Assessment of Impact

The Standards for Food and Nutrition in Regulated Child Care Settings in Nova Scotia

Nutrition Standards in Child Care Project Report

AUTHORS

Erin Kelly, Mount Saint Vincent University
Dr. Misty Rossiter, University of Prince Edward Island, Mount Saint Vincent University
Professor Linda Mann, Mount Saint Vincent University

Acknowledgements

The Nutrition Standards in Child Care Project (NSCCP) was made possible through an Establishment Grant from the Nova Scotia Health Research Foundation (2012-2015). A second grant provided by the Department of Health and Wellness, Public Health allowed for a rural extension to be incorporated into the project's timeframe. The NSCCP benefitted from the hard work of many individuals. We would like to acknowledge the many students, dietetic interns, and research assistants who contributed throughout the duration of the project, in particular Sarah Gatien – a graduate student and dietetic intern at Mount Saint Vincent University. We want to acknowledge and extend our appreciation to the members of our research team listed below.

Dr. Sara Kirk
Canada Research Chair in Health Services Research
School of Health and Human Performance
Dalhousie University

Bronwen Lloyd
Coordinator, Child Care Centres Policy and Program Development
Early Years Branch, NS Department of Education and Early Childhood Development

Nadine Romaine
Public Health Nutritionist
Nova Scotia Health Authority, Capital Region

Tina Swinamer
Coordinator, Early Childhood Nutrition
NS Department of Health and Wellness, Public Health

Shelley Thompson
Director of Early Childhood Development Services.
Early Years Branch, NS Department of Education and Early Childhood Development

This report is intended for internal use. To access more information about the report or about the Nutrition Standards in Child Care Project please contact Dr. Misty Rossiter at mdrossiter@upei.ca.

January 2016

Please use the following citation when referencing this report:
Kelly E, Rossiter MD, and Mann L. *Assessment of Impact: The Standards for Food and Nutrition in Regulated Child Care Settings in Nova Scotia*: Nutrition Standards in Child Care Project, Mount Saint Vincent University. January 2016.

Table of Contents

Report Summary and Recommendations

Establishing healthy eating behaviours in early childhood is critical for optimum development throughout the lifecycle. While data describing the eating behaviours of preschool children is limited in Canada, trends in undesirable dietary intakes have been reported for school aged children. In addition, the rate of childhood obesity is concerning, particularly within the Atlantic Provinces. In Nova Scotia overweight and obesity rates were significantly higher for 2-17 year olds than the national average (32% vs. 26%). [1]

Environments where children spend much of their day, such as schools and child care settings, hold a substantial influence as they represent spaces where children consume numerous types of food and are exposed to learning opportunities that can connect food and eating to overall health and wellbeing. [2-5] Across Nova Scotia 390 licensed child care settings, with 12,862 full and part time spaces, provide care for 13,486 children (numbers provided by the Department of Education and Early Childhood Development). There are also 235 approved family day care homes, monitored by licensed family home day care agencies that provide care for 1110 children. Together, these regulated child care settings nurture and care for approximately 28% of young children living in Nova Scotia. Given the number of young children cared for in regulated child care settings and given the opportunities within their day to enjoy food together, it is essential that best practices related to food and feeding become embedded within the child care culture in Nova Scotia.

In 2007 work began on the preparation of the *Standards and Guidelines for Food and Nutrition in Regulated Child Care Settings*[a]. The *Standards and Guidelines* came into effect across the province on July 1st, 2011 [6] and their purpose was to assist regulated child care settings in ensuring that the food and food environment experienced by children supported consistent healthy eating messages.

In 2012 the *Nutrition Standards in Child Care Project (NSCCP)* was launched to learn from this system-level policy change and to explore any influence the *Standards and Guidelines* may have on the eating behaviours of young children in both regulated child care settings and the home environment. Funding for this research opportunity was provided through an establishment grant from the Nova Scotia Health Research Foundation (NSHRF). The following is a summary outlining the main findings from the NSCCP:

Overall the food and nutrition *Standards and Guidelines* have been well received by the child care community of Nova Scotia. When the *Standards* were first introduced there were significant efforts to support initial and on-going implementation. The manual was created and outlined potential menus, but also supported a shared understanding of the expectations for food and nutrition practices in regulated child care. Most child care centre directors have a high familiarity with the S*tandards*. Despite articulated concerns with specific aspects, support for the main intention behind the *Standards* – to empower child care settings to create healthy food environments for children within their care - was evident among both centre directors and parents.

A number of noteworthy challenges were shared by most of the regulated child care settings. Cost was a major concern and a described barrier to full application of the *Standards*. Articulated issues with cost included the cost of foods meeting the 'food and beverage criteria' vs foods that

[a] From this point onward, the *Standards and Guidelines for Food and Nutrition in Regulated Child Care Settings* will be referred to as the *Standards and/or Guidelines.*

do not, seasonal cost variations, increased cost associated with kitchen maintenance, and the hidden cost of 'time' devoted to meal preparation and food purchasing. Directors of regulated child care settings also reflected on the challenges associated with children's food acceptance and described frustration with food waste that was often linked back to cost. Finally, lack of variety was a shared barrier among many regulated child care settings. This was often attributed to the food and beverage criteria outlined in the *Standards* as many products perceived to be nutritionally adequate would narrowly miss the nutrient criteria cut off and therefore be deemed unacceptable. In addition, there are some specific routines and best-practice approaches that are challenging to implement in a substantial number of regulated child care centres while other routines and best-practices are implemented more easily.

In terms of dietary intake, the amount of food consumed by children during their time in regulated child care did not differ from time outside of this environment. However, differences in the quality of the food served in regulated child care, compared to other environments, was higher suggesting the *Standards and Guidelines* have had a positive influence over the diets of young children while attending regulated child care. It is important to note that many of the described barriers impacting dietary intake reflect larger system level problems that often plague population-level health initiatives. For example while directors seemed content with the food and beverage criteria for sodium, some expressed concerns over trying to find products available to purchase that actually met sodium recommendations. The high sodium intake of children in this study reflects this struggle.

Creating supportive healthy food environments within child care settings is a shared responsibility. Through a continued collaborative and informed approach, the capacity to provide healthy food environments in regulated child care will positively affect lifelong health and wellbeing for young children in Nova Scotia. The following recommendations, although not an exhaustive list, will contribute to the conversation needed to determine 'next-steps' towards better understanding, acceptance, application, and support of the *Standards and Guidelines:*

- Create a knowledge sharing system that would allow easy transfer of knowledge and story sharing of experiences around the S*tandards and Guidelines* to build efficacy and bridge support among regulated child care settings.

- Open a dialog around the financial growing pains associated with implementing and adhering to the *Standards* in child care environments.
    - To assist this conversation, define expectations around the cost of a healthy food environment that follows the S*tandards* (i.e. menu costing)
    - Use the potential knowledge-sharing network to encourage discussion and exchange specifically around food cost and solution sharing.
    - Consider investigating buying power initiatives with grocery store chains or local farmers and producers.

- Focus attention on determining the specific supports that enhance the acceptance and application of the following routines and best-practices and, where applicable, collaboratively develop supports that can be shared among the child care community of Nova Scotia:
    - Providing nutrition education and resources to parents
    - Using infant feedings plans with infants in their care
    - Providing open snack routines
    - Providing family meal service
    - Displaying breastfeeding promotional material in rooms

    - Having policies in place to address food brought from home
    - Ensuring ECE's and child care centre staff eat the same food as the children within their care as much as possible
    - Encouraging and supporting use of best practice verbal cues (internal focus, no pressure, responsive feeding) by ECE's while eating with children during meals and snacks
    - Providing and/or having adequate access to nutrition training opportunities that are instructed by qualified nutrition professionals

- Ensure future revisions of the *Standards and Guidelines* offer additional consideration to Early Childhood Educator professional practice principles and teaching philosophies.

- Define a communication plan that will support increased awareness, understanding, acceptance and support of the *Standards and Guidelines* by parents, families, and guardians.

- Connect with training institutes and early childhood resource centres. Learn from and collaborate with them to provide nutrition training and professional development opportunities that complement efforts that support breastfeeding promotion and the adoption of healthy eating behaviours by children and adults.
    - Ensure training opportunities are made available re: responsive feeding application in child-care environments to help address challenges with food acceptance in the child care setting.

- Consider a multilevel ecological perspective follow-up evaluation to understand the long term impact the *Standards and Guidelines* have had on the eating behaviours of young children attending regulated child care in Nova Scotia. Attention to varied communities across Nova Scotia and a more inclusive complement of voices within the child care community would be of particular importance.

Background

Healthy Eating in the Early Years

Establishing healthy eating behaviours in early childhood is critical for optimum development throughout the lifecycle. While data describing the eating behaviours of preschool children is limited in Canada, trends in undesirable dietary intakes have been reported for school aged children. Lower than recommended intakes of fruit and vegetables and higher intake of high calorie, low nutrient dense food has been reported.[7-9] In addition, Canadian children are challenged with meeting the minimum daily requirement for milk products and meat & alternatives.[7] Nationally, sugar sweetened beverages and fruit juices contribute 25% of the total sugar consumed by 1-8 year old children.[10] Specific to Nova Scotia, grade 5 students have low intakes of calcium and fibre and high intakes of sodium and fat.[11] While much of the reported nutrient intake data defines consumption patterns of school-aged children, concern exists around the eating behaviours of young children and the impact it may be having on their heath and wellbeing. [2]

Families with young children living in Nova Scotia are faced with similar challenges to those living elsewhere in Canada when it comes to buying and consuming food. In a recently published study detailing household food budget shares in Canada between 1939 and 2011, household budget share of ready-to consume foods rose from 37% to 54%. [12] In a separate study, mothers of preschool aged children living in Nova Scotia described a limited capacity to offer preferred food choices to their children due to multiple competing interpersonal and structural constraints.[13]

Understandably, families welcome options that bring efficiency and harmony to daily living, but unintended consequences that affect lifelong health and wellbeing are important to consider.[14,15] Chronic disease and related health issues that develop (e.g. diabetes, obesity, cardiovascular disease), are major public health concerns.[16-19] The rate of childhood obesity is alarming, particularly within the Atlantic Provinces. In Nova Scotia overweight and obesity rates were significantly higher for 2-17 year olds than the national average (32% vs. 26%).[1] More specific to the early years, 15% and 6% of children in Canada between the ages of 2-5 years have been classified as overweight and obese, respectively.[1] Data detailing more recent provincial and national overweight and obesity rates are currently being collected and analyzed through the Canadian Community Health Survey 2015. These results are expected in 2016 and will inform national and provincial overweight and obesity trends.

Determinants of Eating Behaviours

Many social determinants of health impact the nutritional health and well-being of children and families – most significantly income levels, food security, environment, education and literacy rates in the home, and social support systems.[20] The contribution 'environments' have on influencing eating behaviours is multifaceted and a promising avenue for change. Of great influence are the food environments created by families as they powerfully shape food preferences, patterns of food intake, and eating styles of young children.[13,21] Relationships formed between parents and children and strategies used to navigate family specific circumstances strongly influence a child's health and growth trajectory.[13,22-24]

Other environments also have considerable impact on the developing eating behaviours of children. For example, a number a barriers that limit access to healthy food in rural environments are recognized such as suitable access to food outlets, a diminished variety of healthy food choices, and seasonal food variance beyond that experienced in urban settings.[25,26] In Nova

Scotia, the average monthly cost of a basic nutritious diet was found to be statistically higher in rural areas (populations less than 10,000) compared to urban locals. [27]

Environments where children spend much of their day, such as schools and child care settings, hold a substantial influence as they represent spaces where children consume numerous types of food and are exposed to learning opportunities that can connect food and eating to overall health and wellbeing. [2-5] For example, in elementary school studies, links have been made between healthy meals, better health & fewer academic and behavioural problems. [28,29] In addition, population intervention research in Nova Scotia has documented a positive influence of school nutrition policies on diet quality, energy intake and healthy beverage consumption. [30]

Child care settings are uniquely positioned to positively influence the well-being and future health of preschool aged children. [2,3,31] In a basic sense, meal and snack times are able to provide children with the nutrients they need for healthy growth and development. Other opportunities that go beyond the provision of adequate amounts of healthy food are available to child care settings and contribute to a stronger more supportive healthy food environment. Child care settings can offer children opportunities to try new foods, explore and recognize feelings of hunger and satiety, and practice the social skills that surround the sharing and enjoying of food during meal and snack times. [2] In addition, fostering a child's ability to self-regulate their intake and eat a variety of foods, especially vegetables and fruits, increases their chance of achieving and maintaining healthy food habits which can stay with them throughout their lifetime. [32] Beyond the food relationships that children develop, the food environment in child care settings has the potential to extend to children's families. Maintaining a supportive healthy food environment in child care settings, with child care providers acting as powerful role models, creates an opportunity to act as a resource to parents as they navigate through their own family's food environment. [2]

Given the number of young children cared for in regulated child care settings and given the opportunities within their day to enjoy food together, it is essential that best practices related to food and feeding become embedded within the child care culture in Nova Scotia. This shift would contribute to a matrix of supports that will guide early child development towards lifelong health and wellbeing. [33]

The Regulated Child Care Community of Nova Scotia

As detailed in the Early Childhood Education Report from the Atkinson Foundation (2014-2015), Nova Scotia has 52, 599 children from zero to five years of age. [34] This represents 5.6% of the total population of Nova Scotia. In 2011, almost half of parents living in the Atlantic provinces with children 14 years and younger reported using some type of child care (i.e. regulated care, private care). [35] Usage was most common when both parents were in the work force. [35] Across Nova Scotia 390 licensed child care centres, with 12,862 full and part time spaces, provide care for 13,486 children. There are also 235 approved family day care homes, monitored by licensed family home day care agencies that provide care for 1110 children. Together, these regulated child care settings nurture and care for approximately 28% of the young children living in Nova Scotia.

For these children, the child care environment becomes a primary space where their development and learning is shaped. The Department of Education and Early Childhood Development is accountable for regulated child care in Nova Scotia and is responsible for program and policy development for licensed child care facilities and family home day care agencies which are regulated under the Day Care Act. [36]

The regulated child care community in Nova Scotia is represented by a large and varied group of people whose efforts impact the health and wellbeing of young children. Included within this community are:

- Provincial government representatives and regional supporters such as Early Childhood Development Consultants and Public Health Nutritionists whose efforts ensure services intended for young children respond to the needs of those living in Nova Scotia;

- Early childhood education training institutions and resource centres that provide training and support on 'best practice' approaches that nurture and enhance the developmental potential of children;

- Regulated child care centre facilities and family home child care agencies and family home child care providers who respond and shift to the child care needs of the children and families they serve;

- Early childhood educators and child care facility staff who create environments and programs that anticipate and respond to the developmental needs of individual children;

- Mothers, fathers, guardians, relatives, and friends who love and care for the young children within their home and community.

The Standards and Guidelines for Food and Nutrition in Regulated Child Care Settings

In 2007 work began on the preparation of the *Standards and Guidelines for Food and Nutrition in Regulated Child Care Settings* and came into effect across the province on July 1st, 2011. [6] The purpose behind this initiative was to assist regulated child care settings in ensuring that the food and food environment experienced by children supports consistent healthy eating messages. It is important to note that the *Standards* differ from guidelines; the *Standards* must be followed in order to comply with the requirements for the provision of food described in the Day Care Regulations. [37] The Department of Education and Early Childhood Development is responsible for monitoring compliance with this through the licensing inspection process.

The *Standards* operate with a series of objectives and target thirteen specific components that contribute to the food environments of regulated child care settings (See sidebar)[a]. To determine which foods are suitable to be served within regulated child care settings, food and beverage criteria[b] were developed for multiple food categories and food groups. The criteria specifically address the sodium, fat, dietary fibre and sugar content of food items. However, as previously mentioned, food environments extend far beyond the food served. Thus, the *Standards* also focus on aspects of supportive, healthy eating environments that have been shown to positively influence food behaviours and habits developed during the early years. For example, the influence of early childhood educators on the development of eating habits is recognized [5]; allowing children to sit with and observe their educators enjoying healthy food subsequently impacts their own enjoyment and relationship with the foods they choose to eat.

The *Guidelines*[c] are suggested actions that are evidence based and reflect best-practice approaches that improve the food environments of regulated child care settings (See sidebar).

To support province-wide implementation of the *Standards and Guidelines*, 'The Manual for Food and Nutrition in Regulated Child Care Settings' was developed. [38] This manual includes supports for the development of menus that meet the nutrient criteria of the *Standards*, while

COMPONENTS OF THE STANDARDS:

Food and Beverages Served

Clean Drinking Water

Breastfeeding

Adapting the menu for infants

Food Safety

Special Dietary Considerations

Meal and Snack Routines

Meal and Snack Time Environment

Modeling Positive Attitudes towards Food and Nutrition

Fundraising with Food and Beverages

Food is Not Used to Reinforce Desired Behaviors

Special Functions

Promotion and Advertising

COMPONENTS OF THE GUIDELINES:

Family Involvement and Communication

Creating Opportunities for children to learn about nutrition

Nova Scotia Produce and Products

Food Packaging & Environmental Consciousness

Food for Staff and Care Providers

[a] Outlined in the Manual for Food and Nutrition in Regulated Child Care Settings, Section A
[b] Outlined in the Manual for Food and Nutrition in Regulated Child Care Settings, Section C
[c] Outlined in the Manual for Food and Nutrition in Regulated Child Care Settings, Section B

promoting the enjoyment of healthy foods by all children, early childhood educators, child care facility staff and family home day care providers.

Additional supports for a shared understanding of the expectations for food and nutrition practices in regulated child care settings included workshops and training on practical aspects of implementing the *Standards and Guidelines*. Public Health Nutritionists familiar with regulated child care environments and knowledgeable about the *Standards and Guidelines* and related regulations also provided coaching and guidance. As well, Early Childhood Development Consultants supported centres in building capacity and an understanding of healthy eating and healthy childhood development within regulated child care settings.

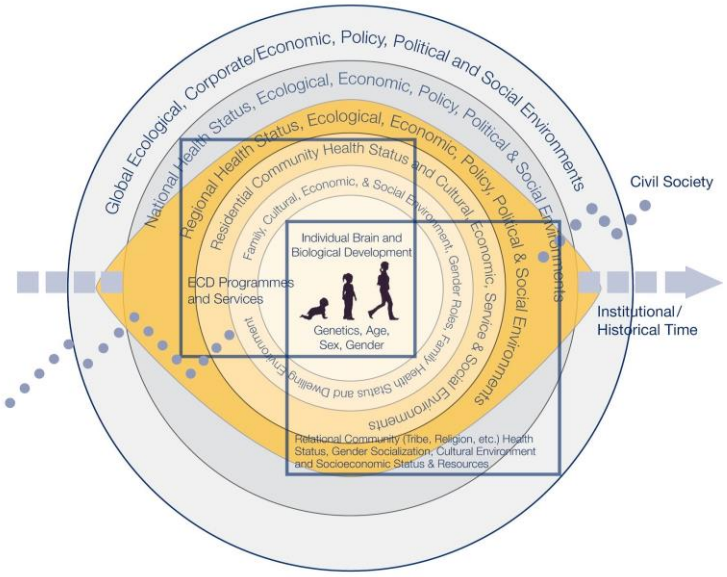
The Nutrition Standards in Child Care Project (NSCCP)

What is the NSCCP?

In 2012 the *Nutrition Standards in Child Care Project (NSCCP)* was launched to learn from this system-level policy change and to explore any influence the *Standards and Guidelines* may have on the eating behaviours of young children in both regulated child care centres and the home environment. Funding for this research opportunity was provided through an establishment grant from the Nova Scotia Health Research Foundation (NSHRF). A grant from the Department of Health and Wellness, Public Health Branch was also received and allowed for the addition of a rural extension to the project.

The NSCCP was guided by the *Total Environment Assessment Model for Early Child Development (Figure 1).* [33] Developed by the World Health Organization's Commission on Social Determinants of Health, this model allows the development of healthy eating habits in young children to be explored through a series of influential spheres that surround and affect a child's development. Some of the influential spheres are very obvious, such as how the eating habits of children are quite often a reflection of their parent's eating habits [39,40] while other influential spheres are more ambiguous, such as the economic capacity of a community. [41] Both significantly impact the foods young children choose to eat and the health outcomes related to developed dietary behaviours.

Figure 1 ***Total Environment Assessment Model for Early Development***



How did the NSCCP investigate the standards?

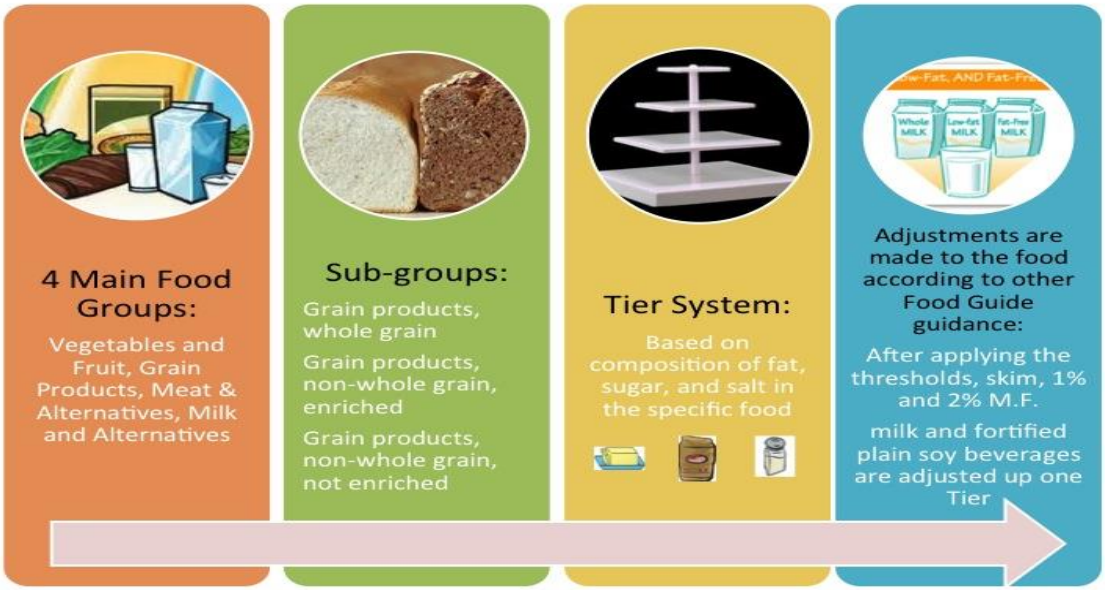
Focusing attention on regulated child care centres, the NSCCP investigated the intended and unintended impact of the *Standards and Guidelines* through three separate avenues of data collection:1) Food Records – reported and direct observation of food consumption of 3-5 year olds enrolled in regulated child care, 2) Nutrition and Physical Activity Questionnaire – circulated to all regulated child care settings in Nova Scotia, and 3) Parent Interviews - one-on-one interviews with parents of 3-5 year old children enrolled in regulated child care across Nova Scotia.

Food Records of Children

To capture actual consumption patterns of foods and nutrients, 4-day food records were collected for children between the ages of 3-5 years enrolled in regulated child care settings across Nova Scotia. Three of the four collection days captured food intake on days when children attended a full day of child care. On these days, research assistants observed and recorded children's food intake in the regulated child care setting while parents recorded their children's intake outside of the regulated child care setting. The forth collection day captured food intake when children did not attend regulated child care (i.e. a weekend day) and was recorded by the parents and guardians of the child enrolled in the study.

In total, 90 food records were collected, 58% (n=52) within the Halifax Regional Municipality (HRM) and 42% (n=38) outside of the HRM. The information collected was entered into ESHA Food Processor SQL©, a nutrient analysis software program that contains up to date nutrition information for foods available in Canada. To complement the nutrient analysis, food records were also assessed for food quality using a food group coding system adapted from Health Canada's 'Canadian Nutrient File Food Classification Surveillance Tool' (Figure 2). [42]

Figure 2 Graphic representation of *Canadian Nutrient File Food Classification Surveillance Tool*



This tool classifies foods into food groups and sub-groups as per Canada's Food Guide. For example, corn would be classified as a vegetable and fruit product, further subdivided as a deep yellow or orange vegetable. Foods are then classified into one of four tiers based on their sodium, sugar and fat content. Placement into tiers is thus indicative of nutritional quality, with foods in tier 1 falling below the lower thresholds for fat, sugar and sodium, and foods in tier 4 exceeding the upper thresholds of these nutrients. Figure 3a provided below indicates how corn may be classified into different tiers based on its nutritional characteristics. The fresh corn is classified as tier 1 as it falls below the lower thresholds for the nutrients of concern, whereas the canned Cream Style Sweet Corn falls into tier 3 as it exceeds the upper threshold for sodium. Similarly, figure 3b speaks to the quality of meat products, with the grilled chicken breast falling into tier 2, but the chicken nuggets falling into tier 4 due to the high sodium and fat content of the nuggets.

Figure 3a and 3b

Tier 1 Product Vs. Tier 3 Product

Tier 2 Product Vs. Tier 4 Product

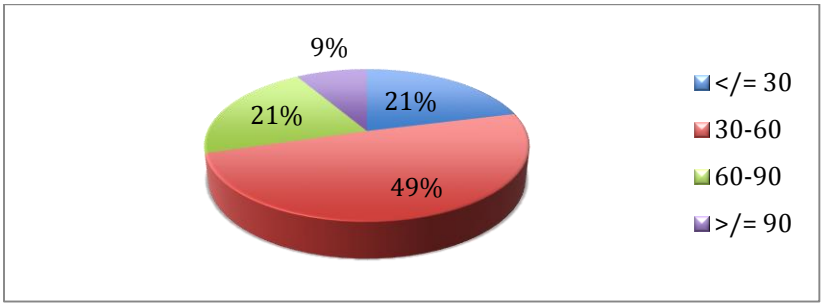
Nutrition and Physical Activity Questionnaire (NAP-Q)

To explore the child care environment and the experiences and perceptions of child care licensees in relation to the *Standards and Guidelines*, a 'Nutrition and Physical Activity Questionnaire' *(*NAP-Q) was circulated to all regulated child care centres in Nova Scotia. Based on a validated questionnaire used in the United States [43], the NAP-Q was adapted in consultation with research advisors representing the regulated child care community to ensure it addressed the current regulatory system that governs the operation of regulated child care settings in Nova Scotia.

The questionnaire was comprised of two sections. The first section focused on food and breastfeeding and the second on the physical activity environments in regulated child care settings. The findings describing physical activity environments in regulated child care settings in Nova Scotia have been documented in a separate report.

In total, 66 regulated child care centres across Nova Scotia returned completed questionnaires (response rate of 17%). Forty-five percent (n=30) came from regulated child care centres located in the Halifax Regional Municipality (HRM) while 41% (n=27) came from other areas of Nova Scotia. A total of 14% (n=9) could not be linked to a geographical area. Most respondents were facility directors or assistant directors and represented various licensing capacity levels (see figure 4). Almost all respondents (94%) described themselves as fairly to very familiar with the *Standards and Guidelines* and most of the settings they represented (75%) had food preparers who had substantial food preparation experience or formal food preparation training.

Figure 4 Licensing Capacity (# of children) of regulated child care centres who responded to NAP-Q



Parent Interviews

To have a better understanding of what contributes to family routines and rituals around food and feeding it was important to learn from parents of young children. Thirty-two one-on-one parent interviews were conducted; 23 were with parents from the Halifax Regional Municipality and 9 were with parents from rural communities within Nova Scotia. The purpose of these interviews were two-fold; 1) to learn about experiences parents have with feeding young children and 2) to learn how parents understand the *Standard and Guidelines*. Specific questions about how the *Standards and Guidelines* were communicated and about parent knowledge of and their beliefs surrounding the *Standards and Guidelines* were also discussed.

Of the parents interviewed, 30 were mothers and 3 were fathers with both parents of one child participating in one of the interviews. Seventy-five percent of the children whose parents were interviewed were between the ages of 4-5 years at the time of the interview while 24% were between the ages of 3-4 years (1% were greater than 5 years old). Information was not collected on parent education or income levels nor did we ascertain food literacy or nutrition knowledge of the parents who participated.

Whose voices were missing?

A recognized limitation of our study's design is the acknowledgment that not all representatives from the regulated child care community in Nova Scotia contributed to our developed understanding. It was beyond the capacity of the NSCCP to capture the voices of early childhood educators and food preparers who work in regulated child care settings. Also missing from the analysis are the community partners, such as Public Health Nutritionists and Early Childhood Development Consultants, who support individual centers to optimize their child care environments. The project was also unable to learn from training institutions and Early Childhood Resource Centres about their involvement and continued efforts supporting the implementation and adoption of the *Standards and Guidelines.*

Awareness, Understanding, Support for, and Application of the *Standards and Guidelines for Food and Nutrition in Regulated Child Care Settings*

Introduction and Implementation of the Standards and Guidelines

Effort put forth by the Department of Community Services [a] and the Department of Health and Wellness to introduce the *Standards and Guidelines* was positively received by many of the facility directors managing regulated child care centres who responded to our Nutrition and Physical Activity Questionnaire (NAP-Q).

Daily Application of the Standards

A number of routines and practices that represent best-practice and support the *Standards and Guidelines* have been identified to take place most-to-all times by more than 80% of questionnaire respondents. These represent possible practices that have greater acceptance and/or are more easily implemented in regulated child care settings (Figure 5).

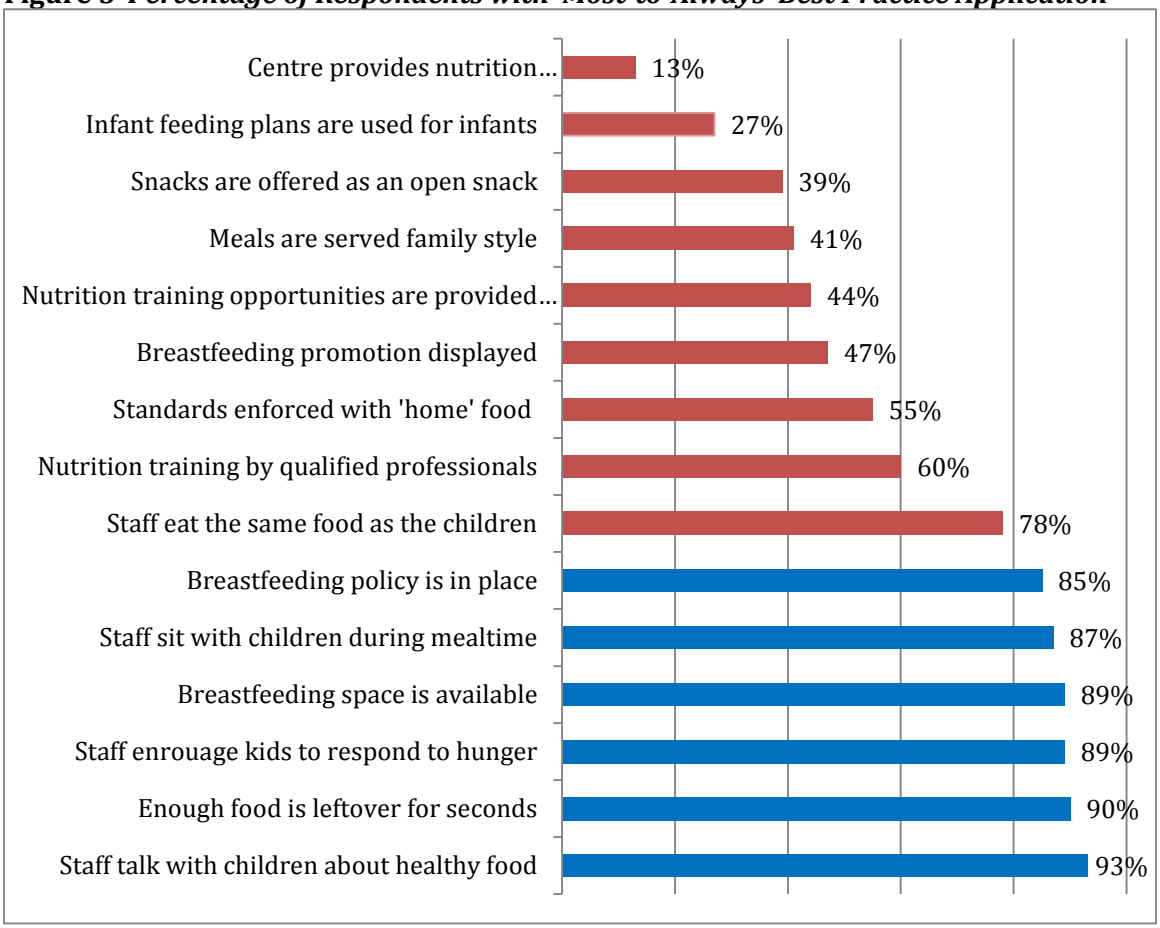
- 85% of responding centres have a breastfeeding policy in place with 89% ensuring that a breastfeeding space is available for nursing mothers.
- During meal times ECEs and child care centre workers sit with children (87% of respondents) and talk with children about healthy food (93% of respondents).
- 90% indicated that enough food is leftover for seconds most of the time.
- 89% indicated that children are encouraged to respond to levels of hunger and feelings of fullness in the regulated child care environment.

Conversely, a number of routines and practices that represent best-practice and support the *Standards and Guidelines* may be harder to implement most-to-all of the time in regulated child care settings.

- Only 55% of respondents indicated that nutrition guidelines are enforced when food is brought from home.
- 78% of respondents indicated that centre ECEs and child care centre workers eat the same food as the children.
- Breastfeeding promotional information is displayed in only 47% of the centres.
- Family style meal service and open snack routines are not as well represented most of the time (41% and 39% respectively).
- Infant feeding plans are regularly used in only 27% of respondent centres.
- Nutrition training opportunities for ECEs and child care centre workers and the provision of nutrition education and resources to parents is limited with only 44% and 13%, respectively, of respondent centres able to provide this support piece adequately.
- When nutrition education was provided to ECEs and child care centre workers, recognized nutrition professionals provided that training most-to-all times in only 60% of the centres who responded to the questionnaire.

[a] In 2014, responsibility for regulated child care in Nova Scotia was transferred to the Department of Education and Early Child Development.

Figure 5 ***Percentage of Respondents with 'Most-to-Always' Best Practice Application***



Standards and Guidelines represented by best practices that appear more difficult to implement require attention and support. Further exploration of the barriers that limit their incorporation into daily practice is recommended and will help determine actionable steps to improve their application. The lower application of 'nutrition education and resources to parents', the enforcement of nutrient guidelines with 'food brought in from home', and the utilization of 'infant feeding plans' might reflect a 'service' relationship currently held between ECEs and families. Interaction between families and ECEs /child care workers specifically about child-related issues is known to be minimal despite the importance of strong parent-centre partnerships and its influence on child outcomes. [44] Supportive action towards increasing the child care community's capacity to act as a valued resource to their community and the families they serve is warranted.

The perceived role held by the child care community in regards to the promotion of breastfeeding practices and self-regulation of food intake may explain the lower rates of breastfeeding promotion, family meal service, and provision of open snack routines among questionnaire respondents. In addition, logistical factors may limit a willingness to change routines and practices in these areas. It may be prudent to determine effective methods of engagement through open dialogue to learn about the specific barriers to their implementation. For example, a number of barriers that prevent the acceptance and application of family meal service in regulated child care settings may exist ranging from a minimal belief in the benefits of family meal-service to practical challenges with space and resources that stop its occurrence. Action taken to encourage more centres to regularly maintain family meal service needs to be informed by what specifically

is preventing it. Finally, nutrition training opportunities that go beyond the basics of healthy eating and address aspects of supportive healthy food environments may not always be available, or may be available but may not be readily accessible by child care community members. Further inquiry into training and professional development opportunities that target healthy food environments and promote responsive feeding practices is recommended.

Identified Beneficial Supports

It was indicated, by facility directors, that the manual developed to support the *Standards and Guidelines* was helpful as were other additional resources such as the menu planning supports and recipes. It is interesting to note that services and supports not directly linked to the development of the *Standards and Guidelines* were also of help to some regulated child care centres such as resources and websites developed by food suppliers.

A few questionnaire respondents also indicated that it was helpful to connect with Public Health Nutritionists and Early Childhood Development Consultants who provided support during the implementation phase. In addition, connecting with other regulated child care centers was cited as helpful, particularly around menu development.

> *"... bouncing ideas off other centers has been very helpful with the menu."*

Grant money made available by the Departments of Health and Wellness and Education & Early Childhood Development was a recognized support and was applied towards a variety of initiatives targeting the development of healthy food environments. Most facility directors indicated that they felt 'fairly to very' familiar with the *Standards and Guidelines* and a number of respondents indicated that they supported the purpose behind them; to improve the food environments and provide healthy nutritious food in regulated child care settings.

> *"I have worked as a child care administrator in BC, Ontario, and NS. NS can be proud of the nutrition standards that are in place, they are progressive, detailed and easy to access and follow."*

Requested Supports

Many supports and resources were of benefit during initial implementation, however, questionnaire respondents described a need for additional resources and support. Despite continued effort to support the S*tandards and Guidelines*, NSCCP analysis suggests there is a perception among some child care directors that this is not happening. Respondents expressed the need for additional ongoing training opportunities addressing food and feeding as well as breastfeeding. Specific 'hands-on' support may help to further facilitate instruction on how to better apply the *Standards and Guidelines* in child care settings. Additional dialogue to better understand the disconnect between what is currently offered for support versus what may be needed at this stage of implementation should be explored.

Improvements to existing menu planning supports were suggested. Detailed sample recipes, lists of packaged food options that meet criteria, snack ideas, and fruit and vegetable alternatives were identified as additional resources that would benefit continued understanding and application.

> *"A good list of everything that is approved by the food and nutrition guidelines! It would save the guess work…"*

These requests complemented voiced frustrations with the amount of time required to read labels and grocery shop to ensure foods purchased met the food and nutrient criteria outlined in the *Standards*. This speaks to the evolution of implementation as what worked and informed at the onset of implementation requires revision and adjustments. These adjustments can respond to the evolving awareness, acceptance, and understanding held by the regulated child care community that ultimately defines their capacity to create supportive healthy food environments in child care settings.

Finally, some facility directors described a feeling of 'no support' with implementation of the S*tandards and Guidelines* suggesting that the developed infrastructure surrounding this policy initiative did not meet the needs of all regulated child care settings and may have impacted the acceptance, understanding, and application within these settings.

> *"I feel there have been very few supports offered for transition to and implementation of guidelines. Workshop offered through Nutritionists at Sobeys was amazing…this wasn't provided by anyone else until one and a half years into the program."*

Identified Challenges

Challenges with Cost and Variety

Cost was a common concern raised by facility directors and attributed to the specific rules and regulations detailing the types of foods to be served during operating hours. Despite the grant money made available by the provincial government to help offset costs associated with the initial implementation of the *Standards and Guidelines*, ongoing financial challenges were voiced and a barrier to full acceptance and application. Financial burdens were described in a number of specific but related ways. In general there was the feeling that foods meeting specific nutrient criteria cost more than other alternatives. The cost of fresh produce throughout the year was also a concern.

The limited variety of cost-appropriate healthy food options that children would eat was also articulated as was the hidden costs to maintain equipment for food service and the cost of food waste when children refused to eat the food served.

> *"The cost of fresh produce has increased our budget [considerably]"*

> *"The amount of food needed to be prepared and the waste and left-overs [is a barrier]. The cost is an issue."*

It is difficult to fully appreciate the financial implications any change may bring. If cost is the main challenge for many regulated child care settings, added resource supports and training opportunities will have minimal impact on adherence and acceptance of the *Standards and Guidelines*. It is recognized that some regulated child care centres managed this aspect of implementation more easily than others. While understanding the reasons contributing

to this marked difference is beyond the scope of the NSCCP, it would be a worthwhile undertaking. As well, limited understanding exists around the food costs associated with providing children in regulated child care settings menus that provide healthy food options that fall in line with the food and beverage criteria. Such information could serve as a benchmark resource for the child care community during menu planning and could contribute to our understanding of the financial implication of such a policy initiative.

Challenges with Acceptance

Acceptance of and support for the *Standards and Guidelines* was evident in some regulated child care centres, but not all. Supportive comments indicated that some directors are happy with the change to provide more healthy choices.

Multiple comments re-iterating the challenges related to child and parent acceptance were a clear theme identified by many of the respondents. Some of the comments related to the challenges with children's food acceptance to be an expected barrier that requires patience.

> *"I was happy with the changes. It has always bothered me for years what some day cares provided for snacks. I was glad to see more fruits and vegetables and no more rice krispie squares and cheese whiz."*

> *"A lot of children are not introduced to salads, fish and veggies etc. at home so it takes a while for children to learn to enjoy different foods."*

As well, the *Standards and Guidelines* were described to provide an opportunity to support parents in their own understanding of how children's eating habits are formed.

> *"Parents were difficult because they did not understand the regulations and were not prepared for change. Parents' attitudes reflect in their children's attitudes toward healthy eating."*

Other comments described the struggle with child 'pickiness' and its relationship with food waste. Directors described the burden of dealing with this hidden cost of implementing the *Standards and Guidelines*. In addition facility directors indicated that the level of ECEs and child care centre workers acceptance of the *Standards and Guidelines* to be a barrier affecting application. Further engagement with ECEs and other regulated child care centre workers is warranted and may help better understand this identified limitation.

Finally, another possible barrier to acceptance was the voiced concern that some of the specific regulations lacked flexibility and infringed on professional principles held by ECEs. Specifically cited were the feelings that ECEs and classroom teachers could no longer teach and model

> *"As educators, I feel we have an obligation to teach children about healthy eating but this also includes moderation and proper choices. I have seen first-hand children who have been restricted from eating anything but healthy foods and when they get into a situation where they make the food choice they can and have gorged on junk food because they don't know how to moderate."*

aspects of moderation to children within their care as many foods were just simply removed from the child care environment.

Dietary Profile of Children Enrolled in Regulated Child Care

Nutrient intake levels and food patterns described below were gathered from the analysis of 4-day food records collected from 90 children enrolled in full-day regulated child care settings. Due to inherent challenges with food record collection, not all 90 food records were available for analysis of all measured variables thus explaining the slight variation in daily average comparisons[a]. Table 1 details the number of participants whose food records were included in each separate analysis.

Table 1 Number of Participants whose Food Records were included in separate variable analysis

	HRM	Rural	Total
Total Available Participants	52	38	**90**
Overall Daily Average Analysis	50	29	**79**
Centre Only Analysis	43	29	**72**
Outside of Centre Analysis	42	19	**61**
Weekend-Day Analysis	50	27	**77**

Fifty-eight percent of children (n=52) attended regulated child care centres within the Halifax Regional Municipality and 42% (n=38) attended regulated child care centres located in other communities across Nova Scotia (including rural communities). Most of the children who participated were 3 or 4 years old with an even split between boys and girls.

Food records were collected 2 years after the *Standards and Guidelines* came into effect in July 2011. Analysis reveals an interesting, yet predictable, dietary pattern for this age group. Outlined below in the following two tables are average daily nutrient intake levels for 3 year olds and 4 & 5 year olds respectively compared to dietary reference intake (DRIs) recommendations. [45] Within these tables, average intake levels are subcategorized into overall average nutrient intake, average daily nutrient intake levels on days not attending regulated child care (RCC) (i.e:

[a] See sub-section 'NSCCP Findings: Saturated Fat Intake' (pg 21) for example of daily average variation comparison.

a weekend day), and average levels on days attending RCC divided by time spent in RCC and time spent outside this environment.

Table 2: Average Nutrient Intakes for 3 year olds enrolled in Regulated Child Care (RCC) including overall average, average intake on days not attending RCC, and average intake during RCC and outside of RCC

Nutrients	**DRIs * (RDA/AI) for 3 year olds**	**Overall Average Intake (%kcal/DRI)**	**Average Intake on days not Attending RCC (%Kcal/DRI)**	**On Days Attending Regulated Child Care**	
				Average Intake during RCC (%Intake)	Average Intake outside RCC (%Intake)
Calories/day	---	1370	1444	626 (46%)	746 (54%)
Total Sugar (g)	25% & 10% **	*94 (27%)*	*98 (27%)*	*39 (43%)*	*52 (57%)*
Saturated Fat (g)	As low as possible	17 (11%)	19 (12%)	7 (44%)	9 (56%)
Trans Fat (g)	As low as possible	.61 (<1%)	.47 (<1%)	.35 (49%)	.36 (51%)
Diet. Fibre (g)	19	*15 (79%)*	*14 (74%)*	8 (50%)	8 (50%)
Sodium (mg)	1000	*1726 (173%)*	*1773 (177%)*	791 (46%)	932 (54%)
Potassium (mg)	3000	*2016 (67%)*	*1946 (65%)*	998 (48%)	1062 (52%)
Iron (mg)	7	10.2 (142%)	10.5 (150%)	4.9 (45%)	6 (55%)
Calcium (mg)	700	850 (122%)	802 (114%)	396 (45%)	487 (55%)
Vitamin D (IU)	600	*295 (49%)*	*253 (42%)*	155 (49%)	161 (51%)
Vitamin C	15	125	139	53	58

(mg)		(833%)	(926%)	(48%)	(52%)
Vitamin B12 (mcg)	0.9	1.7 (222%)	1.8 (200%)	.46 (28%)	1.2 (72%)

* Recommendations reflect RDA/AI amounts for 1-3 year olds
** DRI manual recommends **added sugar** be no more than 25% of caloric intake, WHO recommends **added sugar** be no more that 10% of caloric intake
Italicized values indicate concerning intake levels or levels in needs of further investigation

Table 3: Average Nutrient Intakes for 4 & 5 year olds enrolled in Regulated Child Care (RCC) including overall average, average intake on days not attending RCC, and average intake during RCC and outside of RCC

Nutrients	**DRIs * (RDA/AI) for 4 & 5 year olds**	**Overall Average Intake (%kcal/DRI)**	**Average Intake on days not Attending RCC (%Kcal/DRI)**	**On Days Attending Regulated Child Care**	
				Average Intake during RCC (%Intake)	Average Intake outside RCC (%Intake)
Calories/day	---	1412	1388	637 (45%)	796 (55%)
Total Sugar (g)	25% / 10% **	*93 (26%)*	*93 (27%)*	*41 (44%)*	*52 (56%)*
Saturated Fat (g)	As low as possible	17 (11%)	16 (10%)	7 (44%)	9 (56%)
Trans Fat (g)	As low as possible	.69 (<1%)	.78 (<1%)	.34 (44%)	.45 (56%)
Diet. Fibre (g)	25	*15 (60%)*	*14 (56%)*	*8 (50%)*	*8 (50%)*
Sodium (mg)	1200	*1770 (147%)*	*1816 (151%)*	*834 (46%)*	*994 (54%)*
Potassium (mg)	3800	*1918 (50%)*	*1891 (50%)*	*912 (47%)*	*1049 (53%)*
Iron (mg)	10	10.6 (106%)	9.5 (95%)	4.3 (38%)	7 (62%)
Calcium (mg)	1000	852 (85%)	748 (75%)	402 (44%)	511 (56%)
Vitamin D (IU)	600	*299 (50%)*	*240 (40%)*	*169 (51%)*	*165 (49%)*
Vitamin C	25	112	109	47	69

(mg)		(448%)	(436%)	(41%)	(59%)
Vitamin B12 (mcg)	1.2	1.8 (150%)	1.8 (150%)	.56 (30%)	1.3 (70%)

* Recommendations reflect RDA/AI amounts for 4-8 year olds
** DRI manual recommends **added sugar** be no more than 25% of caloric intake, WHO recommends **added sugar** be no more that 10% of caloric intake
Italicized values indicate concerning intake levels or levels in needs of further investigation

Food and beverages served in regulated child care settings are based on 'Eating Well with Canada's Food Guide'.[46] Regulated child care settings are required to comply with the 'Food and Beverage Criteria' tables outlined in the manual developed to support implementation of the *Standards.* As a 'guide-post' to the identification of food-specific criteria, food content limits for sodium, saturated fat, trans-fat, sugar, and dietary fibre where determined. These represent 'nutrients of concern' whereby either a continued over or under consumption can impact healthy growth and development and is related to multiple health concerns across a person's lifespan.[47] To better describe the intake of nutrients used to design the 'Food and Beverage Criteria' outlined in the *Standards*, a closer examination of energy, saturated fat, trans-fat, total sugar, dietary fibre, and sodium intake levels is described in the following section.

Nutrient Intake Levels and Dietary Patterns

Energy Intake

- On average, children who took part in the NSCCP consumed adequate amounts of energy (1383 kcalories/day). This average intake level falls within the recommended range of energy requirements that support healthy growth and development in this age group (see Table 4).
- Twelve percent of children in the study on average consumed calories higher than this recommended range (>1703 kcal/day), while 16% consumed calories less than this recommended range on average (<1198 kcal/day).

Table 4 Recommended Daily Caloric Intake for 3-4 Year Old Children

Age and Gender	Recommended Daily Calories
3-4 year old girl*:	1198 – 1703
3-4 year old boy*:	1282 - 1701

*Calculated using DRI energy calculation tables (weight of 10-20 kg, height 1.00-1.15 meters, 30-60 minutes of moderate PA/day (Low Activity to Active

- Boys consumed significantly less calories than girls during their time in child care (534 kcal vs. 634 kcal respectively, p=0.013) but consumed significantly more calories than girls outside of the child care setting (841 kcal vs. 688 kcal respectively, p=0.017) allowing for similar caloric consumption throughout the day.

This data supports the premise of 'self-regulation' whereby levels of hunger and satiety can be managed by children independently over a period of time and do not necessarily warrant intervention or concern from parents, guardians, or caregivers. [32]

Recommendations regarding menu planning practices in child care settings suggest that children attending a full day child care program be served enough food to provide ½ to 66% of nutrient requirements for their age group. [3]

Table 5 Recommended Percentage Intake of Carbohydrates, Protein and Fat for Children

Calorie Containing Nutrient	Recommended % of Daily Intake
Carbohydrates*	45 -65 %
Protein*	5-20% (3 year olds) 10-30% (>4 years)
Fat*	30-40% (3years) 25-35% (>4 years)

* DRI reference values for macronutrients

- Our study indicates that, on days attending child care 45% of calories were eaten in the child care setting and 55% outside of the child care setting.

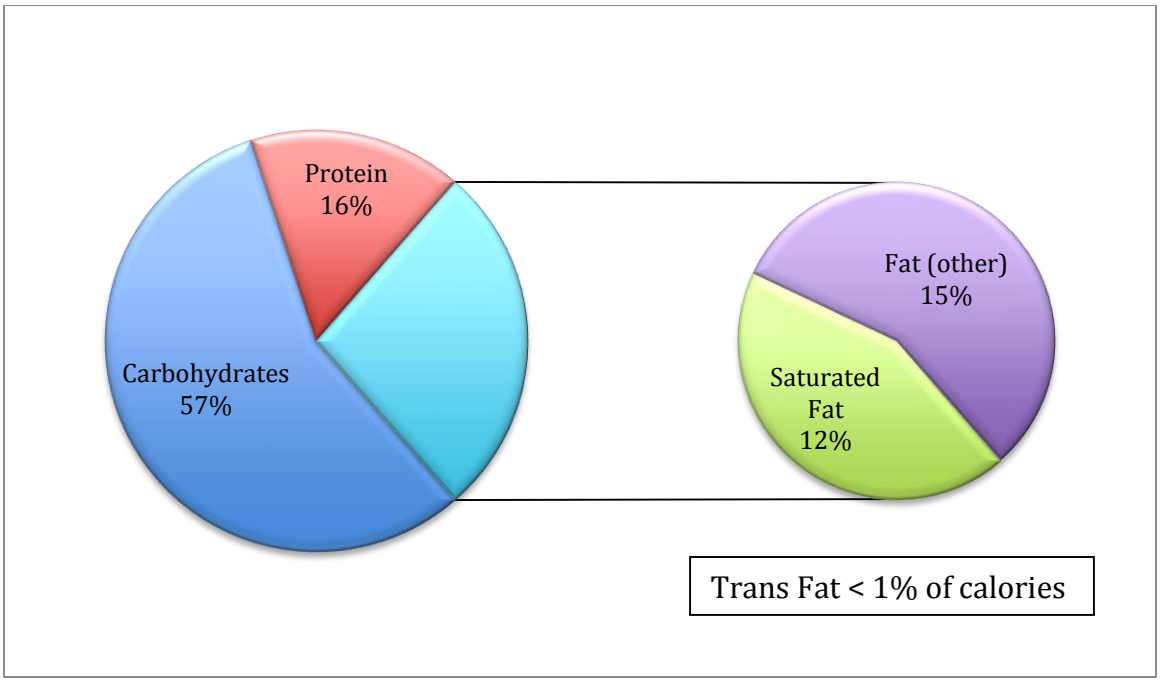
- There was no difference in caloric intake between children living in the HRM and those living in other areas of Nova Scotia.

Dietary reference intake recommendations suggest that caloric distribution, between carbohydrates, protein, and fat, fall within specific ranges to ensure optimal health benefits (see Table 5).

- The caloric distribution of the children participating in the NSCCP fell within recommended ranges for fat, carbohydrates, and protein.

- Caloric distribution was the same in both the regulated child care setting and outside the regulated child care environment.

Figure 8 ***Daily Average Macronutrient Distribution of Carbohydrates, Protein, Fat, and Saturated Fat***



Saturated Fat

Recommendations for 3-5 year old children

Current recommendations[a] for saturated fat consumption suggest no set value, but that intake should be as low as possible. *Eating Well with Canada's Food Guide* represents a diet that maintains an average saturated fat content of 8-9% of total energy[b].

NSCCP Findings: Saturated Fat Intake

- Children participating in the NSCCP consumed an average of 17g[c] of saturated fat per day when attending a full day of child care; equivalent to 11% of their average energy intake. Canadian Community Health Survey (CCHS) 2004 data reveals a similar intake pattern with 11.7% and 10.8% of calories coming from saturated fat for 1-3 year olds and 4-8 year olds respectively. [9]

- There was no significant saturated fat intake difference found between children living in the HRM and those living elsewhere in Nova Scotia; between females and males; and between 3-year-old and 4 & 5-year-old children.

- On days attending regulated child care, the average daily contribution of saturated fat coming from the child care environment was 4.8% of total energy (7.5g/day) balanced by the average contribution coming from outside of the regulated child care setting at 5.8% of total energy (9g/day) and represented no significant difference between these two distinct settings.

---

[a] as per *Dietary Reference Intakes*
[b] as per *Health Canada*
[c] Example of variation in analysis of daily average comparison: 17g/day vs. 16g/day (9g+7g)

- On the days when children did not attend regulated child care the average intake was similar to the intake on days when attending regulated child care; 11.5% of overall energy intake (18g/day).

Foods Contributing to Saturated Fat Intake

- Preliminary food group analysis indicates that the main sources of saturated fat in the children's diets are lower quality (Tiers 3 & 4) meat products and milk and alternative products (See Figure 2 for a description of the Tiers). Examples of meat and alternative products from Tiers 3 and 4 include deep fried meats and fatty cuts of beef and poultry with the skin on.

- The greatest proportion of milk and alternatives consumed were classified as Tier 3. Such products that are potentially significant sources of saturated fat are most cheeses, dairy based desserts and whole milk.

Trans-Fats

Trans-fats are a type of fat that hold similar properties to saturated fats. A limited amount of trans-fats are found naturally in foods such as cow's milk and some meats, but the majority of trans fats are produced during food production. Diets that are high in processed trans-fat contribute to various health conditions including high cholesterol and increase a person's risk of heart disease. Trans-fats are not essential to human growth and development and no specific recommended levels have been established, however it is recommended by Heath Canada to choose foods and cooking methods that are low in trans fat so as to minimize the intake of this nutrient.

NSCCP Findings: Trans-Fat Intake

- < 1% of average daily energy intake came from the consumption of trans fat (.64 grams/day).

- There was no significant trans fat intake difference found between children living in the HRM and those living elsewhere in Nova Scotia; between females and males; and between 3-year-old and 4 & 5-year-old children.

- On days attending regulated child care, the average daily contribution of trans fat coming from the child care environment was 41% of daily average intake (.27g/day) balanced by the average contribution coming from outside of regulated child care settings; 59% of daily average intake (.39 g/day). These intake levels were not significantly different.

- On the days when children did not attend regulated child care the average trans fat intake was similar to the intake on days when attending regulated child care representing a total of <1% of overall energy intake (.56g/day).

Foods Contributing to Trans Fat Intake

Significant sources of trans fat can be difficult to pinpoint, as many food products only contain minor amounts of this nutrient, particularly since Health Canada called on the food industry to

reduce trans-fat levels to <2% in vegetable oils and margarines, and <5% in all other foods in 2007. With this in mind, the main sources of trans fat in the diets of the children were likely the following:

- Commercially prepared foods, already high in total fat (Tier 3 or 4 foods), typically corresponding to foods eaten outside of the centres. Examples of these foods include: commercially made or frozen pizza, chicken nuggets, and hamburgers; commercially baked cakes, cookies and pastries and; stick margarine.

Total Sugar

Recommendations for 3-5 year old children

Total sugar represents the combination of sugars occurring naturally in foods and sugars that have been added to foods to help sweeten, preserve, or support processing. The 2005 Dietary Reference Intake Manual suggests that added or 'free' sugar should equate to no more that 25% of caloric requirements. [45] This recommendation is based on the recognition that individuals who consume high levels of added sugar are more likely to have poor intakes of other essential nutrients. In recognition of the growing understanding of the relationship between sugar intake and overweight and obesity, the World Health Organization released guidelines in 2015 detailing recommended sugar intake levels for adults and children. [48] These guidelines suggest that 'added' sugar contribute no more than 10% of an individual's caloric requirement. Table 6 defines how these two very different recommendations are represented using a 'grams/day' measurement.

Table 6 Added Sugar Recommendations: DRIs vs. WHO Recommendations

Age and Gender	25% of calories (DRI)	10% of calories (WHO)
3-4 year old girl*:	75 – 106 g/day	30 – 43 g/day
3-4 year old boy*:	80 – 106g/day	32 – 43g/day

* based on DRI recommended caloric requirement range

NSCCP Findings: Total Sugar Intake

Due to a limitation with the nutrient analysis software, the intake of 'added' sugars could not be separated from naturally occurring sugars (i.e., sugar naturally in fruit). Consequently, this report describes total sugar intake of the children in our study.

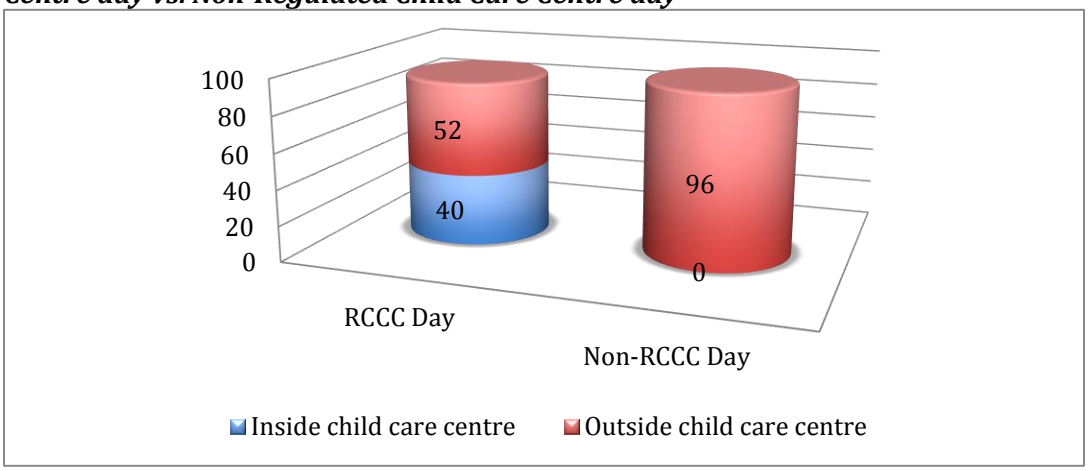
- The average intake of total sugar was 92 g/day. Based on the average caloric intake (1383 kcal/day), this represents a 27% contribution from total sugar.

- On days attending regulated child care, 43% (40g) of total sugar was consumed while in the child care setting. Conversely, 57% (52g) of total sugar was eaten outside of regulated child care.

- There was no significant difference in the intake levels between 3 year olds and 4 & 5 year olds or between children living in the HRM and those living in other areas of Nova Scotia.

- There was also no significant difference between the amount of total sugar consumed on days attending regulated child care and the amount consumed on days not attending regulated child care (92g/da vs. 96 g/day, p=.547).

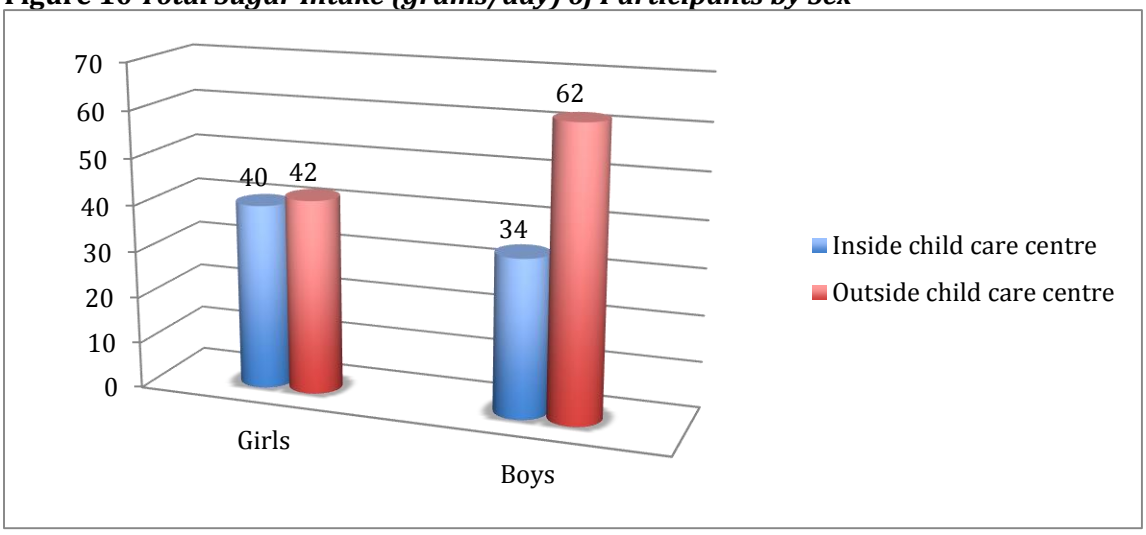
Figure 9 ***Total Sugar Intake (grams/day) of Participants on a Regulated Child Care Centre day vs. Non-Regulated Child Care Centre day***



As a comparison, the 2004 Canadian Community Health Survey reveals an average total sugar consumption of 93 g/day for children living in Nova Scotia between the ages of 1-3 years and an average intake of 129 g/day for children between the ages of 4-8 years. [9] These intake levels represent a 25% and a 27% contribution to total daily calorie consumption.

- On average, boys consumed significantly less sugar than girls during their time in regulated child care settings (34g/day vs. 41g/day, p=0.042), but the total sugar intake of boys was significantly higher than girls when outside the child care environment (62g/day vs. 42 g/day p=.004). See Figure 10.

Figure 10 ***Total Sugar Intake (grams/day) of Participants by Sex***



- Daily average intake of total sugar for boys was significantly higher than girls (86g/day vs. 99 g/day; p=0.02). These average intake levels represent 25% and 28% of total calories for girls and boys respectively.

Although it is challenging to determine the contributing factors to this marked difference between boys and girls [49] it flags a need for further inquiry into the possibility of variable gender specific feeding approaches in early child development.

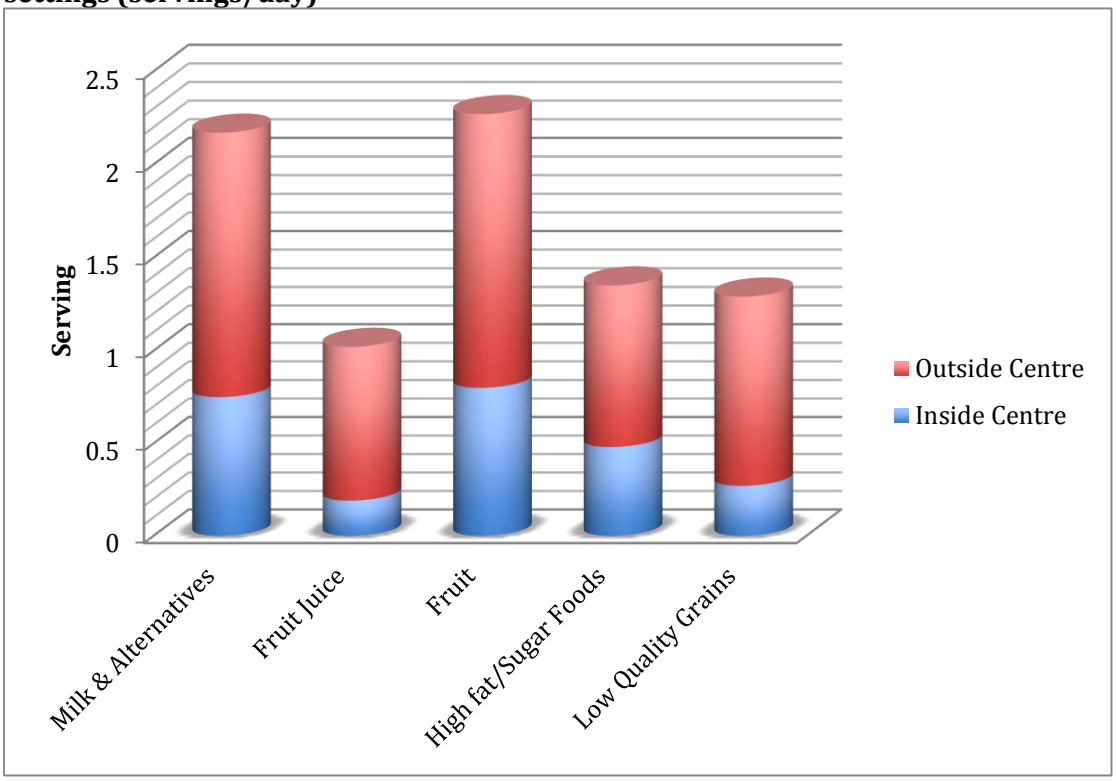
- The difference between the average intake levels in regulated child care settings compared to outside regulated child care settings was significantly different (40g/day vs. 52 g/day, p=.002). This was the case for both children living within the HRM (p=.037) and those living in other areas of Nova Scotia (p=.045). In both groups total sugar intake was higher outside the regulated child care setting.

Foods Contributing to Total Sugar Intake

- Overall, medium quality milk and alternatives (2% and whole milk, flavoured milks etc.), fruit juice (no sugar added), fresh fruit, high fat and/or sugar foods (candies, chocolates) and low quality grains (cookies, cakes, pastries) appear to be the main contributors to total sugar intake.

- Of importance is that of the low quality items, high fat and/or high sugar foods, and low quality grain products, only minimal amounts were consumed at the centre on days attending child care. This not only potentially speaks to the discrepancy in the amount of total sugars consumed at home vs. at the centre, but also to the quality of the foods, with a potential explanation being that children are more likely to be fed candies, cookies, cakes ("treats") etc. while at home.

Figure 11: Dietary sources of sugar in the child care setting and outside the child care settings (servings/day)



- Preliminary food group analysis indicates that consumption of milk and milk alternatives was a significant contributor to the children's total sugar intake. While the sugar found in plain milk is naturally occurring, more than 50% of milk products consumed on days attending child care were categorized as Tier 3. These products include whole flavoured milks, milk-based desserts, and thus likely include added sugars.

- A slightly greater proportion of milk and alternative products were consumed at home on days attending child care rather than at the centre.

- Fruit juice consumption may also account for the greater proportion of total sugars being consumed when at home vs. the centre, as approximately 80% of the fruit juice consumed on days attending child care was at home. The vast majority of fruit juice was categorized as Tier 2, indicating that the juices contained no added sugar. Although not detailed in this report, a more thorough analysis of the contribution of sugar-sweetened beverage consumption is planned.

- Fruits other than juice are another source of naturally occurring sugar, and preliminary analysis indicates that the majority of fruit consumed is of good quality (fresh, no added sugar), with just under half being consumed at the centre on days attending child care.

- Another potentially significant contributor to sugar intake are "other foods and beverages not in the food groups of Canada's Food Guide", specifically high fat and/or sugar foods. This category includes candies, chocolates, syrups etc., and on days attending child care, children only consumed approximately one third (36%) of these foods at the centre.

- Also contributing to total sugar intake, and the discrepancy in sugars consumed at home vs. the centre, are low quality grain products, specifically Tier 3 and Tier 4 products, representing items such as cookies, cakes and muffins. While preliminary analysis indicates that the children consumed less than one serving per day from each of these categories, the vast majority of these items were consumed at home rather than in child care centres.

Dietary Fibre

Recommendations for 3-5 year old children

Currently the Dietary Reference Intake (DRI) recommendation for 3 year old and 4&5 year old children for total fibre is 19g and 25g per day respectively. These intake levels were extrapolated from dietary fibre requirements for adults that were determined to provide the greatest protection against coronary heart disease.

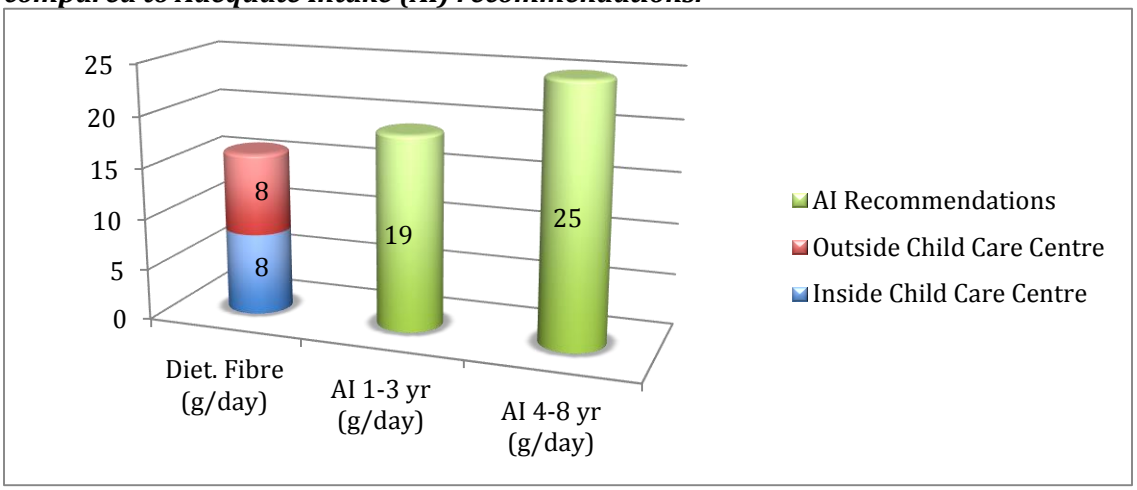
NSCCP Findings: Dietary Fibre Intake

Nutrient analysis software was only able to assess 'dietary' fibre intake levels. Dietary fibre refers to the edible, but non-digestible components found naturally in plant foods. It does not include fibre that has been isolated or synthetically added to foods based on known health benefits termed 'functional fibre'.

- The children consumed an average of 15 grams/day of dietary fibre on days attending regulated child care and 14 grams/day on days outside of the regulated child care setting.

- There was no significant difference between these two average intake values for the two settings, nor was there any difference in the average intake levels of 3 year olds compared to 4 & 5 year olds.

Figure 12 : Average dietary fibre intake on days attending regulated child care compared to Adequate Intake (AI) recommendations.



- Average intakes represented 79% of the recommended level for 3 year olds and 60% of the recommended level for 4 & 5 year olds.

- 12% of children consumed recommended amounts of total fibre on days attending child care and 10% of children consumed recommended amounts of total fiber on days not attending regulated child care.

- On the days attending regulated child care approximately 50% of the dietary fibre was eaten in the regulated child care setting while 50% was consumed outside this environment.

- There was no significant difference between the intake levels of children living within the HRM and children living in other areas of Nova Scotia.

- Interestingly, there was a significant difference in the amount of fibre eaten during child care attendance between girls and boys. Boys were found to eat less fibre while attending regulated child care compared to girls (8g/day vs. 6 g/day, p=.002)

Foods Contributing to Dietary Fibre Intake

Good sources of dietary fibre include whole grain items, such as whole grain bread, and fruits and vegetables, specifically whole and unprocessed fruits and vegetables.

- The main contributor to the children's fibre intake appeared to be fruits, of which they consumed a significantly greater proportion than vegetables.

- Consumption of high fibre vegetables such as the desirable dark green and bright yellow/orange vegetables was quite limited, which may relate to the issue of child acceptance, or lack thereof, of certain foods.

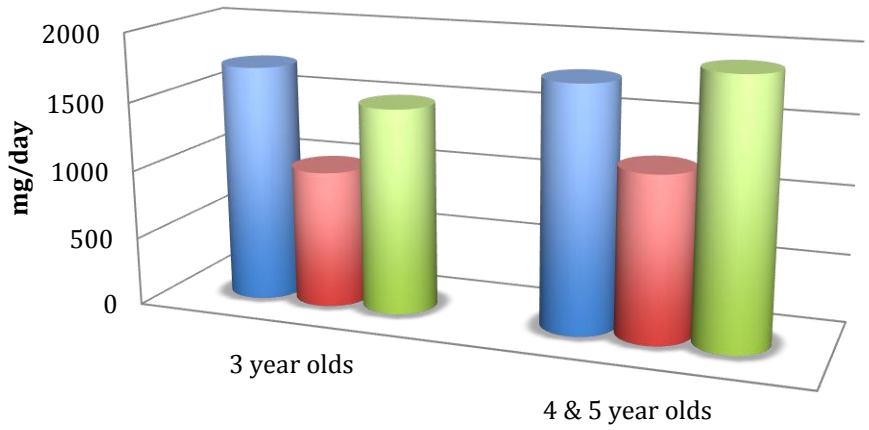
- Whole grain products were also a considerable contributor to fibre intake, however, less than half of total grain products consumed were whole grain, which may also relate to decreased acceptance of these products. The potential acceptability issues with high fibre foods may contribute to consumption patterns that fall short of recommendations.

Sodium

Recommendations for 3-5 year old children

Sodium DRI recommendations for young children, extrapolated from adult populations are outlined in Figure 13. These levels were set to ensure recommended levels of other nutrients could be met and to cover any loss of sodium that occurs during perspiration. The tolerable upper limit for sodium is based on the relationship between high sodium consumption and high blood pressure.

Figure 13 ***Average Sodium Intake of Participants vs. Adequate Intake and Upper Limit Recommendations***



	3 year olds	4 & 5 year olds
Avg. Intake	1726	1770
AI	1000	1200
UL	1500	1900

NSCCP Findings

- The average sodium intake of the children who participated in our study was 1733 mg/day on days attending child care and 1806 mg/day on days not attending child care.

- Intake levels between 3 year olds and 4 & 5 year olds were not significantly different, nor were intake levels between children living in the HRM and children living in other parts of Nova Scotia.

These findings compare to the slightly higher values collected during the Canadian Community Health Survey in 2004 where the average intake of sodium for children aged 1 – 3 years was 1,918 mg/day. [9]

- On days attending regulated child care 46% (807 mg) of total sodium intake was consumed in the regulated child care setting and 54% (952 mg) was consumed outside of the child care setting.

Although not from Canada, an American study on the dietary intake of children at child care centres in New York City reported a similar intake level with an average sodium intake of at the centres to be 700 mg. [50]

- Sodium intakes outside of the regulated child care environment were significantly different; children living outside the HRM consumed more sodium on average than children living within the HRM (1115 mg/d vs. 889 mg/d respectively, p=.033).

- Of concern is the finding that the average intake of sodium exceeds the tolerable upper limit (UL) for 3 year olds (1500mg/day) by 19% and is approaching the tolerable upper limit for 4 and 5 year olds (1900mg/d).

- Interestingly, on the day that children did not attend regulated child care, 18% consumed sodium below or at recommended levels, 27% were above the recommended level but below the UL, while 55% consumed sodium equal to or beyond the UL. On days when children attended regulated child care, 7% consumed an average intake at or below recommended levels, 35% consumed an average sodium intake above the recommended level for their age group but below the UL, and 58% consumed an average sodium intake equal to or beyond the UL.

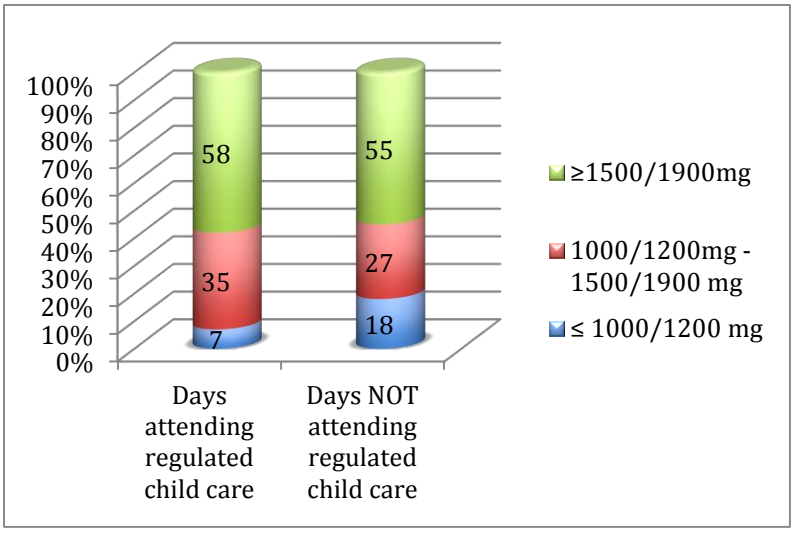


Figure 14 Comparison between days when children attended regulated child care and days when children did not (% of participants who consumed below, between, and above recommended sodium intake levels)

- There was no significant difference in the sodium intake levels between boys and girls.

Foods Contributing to Sodium Intake

Pinpointing the sources of sodium is a difficult task due to the variety of ways that an item may be classified within the Health Canada Tier system. Foods from all of the food groups, classified as Tier two, three or four, can be assumed to notably contribute to total sodium intake. Such

commonly consumed foods include whole wheat breads, snack foods such as crackers, and convenience or pre-prepared meats. In essence, the pervasive use of sodium in commercial products, even those marketed as "low sodium", contributes to consumption patterns that far exceed sodium recommendations.

For the purpose of this report, food items classified as Tier 3 and Tier 4 will be considered likely sources of sodium in the children's diet, however there are limitations to this system. For example, focusing on Meat and Alternatives, an item may be classified as Tier 3 for any one of the following reasons: a) it exceeds the lower thresholds for total fat, sugar and sodium; b) it exceeds the upper threshold for total fat, sugar or sodium or; c) it exceeds the upper saturated fat threshold only. Therefore, the classification of a product in Tier 3 does not necessarily mean that the sodium content is above the upper threshold; however it is a strong possibility. A similar situation applies for products classified as Tier 4, for which the requirements are that the item exceeds at least two upper thresholds for total fat, sugars or sodium. With regards to Meat and Alternatives however, the assumption can be made that foods in Tier 4 are high specifically in fat and sodium, as meat products are typically low in sugar.

- Preliminary analysis of the food groups indicated that on days attending child care, children ate an average of almost one full serving of Meats and Alternatives categorized at Tier 3 and Tier 4. Thus, if the assumption remains that such items are likely high in sodium, these meats represent a significant source of sodium in the children's diets.

- More specifically, the Meat and Alternative products that the children ate the greatest proportion of were poultry, beef, legumes and processed meats. Examples of these types of Tier 3 and 4 products include canned legumes, deli meats, deep-fried or battered meats and sausages.

- Another potentially significant contributor to the children's sodium intake is the consumption of low quality Grain Products. While similar limitations as with Meat and Alternatives exist, Tier 3 and 4 Grain Products will be considered likely sources of high amounts of sodium. Preliminary analysis of the food groups indicated that on days attending child care, the children ate just over one serving of Grain Products from Tier 3 and 4. The types of foods found in these categories that may be responsible for contributing to sodium intake are some breakfast cereals, breads, biscuits, crackers and pastries.

Do *the Standards and Guidelines* positively impact the diets of children enrolled in regulated child care?

As data collection only occurred after implementation, it is not possible to compare dietary intake before and after the *Standards and Guidelines* were implemented. However, from our analysis it appears the *Standards and Guidelines* are helpful to the diets of young children in Nova Scotia. While minimal differences were seen in nutrient intake levels when food consumed outside the regulated child care centre (i.e. home environment) was compared to food consumed inside regulated child care centres, positive impact is evident through examining the quality of the foods consumed. This change is commendable and indicates progressive steps towards affecting the diets of young children.

Parent Perceptions about the Standards for Food and Nutrition in Regulated Child Care Settings

Preliminary analysis and student research has been started on pieces of the parent interview data. The detailed qualitative analysis is ongoing and there is much to be learned from the interview data that can inform the future directions of the *Standards and Guidelines*, particularly from the home and parent perspective. The following sections provide a brief introduction of parents' awareness about the *Standards and Guidelines* and their understandings about the need for the *Standards* and the impact they may have on young children.

Parent Awareness

Most parents indicated that they were aware of the *Standards and Guidelines*. This awareness ranged from quite limited to moderate awareness. Some parents indicated that they had received printed materials (a brochure) about the *Standards and Guidelines* when their child was registered for child care but others stated that they either did not receive any information or did not recall if they did.

> *"...the package that I received [from OUR child care center] to sign up ... had lots of information about ... the food and the Food Guide..."*

Parent Understanding

While one parent commented that the introduction of the *Standards and Guidelines* was associated with not being able to have bake sales, many parents reported that they understood that the *Standards and Guidelines* required the serving of 'balanced' meals and a four-week menu that adhered to food and nutrient criteria. Additional pieces of awareness were that the lunch meal had to have a serving from each food group and snacks included two food groups, one to be a fruit or vegetable. Some also noted that the *Standards and Guidelines* involved family-style eating; the sharing of foods and the sharing of cleanup.

> *"... every meal and snack has to have at least, I think, two food groups, one of which has to be a fruit of vegetable, which I think is fantastic."*
>
> *"I only understand them loosely, you know, they're certainly not serving sugary kind of drinks or food. And most recently, we had a little party, but it was banana bread; it wasn't cake. So there's a lot of effort to minimize sugar and to introduce a lot of vegetables and fruits and variety of foods to kids."*

Parent Support

When asked about the need for the *Standards and Guidelines*, responses suggest that parents experienced some relief knowing their children would receive healthy food while in child care. It was also noted that the *Standards and Guidelines* ensured that children would at least get 'well-balanced food' at the centres if they were not getting this at home.

> *"... without the standards they may just be served 'kids food', dogs, nuggets, KD, that kind of thing..."*

While some concerns were raised, the parental response to the impact of the *Standards and Guidelines* on the feeding of young children was

generally positive. It was noted that having the *Standards and Guidelines*, particularly the access to clean drinking water, encouraged water consumption in the home environment. Parents indicated that additional water consumed at home was perhaps replacing some of the sugary drinks previously consumed in the home environments. Our diet analysis does suggest that the majority of sugary drinks (i.e. fruit juice) is consumed at home (see page 26). Other parental comments indicated that having the *Standards and Guidelines* in child care has made it easier for children to accept a variety of 'healthy foods' when they are served at home and that it is not necessary to make separate meals for children. The family style serving and presenting foods without pressure seemed to result in children having less resistance to trying new items at home.

> *"The major change that has happened recently and I'm still kind of gauging how this is going for my child, is that they allow the kids to kind of select from kind of a buffet".*
>
> *"One thing we like is the focus on family style eating. So all of the children sitting around the tables in groups, sharing the distribution of the food and sharing in clean-up as well."*

Some parents indicated that the *standards* lacked flexibility in that they were strict about foods for celebrations and treats, that some of the foods served were unfamiliar or 'too fancy', and that the family-style eating and open snack created uncertainty about what the child was actually eating. Some parents felt that their child may not select the appropriate foods or adequate amounts of each food may not be consumed - if it was up to the child to decide. This finding suggests that additional awareness around the important positive aspects of family-style serving may need to be more clearly communicated with parents.

> *"I wonder about there being a need for a bit of flexibility around the celebrations, so when they do have celebrations, I'm like, 'Can they just have a little bit of …' you know. "*
>
> *"I get the kind of descriptor of what the kids ate, but I don't quite know if he's making healthy choices … if he's making a variety of choices and getting a balanced meal."*

It is important to note that parents who agree to participate in the interviews may be more interested in food, cooking and health than parents who did not volunteer to participate. This limits our ability to extrapolate their characteristics to all parents who have children enrolled in regulated child care in Nova Scotia. Additional analysis including areas of parental eating behaviours and beliefs, their experiences with developing their child's eating behaviours and how these themes are interrelated are still being analyzed. However, preliminary analysis suggests that parents seems to appreciate the influence the S*tandards and Guidelines* have over their child's eating behaviours while in the regulated child care setting, but may not expect or emulate these changes within their family's food environment.

Recommendations for Moving Forward

The *Standards and Guidelines* are evidence-based and represent best-practice approaches to improve the food environments in regulated child care settings. While ongoing implementation efforts have included workshops and training as well as coaching and guidance from Public Health Nutritionists and Early Childhood Development Consultants, it is recognized that more attention is needed. Major challenges described by child care centre directors include cost, food acceptance, and food variety. As well there were certain best practices that reflect the *Standards and Guidelines* that were challenging for many centres to implement while other best practices were implemented more easily. Although the amount of food consumed by children during their time in regulated child care did not differ from time outside of this environment, differences in the food served in regulated child care, compared to other environments, were noted be of higher nutritional quality.

Emerging from our analysis is a need for collaborative work within the regulated child care community focused on determining the specific challenges with cost, acceptance, and food variety. While not exhaustive, the following suggestions are offered as areas to focus this collaborative effort:

- Create a knowledge sharing system that would allow easy transfer of knowledge and story sharing of experiences around the S*tandards and Guidelines* to build efficacy and bridge support among regulated child care settings.

- Open a dialog around the financial growing pains associated with implementing and adhering to the *Standards* in child care environments.
    - To assist this conversation, define expectations around the cost of a healthy food environment that follows the S*tandards* (i.e. menu costing)
    - Use the potential knowledge-sharing network to encourage discussion and exchange specifically around food cost and solution sharing.
    - Consider investigating buying power initiatives with grocery store chains or local farmers and producers.

- Focus attention on determining the specific supports that enhance the acceptance and application of the following routines and best-practices and, where applicable, collaboratively develop supports that can be shared among the child care community of Nova Scotia:
    - Providing nutrition education and resources to parents
    - Using infant feedings plans with infants in their care
    - Providing open snack routines
    - Providing family meal service
    - Displaying breastfeeding promotional material in rooms
    - Having policies in place to address food brought from home
    - Ensuring ECE's and child care centre staff eat the same food as the children within their care as much as possible
    - Encouraging and supporting use of best practice verbal cues (internal focus, no pressure, responsive feeding) by ECE's while eating with children during meals and snacks
    - Providing and/or having adequate access to nutrition training opportunities that are instructed by qualified nutrition professionals

- Ensure future revisions of the *Standards and Guidelines* offer additional consideration to Early Childhood Educator professional practice principles and teaching philosophies.

- Define a communication plan that will support increased awareness, understanding, acceptance and support of the *Standards and Guidelines* by parents, families, and guardians.

- Connect with training institutes and early childhood resource centres. Learn from and collaborate with them to provide nutrition training and professional development opportunities that complement efforts that support breastfeeding promotion and the adoption of healthy eating behaviours by children and adults.

- Ensure training opportunities are made available re: responsive feeding application in child-care environments to help address challenges with food acceptance in the child care setting.

- Consider a multilevel ecological perspective follow-up evaluation to understand the long term impact the *Standards and Guidelines* have had on the eating behaviours of young children attending regulated child care in Nova Scotia. Attention to varied communities across Nova Scotia and a more inclusive complement of voices within the child care community would be of particular importance.

Conclusion

Overall the food and nutrition *standards* have been well received by the child care community of Nova Scotia. When the *standards* were first introduced there were significant efforts to support initial and on-going implementation. The manual was created and outlined potential menus, but also supported a shared understanding of the expectations for food and nutrition practices in regulated child care. Most child care centre directors have a high familiarity with the s*tandards*. Despite articulated concerns with specific aspects of the s*tandards*, support for the main intention behind the standards – to empower child care settings to create healthy food environments for children within their care - was evident among both centre directors and parents.

A number of noteworthy challenges were shared by most of the regulated child care settings. Cost was a major concern and a described barrier to full application of the standards. Articulated issues with cost included the cost of foods meeting the food and beverage criteria vs foods that do not, seasonal cost variations, increased cost associated with kitchen maintenance, and the hidden cost of 'time' devoted to meal preparation and food purchasing. Directors of regulated child care settings also reflected on the challenges associated with children's food acceptance and described frustration with food waste that was often linked back to cost. Finally, lack of variety was a shared barrier among many regulated child care settings. This was often attributed to the food and beverage criteria outlined in the standards as many products considered appropriate would narrowly miss the nutrient criteria cut off and therefore be deemed unacceptable.

Many of the barriers described by the majority of directors in regulated child care reflect larger system level problems that often plague population-level health initiatives. For example while directors seemed content with the food and beverage criteria for sodium, some expressed concerns over trying to find products available to purchase that actually met sodium recommendations. The high sodium intake of children in this study reflected this struggle.

The recommendations within this report will contribute to the progress of acceptance and application of the *Standards for Food and Nutrition in Regulated Child Care Settings.* Creating supportive healthy food environments within child care settings is a shared responsibility. Through a continued collaborative and informed approach, the capacity to provide healthy food environments in regulated child care will positively affect lifelong health and wellbeing for young children in Nova Scotia.

References

1. Shields M. Overweight and obesity amoung children and youth. *Health Reports*. 2006;17(3):27-42.

2. Larson N, Ward DS, Neelon SB,Story M,. What role can child-care settings play in obesity prevention? A review of the evidence and call for research efforts. *J Am Diet Assoc*. 2011;111(9):1343-62.

3. Benjamin Neelon S,E., Briley ME. Position of the american dietetic association: Benchmarks for nutrition in child care. *J Am Diet Assoc*. 2011;111(4):607-615. doi: 10.1016/j.jada.2011.02.016.

4. Lanigan JD. The relationship between practices and child care providers' beliefs related to child feeding and obesity prevention. *Journal of Nutrition Education and Behavior*. 2012;44(6):521-529. doi: http://dx.doi.org.ezproxy.msvu.ca/10.1016/j.jneb.2011.07.008.

5. Eliassen EK. The impact of teachers and families on young children's eating behaviors. *Young Children*. 2011;66(2):84-89.

6. Government of Nova Scotia. The standards for food and nutrition in regulated child care settings. Retrieved from: https://novascotia.ca/coms/families/provider/ccmanual/C-Food_and_Nutrition.pdf. 2011.

7. Garriguet D. Canadians' eating habits. *Health reports / Statistics Canada, Canadian Centre for Health Information* 2007;18(2):17-32.

8. Hanning RM, Woodruff SJ, Lambraki I, Jessup L, et al. Nutrient intakes and food consumption patterns among ontario students in grades six, seven, and eight. *Canadian Journal of Public Health*. 2007;98(1):12-6.

9. Health Canada. Canadian community health survey, cycle 2.2 (nutrition). Retrieved from: http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/cchs_guide_escc-eng.php. Updated 2004.

10. Langlois K GD. Sugar consumption among canadians of all ages. *Health reports / Statistics Canada, Canadian Centre for Health Information.* 2011;22(3):23-7.

11. Veugelers, P J, Fitzgerald, A L,Johnston, E,. Dietary intake and risk factors for poor diet quality among children in nova scotia. *Canadian journal of public health.* 2005;96(3):212.

12. Moubarac J, Batal M, Martins APB, et al. Processed and ultra-processed food products: Consumption trends in canada from 1938 to 2011. *Can J Diet Pract Res*. 2014;75(1):15-21.

13. Walsh A, Meagher-Stewart D, Macdonald M. Persistent optimizing: How mothers make food choices for their preschool children. *Qual Health Res*. 2015;25(4):527-539. doi: 10.1177/1049732314552456.

14. Roberts KC, Shields M, de Groh M, Aziz A, Gilbert J. Overweight and obesity in children and adolescents: Results from the 2009 to 2011 canadian health measures survey. *Health Rep*. 2012;23(3):37-41.

15. Kime N. Children's eating behaviours: The importance of the family setting. *Area*. 2008;40(3):315-322. doi: 10.1111/j.1475-4762.2008.00834.x.

16. Katzmarzyk PT, Tremblay A, Pérusse L, Després J, Bouchard C. The utility of the international child and adolescent overweight guidelines for predicting coronary heart disease risk factors. *J Clin Epidemiol*. 2003;56(5):456-462.

17. Signorino MR, Winter WE. Childhood obesity and diabetes. *Current Medical Literature: Diabetes*. 2008;25(1):1-16.

18. Williams CL, Strobino BA. Childhood diet, overweight, and CVD risk factors: The healthy start project. *Prev Cardiol*. 2008;11(1):11-20.

19. Thompson DR, Obarzanek E, Franko DL, et al. Childhood overweight and cardiovascular disease risk factors: The national heart, lung, and blood institute growth and health study. *J Pediatr*. 2007;150(1):18-25.

20. Butler-Jones D. The chief public health officer's report on the state of public health in canada 2008. Retrieved from: http://www.phac-aspc.gc.ca/cphorsphc-respcacsp/2008/fr-rc/index-eng.php 2008.

21. Scaglioni S, Salvioni M, Galimberti C. Influence of parental attitudes in the development of children eating behaviour. *Br J Nutr*. 2008;99 Suppl 1:S22-S25. doi: 10.1017/S0007114508892471.

22. Sleddens EFC, Kremers SPJ, Stafleu A, Dagnelie PC, De Vries N,K., Thijs C. Food parenting practices and child dietary behavior. prospective relations and the moderating role of general parenting. *Appetite*. 2014;79:42-50. doi: 10.1016/j.appet.2014.04.004.

23. Harbron J, Booley S, Najaar B. Responsive feeding: Establishing healthy eating behaviour early on in life. *South African Journal of Clinical Nutrition*. 2013;26(3):S141-149.

24. McAdams CB. The environment and pediatric overweight: A review for nurse practitioners. *J Am Acad Nurse Pract*. 2010;22(9):460-467. doi: 10.1111/j.1745-7599.2010.00537.x.

25. Liese AD, Weis KE, Pluto D, Smith E, Lawson A. Food store types, availability, and cost of foods in a rural environment. *J Am Diet Assoc*. 2007;107(11):1916-1923. doi: 10.1016/j.jada.2007.08.012.

26. Hardin-Fanning F, Rayens MK. Food cost disparities in rural communities. *Health Promotion Practice*. 2015;16(3):383-391. doi: 10.1177/1524839914554454.

27. Cost and affordability of a nutritious diet in nova scotia: Report of 2008 participatory food costing. Retrieved from:http://foodarc.ca/wp-content/uploads/2013/05/FoodCostingREport2008.pdf. 2009.

28. Golley R, Baines E, Bassett P, Wood L, Pearce J, Nelson M. School lunch and learning behaviour in primary schools: An intervention study. *Eur J Clin Nutr*. 2010;64(11):1280-1288. doi: 10.1038/ejcn.2010.150.

29. Shi X, Tubb L, Fingers ST, Chen S, Caffery JL. Associations of physical activity and dietary behaviors with children's health and academic problems. *J Sch Health*. 2013;83(1):1-7. doi: 10.1111/j.1746-1561.2012.00740.x.

30. Fung C, McIsaac JD, Kuhle S, Kirk SFL, Veugelers PJ. The impact of a population-level school food and nutrition policy on dietary intake and body weights of canadian children. *Prev Med*. 2013;57(6):934-940. doi: 10.1016/j.ypmed.2013.07.016.

31. Olstad DL, Raine KD, Nykiforuk CIJ. Development of a report card on healthy food environments and nutrition for children in canada. *Prev Med*. 2014;69C:287-295.

32. Tan CC, Holub SC. Children's self-regulation in eating: Associations with inhibitory control and parents' feeding behavior. *J Pediatr Psychol*. 2011;36(3):340-345. doi: 10.1093/jpepsy/jsq089.

33. Irwin L, Siddiqi A, Hertzman C. Early child development: A powerful equalizer. Retrieved from: http://www.who.int/maternal_child_adolescent/documents/ecd_final_m30/en/. 2007.

34. Akbari E, McCuaig K. Early childhood education report 2014. Retrieved from: http://atkinsonfoundation.ca/wp-content/uploads/2014/11/early-childhood-education-report2014-eng.pdf. 2014.

35. Sinha M. Spotlight on canadian: Results from the general social survey: Childcare in canada. *Statistics Canada*. 2014: Retrieved from: http://www.statcan.gc.ca/pub/89-652-x/89-652-x2014005-eng.htm. Updated: Oct 2014

36. Government of Nova Scotia. Day care act. Retrieved from: http://nslegislature.ca/legc/statutes/daycare.htm.

37. Government of Nova Scotia. Day care regulations. Retrieved from: https://www.novascotia.ca/just/regulations/regs/dayregs.htm.

38. Government of Nova Scotia. Manual for food and nutrition in regulated child care settings. https://www.novascotia.ca/coms/families/provider/documents/Manual-Food_and_Nutrition.pdf. Updated: 2011.

39. Larsen JK, Hermans RCJ, Sleddens EFC, Engels RCME, Fisher JO, Kremers SPJ. How parental dietary behavior and food parenting practices affect children's dietary behavior. interacting sources of influence? *Appetite*. 2015;89:246-257. doi: 10.1016/j.appet.2015.02.012.

40. Patrick H, Nicklas TA. A review of family and social determinants of children's eating patterns and diet quality. *J Am Coll Nutr*. 2005;24(2):83-92.

41. Zarnowiecki DM, Dollman J, Parletta N. Associations between predictors of children's dietary intake and socioeconomic position: A systematic review of the literature. *Obesity Reviews*. 2014;15(5):375-391. doi: 10.1111/obr.12139.

42. Health Canada. The development and use of a surveillance tool: The classification of foods in the canadian nutrient file according to eating well with canada's food guide. Retrieved from: http://publications.gc.ca/collections/collection_2014/sc-hc/H164-158-2-2014-eng.pdf. 2014.

43. Benjamin SE, Neelon B, Ball SC, Bangdiwala SI, Ammerman AS, Ward DS. Reliability and validity of a nutrition and physical activity environmental self-assessment for child care. *International Journal of Behavioral Nutrition & Physical Activity*. 2007;4:29-10. doi: 10.1186/1479-5868-4-29.

44. Perlman M, Fletcher BA. Hellos and how are yous: predictors and correlates of communication between staff and families during morning drop-off in child care centers. *Early Education & Development*. 2012;23(4):539-557. doi: 10.1080/10409289.2010.548766.

45. Institue of Medicine. *The dietary reference intakes: The essential guide to nutrition requirements.* Washington DC: The National Academies Press; 2006. 10.17226/11537.

46. Health Canada. Eating well with canada's food guide. Retrieved from: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php. Updated 2011.

47. Whitney EN, Rolfes SR. *Understanding nutrition.* 14th ed. USA: Wadsworth Publishing; 2015.

48. World Health Organization Guidelines: Sugar intake for adults and children. Retrieved from: http://www.who.int/nutrition/publications/guidelines/sugars_intake/en/ . 2015.

49. Cooke LJ, Wardle J. Age and gender differences in children's food preferences. *Br J Nutr*. 2005;93(5):741-746. doi: 10.1079/BJN20051389.

50. Erinosho T, Dixon LB, Young C, Brotman LM, Hayman LL. Nutrition practices and children's dietary intakes at 40 child-care centers in new york city. *J Am Diet Assoc*. 2011;111(9):1391-1397. doi: 10.1016/j.jada.2011.06.001.