groups in designated amounts.
- All other meals consist of four food groups in designated amounts.
- Offer **milk** at least twice a day.
- If **juice** is offered:
 - It is 100% unsweetened juice
 - It is offered no more than 3 times per week
- Offer **water** for thirst.
- **Foods to limit**, if offered:
 - Appear on the menu no more than a total of 3 times per week.
 - Are in addition to the recommended food groups.

Refer to the Appendices for a sample "Menu Planning Form" and "Menu Criteria Backgrounder".

Names of children who have food allergies and the requirements due to the allergies are posted in cooking and food serving areas.

Children are encouraged, but not forced, to eat. Children can decide how much of the foods offered they want to eat.

No type of food is offered as a reward nor withheld as a punishment.

Dietary restrictions of families are followed although parents may be required to provide some of the special foods as outlined in 3(b) above.

Menus are planned and posted at least a week in advance.

The Child Care Regulations, 2015

PART III - Standards for Facilities	SUBJECT - Nutrition	PAGE 5-14
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Foods that are round, hard, small, thick and sticky, smooth, or slippery are not offered to children under 4 years of age unless modified to prevent choking. For example:

- Whole grapes are sliced lengthwise
- Wieners, if offered, are sliced lengthwise
- Pits are removed from fruit before serving
- Peanut butter is spread thinly

Feeding is handled to avoid waiting (e.g. children are seated at tables only once food preparation is complete; in homes, feeding of widely different ages can be staggered, such as feeding infants first while older children are engaged in other activities).

Infants & Toddlers

- Infants under six months are held by an adult during bottle feeding.
- Infants six months and over who are not capable of feeding themselves are held by an adult or seated in an infant seat or highchair during feeding, including bottle feeding.
- Where an infant is less than one year of age, the infant is fed by the same adult for more than half of the infant's feedings.
- Food for infants has the consistency and texture appropriate for developmental stage. Infants learning to eat solids will advance from puree to mashed foods. For older infants the maximum sizes of pieces is ¼ inch cubes.
- Food for toddlers is cut in pieces no larger than ½ inch cubes.
- Infants and toddlers are not put to bed with bottles. This reduces risk of choking, tooth decay and ear infection.

BEST PRACTICE

Eating is an enjoyable experience. Adults sit with children and encourage interaction and conversation about the concepts of colour, quantity and temperature of the food; eating behaviours; and events of the day.

Children are allowed to practice feeding themselves and are actively involved in serving food and other mealtime activities, such as setting and cleaning the table as their ages and abilities allow.

Child-sized utensils and serving dishes are used by children to make self-feeding easier.

Children are offered choices between nutritious alternatives, where feasible.

Menus include a variety of colours, flavours, textures, sizes, shapes and temperatures.

Parents of infants are encouraged to come to the facility to breastfeed or to bring expressed breast milk.

APPENDIX B

Saskatchewan Ministry of Education, Nutrition Guidelines and Menus Checklist for Early Learning and Childcare Facility

Child Care Facilities Menu Planning Form and Menu Checklist *Background Information*



1. Food groups

Canada's Food Guide defines the amount and type of food needed per day for people over the age of 2 years. The recommendations made in this document for meals and snacks in child care settings are based on Canada's Food Guide. They are meant to help ensure children in child care settings have adequate opportunity to meet their daily nutrient requirements. Serve foods from:

- at least 3 food groups at breakfast;
- 4 food groups at lunch;
- 4 food groups at supper; and,
- at least 2 food groups (1 being from Vegetables and Fruit) at each snack.

The amount of food a child eats at meals and snacks will vary each day depending on the child's activity level, appetite, food preferences, body size, and growth rate. For example, a 2 year old might eat half a banana while a 4 year old might eat a whole banana. The child care provider is responsible for offering regular nutritious meals and snacks; however, children are the best judges of how much food, if any, they need to eat.

Nutritious foods such as milk, peanut butter, and cheese should not be restricted because of their fat content. These foods are a nutritious source of dietary fat which children need for their development.

To provide children with the opportunity to meet their daily recommended number of food guide servings:

- offer the recommended number of food groups at each meal and snack;
- offer an adequate amount of food from each food group to provide each child with the opportunity to eat at least $\frac{1}{2}$ - 1 full size Food Guide serving; and,
- offer a variety of nutritious foods at meals and snacks.

2. Milk

Canada's Food Guide recommends all people 2 years and older, drink 2 cups of fluid milk daily for adequate vitamin D intake. To help meet this requirement, offer milk to children at least twice a day. Because chocolate milk is sweetened, white milk is preferred. Offer water to satisfy children's thirst.

3. Juice

Canada's Food Guide recommends eating vegetables and fruit more often than drinking juice. Too much juice can replace other nutritious foods and increase the risk of tooth decay and other dental problems. However, it is recognized that 100% unsweetened juice provides some nutrients and can be a convenient choice from the vegetable and fruit food group. If juice is offered, serve 100% juice with no added sugar (i.e., unsweetened), offer it no more than 3 times a week, and only with meals or snacks. Offer water to satisfy children's thirst.



4. Foods to Limit

By the time most children eat all the food they need as recommended in Canada's Food Guide, there is not much room to eat less nutritious foods. Canada's Food Guide recommends limiting foods and beverages that are high in calories, fat, sugar or salt. These foods include, for example, cakes and pastries, chocolate and candies, cookies and granola bars, doughnuts ice cream and frozen desserts, French fries, potato chips, nachos and other salty snacks, fruit flavoured drinks, soft drinks, sport and sweetened hot or cold drinks.

For most children, small amounts of these types of foods may be part of a healthy eating pattern if they do not displace foods from the four food groups. If these less nutritious foods are offered, they should appear on the menu no more than a total of 3 times a week. The following two examples show how a total of 3 servings a week may occur:

- a) doughnuts are offered on Monday, ice cream on Tuesday, and French fries on Thursday; or,
- b) cookies are offered on Tuesday and Wednesday, and cake on Thursday.

Foods to limit, if offered, should be in addition to the recommended food groups. This will help to ensure foods from the food groups are not displaced and that children have adequate opportunity to meet their recommended number of food guide servings per day.

Note:

- Canada's Food Guide also recommends limiting energy drinks. Energy drinks are not appropriate for children and should be avoided.
- Muffins and loaves are classified as a grain product instead of a food to limit. This will increase the portability, and variety of grain products available for children.

Checklist for Child Care Facility Menus



Provider/Centre: _____

Date: _____


Menu Criteria	YES	NO	Comments
<p><u>Breakfast</u> <i>Servings from 3 food groups are offered.</i> <input type="checkbox"/> Vegetables and fruit <input type="checkbox"/> Grain products <input type="checkbox"/> Milk and alternatives <input type="checkbox"/> Meat and alternatives</p>			
<p><u>Morning Snack</u> <i>Serving of vegetables or fruit plus 1 other food group is offered.</i> <input checked="" type="checkbox"/> Vegetables and fruit <input type="checkbox"/> Grain products <input type="checkbox"/> Milk and alternatives <input type="checkbox"/> Meat and alternatives</p>			
<p><u>Lunch</u> <i>Servings from all 4 food groups are offered.</i> <input checked="" type="checkbox"/> Vegetables and fruit <input checked="" type="checkbox"/> Grain products <input checked="" type="checkbox"/> Milk and alternatives <input checked="" type="checkbox"/> Meat and alternatives</p>			
<p><u>Afternoon Snack</u> <i>Serving of vegetables or fruit plus 1 other food group is offered.</i> <input checked="" type="checkbox"/> Vegetables and fruit <input type="checkbox"/> Grain products <input type="checkbox"/> Milk and alternatives <input type="checkbox"/> Meat and alternatives</p>			
<p><u>Supper</u> <i>Servings from all 4 food groups are offered.</i> <input checked="" type="checkbox"/> Vegetables and fruit <input checked="" type="checkbox"/> Grain products <input checked="" type="checkbox"/> Milk and alternatives <input checked="" type="checkbox"/> Meat and alternatives</p>			
<p><u>Milk</u> is offered at least twice a day.</p>			
<p>If <u>juice</u> is offered:</p> <ul style="list-style-type: none"> • it is 100% unsweetened juice • it is offered no more than 3 times per week. 			
<p><u>Foods to limit, if offered:</u></p> <ul style="list-style-type: none"> • appear on the menu no more than a total of 3 times per week • are in addition to the recommended food groups. <p><i>Foods to limit include: cakes, pastries, doughnuts, cookies and granola bars, ice cream and frozen desserts, French fries, potato chips, nachos and other salty snacks, fruit flavoured drinks, soft drinks, sweetened hot/cold drinks.</i></p>			

APPENDIX C

Saskatchewan Ministry of Education, Menu Planning Form

Menu Planning Form for Child Care Facilities

Provider /Centre: _____ Date: _____



	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast <i>Servings from 3 food groups are offered.</i> <input type="checkbox"/> Vegetables and fruit <input type="checkbox"/> Grain products <input type="checkbox"/> Milk and alternatives <input type="checkbox"/> Meat and alternatives					
Morning Snack <i>Serving of vegetables or fruit plus 1 other food group is offered.</i> <input checked="" type="checkbox"/> Vegetables and fruit <input type="checkbox"/> Grain products <input type="checkbox"/> Milk and alternatives <input type="checkbox"/> Meat and alternatives					
Lunch <i>Servings from all 4 food groups are offered.</i> <input checked="" type="checkbox"/> Vegetables and fruit <input checked="" type="checkbox"/> Grain products <input checked="" type="checkbox"/> Milk and alternatives <input checked="" type="checkbox"/> Meat and alternatives					
Afternoon Snack <i>Serving of vegetables or fruit plus 1 other food group is offered.</i> <input checked="" type="checkbox"/> Vegetables and fruit <input type="checkbox"/> Grain products <input type="checkbox"/> Milk and alternatives <input type="checkbox"/> Meat and alternatives					
Supper <i>Servings from all 4 food groups are offered.</i> <input checked="" type="checkbox"/> Vegetables and fruit <input checked="" type="checkbox"/> Grain products <input checked="" type="checkbox"/> Milk and alternatives <input checked="" type="checkbox"/> Meat and alternatives					

Offer **milk** at least twice a day.

If **juice** is offered:

- it is 100% unsweetened juice
- it is offered no more than 3 times per week.

Offer **water** for thirst.

Foods to limit, if offered:

- appear on the menu no more than a total of 3 times per week.
- are in addition to the recommended food groups.

Canada's Food Guide recommends limiting foods and beverages high in calories, fat, sugar or salt such as cakes and pastries, chocolate and candies, cookies, and granola bars, and doughnuts, ice cream and frozen desserts, French fries, potato chips, nachos and other salty snacks, fruit flavoured drinks, soft drinks and sweetened hot or cold drinks.

APPENDIX D

Telephone-Interview Questionnaire

Centre Name

Centre Code.....

Missing information

• **Baseline..... Date**

• **Endpoint..... Date**

General Questions;

1. Do you keep a record of menu cycles?
 - 1.1. Do you have a copy of menu cycle for Years 2013/2014/2015?
 - 1.2. Can we have a copy of all menu cycles that you have since?
 - **PDF Scan**
 - **Fax**
 - **Mail**

Specific Questions;

2. How does the menu cycle rotate in your centre?
 - Biweekly
 - Monthly basis.
 - Seasonal basis.
 - Other.....
3. Who is primarily responsible for making changes to the menus?
 - Director
 - Cook
 - Educators
 - Other, please specify _____
4. How many times have you updated or changed centre's menu cycles since month/year of (Baseline/End point).
 - 4.1 When did you start these changes?
 - 4.2 What part of the menu have you changed since Month/year (baseline/end point).
 - Whole menu
 - Lunch only

- Snacks only
 - No changes
 - I don't know/remember
5. Does Healthy Start had any impact on revising in your menus, if yes, in what sections of your menu? (Has HSDS had an impact on the revisions of your menus? If yes, what changed?)

APPENDIX E

Behavioural Research Ethical Board Approval Certificate



UNIVERSITY OF
SASKATCHEWAN

Behavioural Research Ethics Board

Certificate of Approval

PRINCIPAL INVESTIGATOR
Hassanali Vatanparast

DEPARTMENT
Nutrition and Dietetics

BEH#
16-386

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED
University of Saskatchewan

STUDENT RESEARCHER(S)
Lila Abobakar

FUNDER(S)
HEART AND STROKE FOUNDATION OF CANADA

TITLE
Evaluation of Menus Planned in Saskatchewan Childcare Centres that Participate In Healthy Start/Depart Sante Program

ORIGINAL REVIEW DATE
20-Oct-2016

APPROVAL ON
27-Oct-2016

APPROVAL OF:
Application for Behavioural Research Ethics
Review

EXPIRY DATE
26-Oct-2017

Full Board Meeting

Date of Full Board Meeting:

Delegated Review

CERTIFICATION

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month prior to the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: <http://research.usask.ca/for-researchers/ethics/index.php>

Vivian Ramsden, Chair
University of Saskatchewan
Behavioural Research Ethics Board

Please send all correspondence to:

Research Ethics Office
University of Saskatchewan
Box 5000 RPO University, 223-110 Science Place
Saskatoon SK S7N 5C9
Telephone: (306) 966-2975 Fax: (306) 966-2069

APPENDIX F

Menu Analysis-Assumptions

- Milk is served with cereal
- Casseroles (noodle) and sandwich “melts” have cheese
- Casseroles have meat
- Fries, sweet potato fries, hashbrowns=other(Processed food)
- Taco salad has taco chips=other(Processed food), not grain
- Cream of wheat made with water
- Stews have meat and veg
- Meat sauce for pasta has meat and veg (same for lasagna); if included term veg lasagna, only counted veg once
- Stir fries have veg
- Chili has meat and beans=2 meat; and veg
- Cream soups made with milk
- Cream/sour cream/ice cream does not count as milk and alts
- Counted salsa as veg
- Chicken salad does not count as veg, assume mix for sandwich, not actual salad
- Scalloped potatoes have cheese
- “soup”=veg soup
- Perogies=veg and grain
- Tacos have cheese and meat and veg
- Pizza has grain, meat, cheese
- Subs have bread, meat, cheese (unless otherwise specified)
- Hot dogs and burgers served with bun
- Pickles don’t count as veg
- Chicken noodle soup, not much chicken?
- Quiche has egg, cheese, and crust
- Cheez whiz does not count as milk and alt
- Denver sandwich has egg and meat
- Banana bread=grain; ham and cheese biscuit=grain
- Hamburger soup=meat and veg
- Trail mix=meat and alt
- Beans=meat and alt (not veg beans)
- Trail mix is meat and alt (nuts)
- Graham crackers/arrowroot cookies=other(Processed food)
- Yogurt parfait=milk and alt, and grain (granola)
- Peppers stuffed with meat and rice
- Zucchini stuffed with meat and cheese

- Club sandwich has bacon
- Tater tot casserole has meat and cheese
- Shipwreck casserole has veg, grain, meat, cheese
- Ravioli has meat and grain
- Breakfast egg bake=egg, bread, cheese, veg