



Characterizing the Food Environment in Saskatoon for Families with Children: Research Methods and Descriptive Results

Authors:

Rachel Engler-Stringer, PhD, Assistant Professor
Department of Community Health and Epidemiology, University of Saskatchewan
Nazeem Muhajarine, PhD, Professor
Department of Community Health and Epidemiology, University of Saskatchewan
Ha Le, MSc, PhD Candidate
Department of Community Health and Epidemiology, University of Saskatchewan
Sugandhi del Canto, PhD Candidate,
Department of Community Health and Epidemiology, University of Saskatchewan
Tracy Ridalls, MA, Project Manager
Smart Cities, Healthy Kids Research

Acknowledgments:

We would like to thank our research team, including co-investigators Sue Buhler (University of Alberta), Jennifer Cushon (Saskatoon Health Region), Paul Veugelers (University of Alberta) and collaborators Karen Archibald (CHEP Good Food Incorporated), Charlie Clark (Saskatoon City Councillor), Bill Holden (City of Saskatoon Planning Branch), Twyla Markham (Saskatoon Health Region) and MSc student Jin Wang. We would also like to acknowledge the work of our research assistants on this study: Jennifer Donlevy, Joel Heitmar, Jostein Misfeldt, Janelle Anderson, Allison Macintosh, Stephanie Rideout and Natalie Ludlow.

Table of Contents

1.0 Introduction.....	3
1.1 <i>Definitions</i>	5
1.2 <i>Brief Review of the Literature</i>	6
1.3 <i>Research Methods</i>	6
1.4 <i>Study Location</i>	7
1.5 <i>Research Questions</i>	7
2.0 Research Design and Data Collection.....	8
2.1 <i>Phase 1—Mapping Food Environment in Saskatoon</i>	8
2.2 <i>Phase 2—Characterizing food Outlets in Saskatoon</i>	9
2.3 <i>Phase 3—Dietary Assessment of Children in Saskatoon</i>	10
2.4 <i>Phase 4—Perceptions of Food Environment Interviews</i>	11
3.0 Descriptive Data Analysis and Results	13
3.1 <i>Community Nutrition Environments in Saskatoon</i>	13
3.2 <i>Consumer Nutrition Environments in Saskatoon</i>	16
3.3 <i>Food Environments Around Elementary Schools in Saskatoon</i>	22
3.4 <i>Historical Development of Grocery Stores in Saskatoon</i>	25
3.5 <i>Self-Reported Dietary Intake and BMI Measurement of Children Aged 11-14 Years in Saskatoon</i>	26
3.6 <i>Perceptions of the Food Environment</i>	34
4.0 Discussion.....	35
4.1 <i>Measurement</i>	36
4.2 <i>Study Strengths and Weaknesses</i>	37
5.0 Conclusion	38
Reference List.....	39
Appendices.....	44

1.0 Introduction

The intent of this report is to document the research methods used and procedures followed in our study characterizing the food environment in Saskatoon for families with children that we have called *Smart Cities, Healthy Kids: Food Environment*. In addition, here we are reporting on descriptive results of the study, while future publications will present more sophisticated analyses, specifically more complex relationships between variables from the various data collection phases we have undergone. This three-year study, conducted from late 2010 until early 2014, has been funded by Canadian Institutes of Health Research and the Saskatchewan Health Research Foundation.

According to findings from the Canadian Health Measures Survey (CHMS), childhood obesity, which has increased significantly since 1981 due to rising levels of body fat (1), has been associated with various health problems that continue throughout the lifespan. Rising rates of childhood overweight and obesity in Canada (1) and around the world (2) are of concern due to various associated health problems that continue throughout the lifespan. Traditional approaches to obesity intervention have focused on downstream (educational, behavioural, and pharmacological) interventions and to date have produced limited success (3-5).

There is increasing international evidence suggesting that the environments in which people live, work, and play have an important role in determining their health (6, 7), including obesity and dietary patterns (8, 9). Built environments in North America generally promote food that is packed with calories (energy-dense food) and offer little incentive for living an active lifestyle (10), particularly in low income neighbourhoods(11). Food environments specifically are increasingly being recognized as a critical determinant of community and population health (9, 12, 13).

The obesogenicity of an environment is “the sum of influence that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals or populations” (14). ‘Obesogenic environments’ encourage the consumption of unhealthy food and/or discourage physical activity, while ‘healthy environments’ encourage a physically active lifestyle and nutritious dietary practices. Although significant research has been conducted exploring the specific influence of environments on physical activity, the complementary component of obesogenic environments, unhealthy food, and the influence environments have on food consumption has not yet been sufficiently explored (13-16).

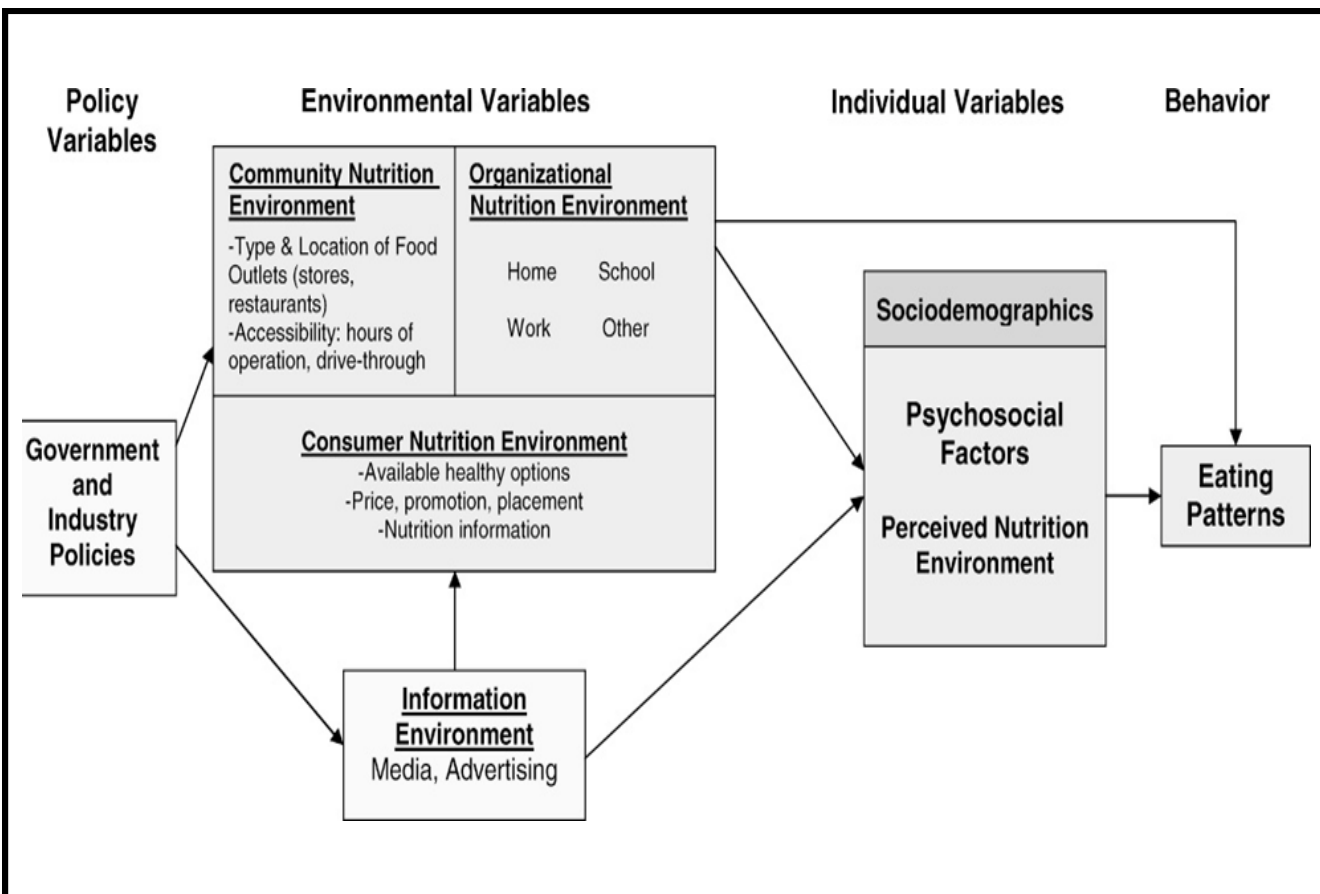
The Glanz *et al.* (13) model of community nutrition environments is useful for understanding the complexity of variables that make up the broad food environment and its applicability to the Saskatoon context. It encompasses four different types of food or nutritional environments, and their joint effect on health (see figure 1 below). According to Glanz *et al.* (13) the four different types of



Saskatoon Farmers' Market

food environments are: (1) the community nutrition environment, (2) the consumer nutrition environment, (3) the organizational nutrition environment, and (4) the information environment. These environments are affected by government and organizations' policies, and are moderated or mediated by demographic, psycho-social and perceived environment variables. Together these factors influence behaviour which ultimately affects obesity and chronic disease risk.

Figure 1: Model of Community Nutrition Environments (13)



Researchers have argued (13, 17) that two of the domains included in the model are in greatest need of research, community nutrition environments and consumer nutrition environments, because they are the least studied, and are likely to have the broadest effects. According to Holsten (17), the research gaps that are most in need of filling include collecting primary data and conducting direct measures of the consumer and community nutrition environments. Additionally, she argues that all types of food outlets (grocery, convenience, restaurant) should be examined together to paint a more complete picture of the community and consumer nutrition environments in a particular locale.

Examination in more detail of the impact of food environments on families' and children's health, will aid in determining how changes in the food environment may result in successful prevention of obesity and its associated health problems. The belief is that policies that impact community and consumer nutrition environments will also influence home food environments, and in turn food consumption (18). Existing policies in Canada, including food taxes, subsidies, and technology, all influence food production, distribution and prices, thereby impacting food environments (19). There is significant research on possible policy options for improving food environments (7, 8, 20-23), however it is important to determine which may be the most effective interventions within the Saskatoon and Canadian contexts. This study represents a step in this direction, and an attempt to more fully understand how food environments impact individual health.

1.1 Definitions

Food Environment – “The food environment can be broadly conceptualized to include any opportunity to obtain food. This definition of the food environment can include physical, socio-cultural, economic and policy factors at both micro- and macro-levels.”(12) Food environments include the accessibility and availability to food as well as marketing and advertising of food and food products (13).

Food Store – For the purposes of this study food stores include all grocery stores, both large or “big box” style and small neighbourhood supermarkets, specialty food stores such as health food stores, bakeries and ethnic food stores, and convenience stores that sell food. It does not include restaurants.

Fast Food Restaurant – Fast food restaurants are those without wait staff, where patrons pay for meals before receiving them and either self-carry the food to tables or take it out (24).

Restaurant – In this study this includes all restaurants that are open to the public except workplace cafeterias.

Food Desert – This term refers to geographic areas, or neighbourhoods, where affordable and nutritious foods are unavailable, requiring residents to travel outside of their neighbourhood to access nutritious foods (25).



*Shopping at the
Saskatoon Farmers'
Market*

1.2 Brief Review of the Literature

Food environments include both the accessibility of food from food stores, for home consumption, and the accessibility to restaurants, both take-out and sit-down (20). Recently, Health Canada published a report on the measurement of food environments in Canada (26). The report highlighted a number of gaps in measurement in the Canadian context, particularly with regard to using more comprehensive measures that examine multiple aspects together.

Research has been done in a number of Canadian cities (Vancouver, Edmonton, Toronto, Montreal, London) mapping food deserts (19, 21, 27-30); but their results are not consistent. Some cities appear to have significant food deserts, while others do not. The Health Canada report examining the measurement of food environments in Canada (26) highlighted the possibility that the problem in Canadian cities may not be food deserts, but rather food swamps (31), a term coined to describe environments with ubiquitous access to unhealthy food. These differences speak to the need for further research regarding food environments, particularly within a Canadian context (27, 32), and importantly on their impact on children's health.

Existing models, such as the Glanz et al.(33) model discussed above, attempt to explain the varied pathways through which food environments influence the health of individuals and communities. These models merit further exploration to understand relationships between variables in an effort to develop effective interventions to improve health outcomes. Context-specific research is needed given the contrasting results of research undertaken in different cities and countries. The need to explore the impacts specifically on children is clear given the likely long-term impacts of food environments on the health of children and the minimal research available in this area. Although mapping food deserts has been done in some Canadian cities, including some preliminary work in Saskatoon, it is clear that research must move beyond mapping to a more in-depth understanding of the potential disparity in food environments and its impact on the health of children; this understanding could then pave the way for evidence-based advocacy and policy to improve the health of children in Saskatoon and beyond.

1.3 Research Methods

The overall purpose of the study described here is to characterize the food environment in Saskatoon, Saskatchewan, and to understand its impact on children's dietary practices and, in turn, on Body Mass Index. This particular report is aimed at documenting the procedures followed in our research design, and to report on our descriptive results. Specifically, our study examines aspects of the food environments in all residential neighbourhoods of Saskatoon, identifying the type and location of food stores and restaurants, their accessibility, and the availability of healthy food options within their premises. We have also collected information on dietary intake and body weights in children living in these neighbourhoods, as well as additional information on the perceptions of children and their parents of the food environments in Saskatoon. A better understanding of the food environments that exist for families in Saskatoon, and their links to diet and obesity, will support the development of evidence-based policy and practice. Our research also aims to inspire further research initiatives aimed at benefitting the nutritional health of children and their families in other regions of Canada.

We have chosen to focus on children aged 10-13 years for various reasons. First, these pre-adolescent years are a time of rapid physiological and psycho-social changes, and habits formed

during these years can impact behaviour throughout the lifespan. Second, children in this age group are still quite dependent on their caregivers for meals, but they are also beginning to make their own food choices. We also have access to data collected on children in the pre-adolescent years living in Saskatoon (e.g., *Smart Cities, Healthy Kids* study, In Motion research studies) that can be used to further contextualize the results produced in this study.

1.4 Study Location

Saskatoon is a medium-sized Canadian city, with about 246,000 residents, which enables collecting in-depth information on the food environment in the city as a whole. It is located in the centre of the country in a rapidly growing province. There is currently little research available examining the food environment in Saskatoon. Three small studies have been conducted examining the food environment in Saskatoon, including a retrospective study exploring location of food stores in Saskatoon, which shows a distinction in access within different neighbourhoods over time (34), and two studies examining the challenges associated with access to food in the city's inner core neighbourhoods (29, 30, 35).



Saskatoon's Broadway Bridge

All cities have their own unique geographic, demographic, political and economic characteristics furthering the need for context specific research (19, 36). The understanding developed within the course of this study of the food environment and its role in the health of children, as well as identifying potential policy solutions that may be developed as a result can be applied, with consideration for differences in context, to other cities across the country.

1.5 Research Questions

The study research questions are aimed at determining how food environments impact children's health, specifically related to dietary practices and obesity. The following research questions have guided our study as a whole but the results presented in this report will not answer all of them. Rather, the results presented will begin the characterization of the food environment in Saskatoon, and our future publications will go on to complete our answers to these questions:

1a. What is the geographical distribution of food stores and fast food restaurants in Saskatoon; How is this distribution related to neighbourhood demographic and socio-economic profiles?

1b. What are the differences in food environments, such as location of different types of food stores and food quality—in supermarkets and convenience stores, fast food and other restaurants-- between higher and lower socioeconomic status neighbourhoods in Saskatoon?

2. What is the relationship between quality of the food environment (as measured by the Nutrition Environment Measures Survey for Stores (NEMS-S) and the Nutrition Environment Measures Survey for Restaurants (NEMS-R)) available in Saskatoon neighbourhoods and the dietary intake and body weights of children aged 10-13 years living in those neighbourhoods?

3. How do children aged 10-13 years and their caregivers who live in neighbourhoods with different socio-economic profiles across Saskatoon perceive the availability, accessibility, and quality of food in their home neighbourhoods and in Saskatoon as a whole?

2.0 Research Design and Data Collection

2.1 Phase 1 – Mapping Food Environment in Saskatoon

Building on previous food access mapping work conducted by Public Health Services in the Saskatoon Health Region (29, 30), in the first phase of this study we built a database inventory and maps of all restaurants, grocery stores, convenience stores and specialty food store locations in Saskatoon. In addition, we added all elementary schools (from kindergarten to grade eight) in Saskatoon (n = 79) to these maps. Finally, we collected historical data on the location of grocery stores in Saskatoon over the last century in order to better understand how the locations of stores have changed over time.

Between November 2010 and February 2011, Geographic Information Systems (GIS) tools were used to geolocate all restaurants, grocery, convenience, and specialty food stores in the 70 neighbourhoods in the City of Saskatoon. In November 2010 we accessed a City of Saskatoon business licenses database from which we extracted listings for all food stores including grocery and convenience stores, and specialty food stores (such as bakeries, health food stores and ethnic markets). Excluded were stores that required membership, such as Costco. We also extracted listings for all restaurants that are open to the general public including fast food and sit down restaurants. We cross-checked the list from the business license database with information from the phone book. From this preliminary list, the research team, with their knowledge of the city gained from past neighbourhood-based built environments research, made updates to include food outlets that had been missed. The list of food outlets was later completed in February of 2011 when research assistants went into each neighbourhood to administer the Nutrition Environment Measures Survey for Stores (37) and the Nutrition Environment Measures Survey for Restaurants survey tools (38) (see research Phase 2 below). At that time, research assistants found that some convenience stores and restaurants had closed (these were removed from our list) while others had opened (or were otherwise not previously included on the list). We added additional food outlets to our list.

In order to add the locations of all elementary schools in Saskatoon to our maps, we started with a list of all schools (and their addresses) located within the boundaries of the City of Saskatoon from the Saskatoon Public Schools Division and Greater Saskatoon Catholic Schools websites. We did not include private schools in our analyses, but these make up fewer than 10% of schools. Using GIS, we geolocated all of the schools in order to include them on our maps. Elementary schools in Saskatoon include kindergarten to grade eight, and therefore children within our target age group of 10-13 years.



Saskatoon Elementary School

In addition, as part of the first phase of our research, we gathered information on the history of the geography of grocery stores in Saskatoon. We consulted the Henderson Directories in the Saskatoon Public Library Local History Room. The Henderson Directories were updated every year in person by trained agents from 1908 until 2000 (they were discontinued at that time) and contain names, addresses, occupations and business addresses of all residents. We used the “Grocery – Retail” category in the Henderson Directories at 5-year intervals from 1910 to 2000 to document the changing geography of grocery stores in the city. The “Grocery-Retail” category does not include gas stations, meat markets, specialty food stores, liquor stores, confectioneries, health supplement stores, and small pharmacies. The years 1944 to 1951 and 1957 to 1960 did not have any listings. The category listing was voluntary because businesses had to pay to include their business in each

category, so it may not always be a complete list. Each store listing was entered into an Excel spreadsheet and organized by address. The address of each business found in the directory was assigned to a neighbourhood using present day boundaries. The total number of grocery stores was then calculated for each neighbourhood.

2.2 Phase 2 – Characterizing Food Outlets in Saskatoon

In the second phase of our study, we conducted a census of the consumer food environments in all grocery, convenience and specialty food stores, except specialty stores that focus only on one type of food (e.g., butchers, bakeries, etc), and all restaurants in the 60 residential neighbourhoods and 10 non-residential neighbourhoods in Saskatoon, Saskatchewan, using the Nutrition Environment Measures Survey for Stores (NEMS-S) (37) and the Nutrition Environment Measures Survey for Restaurants (NEMS-R) (38) (please see Appendix A for copies of both tools).

NEMS-S and NEMS-R were originally developed for use in the United States. NEMS-S has been adapted for use in the Canadian context (see adaptation conducted by S Buhler in Appendix A). The Canadian version of NEMS-S reflects slight differences in the foods available and consumed in the Canadian context (in line with national food consumption data and Canada's Food Guide recommendations). Specifically, the adaptation includes a wider list of fruits and vegetables for assessment, as well as additional sections for canned and frozen produce. The original NEMS-R is already applicable to the Canadian context.

Two types of training were conducted: online training offered by the research team that developed the NEMS-S/R tools, followed by training on the Canadian adaption of NEMS-S. All research assistants participated in both the online training and the two-day in-person training in the administration of NEMS-S and NEMS-R in February 2011. This training was conducted by a co-investigator on the study (S. Buhler) who had previously been trained by the originators of the survey instruments and was responsible for adapting NEMS-S to the Canadian context. In addition, her own research includes the administration of NEMS-S in Edmonton. Quality control measures associated with training and subsequent data collection included ensuring test-retest and inter-rater reliability, as well as stringent supervision of data collection protocols.

Both in its original inception for use in the United States and in its Canadian adaptation, the NEMS-S tool has been tested and found to have very high inter-, intra-rater and test-retest reliability (37). The high reliability of the instrument and its adaptation to a Canadian context provide support for the construct validity of the associated measures. Furthermore, the instrument uses indicator foods that were selected based on authoritative guidelines and recommendations from both US and Canadian government sources, and as such the face validity of the measures has also been affirmed.

The process for administering the NEMS-S involves a trained researcher filling out a survey instrument in each food store based on a series of structured observations. The observer rates the following food categories: milk; fresh, frozen and canned fruits and vegetables; ground beef; hot dogs; frozen dinners; baked goods; beverages; chips and cereal (37). The researcher looks for healthier options for each food type, as well as the quantity and quality of those available in relation to the less healthy options. The measures based on these food categories focus on availability, quality and price of more healthful or recommended options.

The NEMS-R tool is also in current use in Canada. The NEMS-R observation instrument is designed to assess the relative healthfulness of foods and beverages available on the main menu and children's menus, with a focus on availability, facilitators and supports for healthful eating, barriers to healthful

eating, pricing, and signage (38). In this study we report on only the main menus because not all restaurants have children's menus. Research assistants visited each restaurant to confirm the restaurant type designation, collect a take-away menu, and conduct a site visit. If no paper menu was available, raters completed observations onsite based on posted menu boards. In addition, Internet information was also obtained for restaurants having websites. The measures based on the information collected from restaurants focus on the relative healthfulness of foods and beverages available.

Collection of NEMS-S/R data were followed by data cleaning and entry, composite score development and in-depth analysis. Composite "food environment quality" scores were calculated for each food store (grocery, convenience and specialty) using three dimensions: availability, quality and price, and for each restaurant using the dimensions availability, nutrition information and price.

2.3 Phase 3 – Dietary Assessment of Children in Saskatoon

To access and recruit elementary school-aged children (10-13 years) we followed the method used in the *Smart Cities, Healthy Kids: Built Environment* study which was also used in previous related studies (e.g., In Motion Research study, 2001-2006). In brief, with the partnerships already established with Saskatoon school divisions (Public and Catholic), we identified intact classes for recruitment with the help of the school divisions, and sent letters to the children's primary caregivers with an invitation to participate in the study.

In January 2012 we contacted 79 schools located in 46 neighbourhoods in order to request participation in the self-administered in-class survey phase of our study. Data collection occurred during class time in 43 schools located in 30 of 60 socio-economically diverse neighbourhoods across Saskatoon. The survey instrument included questions on sociodemographic characteristics and a food frequency questionnaire (FFQ) for dietary assessment (see Appendix A for the complete survey instrument). Research assistants also measured heights and weights of all children in order to calculate BMI and determine body weight status (39).

The development of valid and efficient dietary assessment tools for use with children is a key research priority for nutrition researchers and epidemiologists (40). But measuring food intake is a challenge in all population groups, and especially so in children, particularly when parents are not involved (41). The most common techniques used for dietary assessment in children are 24-hour food recalls, FFQs and diet records (42). Amongst other problems, diet records have significant respondent burden and cannot be conducted by most children on their own, while 24-recalls can also be a challenge for children to complete on their own and are not considered very accurate unless several are completed over time (40, 43).

Rather than food records and 24-hour recalls, FFQs are becoming the tools of choice in epidemiological studies with children where using a self-administered tool is the most feasible option (41, 43). A benefit of the FFQ is that it provides an estimate of 'usual dietary intake' (rather than intake in the past 24 hours) which is most relevant to the proposed research and the least problematic in this age group, although there are also problems associated with these tools related to variability in reporting of food intake (40, 44) and respondent burden (45).

In order to balance reliability and validity of the survey instrument and respondent burden, for our dietary assessment survey component we used the Canadian-adapted (46) Youth/Adolescent Questionnaire (YAQ) from the *Growing Up Today* study developed by researchers at Brigham and

Women's Hospital and the Harvard School of Public Health (43). Both the original and the Canadian version of the tool have been validated for use in evaluating the dietary adequacy of individuals and populations, and have been used multiple times in large-scale studies (40, 43, 46). The Canadian version uses Canadian language and Canadian food tables to translate reported food intake into nutrient intake.

The study research assistants were trained in how to properly complete the survey instrument, as well as how to answer the participants' questions using the guide to YAQ administration that was shared with us by research team member Dr. Paul Veugelers, whose team has been administering the questionnaire to thousands of children across Canada for a number of years. They were also instructed on how to accurately collect height and weight measurements.

The complete survey instrument was pre-tested with nine children between the ages of 10-13 years. After pre-testing, consent forms were sent home to all children in the sampled schools and the complete survey instrument was administered to children who returned the signed forms. The study participants self-administered the survey with help, where needed, from our research assistants. Surveys took between 20-60 minutes to complete. In addition, one by one, each of the participating children in a classroom were removed to an adjacent room where their height and weight were measured away from the view of the other children. Students' heights were measured standing without shoes, to the nearest 0.1-centimeter, and their weights, to the nearest 0.1 kilogram on calibrated digital scales.

2.4 Phase 4 – Perceptions of the Food Environment Interviews

This study recognizes the importance of how children and their caregivers perceive the food environment and how these perceptions, along with various other factors, influence food-related behaviours. Our intent in this phase of the study was to gather in-depth information on how individuals living within particular neighbourhoods view their food environments, in order to contextualize information on objective characteristics of the food environment. This included the spatial distribution of grocery and convenience stores and the quality and accessibility of healthy foods within them. As such, in the fourth and final phase of this study we conducted in-depth semi-structured interviews with parent-child dyads on their perceptions of the food environment in their home neighbourhood and in Saskatoon as a whole. In addition, we used photovoice, and finally, participant observation, to collect additional information on perceptions of the food environment in a smaller group of families.

Letters inviting participation in the qualitative phase were sent to 900 families who had a child or children who had participated in the dietary assessment. Families were invited based on the average income of their neighbourhood of residence and the NEMS score of their neighbourhood of residence. When parents responded to our request, confirmed their neighbourhood of residence and which school their child attended, we also asked whether or not they owned a vehicle. We then sampled families using maximum variation purposeful sampling (47) to participate in interviews based on who responded to our request with the goal of maximizing diversity by neighbourhood of residence socio-economic characteristics, and including families who did not own a vehicle. There was only two families without a vehicle who responded to our request for interviews.

Parents and children participated separately in qualitative semi-structured interviews (between 30-90 minutes in length for parents, and 20-60 minutes for children) to provide in-depth data on the perceived food environments in their neighbourhood of residence and in Saskatoon as a whole. Perceiving is a process of attaining awareness or understanding of sensory information (48). When

people perceive, they are internalizing what is observable to them within their environment. In the context of this study, we wanted to understand how caregivers and children living within particular neighbourhoods in Saskatoon perceive the aspects of the built environment around them that impact on food choice (for caregivers, how they provide food for their children, and for children how they feed themselves).

Interviews were conducted separately for children and their parents, in each participant's home. Questions focused on individual perceptions of the food environment and beliefs about how various aspects of that environment influence the children's eating patterns. Adults were asked, for example, about their grocery shopping habits, and how and why they purchase food the way they do. They were asked about the food available in their neighbourhood and in the city as a whole in stores and restaurants, and their perceptions of its quality and accessibility. The children's interviews focused on where the children get the food they eat, whether from in the home or outside, the types of food they purchase on their own or consume through meal programs at school, and their perceptions of the ease (or lack thereof) with which they are able to acquire different types of foods (see Appendix A for the parent and child interview guides). All interviews with both children and caregivers were tape-recorded and transcribed verbatim, then returned to participants along with a transcript release form which needed to be signed in order to be included in our analysis.

In addition, a sub-group of the families who participated in semi-structured interviews was asked to photograph (using digital cameras) aspects of their neighbourhood and the City as a whole that they perceive influence their food-related behaviour, followed by a second interview to discuss their photographs. We sampled this group of participants based on their responses in their interviews in order to seek out maximum variation once again. Specifically, the two researchers who conducted almost all of the interviews, and had read all of the transcripts, were each asked to independently make a list of the ten households they thought would best represent a wide range of perceptions of the food environment in Saskatoon through photovoice, and then to compare them and come to agreement on which households to invite to participate.

Photovoice is a qualitative data collection method that uses photographs to convey information and experiences not always easily documented using traditional interview methods (49-51). It also gives participants a central role in data collection as they choose how to convey their experience using the images that have meaning to them. Participants are given cameras and asked to take photographs that represent an aspect of their life experiences. Given that accessing food and eating are tacit activities that are embedded in day-to-day life and can therefore be difficult to describe (52, 53), we chose photography as a method to help uncover aspects of the experience that might not be otherwise easily explained.

Caregiver participants received basic instruction on how to use their camera and how to take photographs, as well a list of questions that could be answered through photographs (see Appendix A for the guide participants were given along with their camera). About two weeks after being given their camera, we scheduled another set of interviews with caregivers to examine the photographs and have them explain their choice of images to represent the influences of the built environment on their family's eating. These interviews were tape-recorded and transcribed verbatim for subsequent analysis.

Finally, in order to gather some additional, very in-depth information on how families with children experience their food environment, we selected four of the ten households who had participated in the photovoice data collection to be observed by one of our researchers as they conducted a major shopping trip. One participant who did not own a vehicle was included, as well as four other families

with quite different described shopping practices. This researcher went to the home of each participant prior to the shopping trip and accompanied them as they travelled to the store, conducted their shopping, and then as they travelled home with their groceries. The researcher took brief field notes throughout this process, then additional more in-depth ones upon completion of the shopping trip. In addition, she took a digital tape recorder with her and recorded her questions to the participant, as well as the participant's answers. The digital recordings were transcribed verbatim and were combined with the field notes for qualitative analysis.

3.0 Descriptive Data Analysis and Results

The analyses and results we will focus on in this report include describing the community and consumer food environments in Saskatoon, as described by Glanz et al (13), followed by descriptive results from our dietary assessment and height and weight measurement of children. First, we will describe the locations of all food procurement locations by type including all restaurants, and grocery, convenience and specialty food stores (community food environment). This will be followed by reporting on the consumer food environments within each of these locations (conducted using NEMS-S/R), and then by neighbourhood demographic and design type characteristics. Second, we will describe the accessibility of these food procurement locations to children in elementary schools. Third, we will report on the historical development of grocery stores across Saskatoon. Fourth, we will describe the self-reported dietary intake of children aged 10-14 years in Saskatoon, as well as their measured height and weight. We will not report on the qualitative data collected as part of this study.

3.1 Community Nutrition Environments in Saskatoon

In the first phase of our research we completed an inventory and maps of all food stores (grocery, convenience, specialty) and restaurants in Saskatoon's 60 residential neighbourhoods. We then calculated the total number of grocery stores (n = 24), convenience stores (n = 92) and fast food restaurants and chain coffee shops (n = 201) and all other restaurants (n = 244). Figure 2A is a map of Saskatoon's residential neighbourhoods and the locations of all small and large scale supermarkets, along with 500 and 750 metre road network buffers around each store to demonstrate a typical 10-15 walking catchment area around each store. This approach to creating buffer zones is considered to be more accurate than drawing a circle around a location indicating a distance because it reflects an actual walking, cycling or driving route a person might take to reach a location.

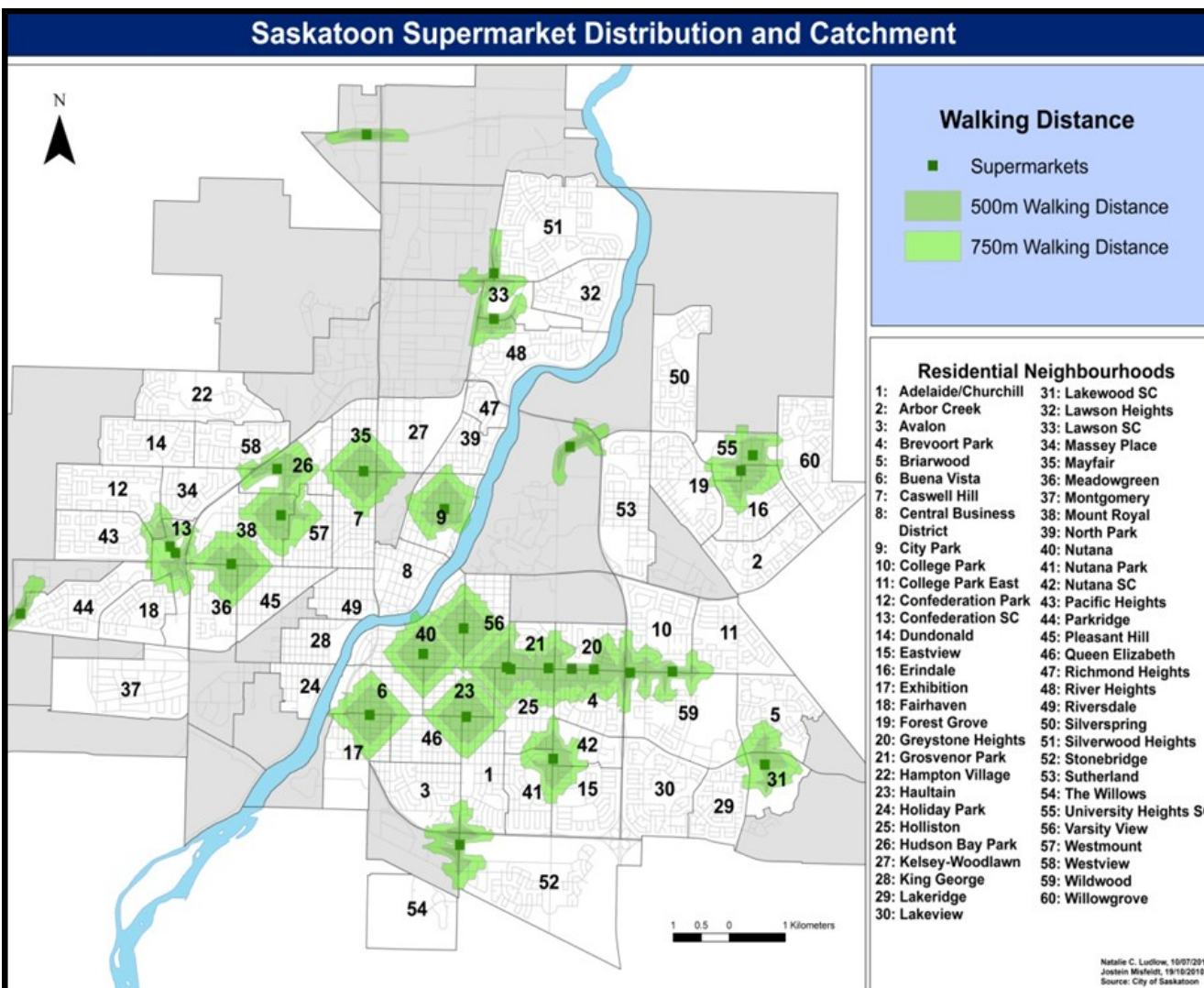


Left: Saskatoon Farmers' Market, downtown



Right: At a Saskatoon Fruit Stand on 8th Street

Figure 2A: Locations of Supermarkets* in Saskatoon



*Supermarkets are stores that carry a full range of foods.



Shopping at a small, local Saskatoon grocery store.



Figure 2B includes the locations of all convenience stores in Saskatoon, and in Figure 2C you will find a map of the locations of all fast food restaurants, again with 500 and 750m road network buffers around each of these. We have not included maps of all other restaurants, because that map would have so many points on it that it would be difficult to interpret. In addition, convenience stores, fast food restaurants and chain coffee shops are food sources that contain food at a price point that is within the reach of children and are considered to be unhealthy food sources (54, 55).

Figure 2B: Locations of Convenience Stores in Saskatoon

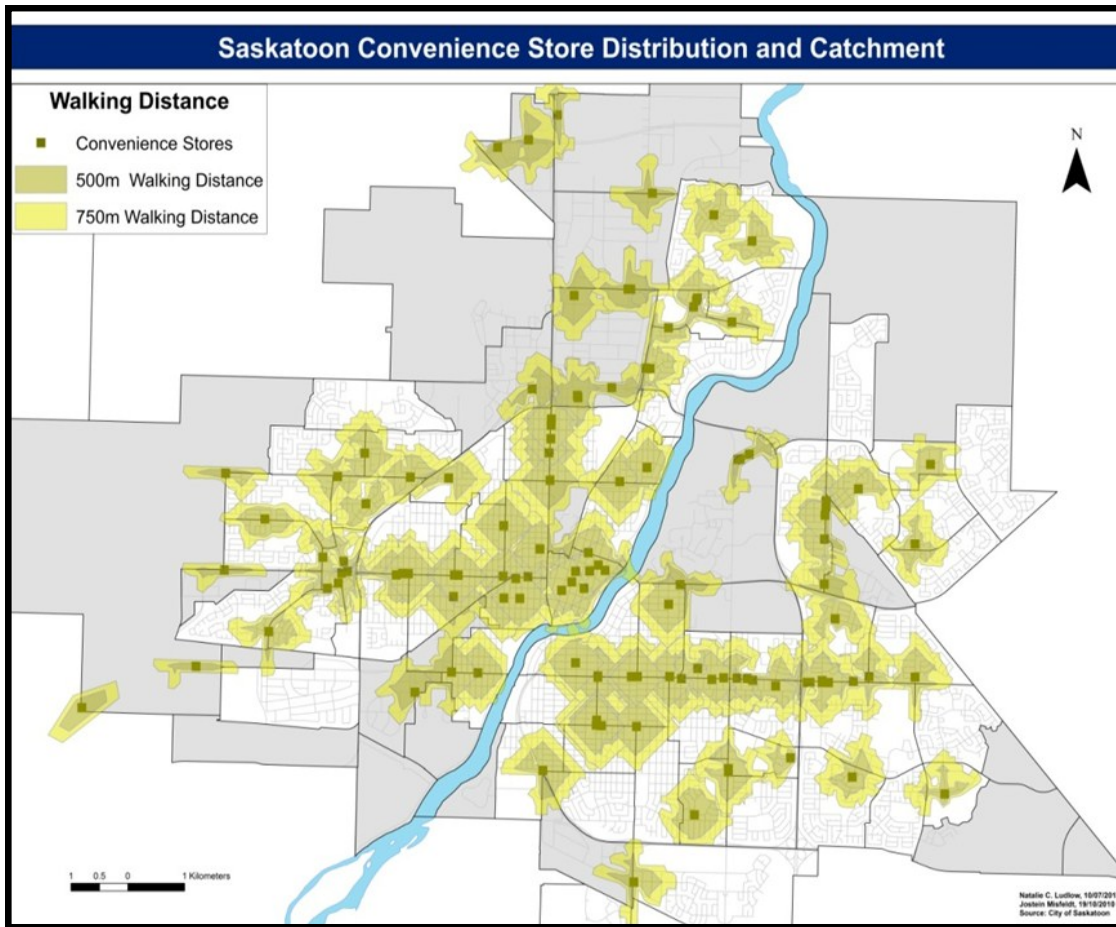
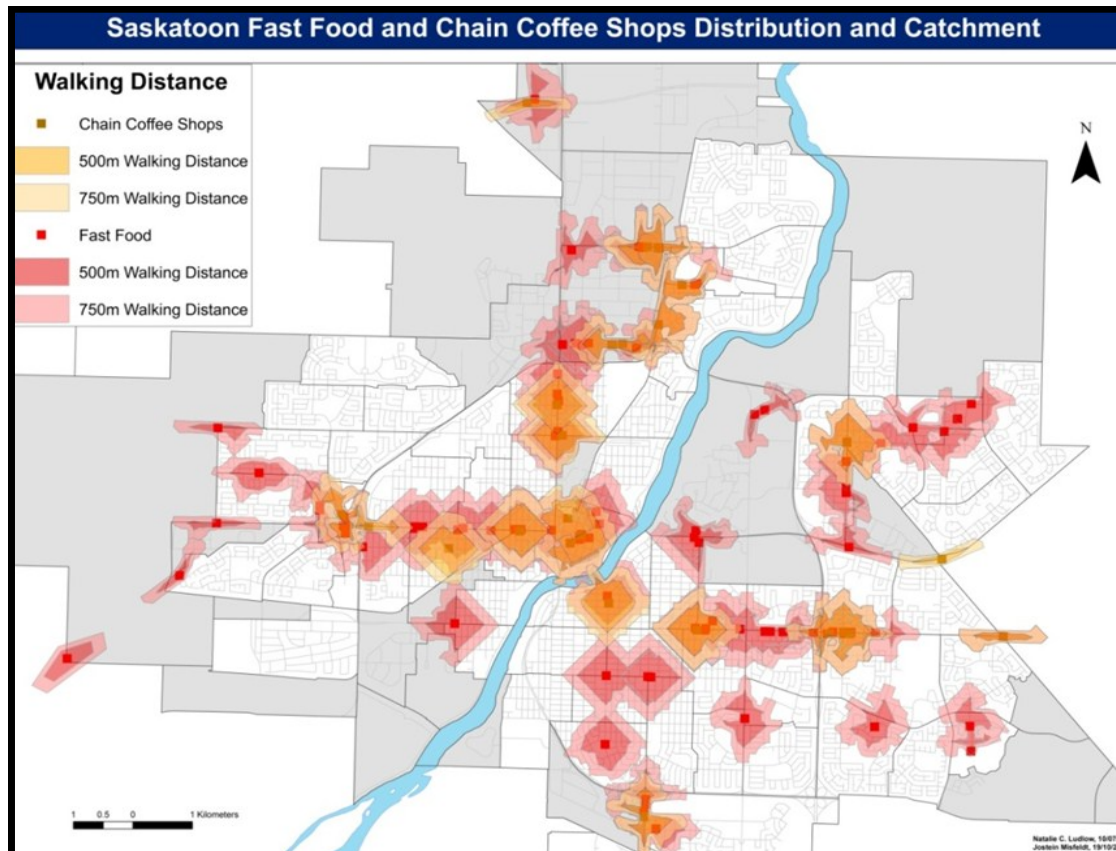


Figure 2C: Locations of Fast Food Restaurants and Chain Coffee Shops in Saskatoon



3.2 Consumer Nutrition Environments in Saskatoon

Grocery and convenience stores were assessed for their in-store offerings using NEMS-S, a survey instrument completed by a trained rater on a series of structured observations. A composite score from each food category was used to assess the overall “healthfulness” of a store - a higher score indicated a wider variety of healthy options at prices either equal to, or lower than, less healthy options within a comparable category. Mean scores were then calculated for each neighbourhood and are presented in Figure 3A below, as well as in TABLE B1: Saskatoon Neighbourhood-level NEMS-S Scores in Appendix B, ordered by proportion of low income.

Food store-specific data (neighbourhood mean NEMS-S scores) are presented below. Figure 3A illustrates the mean NEMS-S scores by neighbourhood. Figure 3B shows the neighbourhoods with the lowest half of NEMS-S scores, divided according to the neighbourhoods with the highest and lowest proportion of low income.



Saskatoon Restaurants on 8th Street

Figure 3A: Food Store Scores in Saskatoon Residential Neighbourhoods

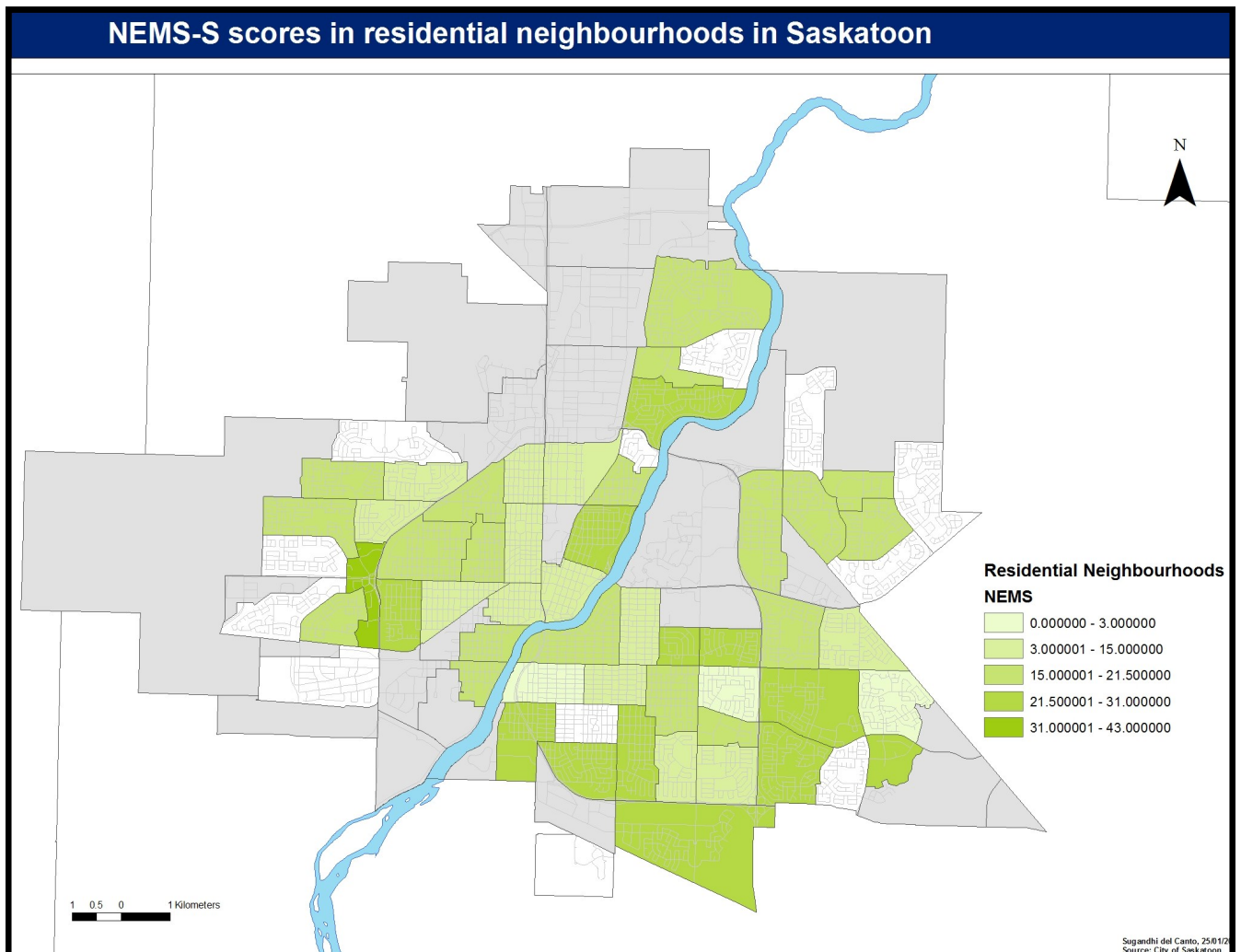


Figure 3B: Highest and Lowest Income Neighbourhoods with the Lowest Food Store Scores

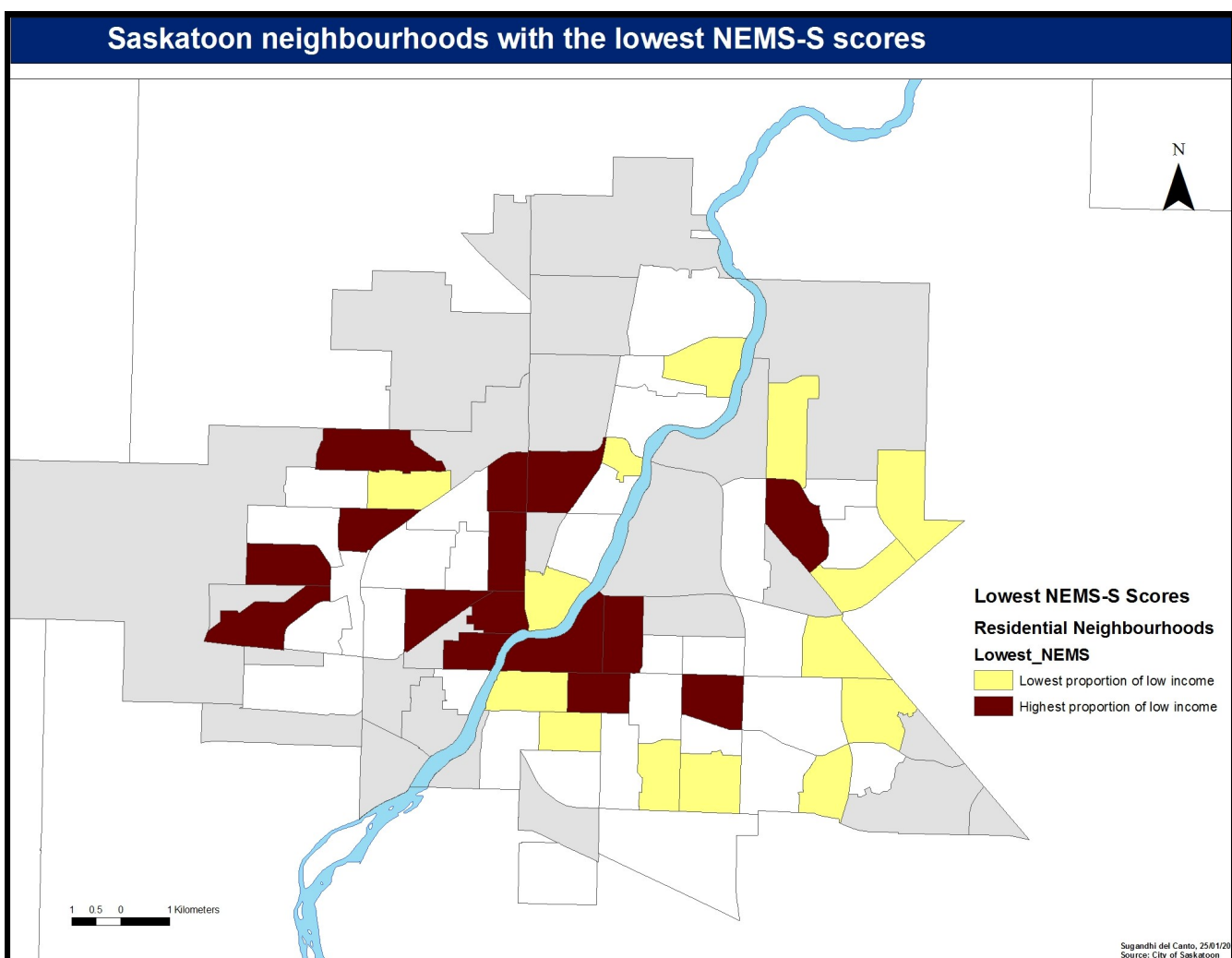


Table 1 indicates the proportional distribution of grocery and convenience stores in neighbourhoods of differing proportions of low income (based on 2005 prevalence of low income families before tax, Statistics Canada).

Table 1 also highlights fresh and frozen fruit and vegetable access according to parameters of availability and price. Data gathered during store audits were used to calculate mean availability and price of 16 fruit and 16 vegetable varieties available within the 24 grocery stores across 18 residential neighbourhoods. A median split of mean fruit and vegetable offerings was used to classify stores as having *high* or *low* availability. Data were also collected on the price per kilogram, or the price per item, for 32 individually-priced produce items within each store. The mean price for each fruit and vegetable item across all stores was calculated. For each item available within a store, the cost difference between that item and the overall mean price for that item across all stores was calculated. This 'mean difference' was summed for all items in a store and divided by the number of items available, resulting in a single price figure for each store. This single price figure was used to classify the "price" of fruit and vegetables for each store. Those stores with fruit and vegetables priced at or below the average for all stores were classified as *inexpensive*, and stores with fruit and vegetables priced above average were classified as *expensive*. These findings are shown in Table 1.



Table 1: Food Store Score Summary

Neighbourhoods	No. of food stores	No. of grocery stores (%)	No. of convenience stores	FV Price	FV Availability
All	115	24 (20)	92 (80)		
Lowest proportion of low income	32	6 (19)	26 (81)	High	High
Middle proportion of low income	37	10 (27)	27 (73)	High	High
Highest proportion of low income	46	7 (15)	39 (85)	Low	Low

Similar to NEMS-S, NEMS-R is an observational measure developed to assess factors believed to contribute to food choices in restaurants, including availability of healthy foods, facilitators and barriers to healthful eating, and pricing of healthy and unhealthy foods. NEMS-R developed standard protocols for completing evaluations by trained raters. A composite score ranging from -27 to 63 for each restaurant was calculated by summing the scores for each of the assessed categories. Points were awarded for availability of nutrition information and healthful options, whereas points were removed for barriers to healthful eating. Mean NEMS-R scores were calculated for each residential neighbourhood and are presented in figure 3C below, as well as in Table B2: Saskatoon Neighbourhood-level NEMS-R Scores (see Appendix).

Figure 3C: NEMS-R scores in Saskatoon Residential Neighbourhoods

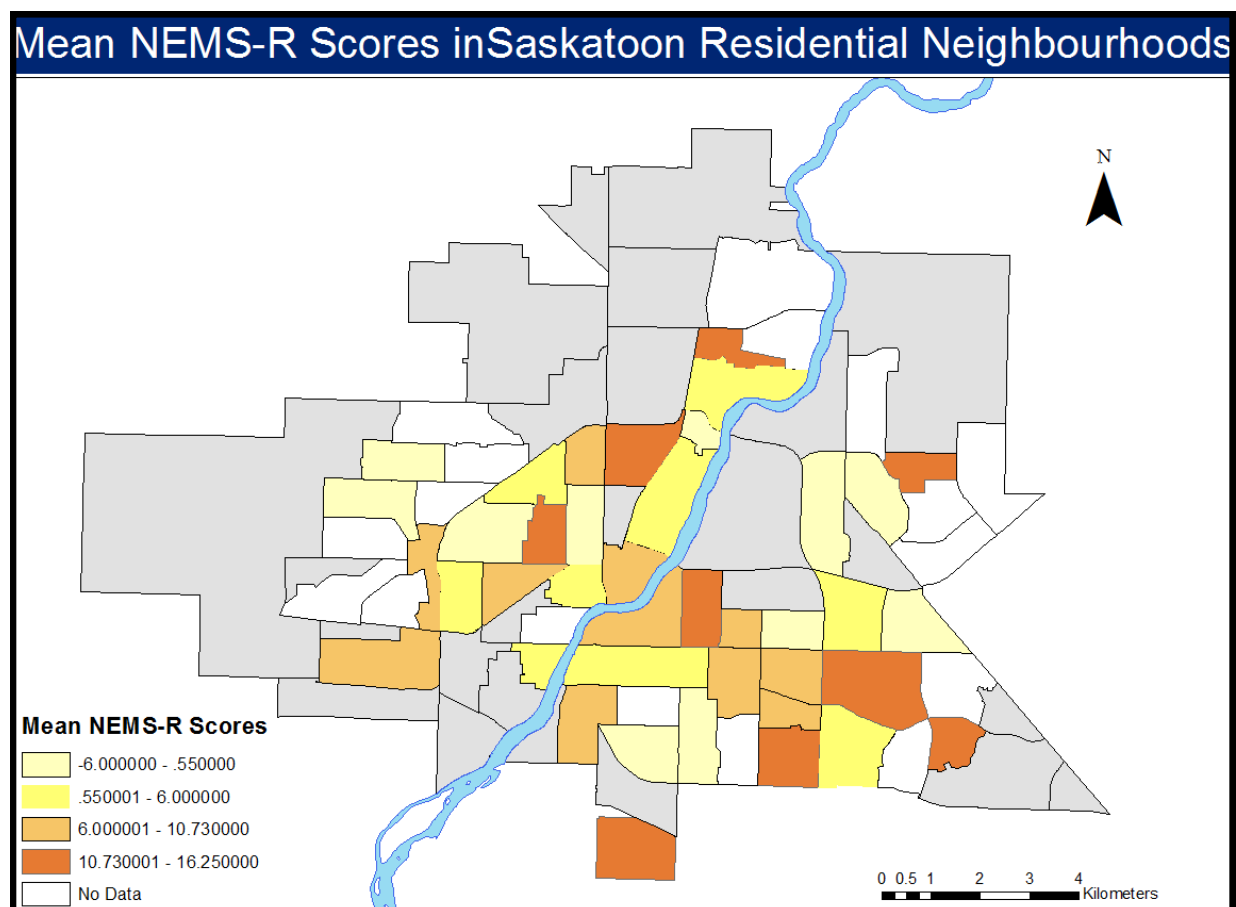


Table 2 below presents the proportional distribution of restaurants classified into 9 detailed categories (1-sit-down restaurants, 2-coffee shops, 3-fast food restaurants) in residential neighbourhoods, which were grouped into tertiles of high, mid and low-distress levels based on the proportion of low-income families (see Figure X1). Pearson Chi-Square test determined a significant difference in the distribution of restaurants assessed by neighbourhood distress level ($p=0.036$; Chi-Square value=27.249, $df=16$). Among them, high-distress neighbourhoods had more chain coffee shops (6%), and pizza fast-food restaurants (12%); whereas low-distress neighbourhoods had more high-end sit down restaurants (11%) and pita and sandwich fast food (15%).

Figure 3D also illustrates the distribution of restaurants by highlighting chain coffee shops and different types of fast food across Saskatoon neighbourhoods.

Table 2: Number of restaurant types summary

Neighbourhood distress	Regular - sit-down	High-end - sit-down	Cafeteria - sit-down	Chain - coffee shop	Other - coffee shop	Burger & Chicken	Pita & Sandwich	Pizza	Ethnic Fast Food
All	147 (43%)	20(6%)	11(3%)	14 (4%)	16 (5%)	38 (11%)	38(11%)	32 (9%)	28(8%)
Lowest proportion of low income	41(35%)	13(11%)	2(2%)	4(3%)	8(7%)	12 (10%)	17(15%)	9(8%)	11(9%)
Middle proportion of low income	39(42%)	6(7%)	5(5%)	2(2%)	5(5%)	10 (11%)	9(10%)	7(8%)	9(10%)
Highest proportion of low income	67(55%)	1(1%)	4(3%)	8(6%)	3(2%)	16 (12%)	12(9%)	16 (12%)	8(6%)

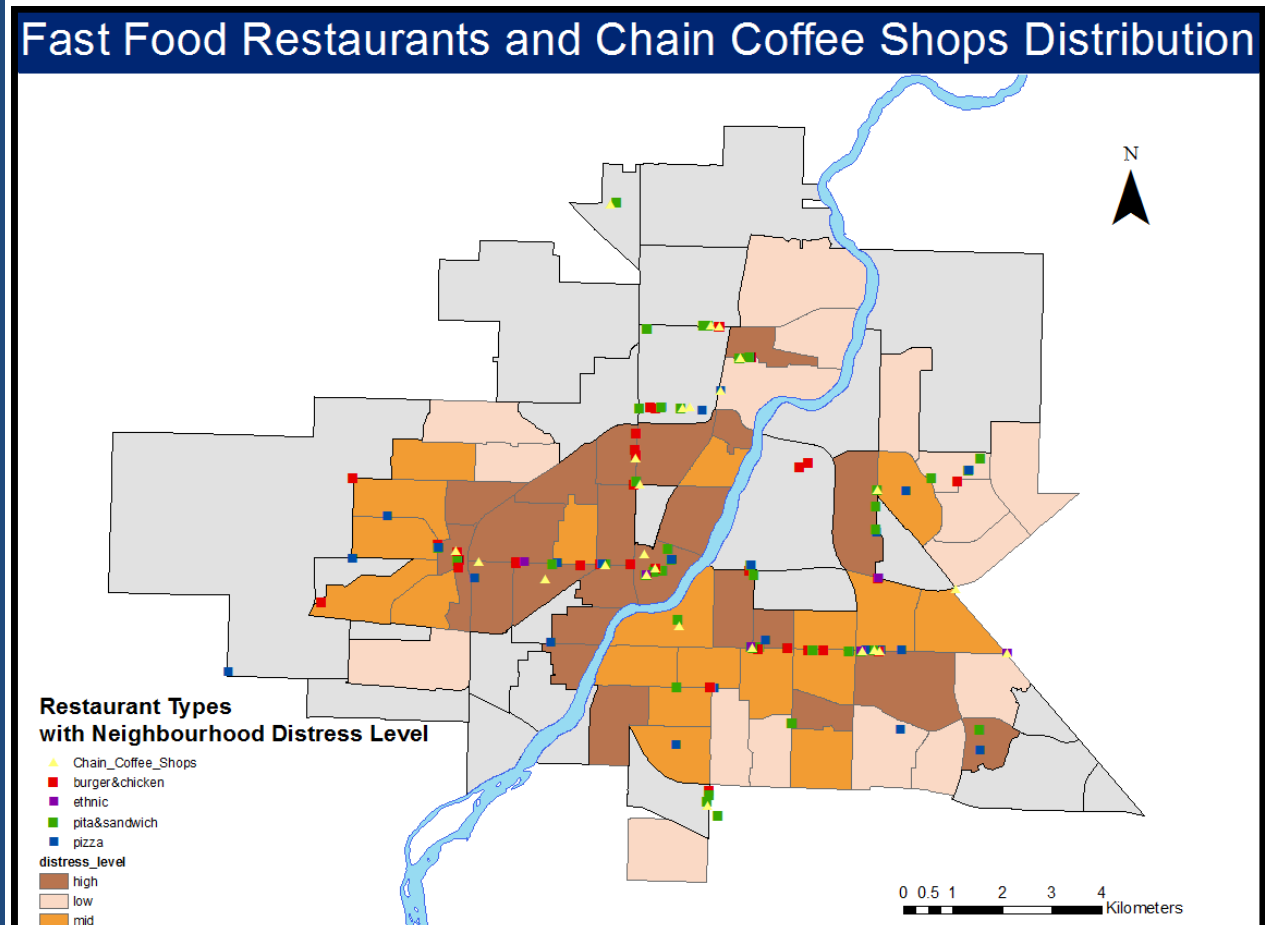


Left: Saskatoon Bus Stop Restaurant, downtown.

Right: Garlic Guru, Saskatoon Farmers' market



Figure 3D: Saskatoon Fast Food and Chain Coffee Shops Distribution by Neighbourhood Distress Level



In order to calculate NEMS-R scores, each item from the survey was rated with a score of zero for no and 1 for yes. For example, if the restaurant had nutrition information available, 1 was entered into the column. After assigning zeros and 1s to each item, a percentage total was tabulated for all restaurants. Then we created a composite score for each neighbourhood based on the mean score in all restaurants across each neighbourhood. The scores are listed in Table 3 below, with neighbourhoods categorized by proportion of low-income families. Pearsons Chi-square statistic was used to assess significance in distribution between neighbourhood distress levels for each NEMS-R item. Overall, there is no significant difference in the NEMS-R items across the neighbourhood distress levels (see Table 3 below).



Left:
Saskatoon
Fast Food
Restaurant



Right: Sit-
Down
Restaurant

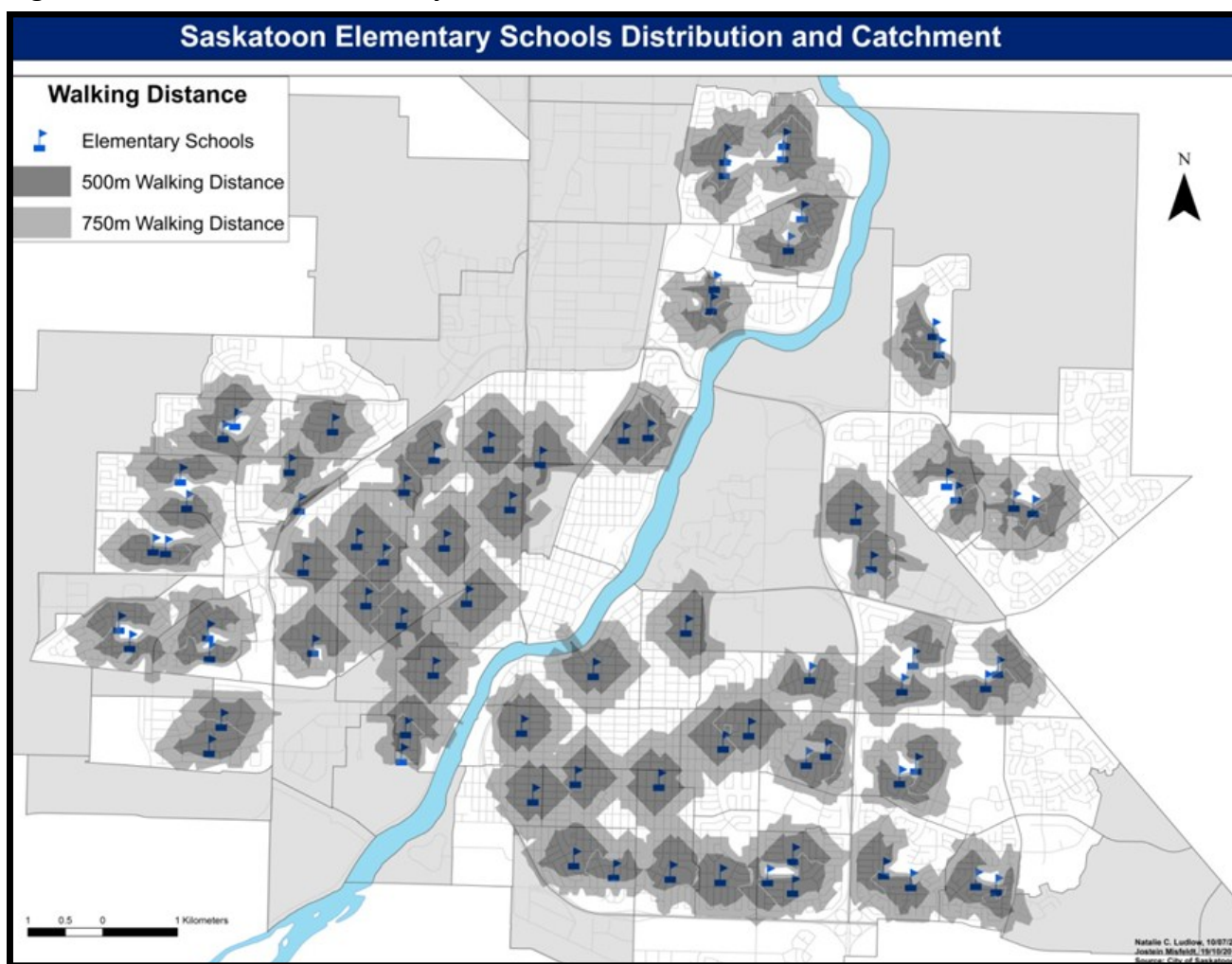
Table 3: Characteristics of restaurant food environment by neighbourhood distress level

NEMS-r item	High-distress (low-income family proportion ≥ 10%, n=135)	Mid-distress (low-income family proportion=4.8% -10%, n=92)	Low-distress (low-income family proportion < 4.8%, n=117)	p-value
% Available				
Healthy Entrees				
a. Main dishes/entrees: Healthy Options	24	23	26	0.600
b. Main dish salads: Healthy Options	7	12	13	0.535
c. Low-fat or fat free salad dressings	13	12	16	0.263
Healthy Side Dished				
a. Fruit w/o added sugar	4	12	15	0.272
b. Non-fried side of vegetables	19	20	23	0.229
c. Baked Chips	5	7	7	0.540
d. Whole Grain bread	30	33	38	0.703
Healthy Beverages				
a. 100% fruit juice	76	90	83	0.337
b. 1% low-fat, skim or non-fat milk	9	10	11	0.515
c. Diet Soda	95	93	94	0.481
Facilitators				
a. Nutrition Info	19	21	18	0.505
b. Sign Healthy choices	12	12	15	0.604
c. Reduced-size portions offered on menu	12	16	12	0.602
Barriers				
a. Super-sizing, large sizes encouraged	39	33	27	0.592
b. Menus discourages special requests	7	7	9	0.593
c. All-you can eat or unlimited trips	9	5	3	0.646
e. Signs encourage unhealthy eating	41	35	23	0.475
f. Signs/banners encourage overeating	39	29	21	0.542
g. Low carb promotion	1	1	1	0.455
Pricing				
a. Combo meal cheaper than individual items (sum= "more")	73	62	51	0.602
b. Healthy entrees cost more than regular ones	0	0	0	NA
c. Charge for shared entrée	1	2	0	0.489
d. Smaller portion at reduced \$\$	14	14	13	0.346

3.3 Food Environments Around Elementary Schools in Saskatoon

Similar to the method chosen by Robitaille et al (56), we also created walking zone buffers of 750m (or about 15 minutes walking distance) around each geolocated elementary school (n = 78) to reflect destinations within a reasonable walking distance during a student’s lunch period or after school (see Figure 4A). These buffers were created along road networks to reflect actual paths that can be walked from the schools. First, the schools are geolocated on the map, then using the road networks we calculated the time needed to walk along each stretch of road based on an average walking speed of 4km/hour. We used the Network Analyst extension of ArcGIS 10.1 and Service Area analysis to combine the location of schools and the time needed to travel the stretches of road on foot (57). By using the software in this way, we could specify the size of buffer zones to create, in our case, 500 and 750 metres. The software then computes all possible routes starting from each school in order to create the buffer zones.

Figure 4A: Locations of Elementary Schools in Saskatoon Road Network Catchments



Accessibility to unhealthy food sources from elementary schools by neighbourhood income level

Next we calculated the number of grocery and convenience stores and fast-food restaurants located within the buffer zones created around each school. We calculated the number of schools with and without each food outlet type and the proportion of schools with and without each type (see Table B3 in Appendix B). There were a total of 10 schools (12.8%) located within a 750m walking distance of a

grocery store. We found 38 schools (48.7%) within a 750m walking distance of at least one convenience store and 21 schools (26.9%) within a 750m walking distance of at least one fast-food restaurant. All together, across the city, 40 elementary schools (51.3%) were located within walking distance of at least one fast food restaurant or convenience store. There were a total of 10 schools located within a 750m (15 minute) walking distance of a grocery store.

Next, similar to Kestens and Daniel (2010), we examined the proportion of elementary schools that are within walking distance of healthy or unhealthy food outlets in the highest and lowest income quartile of neighbourhoods. Of the 21 elementary schools within the lowest income quartile neighbourhoods 15 (or 71.4%) are located within walking distance of a fast food restaurant or a convenience store. In addition, seven of these 21 schools (33.3%) are located within walking distance of multiple fast food restaurants or convenience stores (unhealthy food outlets). In contrast, of the 17 elementary schools within highest income quartile neighbourhoods, only six of these (35.3%) have a fast food restaurant or convenience store within walking distance; further, none have more than one of these unhealthy food outlets within walking distance.



Figure 4B: Elementary School Locations and Distribution of Food Sources in the West of Saskatoon

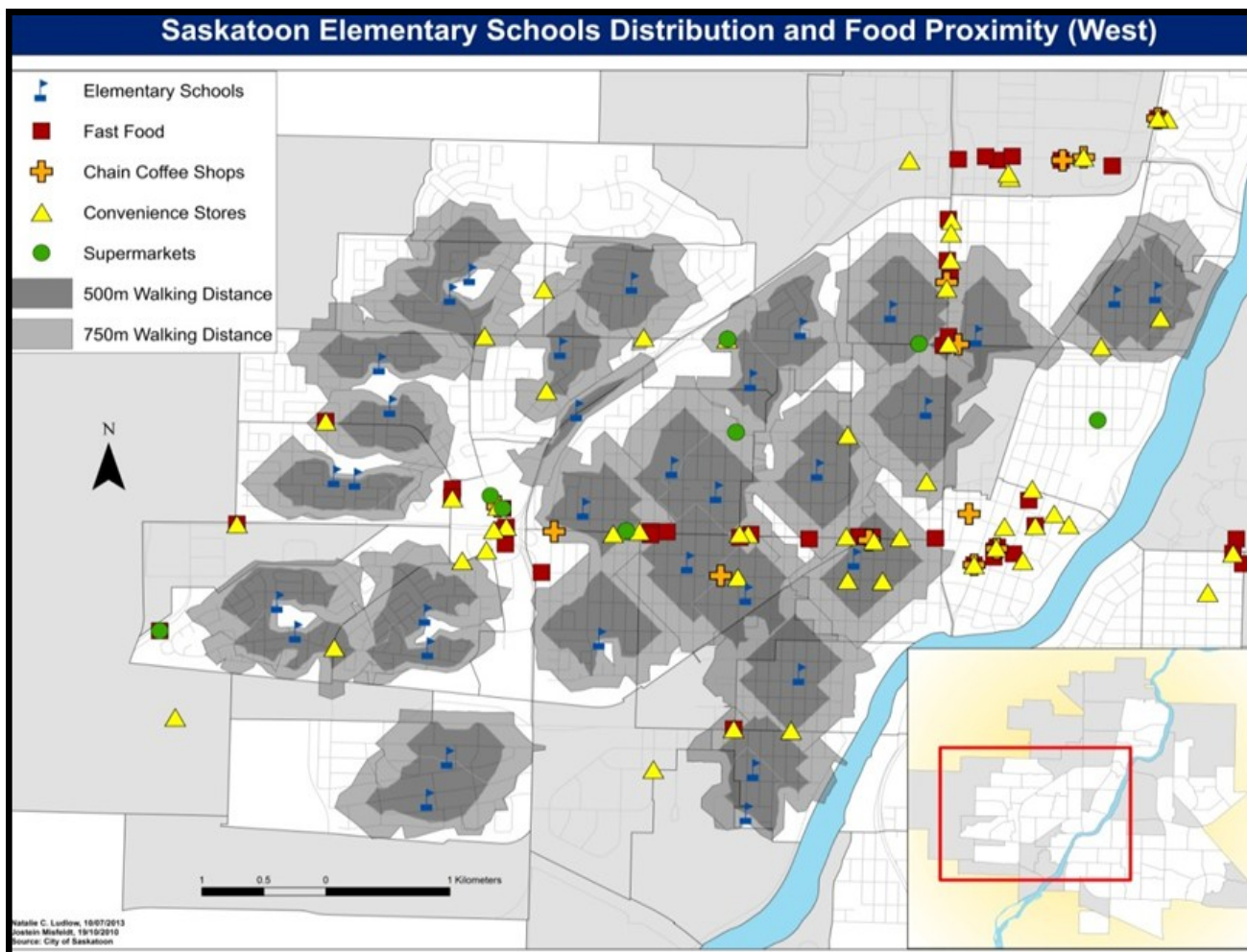


Figure 4C: Elementary School Locations and Distribution of Food Sources in the North East part of Saskatoon

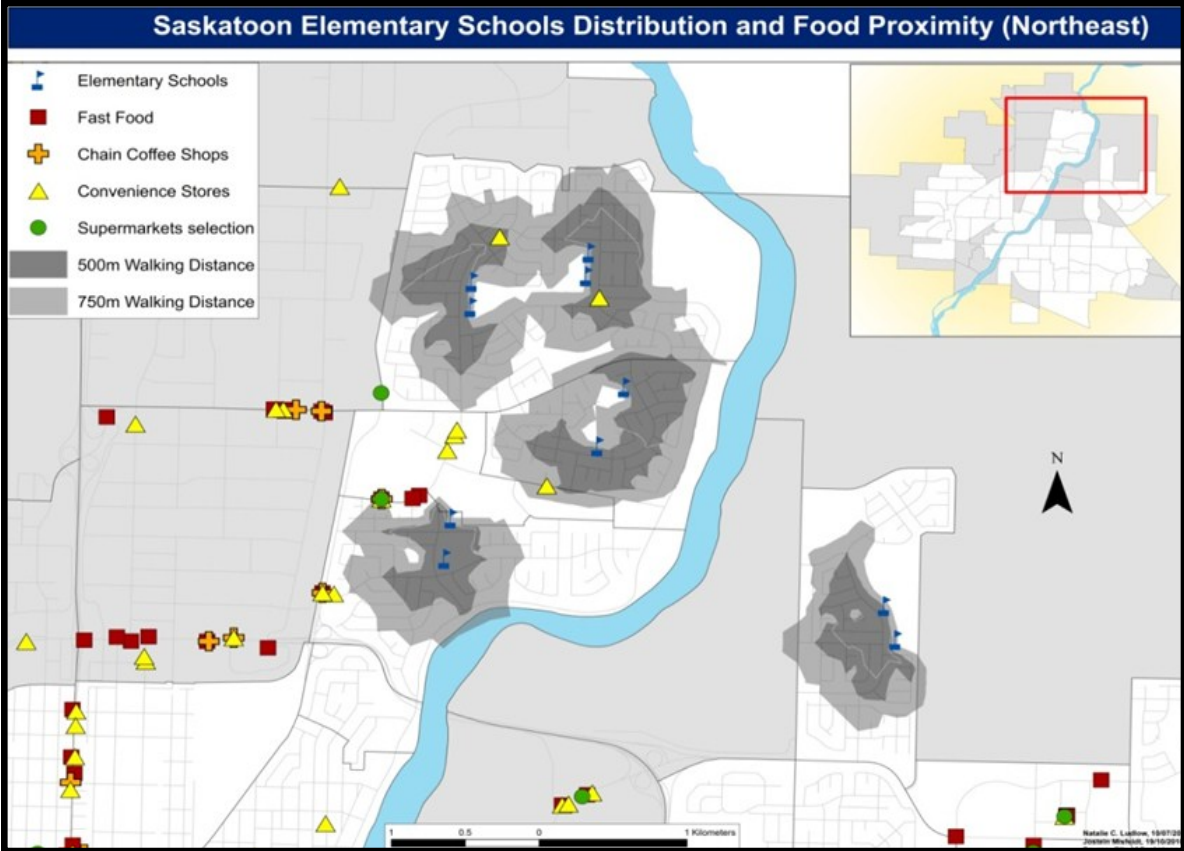
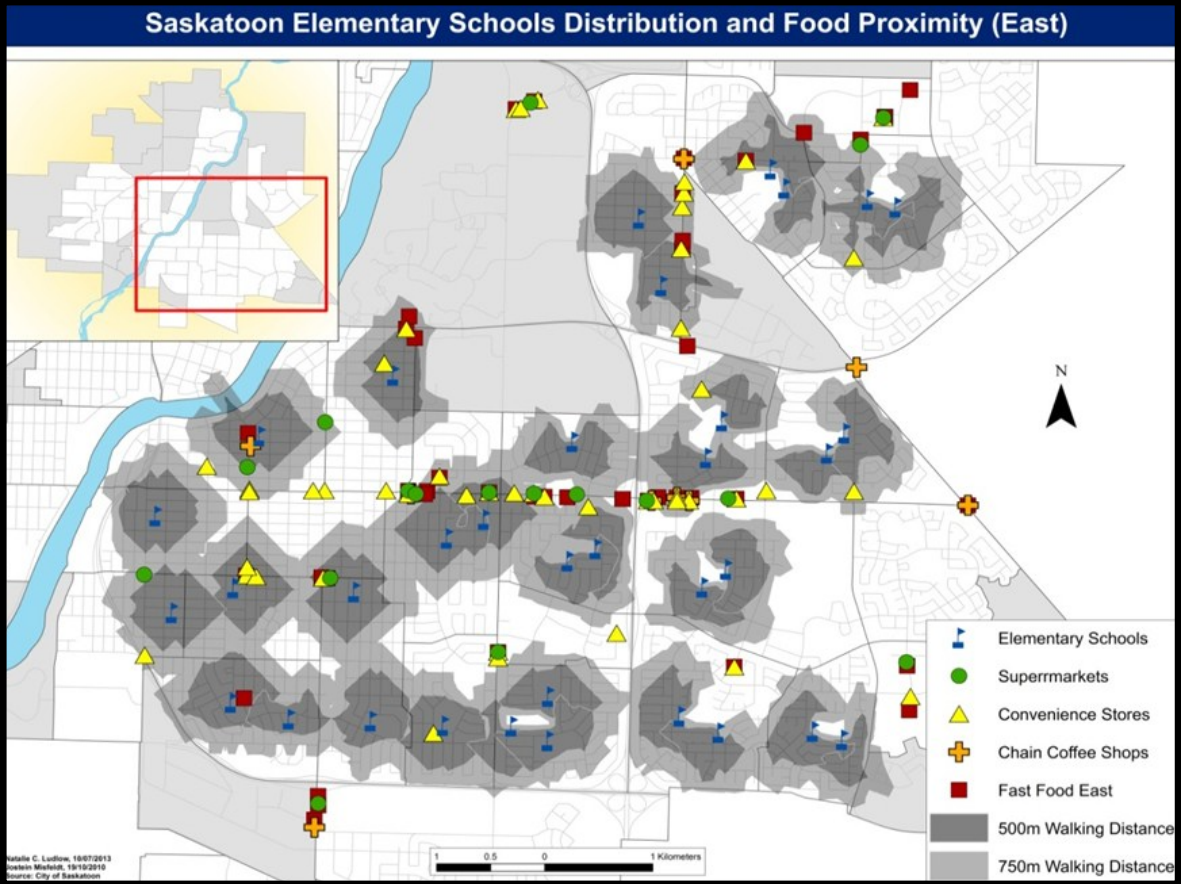


Figure 4D: Elementary School Locations and Distribution of Food Sources in the East of Saskatoon



3.4 Historical Development of Grocery Stores in Saskatoon

In Table 4 we present historical data showing the growth in the population in Saskatoon from 1910-2000, the changes in number of grocery stores in the core and suburban neighbourhoods and the population per grocery store during that same period.

Table 4: Number of Grocery Stores

Year	City Population	Total Grocery Stores	Core Total Grocery Stores	Suburb Total Grocery Stores	Population/ Grocery Store
1910	12004	20	20	0	600.2
1915	21054	57	53	4	369.3684211
1920	25739	79	73	6	325.8101266
1925	31234	77	67	10	405.6363636
1930	43291	96	80	16	450.9479167
1935	41734	108	89	19	386.4259259
1940	43027	95	80	15	452.9157895
1945	46028	85	72	13	541.5058824
1952	53268	99	75	24	538.0606061
1961	95526	95	66	29	1005.536842
1965	115247	105	69	36	1097.590476
1970	126450	97	57	40	1303.608247
1975	133750	74	41	33	1807.432432
1980	154210	64	32	32	2409.53125
1985	177641	83	38	45	2140.253012
1990	186058	81	33	48	2297.012346
1995	193647	71	24	47	2727.422535
2000	196811	57	19	38	3452.824561

Figure 5A is a graph titled Population and Grocery Stores. It shows how the number of grocery stores in the city based on listings in the Henderson Directories changed as the population grew. Up until the mid-1930s, the number of grocery stores increased quickly - in fact, more quickly than the population was increasing at the time. Then, as the number of grocery stores stayed at about the same level for the next thirty years, the population continued to grow, such that there were somewhat fewer stores per capita. In the latter part of the 1960s, the number of stores began to decrease until the late 1970s when the two lines on the graph cross and the number of stores continued to decrease even as the population continued to grow. For the next two decades until the Henderson directory data collection was discontinued, the number of grocery stores continued to decrease. The decrease in number of stores per capita that started slowly in the late 1930s and then sped up in the late 1970s likely reflects an increasing tendency in the growth in size of individual grocery stores (58).

Figure 5B illustrates the number of grocery stores in all core neighbourhoods versus all suburban neighbourhoods from 1910 until 2000. Initially, there were no stores in the suburban areas because those areas of the city had not yet been developed. Then, as suburbs were developed over time, the number of grocery stores within them increased. In the core neighbourhoods of the city the number

of grocery stores increased over time until peaking in the mid-1930s. At that time the number of stores in the core neighbourhoods began to decrease slowly until the late 1960s when they began to drop off precipitously. By the early 1980s the two lines on the graph intersect and the number of grocery stores in the suburbs overtakes the number in the core neighbourhoods. This trend continued (albeit less drastically) until 2000 when Henderson Directory information stopped being collected.

Figure 5A: Saskatoon Population and Number of Grocery Stores Over Time

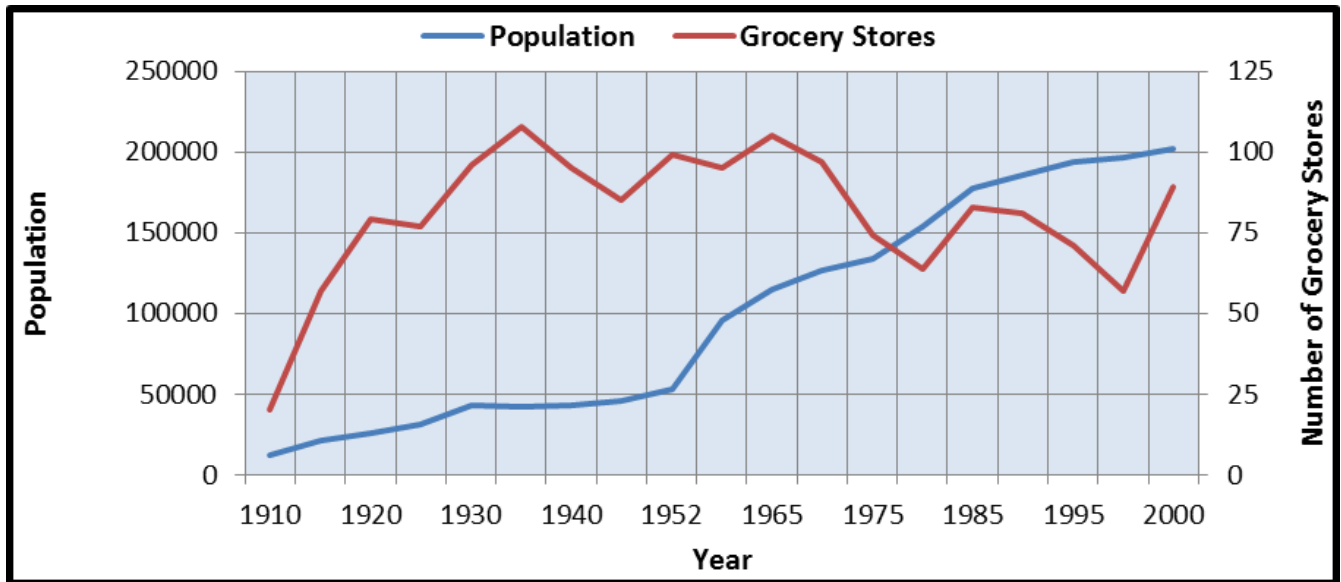
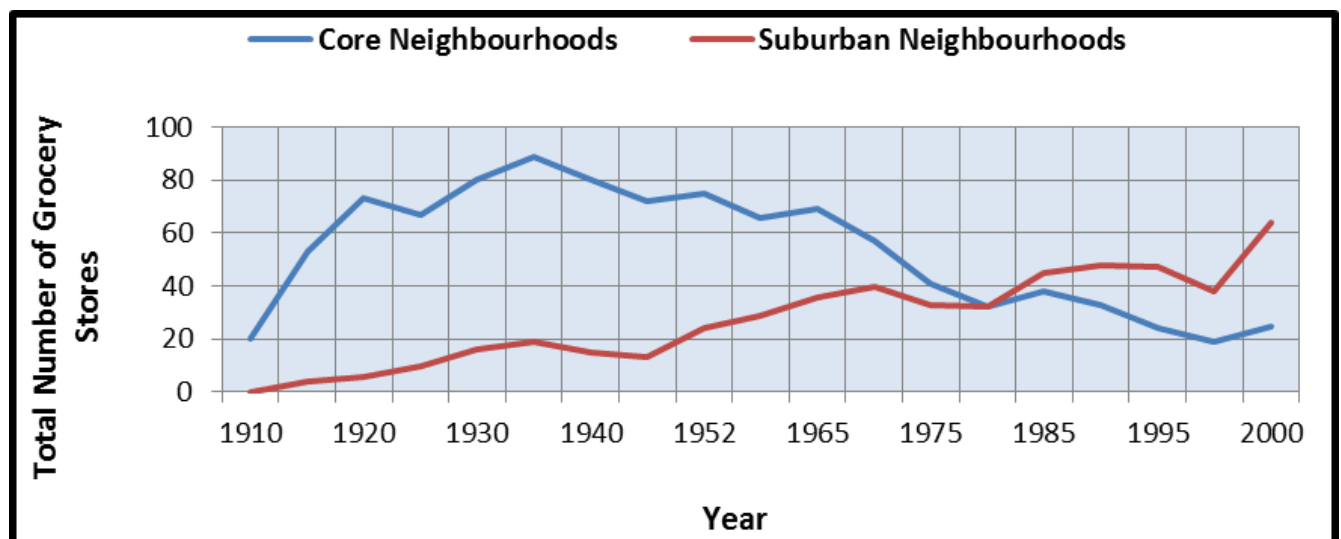


Figure 5B: Number of Grocery Stores in Core and Suburban Neighbourhoods Over Time



3.5 Self-Reported Dietary Intake and BMI Measurement of Children Aged 10-14 Years in Saskatoon

Forty-three out of 79 schools in 30 neighbourhoods were willing to participate in the dietary assessment and BMI phase of the study. In total, we contacted 4991 children in those 43 schools enrolled in grades five to eight. We received permission for participation for a total of 1469 children. Demographic and Diet data were collected in March and April 2012 from 1469 children aged 10-14 years, using the Youth Adolescent Questionnaire (YAQ) - self-administered food frequency

questionnaire. Children’s height and weight were also directly measured and Body Mass Index (BMI) calculated using the age- and sex-specific BMI calculator from the WHO (59). Using the WHO reference we classified children as normal weight (+/-1SD), overweight or obese (>+1SD) and obese (>+2SD).

After data entry was completed we excluded two children because they answered the same answer for every question. Among 1467 students who completed the demographic survey and YAQ questionnaire, we excluded 59 students who live outside of Saskatoon. The remaining 1408 students aged 10-14 years old were included in the descriptive analysis. In addition, following the established criteria for outlying observations, we further excluded 39 students reporting average energy intakes less than 500 kcal or greater than 5000 kcal per day. BMIs beyond 3 standard deviations from the age and sex specific mean, were also excluded, as were those less than -3 standard deviations. The sample remaining included 1336 students for overweight/obesity analysis.

Among the 1408 children, 55.2% were girls and 44.8% were boys. The proportion of girls 10-14 years old in this sample is a bit higher as compared to that of the City of Saskatoon Census Profile 2011 (48.6%). Participants were 10-14 years in age with the smallest proportion reporting their age as 14 years old (7.2%), and the largest proportion 11 years old (28.3%). About 15% of students self-identified as Aboriginal. Three fourths of the children live with both parents most of the time, 12.7% live with mother or father only and 9% live with mother part-time or father part-time. About 70% of the participants live with 1 or 2 siblings, and nearly a fifth live with 3 or more siblings. About 10% of the students reported their family economic situation as wealthy, 68% as average and about 5% as difficult.

With regards to self-rated health, 29% of students rated their health as excellent, about two thirds rated themselves in good health and just under 4% rated themselves in poor health. About 10% of students reported that it was difficult for them to do physical activities because of health problems that have lasted 6 months or longer. Three fourths of children reported their weight as normal, with about 14% as overweight and 10% as underweight. Finally, as far as school performance, nearly two thirds of students reported that they were performing about average, and a third above average.

Table 5: Characteristics of the Study Participants

Variables	Frequency (n)	Percent (%)
Sex		
Female	777	55.2
Male	631	44.8
Age		
10	265	18.9
11	399	28.3
12	363	25.8
13	279	19.8
14	102	7.2
Aboriginal status		
Yes	208	14.8
No	1184	84.1



Variables	Frequency (n)	Percent (%)
<i>Where do you live most of the time?</i>		
Both parents (biological or adopted)	1057	75.1
Mother only or Father only	179	12.7
Mother part time/Father part time	129	9.2
Other relative/ Group Home or Foster Home/Other	41	3.0
<i>Brothers and sisters that you live with right now</i>		
None	1057	11.3
1 or 2	179	70.1
>=3	170	18.5
<i>Self-rated family economic situation</i>		
Wealthy	184	10.5
Average	958	68.0
Difficult	66	4.7
<i>Self-rated health</i>		
Excellent	405	28.8
Good	946	67.1
Poor	53	3.8
<i>Is it hard for you to do physical activities because of health problems that have lasted 6 months or longer?</i>		
Yes	138	9.8
No	1157	82.2
Don't know/Not sure	109	7.7
<i>Self-rated weight</i>		
I think I am underweight (by 5 or more pounds)	135	9.6
I think I am overweight (by 5 or more pounds)	197	14.0
I think my weight is okay	1058	75.1
<i>How well are you doing in school this year?</i>		
Above average	439	31.2
Average	910	64.6
Below average	53	3.8
<i>This year where have most of your marks been?</i>		
80 or higher	999	71.0
70-79%	260	18.5
Less than 70%	115	8.2

In terms of self-reported information on the students' perceptions of the food environment, almost all children (96%) reported the supermarket/grocery store as the place where their families most often shop for food. About 95% said the main means of transportation to the grocery store was by vehicle (own, friend/relative's, or taxi). In terms of their home's distance to a grocery store where their family shops, nearly 30% of students reported that it is either less than a kilometer or 1-2 kilometers away, and 16% reported that it's more than 2 kilometers. In reporting on the distance between their home and the fast food restaurant where the child participant's family eats most often, about a fifth of students reported that it is less than a kilometer from their home, 23% from 1-2 kilometers and 16% more than 2 kilometers.

Table 6: Study Participant Perceptions of the Food Environment

Variables	Frequency (n)	Percent (%)
<i>Places family most often shops for food</i>		
Supermarket/Grocery Store	1350	95.9
Specialty food stores (for example Asian markets or health food stores)	6	0.4
Convenience stores	11	0.8
Others	18	2.3
Don't know	23	1.6
<i>Main means of transportation to the grocery store</i>		
By vehicle (your own, friend/relative's, or taxi)	1131	94.5
By bus	12	0.9
Walking	52	3.7
Other	7	0.5
Don't know	5	0.4
<i>Distance between home and the main grocery store your family shops at</i>		
Less than a kilometer (fewer than 10 blocks)	399	28.3
1-2 kilometers (10-20 blocks)	408	29.0
More than 2 kilometers (more than 20 blocks)	220	15.6
Don't know	376	26.7
<i>Distance between your home and the fast food restaurant that you and your family eat at the most</i>		
Less than a kilometer (fewer than 10 blocks)	277	19.7
1-2 kilometers (10-20 blocks)	328	23.3
More than 2 kilometers (more than 20 blocks)	229	16.3
Don't know	221	15.7
	350	24.9

We compared students' responses on the YAQ food frequency questionnaire with the recommended number of servings for each of the four food groups of Canada's Food Guide (60). Students' nutrient intakes were assessed using Canadian Nutrient Files (61) and compared with the Dietary Reference Intakes (DRIs)(62). Intake of carbohydrate, protein and fat were compared with the Acceptable Macronutrient Distribution Range (AMDR) (62). Fibre was compared with the Adequate Intake (AI),

as an Estimated Average Requirement (EAR) is unavailable for this nutrient (62). In the absence of definitive data on which to base an EAR, an AI represents a value that is observed to be adequate in healthy populations (62). Conclusions regarding the extent of inadequacy with values below an AI cannot be drawn because lower values may be adequate. Therefore, we did not estimate the prevalence of adequacy for nutrients with an AI as we did for nutrients with an AMDR and an EAR. Vitamin A, C, D and Folate as well as calcium, iron and zinc were compared with the Estimated Average Requirement (EAR), the value that is estimated to meet the requirements of 50% of healthy individuals (62). Sodium intake was compared with the Upper Limit (UL), a value above which potential adverse effects may occur (i.e., high blood pressure) (62). For sodium, only the UL was used because health concerns primarily pertain to the excess consumption of this nutrient and sodium deficiencies are extremely rare in Canada.

In Table 7 we have presented the recommended number of servings per day from each food group as recommended in Canada’s Food Guide (CFG) (60), the mean number of servings per day consumed of each food group in the children in our sample (mean servings per day observed), as well as the proportion of children not meeting the recommendations. Vegetables and fruit, as well as grain products are the two food groups for which our sample was least likely to meet recommendations. Among students aged 10-14 years old in Saskatoon 83.2% did not meet the minimum recommendations of CFG for grain products, nor did they meet recommendations for the food groups: vegetables and fruit (79.2%), milk products (52.7%) and meat and alternatives (33.9%).

Table 7: Recommended and Observed Number of Servings from Canada’s Food Guide to Healthy Eating Among Children 10-14 Years Old in Saskatoon

Food group	Recommended # Servings/Day	Mean # Servings/Day	Less than the minimum recommended servings/Day (%)
Grain products	6	4.2	83.2 (81.3-85.2)
Vegetables & Fruit	6	4.3	79.2 (77.1-81.3)
Milk products	3-4	3.1	52.7 (50.0-55.3)
Meat & Alternatives	1-2	1.4	33.9 (31.4-36.4)

In Table 8 we have presented the recommended number of servings per day from each food group as included in CFG by gender. There is a statistically significant difference between boys and girls in the mean number of servings of grain products, milk products and meat and alternative products with boys are more likely to have higher value of the mean number of servings as compared to that of girls.

In Table 9 we have presented the recommended number of servings per day from each food group as included in CFG by student’s family economic situation. For grain products and meat and alternatives, children who considered themselves as coming from average economic situation families consume a significantly lower mean number of servings per day as compared to the students coming from wealthy families. With regards to vegetables and fruit and milk products, children from wealthy families consume a significantly higher mean number of servings per day than participants from average economic situation families and difficult economic situation families.

Table 8: Recommended and Observed Number of Servings from Canada’s Food Guide to Healthy Eating Among Children 10-14 Years Old in Saskatoon by Sex

Food groups		Mean # Servings/Day	Statistically significant
Grain products		4.2	
	Girls	4.1	
	Boys	4.4	*
Vegetables & Fruit		4.3	
	Girls	4.4	
	Boys	4.3	
Milk products		3.1	
	Girls	3.0	
	Boys	3.3	**
Meat & Alternatives		1.4	
	Girls	1.4	
	Boys	1.5	**

Table 9: Recommended and Observed Number of Servings from Canada’s Food Guide to Healthy Eating Among Children 10-14 Years Old in Saskatoon by Family Economic Situation

Food groups by family economic situation		Mean # Servings/Day	Statistically significant
Grain products		4.2	
	Wealthy	4.8	Reference group
	Average	4.1	*
	Difficult	4.4	
Vegetables & Fruit		4.4	
	Wealthy	5.3	Reference group
	Average	4.2	**
	Difficult	4.0	*
Milk products		3.1	
	Wealthy	4.0	Reference group
	Average	3.0	**
	Difficult	3.0	*
Meat & Alternatives		1.4	
	Wealthy	1.7	Reference group
	Average	1.4	*
	Difficult	1.5	

* p<0.05 ** < 0.001

There is no statistical significance between different neighbourhood planning eras in terms of intake from all four food groups (data are not shown).

The mean daily energy intake was 1689 and 1865 kilocalories for girls and boys, respectively. On average, carbohydrate contributed 56.6% of total energy intake; 10.2% of students were not within the recommended range (45-65% of total calories) with 2.3% and 7.9% beneath or exceeding this range, respectively. Protein contributed 16.5% of total energy intake; only 1.6% of student did not meet the lower end of the recommended range (10-30% of total calories). With regard to fat, 29.9% of students were not within the recommended range (25-35% of total calories) with 24.4% and 5.5% less than or exceeding this range, respectively. The average intake of fibre was lower than the AI for both boys and girls.

Table 10: Macronutrient Intake Among Children 10-14 years old in Saskatoon

Macronutrient intake	DRI Category	Reference Value	Mean (SD)	% of Inadequacy
Carbohydrate (%)	AMDR	45-65	56.6 (6.2)	10.2 (2.3 + 7.9)
Protein (%)	AMDR	10-30	16.5 (3.2)	1.6 (1.6+0)
Fat (%)	AMDR	25-35	28.0 (5.0)	29.9 (24.4+5.5)
Fibre (g)	AI			
<i>Males</i>		31	15.6 (8.9)	
<i>Females</i>		26	14.8 (7.6)	

AMDR= Acceptable Macronutrient Distribution Range

AI= Adequate Intake

The average intakes of vitamin A, C, folate, iron, and zinc exceeded reference values and 10.3%-83.7% of students had inadequate intakes. The average intake of calcium was lower than the reference value with 56% of students having inadequate level. The average intake of sodium exceeded the upper limit.

Table 11: Vitamin and Mineral Intake Among Children 10-14 years old in Saskatoon

Vitamins and Minerals	DRI Category	Reference Value	Mean (SD)	% of Inadequacy
Vitamin A (RAE)	EAR			
<i>Males</i>		445	910.0 (530.2)	18.7
<i>Females</i>		420	858.4 (469.3)	16.5
Vitamin D (IU)	EAR	400	238.5 (161.4)	83.7
Vitamin C (mg)	EAR	39	118.2 (85.1)	12.6
Folate (DFE)	EAR	250	325.4 (167.7)	36.1
Calcium (mg)	EAR	1100	1063.9 (574.3)	56.0
Iron (mg)	EAR			
<i>Males</i>		5.9	12.3 (6.7)	10.3
<i>Female</i>		5.7	11.2 (5.3)	10.8
Zinc (mg)	EAR	7.0	9.3 (4.6)	32.3
Sodium (mg)	UL	2200	2218.3 (1114.0)	

EAR= Estimated Average Requirement

AI= Adequate Intake

UL= Upper Limit

The observed overall diet quality score averaged 62.7 and ranged from 12.0 to 87.0 on a scale of 0 to 100. Diet quality was about the same among girls (63.0) and boys (62.5).

In this sample 49.2 % (95% CI 46.6-51.8) of children were neither overweight nor obese; 23.4% (95% CI 21.2-25.7) were overweight; and 14.2% (95% CI 12.4-16.0) were obese (Figure 6A). There is a statistically significant difference between boys and girls in terms of overweight/obesity; the prevalence of overweight/obesity is much higher among males (48.8%) compared to that of 28.6% for females. The prevalence of obesity for boys is more than two times that of girls (Figure 6B).

Figure 6A: Weight Status among Children 10-14 years old in Saskatoon

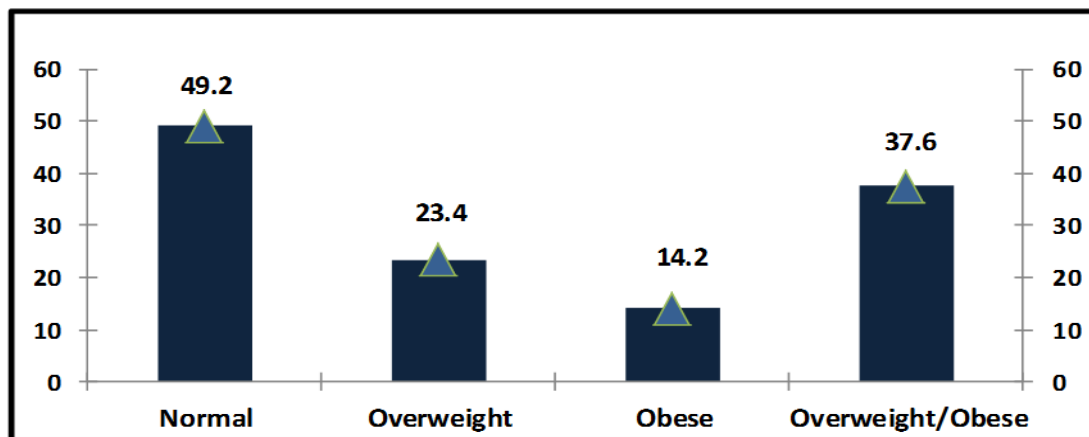


Figure 6B: Weight Status by Sex among Children 10-14 years old in Saskatoon

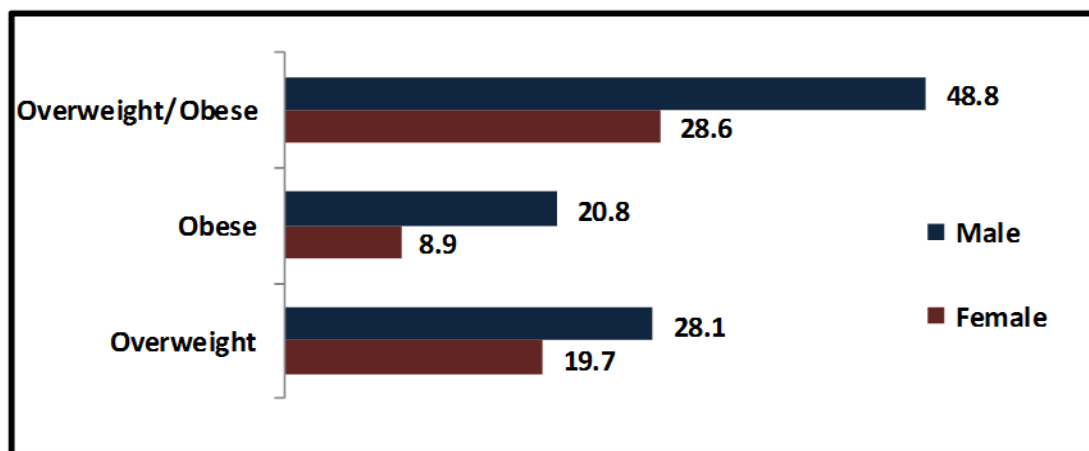
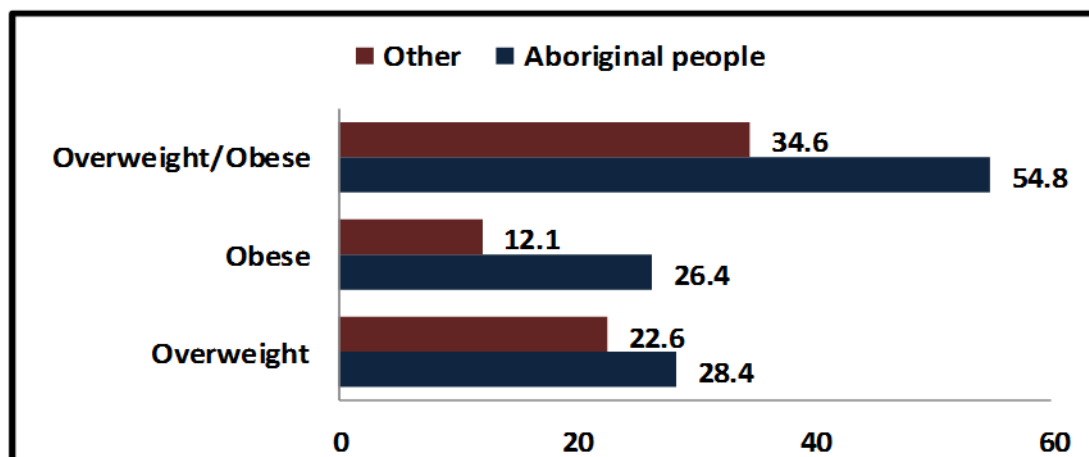


Figure 6C: Weight Status among Children 10-14 years old in Saskatoon by Aboriginal status



Children who self-identified as Aboriginal are more likely to be obese/overweight compared to those who did not (Figure 6C).

The prevalence of overweight or obesity in our study sample increases with age of participants. Finally, Figure 6E below shows that children who identified themselves as living in a difficult economic situation are more likely to be overweight/obese as compared to those who believed they came from wealthy economic situation.

Figure 6D: Weight Status Among Children 10-14 years old in Saskatoon by Age

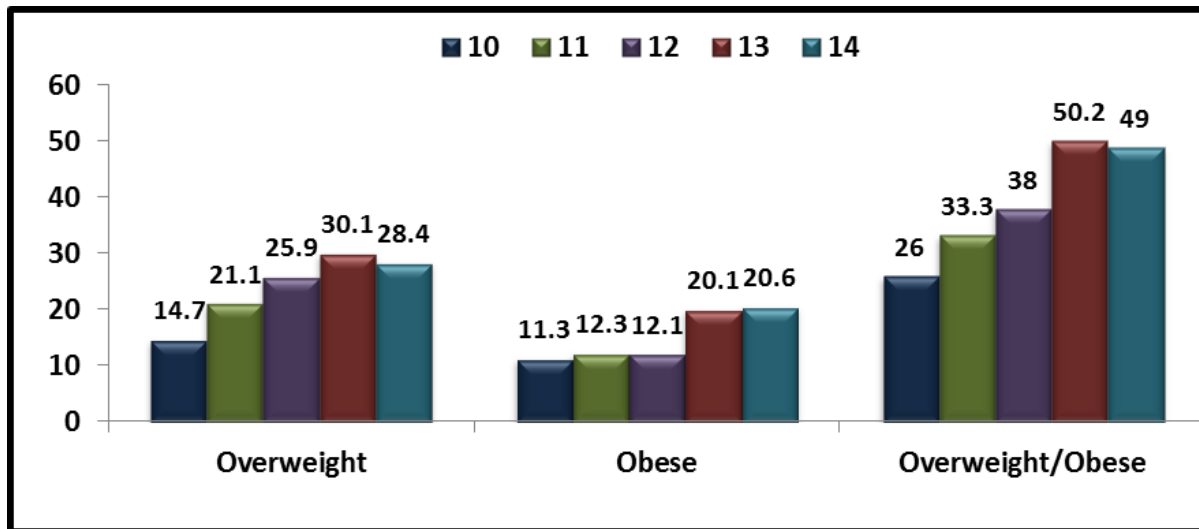
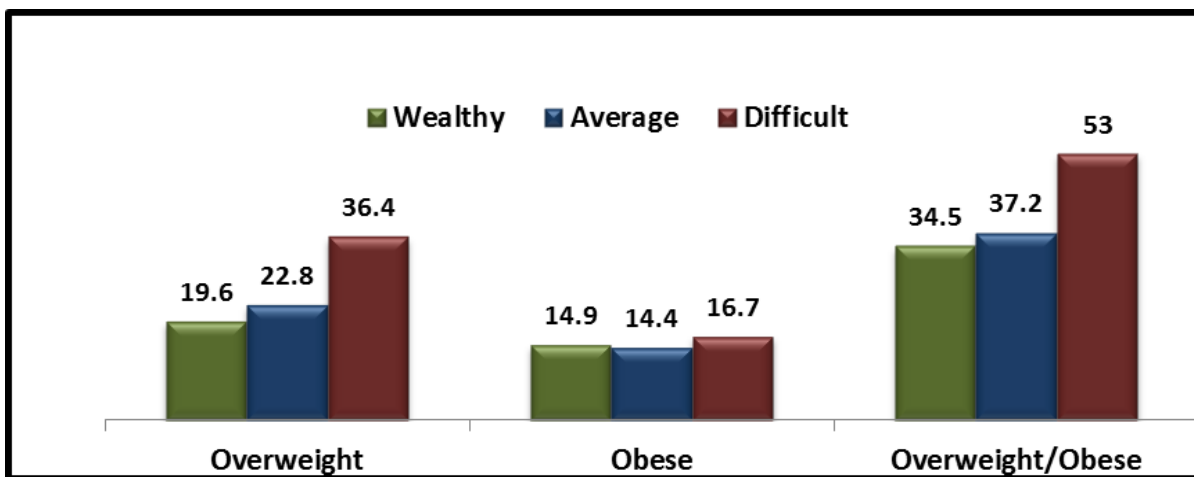


Figure 6E: Weight Status Among Children 10-14 years old in Saskatoon by Perceived Family Economic Situation



3.6 Perceptions of the Food Environment

Our sample for the parent-child dyad qualitative in-depth interviews includes 28 families. In three of the families there were two children in the 10-14 year-old age group and as such we interviewed both children in these three families, for a total of 59 participants. We will not report here on analyses of the qualitative data in this study. That analysis is ongoing and will be published in the form of journal articles.

4.0 Discussion

Our maps show that grocery store locations are concentrated along specific high vehicular traffic corridors in the city (8th Street for example), and in suburban strip malls (such as Confederation). On the other hand, convenience stores are concentrated in older, lower income neighbourhoods in the city's core in particular. Our historical food store data shows how this has changed over the decades, and that this phenomenon has developed largely since the early 1980s.



We found a high concentration of unhealthy food outlets (fast food and convenience stores) located around elementary schools in low-income neighbourhoods. This is an issue of concern and strengthens the assertion that food swamps are a problem in low-income areas of Canadian cities (31).

This initial analysis of NEMS-S measures provides a glimpse into Saskatoon's in-store food environment. Overall, neither NEMS-S measures nor fruit and vegetable access varied significantly across the city (although non-significant trends were observed). While all grocery stores in residential neighbourhoods were measured, the relatively small number of grocery stores (n=24) may have made it difficult to assess relationships with neighbourhood-level SES. It is worth noting that neighbourhoods of lower SES in Saskatoon can be characterized as food swamps (31), having significantly more convenience stores than neighbourhoods of higher SES. The category of specialty food stores, which included ethnic grocery stores, were excluded from this analysis, and this may have led to an under-reporting of overall fruit and vegetable access, particularly in neighbourhoods that do not have a chain grocery store. In addition, big box stores, such as Giant Tiger, were not included as grocery stores, and stores requiring membership, such as Costco, were excluded from this analysis, which may also have contributed to an under-reporting of fruit and vegetable access. Exclusion of these stores may also have skewed the overall neighbourhood-level in-store scores.

The analysis of NEMS-R measures mainly focuses on the relative healthfulness of foods and beverages available on the main menus. We excluded children's menus because not all restaurants had children's menus available. Overall, there are significant differences in healthfulness of food served among different restaurant types as indicated by total NEMS-R scores, and sub-scores for Healthy Entrees, Healthy Side Dishes, Beverage, Facilitators, Barriers, and Pricing. For example, regular chain coffee shops and pita and sandwiches fast food restaurants had higher total NEMS-R scores and Healthy Entrees sub-scores. In contrast, burger and chicken and pizza fast food restaurants were assessed as having more barriers to healthy eating. Even though there are few differences in NEMS-R scores by restaurant types across neighbourhood distress levels, higher income neighbourhoods had significantly higher (more healthful) scores than neighbourhoods with lower incomes. Specifically, higher income neighbourhoods had higher scores for 'Healthy Side Dishes' and fewer 'Barriers and Pricing', although mid-distress neighbourhoods had more 'Healthy Beverages'.

Overall, our data show poor dietary intake in the children included in our study. Of particular concern is the large proportion of children not consuming the minimum number of daily servings of vegetables and fruit (nearly 80% of children aged 10-14 years old had fewer than 6 servings of vegetables and fruit each day), as well as milk products (50% of children consumed fewer than 3-4

servings daily). We also found low fibre intake in our study sample (the mean value for males is 15.6 g as compared to 31 g and mean value for female is 14.8 g as compared to 26 g), and a high proportion did not meet the recommended intakes of vitamin D (84%), calcium (56%), and folate (36%). In Saskatoon, macronutrient intake of 10-14 year old children is in line with the acceptable ranges set by the Institute of Medicine (2005) for fat, protein and carbohydrates.

We found the prevalence of overweight and obesity among Saskatoon children, for boys (48.8%) and girls (28.6%) (and especially boys), by Aboriginal status (54.8%) and difficult family economic situation (53%) is high. Our study does not depend on self-report for collection of height and weight data, which is commonly used for determining BMI, and therefore we can have confidence in our overweight and obese classifications based on BMI. This study demonstrated that the prevalence of overweight and obesity of Saskatoon children is greater than that of Canadian children in general (31.5%) (63).

4.1 Measurement

Our food environment study focused on the City of Saskatoon as whole, rather than on select neighbourhoods. This way we were able to take a whole-of-city approach to this study rather than including only select neighbourhoods. At 246,000 residents, with 70 neighbourhoods, it was feasible to collect data on store and restaurant locations comprehensively. In addition, we were able to ensure very complete data on the locations of food stores and restaurants for several reasons. We started with City of Saskatoon business licensing databases combined with earlier mapping of fast food restaurants and grocery stores conducted by the Saskatoon Health Region (29, 30). Our lists of stores and restaurants were then augmented by a research team that was already very familiar with Saskatoon's neighbourhoods because of past data collection on the built environment (see Smart Cities, Healthy Kids: Built Environment study, www.smartcitieshealthykids.com). Finally, during the Nutrition Environment Measures Survey for Stores and Restaurants data collection, our research assistants had to go to each neighbourhood and collect data. Thus, they were able to visually confirm the location of stores and restaurants, and they were able to note recent closures of locations as well as new store openings. This three-stage collection of location data augments its comprehensiveness, which is important given the problems with this type of data collection that have been highlighted such as use of incomplete records due to reliance on phone books for example (64). What this information does not tell us is how the spatial distribution of food outlets translates into food purchasing and consumption.

Collecting and analyzing NEMS-S and R data proved to have some challenges. First we will highlight challenges with NEMS-S. We found that while the NEMS-S tool was useful in measuring aspects of the food environment in grocery stores and convenience stores, it fell short with ethnic foods stores and other similar stores where there is a great deal of produce available, but not necessarily of the type that is captured by the tool. Once we began analyzing our data, we also found that when examining neighbourhoods as a whole, NEMS-S measures did not adequately capture differences. For example, a neighbourhood with several convenience stores and one small grocery store might score equally as well as a neighbourhood with two grocery stores, though qualitatively they likely have very different food environments. NEMS-S also only characterizes the relative healthfulness of the food environment, rather than the absolute food environment, meaning that certain qualitative differences in the food environment are masked when using only this tool. In the future, we recommend that the NEMS-S tool should be combined with shelf space measures. For example, we could have measured sugar-sweetened beverage shelf space in each neighbourhood, which may have

better characterized which neighbourhoods have greater access to unhealthy food (are 'food swamps' (31)), given that this has been a noted characteristic of Canadian cities (26).

NEMS-R focuses on a series of food indicators including availability, facilitators, and supports for healthy eating, barriers to healthful eating, pricing, and signage. However, there are likely to be other restaurant environment factors of interest to researchers that were not part of NEMS-R (38), because the instrument was designed to evaluate selected attributes that could be readily observed, as well as relevant to obesity and chronic disease risk. Also, there is little psychometric evidence comparing the within-rater variability, such as comparative pricing on healthy versus regular options, which might influence the reliability of implementation.

As an observational tool, NEMS-R only assesses the relative healthfulness of foods and beverages available on the menus, but does not evaluate the actual healthfulness of foods, which would require laboratory or recipe analyses (38, 65). For example, the general NEMS-R protocol counts items marked or highlighted as healthful on the main menu, but not all restaurants post this information. Without this information, the food cannot be classified as healthy or unhealthy and thus the restaurant does not receive a score in this area. This has a large impact on the total NEMS-R score and often classifies healthy restaurants as unhealthy (i.e. a build your own salad bar scored lower than fast food restaurants). Overall only the restaurants with nutritional information are being compared and these tend to be bigger chain restaurants that offer a selection of healthier items within their regular menu. It is hard to compare all restaurants equally when they do not all have the same information for evaluation by raters.

Other small specific issues include, for example, that when it was not possible to determine how side vegetables were cooked, they could not be classified as healthy and thus lost points. Also, diet soda was classified as healthy and if the restaurant had it available then it automatically scored higher. This led to some scores being much higher and "healthier". Salads that came dressed with a homemade dressing could not be classified as healthy because we could not verify what the contents of the dressing were and if they met the healthfulness criteria. Many of the issues with NEMS-R came down to availability of information which had an effect on the final score. Overall, similar to the spatial distribution, NEMS-S/R do not tell us how the consumer food environments in food outlets across the city translate into purchasing and consumption behaviours.

We directly measured height and weight in our study, which adds to the accuracy of our data. The Youth/Adolescent food frequency questionnaire used in this study also has been used previously in large scale studies the US and Canada (66-68). It has been validated to assess the diets of children in the 9 to 14 year old age group in the US. Correlation coefficients between the mean energy-adjusted nutrients computed by the two methods (FFQ and three 24 – h dietary recalls) ranged from 0.21 for sodium to 0.58 for folate. After correction for within-person error, the average correlation coefficient was 0.54, similar to that found among adults (67). As with any dietary assessment tool, there are limitations to its use. Specifically, the YAQ is quite long and therefore has a respondent burden that could lead to reporting problems. Dietary data is especially prone to reporting error, mostly through under-reporting, which may be influenced by body weight status (67).

4.2 Study Strengths and Weaknesses

The strengths of the present study include our focus on the city as a whole, and our inclusion of all food outlets (with very few exceptions), in the GIS and NEMS phases of this research. For height and weight measurement and dietary assessment, the population-based design, the large sample size,

the relative high response rates and direct measure of children's height and weight are important strengths. There are limits to interpreting these results due to the cross-sectional nature of the study (such as measuring in-store offerings without considering individual or neighbourhood-level food shopping practices, or a consideration of how in-store offerings may vary by time of year). In-depth information on food practices in the context of neighbourhood-level food environment, by both caregivers and children, is critical information that is missing from the current report. However, this gap will be addressed some in our on-going quantitative and qualitative analyses.

5.0 Conclusion

Food swamps appear to be a problem of concern in Saskatoon, particularly in low-income neighbourhoods. Dietary intake among adolescent children in Saskatoon is relatively poor. The proportion of children who are overweight or obese in Saskatoon (37.2%) is a bit higher than that of Canadian children (31.5%). The development of evidence-based policies and prevention initiatives targeting children and their families may improve dietary quality and prevent obesity.



Saskatoon Children's Festival

References

1. Statistics Canada. Canadian health measures survey [homepage on the Internet]. Statistics Canada; 2010 [cited 2010 January 13]; Available from: <http://www.statcan.gc.ca/daily-quotidien/100113/dq100113a-eng.htm>.
2. Wang Y, Lobstein T. Worldwide trends in childhood overweight and obesity. *International Journal of Pediatric Obesity*. 2006;1(1):11-25.
3. Neff RA, Palmer AM, McKenzie SE, Lawrence RS. Food Systems and Public Health Disparities. *Journal of Hunger and Environmental Nutrition*. 2009;4(3):282.
4. Jebb S, Kopelman P, Butland B. Executive summary: Foresight 'Tackling obesities: Future choices' project. 2007.
5. Drewnowski A. How to modify the food environment: Energy density, food costs, and portion size. *Journal of Nutrition*. 2005;135(Journal Article):889-99.
6. Liese AD, Weis KE, Pluto D, Smith E, Lawson A. Food store types, availability, and cost of foods in a rural environment. *Journal of the American Dietetic Association*. 2007;107(11):1916-23.
7. Li F, Harmer P, Cardinal BJ, Bosworth M, Johnson-Shelton D. Obesity and the built environment: Does the density of neighborhood fast-food outlets matter? *American Journal of Health Promotion*. 2009;23(3):203.
8. Sallis JF, Glanz K. The role of built environments in physical activity, eating, and obesity in childhood. *The Future of children / Center for the Future of Children, the David and Lucile Packard Foundation*. 2006;16(1):89-108.
9. Townshend T, Lake AA. Obesogenic urban form: Theory, policy and practice. *Health and Place*. 2009;15(4):909-16.
10. Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: The development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventive Medicine*. 1999;29(6):563-70.
11. Cummins S, Macintyre S. Food environments and obesity--neighbourhood or nation? *International Journal of Epidemiology*. 2006;35(1):100-4.
12. Kirk SF, Penney TL, McHugh TL. Characterizing the obesogenic environment: the state of the evidence with directions for future research. *Obesity Reviews : An Official Journal of the International Association for the Study of Obesity*. 2010;11(2):109-17.
13. Glanz K, Sallis JF, Saelens BE, Frank LD. Healthy nutrition environments: concepts and measures. *American Journal of Health Promotion* . 2005;19(5):330-3, ii.
14. Lake A, Townshend T. Obesogenic environments: Exploring the built and food environments. *Journal of the Royal Society for the Promotion of Health*2006.

15. Lake AA, Townshend T. Obesogenic environments: exploring the built and food environments. *The Journal of the Royal Society for the Promotion of Health*. 2006;126(6):262-7.
16. Rosenkranz RR, Dzewaltowski DA. Model of the home food environment pertaining to childhood obesity. *Nutrition Reviews*. 2008;66(3):123-40.
17. Holsten JE. Obesity and the community food environment: a systematic review. *Public Health Nutrition*. 2009;12(3):397.
18. Sallis JF, Glanz K. Physical activity and food environments: solutions to the obesity epidemic. *The Milbank Quarterly*. 2009;87(1):123-54.
19. Smoyer-Tomic K, Spence J, Amrhein C. Food deserts in the prairies? Supermarket accessibility and neighborhood need in Edmonton, Canada. *Professional Geographer*. 2006;58(3):307-26.
20. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. *Annual Review of Public Health*. 2008;29:253-72.
21. Toronto Food Policy Council. Food retail access and food security for Toronto's low income citizens. Toronto: 1996.
22. Johnson DB, Smith LT, Bruemmer B. Small-grants programs: lessons from community-based approaches to changing nutrition environments. *Journal of the American Dietetic Association*. 2007;107(2):301-5.
23. Mojtahedi MC, Boblick P, Rimmer JH, Rowland JL, Jones RA, Braunschweig CL. Environmental barriers to and availability of healthy foods for people with mobility disabilities living in urban and suburban neighborhoods. *Archives of Physical Medicine and Rehabilitation*. 2008;89(11):2174-9.
24. Austin S, Melly S, Sanchez B, Patel A, Buka S, Gortmaker S. Clustering of fast-food restaurants around schools: A novel application of spatial statistics to the study of food environments. *American Journal of Public Health*. 2005;95(9):1575-81.
25. Cummins S, Macintyre S. A Systematic Study of an Urban Foodscape: The Price and Availability of Food in Greater Glasgow. *Urban Studies*. 2002;39:2115-30.
26. Health Canada. Measuring the Food Environment in Canada. Ottawa, ON: Health Canada, 2013.
27. Larsen K, Gilliland J. Mapping the evolution of 'food deserts' in a Canadian city: Supermarket accessibility in London, Ontario, 1961-2005. *International Journal of Health Geographics*. 2008;7(1):16.
28. Apparicio P, Cloutier M, Shearmur R. The case of Montreal's missing food deserts: Evaluation of accessibility to food supermarkets. *International Journal Health Geographies*. 2007;6(1):4-17.

29. Kershaw T, Creighton T, Markham T, Marko J. Food access in Saskatoon. Saskatoon, SK: Saskatoon Health Region, 2010.
30. Cushon J, Creighton T, Kershaw T, Marko J, Markham T. Deprivation and food access and balance in Saskatoon, Saskatchewan. *Chronic Diseases and Injuries in Canada*. 2013;33(3):146-59.
31. Fielding J, Simon P. Food deserts or food swamps? *Archives of Internal Medicine*. 2011;171(13):1171-2.
32. Papas MA, Alberg AJ, Ewing R, Helzlsouer KJ, Gary TL, Klassen AC. The built environment and obesity. *Epidemiologic Reviews*. 2007;29:129-43.
33. Glanz K, Sallis JF, Saelens BE, Frank LD. Healthy nutrition environments: concepts and measures. *American Journal of Health Promotion*. 2005;19(5):330-3.
34. Peters EJ, McCreary TA. Poor neighbourhoods and the changing geography of food retailing in Saskatoon, Saskatchewan, 1984-2004. *Canadian Journal of Urban Research*. 2008;17(1).
35. Woods F. Access to Food in Saskatoon's Core Neighbourhood: A Community Study. Community-University for Social Research, Saskatoon Community Clinic and Partners, 2002.
36. Muhajarine N, Vu L, Labonte R. Social contexts and children's health outcomes: Researching across the boundaries. *Critical Public Health*. 2006;16(3):205-18.
37. Glanz K, Sallis J, Saelens B, Frank L. Nutrition Environment Measures Survey in Stores (NEMS-S). *American Journal of Preventive Medicine*. 2007;32(4):282-9.
38. Saelens B, Glanz K, Sallis J, Frank L. Nutrition Environment Measures Study in Restaurants (NEMS-R): Development and evaluation. *American Journal of Preventive Medicine*. 2007;32(4):273-81.
39. Cole T, Bellizzi M, Flegal K, Dietz W. Establishing a standard definition for child overweight and obesity worldwide: International survey. *British Medical Journal*. 2000;320:1240-3.
40. Rockett H, Berkey C, Colditz G. Evaluation of dietary assessment instruments in adolescents. *Current Opinion Clinical Nutrition Metabolism Care*. 2003;6(5).
41. Haraldsdottir J, Thorsdottir I, de Almeida M, Maes L, Perez Rodrigo C, Elmadfa I, et al. Validity and reproducibility of a pre-coded questionnaire to assess fruit and vegetable intake in European 11- to 12-year-old schoolchildren. *Annals Nutrition and Metabolism*. 2005;49(4):221-7.
42. Economos C, Sacheck J, Kwan H, Chui K, Irizarry L, Guillemont J, et al. School-based behavioral assessment tools are reliable and valid for measurement of fruit and vegetable intake, physical activity, and television viewing in young children. *Journal American Dietetic Association*. 2008;108(4):695-701.

43. Rockett H, Berkey C, Colditz G. Comparison of a short food frequency questionnaire with the Youth/Adolescent Questionnaire in the Growing Up Today Study. *International Journal Pediatric Obesity*. 2007;2(1):31-9.
44. Livingstone M, PJ R, Wallace J. Issues in dietary intake assessment of children and adolescents. *British Journal Nutrition*. 2004;92 Suppl 2:S213-22.
45. Feskanich D, Rockett H, Colditz G. Modifying the Healthy Eating Index to assess diet quality in children and adolescents. *Journal American Dietetic Association*. 2004;104(9):1375-83.
46. Veugelers P, Sithole F, Zhang S, Muhajarine N. Neighborhood characteristics in relation to diet, physical activity and overweight of Canadian children. *International Journal Pediatric Obesity*. 2008;3:152-9.
47. Patton MQ. *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage Publications; 2002. xxiv, 598.
48. Seventh ed: Oxford University Press; 1982. *Concise Oxford English Dictionary*.
49. Wang C. Photovoice: A participatory action research strategy applied to women's health. *Journal of Women's Health*. 1999;8(2):185-92.
50. Booth T, Booth W. In the frame: Photovoice and mothers with learning difficulties. *Disability and Society*. 2003;18(4):431-2.
51. Baker T, Wang C. Photovoice: Use of a participatory action research method to explore the chronic pain experience in older adults. *Qualitative Health Research*. 2006;16:1405-13.
52. Short F. *Kitchen Secrets: The Meaning of Cooking in Everyday Life*. Oxford: Berg; 2006.
53. DeVault ML. *Feeding the Family: The Social Organization of Caring as Gendered Work*. Stimpson CR, editor. Chicago: University of Chicago Press; 1991.
54. Borradaile KE, Sherman S, Vander Veur SS, McCoy T, Sandoval B, Nachmani J, et al. Snacking in children: the role of urban corner stores. *Pediatrics*. 2009;124(5):1293-8.
55. Cohen DA, Ghosh-Dastidar, B., Beckman, R., Lytle, L., Elder, J., Pereira, M.A., Veblen Mortenson, S., Pickrel, J., Conway, T.L. Adolescent girls' most common source of junk food away from home. *Health and Place*.
56. Robitaille E, Bergeron P, Lasnier B. Geographical Analysis of the Accessibility of Fast-Food Restaurants and Convenience Stores Around Public Schools in Quebec. Institut National de Santé Publique du Québec, 2010 Contract No.1092: Report.
57. ESRI. *ArcMap Desktop Software*. 10.1 ed. Redlands, CA: ESRI Inc.; 2012.
58. Hernandez T, Simmons J. Evolving retail landscapes: Power retail in Canada. *The Canadian Geographer*. 2006;50(4):465-86.
59. World Health Organization. *WHO AnthroPlus*. AnthroPlus version 31. Geneva2007.

60. Health Canada. Eating Well with Canada's Food Guide. Ottawa: Health Canada; 2007.
61. Canadian Nutrient File (CNF) [database on the Internet]. Health Canada. 2010. Available from: http://www.hc-sc.gc.ca/fn-an/nutrition/fiche-nutri-data/cnf_downloads-telechargement_fcen-eng.php.
62. Dietary Reference Intakes Tables [database on the Internet]. Health Canada. 2002/2005 [cited March 28, 2013]. Available from: <http://www.hc-sc.gc.ca/fn-an/nutrition/reference/table/index-eng.php>.
63. Overweight and obesity in children and adolescents: Results from the 2009-2011 Canadian Health Measures Survey [database on the Internet]. Statistics Canada. 2012.
64. Liese AD, Barnes TL, Lamichhane AP, Hibbert J, Colabianchi N, Lawson AB. Characterizing the Food Retail Environment: Impact of Count, Type, and Geospatial Error in 2 Secondary Data Sources. *Journal of Nutrition Education and Behavior*. 2013;45(5):435-42.
65. Horacek TM, Erdman MB, Byrd-Bredbenner C, Carey G, Colby SM, Greene GW, et al. Assessment of the dining environment on and near the campuses of fifteen post-secondary institutions. *Public Health Nutrition*. 2013;16(07):1186-96.
66. Veugelers PJ, Fitzgerald AL, Johnston E. Dietary intake and risk factors for poor diet quality among children in Nova Scotia. *Canadian Journal of Public Health*. 2005;96(3):212-6.
67. Rockett HR, Breitenbach M, Frazier AL, Witschi J, Wolf AM, Field AE, et al. Validation of a youth/adolescent food frequency questionnaire. *Preventive Medicine*. 1997;26(6):808-16.
68. Rockett HR, Berkey CS, Field AE, Colditz GA. Cross-sectional measurement of nutrient intake among adolescents in 1996. *Preventive Medicine*. 2001;33(1):27-37.

Appendix A – Data Collection Instruments

Measure Complete

Nutrition Environment Measures Survey (NEMS) Measure #1: MILK

Rater ID:

Store ID: ---

Date: / /
Month Day Year

Grocery Store Convenience Store Other

Marking Instructions

Please use a pencil or blue or black ink Correct Incorrect

A. Reference Brand

1. Store brand (preferred) yes no

2. Alternate Brand Name

Comments: _____

B.

Availability

Comments:

1. a. Is low-fat (skim or 1%) available? Yes No
b. If not, is 2% available? Yes No NA

2. **Shelf Space:** (measure only if low fat milk is available)

Type	1 L	2 L	4 L
a. Skim	<input type="text"/>	<input type="text"/>	<input type="text"/>
b. 1%	<input type="text"/>	<input type="text"/>	<input type="text"/>
c. Whole	<input type="text"/>	<input type="text"/>	<input type="text"/>

C. Pricing: All items should be reference brand

Comments:

1. Whole milk, 1 L \$. _____
2. Whole milk, 2 L \$. _____
3. Skim or 1% milk, 1 L \$. _____
(Lowest available)
4. Skim or 1% milk, 2 L \$. _____
(Lowest available)

Alternate Items:

5. 2%, 1 L \$. N/A _____
6. 2%, 2 L \$. N/A _____

Produce Item	Available		Price	Unit			Quality		Comments	
	Yes	No		#	pc	kg	A	UA		
11. Pineapple	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____	
12. Kiwis	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____	
13. Plums	<input type="radio"/>	_____ <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	_____

14. Total Types: (count # of yes responses) |

**Nutrition Environment Measures Survey (NEMS)
Measure #3: FROZEN FRUIT**

Rater ID:

Store ID: ---

Date: / /
Month Day Year

Grocery Store Convenience Store Other

Availability and Price

Item	Package Size (grams)	Available		Price	Comments
		Yes	No		
1. Blueberries	<input type="text"/> g	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
	<input type="text"/> g			\$ <input type="text"/> . <input type="text"/>	
2. Strawberries	<input type="text"/> g	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
	<input type="text"/> g			\$ <input type="text"/> . <input type="text"/>	
3. Raspberries	<input type="text"/> g	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
	<input type="text"/> g			\$ <input type="text"/> . <input type="text"/>	

**Nutrition Environment Measures Survey (NEMS)
Measure #4: CANNED FRUIT**

Rater ID:

Store ID: ---

Date: / /
Month Day Year

Grocery Store Convenience Store Other

Availability and Price

Item	Can Size (mL)	Available		Price	Comments
		Yes	No		
1. Peaches <input type="radio"/> Del Monte 398 mL <input type="radio"/> Other _____ <input type="text"/> mL (In juice)		<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
Available packed in water with no added sugar?		<input type="radio"/>	<input type="radio"/>		
2. Pineapple <input type="radio"/> Dole 398 mL <input type="radio"/> Other _____ <input type="text"/> mL (In Juice)		<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
Available packed in water with no added sugar?		<input type="radio"/>	<input type="radio"/>		
1. Applesauce <input type="radio"/> SunRype 625 mL <input type="radio"/> Other _____ <input type="text"/> mL		<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
2. Pears <input type="radio"/> Del Monte 398 mL <input type="radio"/> Other _____ <input type="text"/> mL (In Juice)		<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
Available packed in water with no added sugar?		<input type="radio"/>	<input type="radio"/>		

**Nutrition Environment Measures Survey (NEMS)
Measure #5: VEGETABLES**

Rater ID:

Store ID: ---

Date: / /
Month Day Year

Grocery Store Convenience Store Other

Availability and Price

Produce Item		Available		Price	Unit	Quality		Comments
		Yes	No			A	UA	
1. Carrots	<input type="radio"/> 2 lb bag <input type="radio"/> _____	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
2. Tomatoes (Field)	<input type="radio"/> Loose <input type="radio"/> _____	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
3. Sweet Peppers	<input type="radio"/> Green bell <input type="radio"/> _____	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
4. Broccoli	<input type="radio"/> Bunch <input type="radio"/> _____	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
5. Lettuce	<input type="radio"/> Green leaf <input type="radio"/> _____	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
6. Corn		<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
7. Celery		<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
8. Cucumbers	<input type="radio"/> Long English <input type="radio"/> _____	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
9. Green Cabbage	<input type="radio"/> Head <input type="radio"/> _____	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
10. Cauliflower		<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	<input type="text"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____

Produce Item	Available		Price	Unit			Quality		Comments
	Yes	No		#	pc	lb	A	UA	
11. Potatoes (White) <input type="radio"/> 5 lb bag	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
<input type="radio"/> _____					pc	kg			_____
			\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>			_____
12. Yams	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____
					pc	kg			_____
			\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>			_____

13. Total Types: (count # of yes responses) |

Measure Complete

**Nutrition Environment Measures Survey (NEMS)
Measure #6: FROZEN VEGETABLES**

Rater ID:

Store ID: ---

Date: / /
Month Day Year

Grocery Store Convenience Store Other

Availability and Price

Item		Package Size (grams)	Available		Price	Comments
			Yes	No		
1. Peas	<input type="radio"/> Green Giant	1 kg	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
	<input type="radio"/> Other _____	<input type="text"/> g				
2. Corn	<input type="radio"/> Green Giant	1 kg	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
	<input type="radio"/> Other _____	<input type="text"/> g				
3. Mixed Vegetables	<input type="radio"/> Green Giant	1 kg	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
	<input type="radio"/> Other _____	<input type="text"/> g				
4. Carrots (Straight Cut)	<input type="radio"/> Green Giant	1 kg	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
	<input type="radio"/> Other _____	<input type="text"/> g				

**Nutrition Environment Measures Survey (NEMS)
Measure #7: CANNED VEGETABLES**

Rater ID:

Store ID: ---

Date: / /
Month Day Year

Grocery Store Convenience Store Other

Availability and Price

Item	Can Size (mL)	Available		Price	Comments
		Yes	No		
1. Tomatoes <input type="radio"/> Hunts <input type="radio"/> (Stewed) <input type="radio"/> Other _____	<input type="text"/> mL <input type="text"/> mL	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> \$ <input type="text"/> . <input type="text"/>	_____
Available canned without added salt?		<input type="radio"/>	<input type="radio"/>		
2. Corn <input type="radio"/> Green Giant <input type="radio"/> Other _____	398 mL <input type="text"/> mL	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> \$ <input type="text"/> . <input type="text"/>	_____
Available canned without added salt?		<input type="radio"/>	<input type="radio"/>		
3. Peas <input type="radio"/> Green Giant <input type="radio"/> Other _____	398 mL <input type="text"/> mL	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> \$ <input type="text"/> . <input type="text"/>	_____
Available canned without added salt?		<input type="radio"/>	<input type="radio"/>		
4. Beets <input type="radio"/> Aylmer <input type="radio"/> Other _____	398 mL <input type="text"/> mL	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> \$ <input type="text"/> . <input type="text"/>	_____
Available canned without added salt?		<input type="radio"/>	<input type="radio"/>		

Nutrition Environment Measures Survey (NEMS)
Measure #8: GROUND BEEF

Rater ID:

Store ID: ---

Date: / /
 Month Day Year

Grocery Store Convenience Store Other

Availability and Price

Item	Available			Price/kg	Comments
	Yes	No	N/A		

Healthier Option:

1. Lean ground beef, (Use Smallest Package) Yes No N/A Price: \$. _____

Alternate Items: Yes No N/A

2. Lean ground beef (<10% fat) Yes No N/A Price: \$. _____
 % fat

3. Ground Turkey (≤ 10% fat) Yes No N/A Price: \$. _____
 % fat

Regular option:

5. Regular ground beef, (Use Smallest Package) Yes No Price: \$. _____

Alternate Item: Yes No N/A

6. Standard alternate ground beef, if above is not available Yes No N/A Price: \$. _____
 % fat

Nutrition Environment Measures Survey (NEMS)
Measure #9: HOT DOG

Rater ID:

Store ID: ---

Date: / /
 Month Day Year

Grocery Store Convenience Store Other

Availability and Price

Item	Available			Price/pkg.	Comments
	Yes	No	N/A		

Healthier Option:

1. Oscar Mayer Fat-free Wieners (turkey/beef) 0g fat \$. _____

Alternate Items: (≤ 9 g Fat) Yes No N/A

2. Fat-free other brand 0g fat \$.

 Brand name Kcal/svg

3. Light Wieners (turkey/pork) \$. _____

4. Light beef Franks, (about 1/3 less calories 50% less fat) \$. _____

5. Turkey Wieners (about 1/3 less fat) \$. _____

6. Other

\$. g pkg Hot dogs/pkg
 g fat kcal/svg

Regular option:

7. Oscar Mayer Wieners (turkey/pork/chicken)-regular 12g fat \$.

Alternate Items: (≥ 10 g fat)

8. Beef Franks (regular) 13 g fat \$.

9. Other

\$. g pkg Hot dogs/pkg
 g fat kcal/svg

**Nutrition Environment Measures Survey (NEMS)
Measure #10: FROZEN DINNERS**

Rater ID:

Store ID: ---

Date: / /
Month Day Year

Grocery Store Convenience Store Other

A. Reference Brand

1, Stouffer's brand (preferred) Yes No

2. Alternate brand (with reduced-fat dinners

available) Brand Name:

Comments: _____

B. Availability

1. Are reduced-fat frozen dinners available? (≤ 9 g fat/8-11 oz.)

Shelf Space: (measure only if reduced-fat frozen dinners are available)

2. Reduced-fat dinners/regular dinners: Proportion $\leq 10\%$ 11-33% 34-50% 51%+

C. Pricing (All items must be same brand)

Reduced-Fat Dinner	Price/Pkg	Regular Dinner	Price/Pkg	Comments
1. Lean Cuisine Lasagna <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	Stouffer's Lasagna <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	_____
2. Lean Cuisine Tuscan Chicken Panini <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	Stouffer's Bistro Panini Grilled Chicken Italian Style <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	_____
3. _____ <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	_____ <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	_____
Reduced-Fat Alternate (≤ 9 g fat)	Price/Pkg	Regular Alternate (≥ 10 g fat)	Price/Pkg	Comments
4. Other _____ <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	Other _____ <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	_____
5. Other _____ <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	Other _____ <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	_____
6. Other _____ <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	Other _____ <input type="text"/> g <input type="text"/> K cal. <input type="text"/> g fat	\$ <input type="text"/> . <input type="text"/>	_____

**Nutrition Environment Measures Survey (NEMS)
Measure #11: BAKED GOODS**

Rater ID:

Store ID: ---

Date: / /
Month Day Year

Grocery Store Convenience Store Other

Availability & Price

Low-fat baked goods ≤ 3 g fat/serving

Item	Available Yes No	Amt. per package	g fat/ per item	kcal/ per item	Price	Comments
------	---------------------	---------------------	--------------------	-------------------	-------	----------

Healthier option:

1. Bagel

Single Yes No \$

	Yes	No	N/A						
Package	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/>	

Alternate Items:

2. English muffin Yes No N/A \$

3. a. Low-fat muffin Yes No N/A \$

b. # varieties of low fat muffins 0 1 2 3+

Regular option (≥ 4 g fat/serving or 400 Kcal/serving):

4. Regular muffin Yes No \$

Alternate Items	Yes	No	N/A						
5. Regular Danish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	\$ <input type="text"/> <input type="text"/> <input type="text"/>	

6. Other Yes No N/A \$

**Nutrition Environment Measures Survey (NEMS)
Measure #12-CS-BEVERAGE**

Rater ID:

Store ID: ---

Date: / /
Month Day Year

Grocery Store Convenience Store Other

Availability & Price

Healthier option:	Available	Price		Comments
		Yes	No	
1. Diet Coke	355 mL 591 mL	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____ \$ <input type="text"/> . <input type="text"/> <input type="text"/> _____
2. Alternate brand of diet soda	Yes No N/A	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____ \$ <input type="text"/> . <input type="text"/> <input type="text"/> _____
<input type="text"/>	355 mL	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____
<input type="text"/>	591 mL	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____

Regular option:

Regular option:	Yes	No	Price		Comments
3. Coke	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____ \$ <input type="text"/> . <input type="text"/> <input type="text"/> _____
4. Alternate brand of sugared soda	Yes No N/A	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____ \$ <input type="text"/> . <input type="text"/> <input type="text"/> _____
<input type="text"/>	355 mL	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____
<input type="text"/>	591 mL	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____

Healthier option:

5. 100% juice, 1.89 L	Yes No	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____
<input type="radio"/> Minute Maid <input type="radio"/> Tropicana <input type="radio"/> Other	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____

Alternate Items:

Alternate Items:	Yes	No	N/A	Price	Comments
6. 100% juice, 1.89 L	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____	
<input type="radio"/> Minute Maid <input type="radio"/> Tropicana <input type="radio"/> Other	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____	
7. 100% juice, _____ mL	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____	
<input type="radio"/> Minute Maid <input type="radio"/> Tropicana <input type="radio"/> Other	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____	

Regular option:

8. Juice Drink, 1.89 L	Yes No	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____
<input type="radio"/> Five Alive <input type="radio"/> Tropicana <input type="radio"/> Other	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____

Alternate Items:

Alternate Items:	Yes	No	N/A	Price	Comments
9. Juice Drink, 1.89 L	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____	
<input type="radio"/> Minute Maid <input type="radio"/> Tropicana <input type="radio"/> Other	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____	
10. Juice Drink, _____ mL.	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____	
<input type="radio"/> Minute Maid <input type="radio"/> Tropicana <input type="radio"/> Other	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/> _____	

Healthier option:

11. **100% Orange Juice, _____ mL**

SunRype Store Brand Other

Yes No

\$ | _____

12. **100% Apple Juice, _____ mL**

SunRype Store Brand Other

Yes No

\$ | _____

13. **100% Grape Juice, _____ mL**

SunRype Store Brand Other

Yes No

\$ | _____

Alternate Items:

Yes No N/A

14. **100% Juice _____ mL**

SunRype Store brand Other

\$ | _____

Regular option:

Yes No

15. **Orange Drink, _____ mL**

Brand _____ Store Brand

\$ | _____

16. **Apple Drink, _____ mL**

Brand _____ Store Brand

\$ | _____

17. **Grape Drink, _____ mL**

Brand _____ Store Brand

\$ | _____

Alternate Items:

Yes No N/A

18. **Juice Drink, _____ mL**

Brand _____ Store Brand

\$ | _____

**Nutrition Environment Measures Survey (NEMS)
Measure #13: BREAD**

Rater ID:

Store ID: ---

Date: //
Month Day Year

Grocery Store Convenience Store Other

Availability & Price

Item	Available			Loaf size (grams)	Price/loaf	Comments
	Yes	No	N/A			

Healthier Option: Whole grain bread (100% whole wheat bread and whole grain bread)

1. Store Bakery \$. _____

Alternate Items:

2. Sara Lee Classic 100% Whole Wheat Bread \$. _____

3. Other: **Yes No N/A**
 \$. _____

4. # of varieties of 100% whole wheat bread and whole grain (all brands) 0 1 2 3 4 5 6+

Regular Option: White bread (bread made with refined flour)

5. Store Bakery \$. _____

Alternate Items:

6. Sara Lee Classic White Bread \$. _____

7. Other: **Yes No N/A**
 \$. _____

Nutrition Environment Measures Survey (NEMS)
Measure #14: BAKED CHIPS

Rater ID:

Store ID: ---

Date: / /
 Month Day Year

Grocery Store Convenience Store Other

Availability & Price

Low-fat chips ≤3g fat per 1 oz. serving

Item	Available	Price	Comments
Healthier Option :			
	Yes No		
1. Baked Lays Potato Chips	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
<input type="radio"/> 180 g			
<input type="radio"/> Other _____ g.			
Alternate Item:			
	Yes No N/A		
2. <input type="text"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
<input type="radio"/> 180 g.			
<input type="radio"/> Other _____ g.			
3. # of varieties of low-fat chips (any brand)		<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6+	

Regular Option (select most comparable size to healthier option available):

	Yes No		
4. Lays Potato Chips Classic	<input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
<input type="radio"/> 235 g.			
<input type="radio"/> Other _____ g.			
Alternate Item:			
	Yes No N/A		
5. <input type="text"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>	\$ <input type="text"/> . <input type="text"/>	_____
<input type="radio"/> 235 g.			
<input type="radio"/> Other _____ g.			

Nutrition Environment Measures Survey (NEMS)
Measure #15: CEREAL

Rater ID:

Store ID: ----

Date: / /
 Month Day Year

Grocery Store Convenience Store Other

Availability & Price

Healthier cereals < 7 g sugar per serving

Item	Available			Size (grams)	Price	Comments
	Yes	No	N/A			

Healthier Option:

1. Cheerios (Plain) \$. _____

Alternate Item:

2. Other _____ \$. _____

3. # of varieties of healthier cereals 0 1 2 3+

Regular Options (≥7g of sugar per serving):

4. Cheerios (Honey Nut) \$. _____

Alternate Item:

5. Other _____ \$. _____

**Nutrition Environment Measures Survey (NEMS)
RESTAURANT MEASURES--DATA COLLECTION**

Restaurant ID: - - -

Date: / /
Month / Day / Year

Rater ID:

1) Type of Restaurant: Code #

2) Data Sources:	Site Visit/Observation	Take-Away Menu	Internet	Interview
	<input type="radio"/> yes <input type="radio"/> no	<input type="radio"/> yes <input type="radio"/> no	<input type="radio"/> yes <input type="radio"/> no	<input type="radio"/> yes <input type="radio"/> no

3) Site Visit Information:

Take-away Menu yes no

Nutrition Information yes no

Other: yes no

Other: yes no

Comments: _____

4) Take-Away Menu Features:

Nutrition Information yes no

Identification of healthier menu items yes no

Other: yes no

Other: yes no

Comments: _____

5) Internet Site Features:

Menu yes no

Nutrition Information yes no

Identification of healthier menu items yes no

Other: yes no

Web site URL _____

Comments: _____

6) Interview Information:

Menu options yes no

Pricing yes no

Other: yes no

Comments (describe items above)

7) Hours of operation:

Data Source(s): Site Menu Web

Sunday Open Closed

B: 6:00 - 11:00am

L: 11:00 am - 3:00 pm

D: 5:00 pm to Close

: AM PM

Open 24 Hours (If 24-hr, leave *Hours of Operation section* blank)

Thursday Open Closed

B: 6:00 - 11:00am

L: 11:00 am - 3:00 pm

D: 5:00 pm to Close

: AM PM

Friday Open Closed

B: 6:00 - 11:00am

L: 11:00 am - 3:00 pm

D: 5:00 pm to Close

: AM PM

Saturday Open Closed

B: 6:00 - 11:00am

L: 11:00 am - 3:00 pm

D: 5:00 pm to Close

: AM PM

8) Access: Drive-thru window

yes no

Parking onsite

yes no

9) Size of Restaurant:

Seating capacity = **OR** Number of tables =

Comments: _____

Comments: _____

**Nutrition Environment Measures Survey (NEMS)
RESTAURANT MEASURES--DATA COLLECTION**

Restaurant ID: - - -

Date: / /
Month / Day / Year

Rater ID:

Site visit (Observation)	Select One	Comments
10) Restaurant has a salad bar	<input type="radio"/> yes <input type="radio"/> no	_____
11) Signage/Promotions		
a. Is nutrition information posted near point-of-purchase, or available in a brochure?	<input type="radio"/> yes <input type="radio"/> no	_____
b. Do signs/table tents/displays highlight healthy menu options?	<input type="radio"/> yes <input type="radio"/> no	_____
c. Do signs/table tents/displays encourage healthy eating?	<input type="radio"/> yes <input type="radio"/> no	_____
d. Do signs/table tents/displays encourage unhealthy eating?	<input type="radio"/> yes <input type="radio"/> no	_____
e. Do signs/table tents/displays encourage overeating (all-you-can-eat, super-size, jumbo, grande, supreme, king size, feast descriptors on menu or signage)?	<input type="radio"/> yes <input type="radio"/> no	_____
f. Does this restaurant have a low-carb promotion?	<input type="radio"/> yes <input type="radio"/> no	_____
g. Other? _____	<input type="radio"/> yes <input type="radio"/> no	
Menu Review/Site visit		
12) a. Chips	<input type="radio"/> yes <input type="radio"/> no	_____
b. Baked chips	<input type="radio"/> yes <input type="radio"/> no	_____
13) a. Bread	<input type="radio"/> yes <input type="radio"/> no	_____
b. 100% wheat or whole grain bread	<input type="radio"/> yes <input type="radio"/> no	_____
14) 100% fruit juice	<input type="radio"/> yes <input type="radio"/> no	_____
15) 1% Low-fat, skim, or non-fat milk	<input type="radio"/> yes <input type="radio"/> no	_____

**Nutrition Environment Measures Survey (NEMS)
RESTAURANT MEASURES--DATA COLLECTION**

Restaurant ID: - - -

Date: / /
Month / Day / Year

Rater ID:

Menu Review	Select One	Choices (#)	Comments
16) Main Dishes/Entrees:	<input type="radio"/> yes	# <input type="text"/>	_____
a. Total # Main Dishes/Entrees	<input type="radio"/> no		_____
b. Healthy options	<input type="radio"/> yes	# <input type="text"/>	_____
	<input type="radio"/> no		_____
17) Main dish salads:	<input type="radio"/> yes	# <input type="text"/>	_____
a. Total # Main dish salads	<input type="radio"/> no		_____
b. Healthy options	<input type="radio"/> yes	# <input type="text"/>	_____
	<input type="radio"/> no		_____
c. Low-fat or fat free salad dressings	<input type="radio"/> yes	# <input type="text"/>	_____
	<input type="radio"/> no		_____
18) Fruit (w/out added sugar)	<input type="radio"/> yes	# <input type="text"/>	_____
	<input type="radio"/> no		_____
19) Non-fried vegetables (w/out added sauce)	<input type="radio"/> yes	# <input type="text"/>	_____
	<input type="radio"/> no		_____
20) Diet soda	<input type="radio"/> yes		_____
	<input type="radio"/> no		_____
21) Other healthy or low calorie beverage?	<input type="radio"/> yes		_____
<input type="text"/>	<input type="radio"/> no		_____
<input type="text"/>			_____

**Nutrition Environment Measures Survey (NEMS)
RESTAURANT MEASURES--DATA COLLECTION**

Restaurant ID: - - -

Date: / /
Month / Day / Year

Rater ID:

Menu Review/Site Visit

22) Facilitators & Supports

Select One

Comments

a. Nutrition information on menu (paper or posted menu) yes no

b. Healthy entrees identified on menu yes no

c. Reduced-size portions offered on menu yes no
 standard

d. Menu notations that encourage healthy requests yes no

e. Other? yes no

23) Barriers

a. Large portion sizes encouraged?
Super-size items on menu yes no

b. Menu notations that discourage special requests
(e.g., *No substitutions* or charge for substitutions) yes no

**Nutrition Environment Measures Survey (NEMS)
RESTAURANT MEASURES--DATA COLLECTION**

Restaurant ID - - -

Date: / /
Month / Day / Year

Rater ID:

23) Barriers (Cont.)

Select One

Comments

c. All-you-can-eat or "unlimited trips" yes
 no

d. Other? _____ yes
 no

24) Pricing

a. Sum of individual items compared to combo meal more less
 same NA

b. Healthy entrees compared to regular ones more less
 same NA

c. Charge for shared entree? yes
 no

d. Smaller portion compared to regular portion more less
(if 22c is No or Standard then mark N/A) same NA

e. Other? _____ more less
 same NA

**Nutrition Environment Measures Survey (NEMS)
RESTAURANT MEASURES--DATA COLLECTION**

Restaurant ID: - - -

Date: / /
Month / Day / Year

Rater ID:

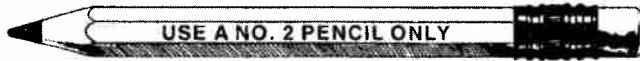
Menu Review	Select One	Comments
25) Kid's menu?	<input type="radio"/> yes <input type="radio"/> no	_____
a. Age limit	<input type="radio"/> 10 and Under <input type="radio"/> 12 and under <input type="radio"/> Other <input type="radio"/> NA	_____
b. Any healthy entrees?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
c. 100% fruit juice	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
d. 1% low-fat, skim or non-fat milk	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
e. Are there free refills on unhealthy drinks?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
f. Are there any healthy side items (either assigned or to choose)?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
g. Can you substitute a healthy side for an assigned unhealthy one?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
h. Do any entrees that have assigned sides include an assigned healthy side?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
i. Is an unhealthy dessert automatically included in a kid's meal?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
j. Are there any healthy desserts (either free or at additional cost)?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
k. Is nutrition information (e.g., calories or fat) provided on the kid's menu?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
l. Other unhealthful eating promotion?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____
m. Other healthful eating promotion?	<input type="radio"/> yes <input type="radio"/> no <input type="radio"/> NA	_____

MARKING INSTRUCTIONS

- Use a **NO. 2 PENCIL** only.
- Do not use ink or ballpoint pen.
- Darken in the circle completely.
- Erase cleanly any marks you wish to change.
- Do not make any stray marks on this form.

The **RIGHT** way to mark your answer!

The **WRONG** way to mark your answers!



A	0	0	0	0	0	0	0	0	
B	1	1	1	1	1	1	1	1	
C	2	2	2	2	2	2	2	2	
D	3	3	3	3	3	3	3	3	
E	4	4	4	4	4	4	4	4	
	5	5	5	5	5	5	5	5	
	6	6	6	6	6	6	6	6	
	7	7	7	7	7	7	7	7	
	8	8	8	8	8	8	8	8	
	9	9	9	9	9	9	9	9	A

1. What is your AGE?

- Less than 9
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18 or older

2. Are you:

- Male
- Female

Questionnaire refers to what you ate over the past year

3. Do you now take vitamins (like Flintstones, One-A-Day, etc.)?

- No Yes **→ If yes)**
- a) How many vitamin pills do you take a week?**
- 2 or less
 - 3 - 5
 - 6 - 9
 - 10 or more
- b) For how many years have you been taking them?**
- 0 - 1 years
 - 2 - 4
 - 5 - 9
 - 10+ years

4. How many teaspoons of sugar do you ADD to your beverages or food each day?

- None/less than 1 teaspoon per day
- 1 - 2 teaspoons per day
- 3 - 4 teaspoons per day
- 5 or more teaspoons per day

5. Which cold breakfast cereal do you usually eat?

- Never eat cold breakfast cereal

6. Where do you usually eat breakfast?

- At home
- At school
- Don't eat breakfast
- Other

7. Which of the following best describes your lunch on a school day?

- I bring a prepared lunch from home
- I buy my lunch at school
- I eat my lunch at home
- I don't eat lunch
- Other

0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

8. How many times each week (including weekdays and weekends) do you usually eat at a fast food restaurant, or eat food taken out from a fast food restaurant?

- Never/less than once per week
 1 - 2 times per week
 3 - 4 times per week
 5 or more times per week

10. How many times each week (including weekdays and weekends) do you usually eat supper in front of the TV?

- Never/less than once per week
 1 - 2 times per week
 3 - 4 times per week
 5 or more times per week

12. How often do you have supper that is ready made, like frozen dinners, Spaghetti-O's, microwave meals, etc.

- Never/less than once per week
 1 - 2 times per week
 3 - 4 times per week
 5 or more times per week

14. How often do you eat food that is fried at home, like fried chicken?

- Never/less than once per week
 1 - 3 times per week
 4 - 6 times per week
 Daily

9. How many times each week (including weekdays and weekends) do you usually eat supper at the table with other people?

- Never/less than once per week
 1 - 2 times per week
 3 - 4 times per week
 5 or more times per week

11. How many times each week (including weekdays and weekends) do you usually eat supper at a friend's house?

- Never/less than once per week
 1 - 2 times per week
 3 - 4 times per week
 5 or more times per week

13. How many times each week (including weekdays and weekends) do you usually eat supper alone?

- Never/less than once per week
 1 - 2 times per week
 3 - 4 times per week
 5 or more times per week

15. How often do you eat fried food away from home (like french fries, chicken nuggets)?

- Never/less than once per week
 1 - 3 times per week
 4 - 6 times per week
 Daily

DIETARY INTAKE

How often do you eat the following foods:

Example If you drink one can of diet pop 2 - 3 times per week, then your answer should look like this:

**E1. Diet pop
(1 can or glass)**

- Never
 1 - 3 cans per month
 1 can per week
 2 - 6 cans per week
 1 can per day
 2 or more cans per day

BEVERAGES

FILL OUT ONE BUBBLE FOR EACH FOOD ITEM

16. Diet pop (1 can or glass)

- Never/less than 1 per month
 1 - 3 cans per month
 1 can per week
 2 - 6 cans per week
 1 can per day
 2 or more cans per day

17. Pop - not diet (1 can or glass)

- Never/less than 1 per month
 1 - 3 cans per month
 1 can per week
 2 - 6 cans per week
 1 can per day
 2 or more cans per day

18. Hawaiian Punch, lemonade, Koolaid or other non-carbonated fruit drink (1 glass)

- Never/less than 1 per month
 1 - 3 glasses per month
 1 glass per week
 2 - 4 glasses per week
 5 - 6 glasses per week
 1 glass per day
 2 or more glasses per day

19. Iced Tea - sweetened (1 glass, can or bottle)

- Never/less than 1 per month
 1 - 3 glasses per month
 1 - 4 glasses per week
 5 - 6 glasses per week
 1 or more glasses per day

20. Tea (1 cup)

- Never/less than 1 per month
 1 - 3 cups per month
 1 - 2 cups per week
 3 - 6 cups per week
 1 or more cups per day

21. Coffee - not decaf. (1 cup)

- Never/less than 1 per month
 1 - 3 cups per month
 1 - 2 cups per week
 3 - 6 cups per week
 1 or more cups per day

Example If you eat:

- 3 teaspoons of margarine on toast
 1 - 2 teaspoons of margarine on sandwich
 1 teaspoon of margarine on vegetables

5 - 6 teaspoons total all day

then answer this way →

E2. Margarine (1 teaspoon) - not butter

- Never
 1 - 3 teaspoons per month
 1 teaspoon per week
 2 - 6 teaspoons per week
 1 teaspoon per day
 2 - 4 teaspoons per day
 5 or more teaspoons per day

DAIRY PRODUCTS

22. What TYPE of milk do you usually drink?

- Whole milk
 2% milk
 1% milk
 Skim/nonfat milk
 Don't know
 Don't drink milk

23. Milk (glass or with cereal)

- Never/less than 1 per month
 1 glass per week or less
 2 - 6 glasses per week
 1 glass per day
 2 - 3 glasses per day
 4+ glasses per day

24. Chocolate milk (glass)

- Never/less than 1 per month
 1 - 3 glasses per month
 1 glass per week
 2 - 6 glasses per week
 1 - 2 glasses per day
 3 or more glasses per day



30962

25. Instant Breakfast Drink (1 packet)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

26. Whipped cream

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

27. Yogurt (1 cup) - Not frozen

- Never/less than 1 per month
- 1 - 3 cups per month
- 1 cup per week
- 2 - 6 cups per week
- 1 cup per day
- 2 or more cups per day

28. Cottage or ricotta cheese

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

29. Cheese (1 slice)

- Never/less than 1 per month
- 1 - 3 slices per month
- 1 slice per week
- 2 - 6 slices per week
- 1 slice per day
- 2 or more slices per day

30. Cream cheese

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

31. What TYPE of yogurt, cottage cheese & dairy products (besides milk) do you use mostly?

- Nonfat
- Lowfat
- Regular
- Don't know

32. Butter (1 teaspoon) - NOT margarine

- Never/less than 1 per month
- 1 - 3 teaspoons per month
- 1 teaspoon per week
- 2 - 6 teaspoons per week
- 1 teaspoon per day
- 2 - 4 teaspoons per day
- 5 or more teaspoons per day

33. Margarine (1 teaspoon) - NOT butter

- Never/less than 1 per month
- 1 - 3 teaspoons per month
- 1 teaspoon per week
- 2 - 6 teaspoons per week
- 1 teaspoon per day
- 2 - 4 teaspoons per day
- 5 or more teaspoons per day

34. What FORM and BRAND of margarine does your family usually use?

- None
- Stick
- Tub
- Squeeze (liquid)



WHAT SPECIFIC BRAND AND TYPE (LIKE "PARKAY CORN OIL SPREAD")?

Leave blank if you don't know.

35. What TYPE of oil does your family use at home?

- Canola oil
- Corn oil
- Safflower oil
- Olive oil
- Vegetable oil
- Don't know

0	0	0	34
1	1	1	F
2	2	2	B
3	3	3	
4	4	4	
5	5	5	
6	6	6	35
7	7	7	
8	8	8	
9	9	9	

MAIN DISHES

36. Cheeseburger (1)

- Never/less than 1 per month
- 1 - 3 per month
- One per week
- 2 - 4 per week
- 5 or more per week

37. Hamburger (1)

- Never/less than 1 per month
- 1 - 3 per month
- One per week
- 2 - 4 per week
- 5 or more per week

38. Pizza (2 slices)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

39. Tacos/burritos (1)

- Never/less than 1 per month
- 1 - 3 per month
- One per week
- 2 - 4 per week
- 5 or more per week

40. Which taco filling do you usually have:

- Beef & beans
- Beef
- Chicken
- Beans

41. Chicken nuggets (6)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

42. Hot dogs (1)

- Never/less than 1 per month
- 1 - 3 per month
- One per week
- 2 - 4 per week
- 5 or more per week

43. Peanut butter sandwich (1) (plain or with jelly, fluff, etc.)

- Never/less than 1 per month
- 1 - 3 per month
- One per week
- 2 - 4 per week
- 5 or more per week

44. Chicken or turkey sandwich (1)

- Never/less than 1 per month
- 1 - 3 per month
- One per week
- 2 or more per week

45. Roast beef or ham sandwich (1)

- Never/less than 1 per month
- 1 - 3 per month
- One per week
- 2 or more per week

46. Salami, bologna, or other deli meat sandwich (1)

- Never/less than 1 per month
- 1 - 3 per month
- One per week
- 2 or more per week

47. Tuna sandwich (1)

- Never/less than 1 per month
- 1 - 3 per month
- One per week
- 2 or more per week

48. Chicken or turkey as main dish (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

49. Fish sticks, fish cakes or fish sandwich (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

50. Fresh fish as main dish (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

51. Beef (steak, roast) or lamb as main dish (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

52. Pork or ham as main dish (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

53. Meatballs or meatloaf (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

54. Lasagna (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

55. Macaroni and cheese (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

56. Spaghetti with tomato sauce (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

57. Eggs (1)

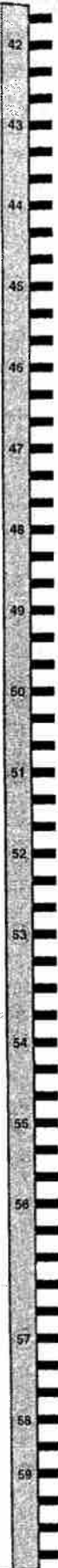
- Never/less than 1 per month
- 1 - 3 eggs per month
- One egg per week
- 2 - 4 eggs per week
- 5 or more eggs per week

58. Liver: beef, calf, chicken or pork (1 serving)

- Never/less than 1 per month
- Less than once per month
- Once per month
- 2 - 3 times per month
- Once per week or more

59. Shrimp, lobster, scallops (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week



30962

60. French toast (2 slices)

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 or more times per week

61. Grilled cheese (1)

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 or more times per week

62. Eggrolls (1)

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 or more times per week

MISCELLANEOUS FOODS**63. Brown gravy**

- Never/less than 1 per month
 Once per week or less
 2 - 6 times per week
 Once per day
 2 or more times per day

64. Ketchup

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 4 times per week
 5 or more times per week

65. Clear soup (with rice, noodles, vegetables) 1 bowl

- Never/less than 1 per month
 1 - 3 bowls per month
 1 bowl per week
 2 or more bowls per week

66. Cream (milk) soups or chowder (1 bowl)

- Never/less than 1 per month
 1 - 3 bowls per month
 1 bowl per week
 2 - 6 bowls per week
 1 or more bowls per day

67. Mayonnaise

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 6 times per week
 Once per day

68. Low calorie/fat salad dressing

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 6 times per week
 Once or more per day

69. Salad dressing (not low calorie)

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 6 times per week
 Once or more per day

70. Salsa

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 6 times per week
 Once or more per day

71. How much fat on your beef, pork, or lamb do you eat?

- Eat all
 Eat some
 Eat none
 Don't eat meat

72. When you have chicken or turkey, do you eat the skin?

- Yes
 No
 Sometimes

BREADS & CEREALS

73. Cold breakfast cereal (1 bowl)

- Never/less than 1 per month
- 1 - 3 bowls per month
- 1 bowl per week
- 2 - 4 bowls per week
- 5 - 7 bowls per week
- 2 or more bowls per day

74. Hot breakfast cereal, like oatmeal (1 bowl)

- Never/less than 1 per month
- 1 - 3 bowls per month
- 1 bowl per week
- 2 - 4 bowls per week
- 5 - 7 bowls per week
- 2 or more bowls per day

75. White bread, pita bread, or toast (1 slice)

- Never/less than 1 per month
- 1 slice per week or less
- 2 - 4 slices per week
- 5 - 7 slices per week
- 2 - 3 slices per day
- 4+ slices per day

76. Dark bread (1 slice)

- Never/less than 1 per month
- 1 slice per week or less
- 2 - 4 slices per week
- 5 - 7 slices per week
- 2 - 3 slices per day
- 4+ slices per day

77. English muffins or bagels (1)

- Never/less than 1 per month
- 1 - 3 per month
- 1 per week
- 2 - 4 per week
- 5 or more per week

78. Muffin (1)

- Never/less than 1 per month
- 1 - 3 muffins per month
- 1 muffin per week
- 2 - 4 muffins per week
- 5 or more muffins per week

79. Cornbread (1 square)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more per week

80. Biscuit/roll (1)

- Never/less than 1 per month
- 1 - 3 per month
- 1 per week
- 2 - 4 per week
- 5 or more per week

81. Rice

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

82. Noodles, pasta

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

83. Tortilla - no filling (1)

- Never/less than 1 per month
- 1 - 3 per month
- 1 per week
- 2 - 4 per week
- 5 or more per week

84. Other grains, like kasha, couscous, bulgur

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

85. Pancakes (2) or waffles (1)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

86. French fries (large order)

- Never/less than 1 per month
- 1 - 3 orders per month
- 1 order per week
- 2 - 4 orders per week
- 5 or more orders per week

87. Potatoes - baked, boiled, mashed

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

73
74
75
76
77
78
79
80
81
82
83
84
85
86
87

FRUITS & VEGETABLES

88. Raisins (small pack)

- Never/less than 1 per month
- 1 - 3 times per month
- 1 per week
- 2 - 4 times per week
- 5 or more times per week

89. Grapes (bunch)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

90. Bananas (1)

- Never/less than 1 per month
- 1 - 3 per month
- 1 per week
- 2 - 4 per week
- 5 or more per week

91. Cantaloupe, melons (1/4 melon)

- Never/less than 1 per month
- 1 - 3 times per month
- 1 per week
- 2 or more times per week

92. Apples (1) or applesauce

- Never/less than 1 per month
- 1 - 3 per month
- 1 per week
- 2 - 6 per week
- 1 or more per day

93. Pears (1)

- Never/less than 1 per month
- 1 - 3 per month
- 1 per week
- 2 - 6 per week
- 1 or more per day

94. Oranges (1), grapefruit (1/2)

- Never/less than 1 per month
- 1 - 3 per month
- 1 per week
- 2 - 6 per week
- 1 or more per day

95. Strawberries

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

96. Peaches, plums, apricots (1)

- Never/less than 1 per month
- 1 - 3 per month
- 1 per week
- 2 or more per week

97. Orange juice (1 glass)

- Never/less than 1 per month
- 1 - 3 glasses per month
- 1 glass per week
- 2 - 6 glasses per week
- 1 glass per day
- 2 or more glasses per day

98. Apple juice and other fruit juices (1 glass)

- Never/less than 1 per month
- 1 - 3 glasses per month
- 1 glass per week
- 2 - 6 glasses per week
- 1 glass per day
- 2 or more glasses per day

99. Tomatoes (1)

- Never/less than 1 per month
- 1 - 3 per month
- 1 per week
- 2 - 6 per week
- 1 or more per day

100. Tomato/spaghetti sauce

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

101. Tofu

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

102. String beans

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

103. Beans/lentils/soybeans

- Never/less than 1 per month
- Once per week or less
- 2 - 6 times per week
- Once per day

104. Broccoli

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

105. Beets (not greens)

- Never/less than 1 per month
- Once per week or less
- 2 or more times per week

106. Corn

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

107. Peas or lima beans

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

108. Mixed vegetables

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

109. Spinach

- Never/less than 1 per month
- 1 - 3 times per month
- Once a week
- 2 - 4 times per week
- 5 or more times per week

110. Greens/beet greens

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

111. Green/red peppers

- Never/less than 1 per month
- 1 - 3 times per month
- Once a week
- 2 - 4 times per week
- 5 or more times per week

112. Yams/sweet potatoes (1)

- Never/less than 1 per month
- 1 - 3 times per month
- Once a week
- 2 - 4 times per week
- 5 or more times per week

113. Zucchini, summer squash, eggplant

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

114. Carrots, cooked

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

115. Carrots, raw

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

116. Celery

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 4 times per week
- 5 or more times per week

117. Lettuce/tossed salad

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 - 6 times per week
- One or more per day

118. Coleslaw

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

119. Potato salad

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week



Think about your usual snacks. How often do you eat each type of snack food.

Example If you eat poptarts rarely (about 6 per year) then your answer should look like this:

E3. Poptarts (1)

- Never/less than 1 per month
- 1 - 3 per month
- 1 - 6 per week
- 1 or more per day

SNACK FOODS/DESSERTS

120. Fill in the number of snacks (food or drinks) eaten on school days and weekends/vacation days.

Snacks	School Days					Vacation/Weekend Days				
	NONE	1	2	3	4 OR MORE	NONE	1	2	3	4 OR MORE
Between breakfast and lunch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
After lunch, before dinner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
After dinner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

121. Potato chips (1 small bag)

- Never/less than 1 per month
- 1 - 3 small bags per month
- One small bag per week
- 2 - 6 small bags per week
- 1 or more small bags per day

122. Corn chips/Doritos (small bag)

- Never/less than 1 per month
- 1 - 3 small bags per month
- One small bag per week
- 2 - 6 small bags per week
- 1 or more small bags per day

123. Nachos with cheese (1 serving)

- Never/less than 1 per month
- 1 - 3 times per month
- Once per week
- 2 or more times per week

124. Popcorn (1 small bag)

- Never/less than 1 per month
- 1 - 3 small bags per month
- 1 - 4 small bags per week
- 5 or more small bags per week

125. Pretzels (1 small bag)

- Never/less than 1 per month
- 1 - 3 small bags per month
- 1 small bags per week
- 2 or more small bags per week

126. Peanuts, nuts (1 small bag)

- Never/less than 1 per month
- 1 - 3 small bags per month
- 1 - 4 small bags per week
- 5 or more small bags per week

127. Fun fruit or fruit rollups (1 pack)

- Never/less than 1 per month
- 1 - 3 packs per month
- 1 - 4 packs per week
- 5 or more packs per week

128. Graham crackers

- Never/less than 1 per month
- 1 - 3 times per month
- 1 - 4 times per week
- 5 or more times per week

129. Crackers, like saltines or wheat thins

- Never/less than 1 per month
- 1 - 3 times per month
- 1 - 4 times per week
- 5 or more times per week

130. Poptarts (1)

- Never/less than 1 per month
 1 - 3 poptarts per month
 1 - 6 poptarts per week
 1 or more poptarts per day

131. Cake (1 slice)

- Never/less than 1 per month
 1 - 3 slices per month
 1 slice per week
 2 or more slices per week

132. Snack cakes, Vachon Cakes (1 package)

- Never/less than 1 per month
 1 - 3 per month
 Once per week
 2 - 6 per week
 1 or more per day

133. Danish, sweetrolls, pastry (1)

- Never/less than 1 per month
 1 - 3 per month
 1 per week
 2 - 4 per week
 5 or more per week

134. Donuts (1)

- Never/less than 1 per month
 1 - 3 donuts per month
 1 donut per week
 2 - 6 donuts per week
 1 or more donuts per day

135. Cookies (1)

- Never/less than 1 per month
 1 - 3 cookies per month
 1 cookie per week
 2 - 6 cookies per week
 1 - 3 cookies per day
 4 or more cookies per day

136. Brownies (1)

- Never/less than 1 per month
 1 - 3 per month
 1 per week
 2 - 4 per week
 5 or more per week

137. Pie (1 slice)

- Never/less than 1 per month
 1 - 3 slices per month
 1 slice per week
 2 or more slices per week

138. Chocolate (1 bar or packet) like Hershey's or M & M's

- Never/less than 1 per month
 1 - 3 per month
 1 per week
 2 - 6 per week
 1 or more per day

139. Other candy bars (Milky Way, Snickers)

- Never/less than 1 per month
 1 - 3 candy bars per month
 1 candy bar per week
 2 - 4 candy bars per week
 5 or more candy bars per week

140. Other candy without chocolate (Skittles) (1 pack)

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 4 times per week
 5 or more times per week

141. Jello

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 4 times per week
 5 or more times per week

142. Pudding

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 4 times per week
 5 or more times per week

143. Frozen yogurt

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 4 times per week
 5 or more times per week

144. Ice cream

- Never/less than 1 per month
 1 - 3 times per month
 Once per week
 2 - 4 times per week
 5 or more times per week

145. Milkshake or frappe (1)

- Never/less than 1 per month
 1 - 3 per month
 1 per week
 2 or more per week

146. Popsicles

- Never/less than 1 per month
 1 - 3 popsicles per month
 1 popsicle per week
 2 - 4 popsicles per week
 5 or more popsicles per week

130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146

147. Please list any other foods that you usually eat at least once per week that are not listed (for example, coconut, hummus, falafel, chili, plantains, mangoes, etc. . .)

FOODS

HOW OFTEN?

- a) _____
- b) _____
- c) _____
- d) _____

- a) _____
- b) _____
- c) _____
- d) _____

a			b			c			d		
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9

a		b		c		d	
0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9

THANK YOU
 FOR
 COMPLETING
 THIS
 SURVEY!

147
 a
 b
 c
 d

 0
 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20

Smart Cities, Healthy Kids Food Environment Demographics Survey

MARKING INSTRUCTIONS

Use an HB pencil only
 Darken in the circle completely
 Erase cleanly any marks you wish to change
 Do not make any stray marks on this form

CORRECT: ●

INCORRECT: ☒ ☓ ☑ ☔

A	0	0	0	0	0	0	0
B	1	1	1	1	1	1	1
C	2	2	2	2	2	2	2
D	3	3	3	3	3	3	3
E	4	4	4	4	4	4	4
	5	5	5	5	5	5	5
	6	6	6	6	6	6	6
	7	7	7	7	7	7	7
	8	8	8	8	8	8	8
	9	9	9	9	9	9	9

Questions about You – circle the answer that applies to you

1. I am in Grade

- 5
- 6
- 7
- 8

2. What is the name of your school?

3. What is your street address? _____

(write down the address of the house where you live the most of the time)

4. What is your postal code? _____

5. Do you identify as an Aboriginal person (First Nations, Metis, Inuit)?

- Yes
- No

6. Where do you live most of the time?

- Both parents (biological or adopted)
- Mother only
- Father only
- Mother part time/Father part time
- Other relative (Grandmother, Aunt, Uncle, etc.)
- Group Home or Foster Home
- Other

7. How many brothers and sisters do you have that live with you right now?

- | | |
|----------------------------|---------------------------------|
| <input type="radio"/> None | <input type="radio"/> 4 |
| <input type="radio"/> 1 | <input type="radio"/> 5 |
| <input type="radio"/> 2 | <input type="radio"/> 6 |
| <input type="radio"/> 3 | <input type="radio"/> 7 or more |

8. What is your dad's job? _____

9. What is your mom's job? _____

10. Would you describe your family's money situation as? (please choose only one answer)

- Wealthy
- Average
- Difficult
- Poor
- Don't know

11. In general would you say that your health is:

- Excellent
- Very good
- Good
- Fair
- Poor

12. Do you have any food allergies, intolerances or issues that affect the way you eat?

- Yes If yes, please list _____
- No
- Don't know/not sure

13. This question is about your weight. Choose the answer that is closest to how you feel.

- I think I am underweight (by 5 or more pounds)
- I think I am overweight (by 5 or more pounds)
- I think my weight is okay

14. How well are you doing in school this year?

- Above average
- Average
- Below average

15. This year where have most of your marks been?

- 90% or higher
- 80-89%
- 70-79%
- 60-69%
- 50-59%
- 49% or lower

16. Which places are there to buy food within 10 blocks (about 1 km) from where you live.

Choose all that apply.

- Supermarket/Grocery store
- Convenience store
- Fast food restaurant (such as McDonald's, Subway, Tim Horton's, Wendy's)
- Full-service restaurant (where you sit down and order at your table)
- None
- Don't know

17. Where does your family most often shop for food? **Choose only one.**

- Supermarket/Grocery Store (Ex. Superstore, Safeway, Sobeys)
- Convenience stores (or corner store)
- Specialty food stores (for example Asian markets or health food stores)
- Other (specify store type) _____
- Don't know

18. How does your family usually travel to the grocery store?

- By vehicle (your own, friend/relative's, or taxi)
- By bus
- Walking
- Other (specify) _____
- Don't know

19. How far is your home from the main grocery store your family shops at?

- Fewer than 10 blocks (less than a kilometer)
- 10-20 blocks (1-2 kilometers)
- More than 20 blocks (More than 2 kilometers)
- Don't know

20. How far is your home from the fast food restaurant that you and your family eat at the most?

- Fewer than 10 blocks (less than a kilometer)
- 10-20 blocks (1-2 kilometers)
- More than 20 blocks (More than 2 kilometers)
- Don't eat at fast food restaurants
- Don't know

Appendix B – Community and Consumer Food Environments Data

Table B1: Saskatoon Neighbourhood-level NEMS-S Scores

Neighbourhood	Proportion of low income (2005)	NEMS-S score (mean)	Grocery stores (n)	Convenience stores (n)	Total stores (n)
Stonebridge	N/A	24.5	1	1	2
The Willows	N/A	0	0	0	0
Riversdale	47.1	14	1	1	2
Pleasant Hill	46.9	13	0	2	2
Confederation SC	45.3	17.33	2	6	8
Westmount	34.7	17	0	2	2
Meadowgreen	34.4	25	0	1	1
Kelsey Woodlawn	29.2	10.5	0	4	4
King George	27.8	16	0	1	1
Massey Place	27.2	14	0	2	2
Mayfair	22.7	10.5	0	2	2
Caswell Hill	22.4	15.5	0	2	2
Mount Royal	17.9	18	1	3	4
Confederation Park	17.2	17.5	0	2	2
College Park	17	21	1	3	4
Sutherland	16.7	16.5	0	2	2
Greystone Heights	16.6	27.25	2	2	4
Forest Grove	16.2	16	0	1	1
Hampton Village	15.8	0	0	0	0
Varsity View	15.8	15	0	3	3
Holiday Park	15.6	0	0	0	0
Nutana SC	14.6	16.5	1	3	4
Exhibition	14	24.5	0	1	1
Grosvenor Park	13.9	26.25	2	1	3
Fairhaven	13.4	18	0	1	1
Haultain	12.6	10.5	0	2	2
Nutana	12.3	17.43	1	5	5
Holliston	11.5	17.67	1	3	4
Parkridge	11.3	0	0	0	0
Hudson Bay Park	11.2	21.5	1	1	2
Lakewood SC	11	31	1	1	2
Pacific Heights	11	0	0	0	0
Brevoort Park	10.3	3	0	1	1
City Park	10.3	22	1	1	2
Lawson Heights	9.7	0	0	0	0
Dundonald	9.1	19	0	1	1
Queen Elizabeth	9	15	0	1	1
Adelaide /Churchill	8.8	22.5	1	1	2
North Park	8.7	19	0	2	2

Neighbourhood	Proportion of low income (2005)	NEMS-S score (mean)	Grocery stores (n)	Convenience stores (n)	Total stores (n)
Westview	7.4	14.5	0	2	2
Lakeview	7.2	25	1	0	1
College Park East	6.7	13.5	0	2	2
Wildwood	6.6	25.25	1	3	4
Richmond Heights	6.1	0	0	0	0
Buena Vista	6	2	0	1	1
Avalon	5.9	23	0	1	1
Eastview	5.6	13	0	1	1
Silverwood Heights	5.5	17	0	2	2
River Heights	4.4	26.33	1	2	3
Willowgrove	3.7	0	0	0	0
Lawson SC	3.5	20.86	2	5	7
University Heights SC	3	19.4	2	3	5
Briarwood	2.8	0	0	0	0
Nutana Park	2.6	12	0	1	1
Silverspring	2.3	0	0	0	0
Lakeridge	2.2	0	0	0	0
Central Business District	1.9	13	0	4	4
Erindale	1.7	19	0	1	1
Arbor Creek	1.4	0	0	0	0
Montgomery Place	0	0	0	0	0

Table B2: Saskatoon Neighbourhood-level NEMS-R Scores

Neighborhood	Proportion of low income (2005)	No. of	No. of Fast-food Restaurants (including Chain Coffee Shops)	NEMS-R Score (Mean)
Pleasant Hill	38.9	12	6	13.00
Riversdale	36.8	11	2	6.83
Confederation SC	32.4	16	12	11.82
Varsity View	30.9	3	2	17.20
Meadowgreen	25.8	1	0	6.00
Kelsey Woodlawn	24.5	9	4	19.67
Massey Place	23.1	0	0	NA
King George	21.6	0	0	NA
Caswell Hill	18.4	14	7	7.57

Neighborhood	Proportion of low income (2005)	No. of Restaurants	No. of Fast-food Restaurants (including Chain Coffee Shops)	NEMS-R Score (Mean)
Mayfair	17.4	12	5	10.75
Hampton Village	15	0	0	NA
Grosvenor Park	13.9	15	5	11.27
Confederation Park	13.4	1	1	9.00
Mount Royal	13.4	4	3	8.00
Exhibition	12.4	1	0	16.00
University Heights SC	11.6	5	13	19.68
Stonebridge	11.2	11	6	25.75
College Park	10.9	13	6	9.23
Fairhaven	10.8	0	0	NA
Greystone Heights	10.3	7	3	8.57
Forest Grove	9.7	1	1	0.00
Holiday Park	9	1	0	3.00
Holliston	8.9	11	4	17.45
Nutana SC	8.9	11	5	9.91
Parkridge	8.3	0	0	NA
Dundonald	8.1	1	1	3.00
Pacific Heights	7.7	0	0	NA
Brevoort Park	7.6	15	7	12.00
Haultain	7.5	1	0	3.00
Nutana	7.4	15	2	11.60
Lawson Heights	6.9	0	0	NA
North Park	6.9	1	0	6.00
Lakewood SC	6.8	4	2	31.75
City Park	6.7	8	0	3.75
Hudson Bay Park	6.1	3	0	8.00
Richmond Heights	6.1	1	0	0.00
College Park East	5.5	1	0	3.00
Westmount	5.5	0	0	12.67
Westview	5.2	18	0	NA
Queen Elizabeth	4.8	0	0	NA
Eastview	4.7	1	0	12.00
Lakeview	4.5	4	1	4.50
Avalon	4.3	2	1	0.00
Buena Vista	4.1	3	0	5.00
Silverwood Heights	3.6	0	0	NA
Lawson SC	3.5	16	12	14.59
Adelaide /Churchill	3.4	2	2	5.50
Willowgrove	3.4	0	0	NA
River Heights	3.2	3	3	12.00
CentralBusiness District	2.9	67	23	12.40

Neighborhood	Proportion of low income (2005)	No. of Restaurants	No. of Fast-food Restaurants (including Chain Coffee Shops)	NEMS-R Score (Mean)
Briarwood	2.3	0	0	NA
Silverspring	1.9	0	0	NA
Montgomery Place	1.5	1	0	NA
Arbor Creek	1.4	0	0	NA
Lakeridge	1.3	0	0	NA
Erindale	0.9	0	0	NA
Nutana Park	0	0	0	NA
Sutherland	0	1	6	3.45
The Willows	0	17	0	9.00
Wildwood	0	0	15	14.78
Total		344	160	

Table B3: Elementary Schools and Number of Food Outlets Within 750m Walking

School	Neighbourhood	Grocery Store	Convenience	Fast Food	Chain Coffee
Alvin Buckwold	Eastview	0	0	0	
Bishop Filevich	Sutherland	0	2	1	
Bishop Klein	Massey Place	0	1	0	
Bishop Pocock	Wildwood	0	0	0	
Bishop Roborecki	Confederation Park	0	0	0	
Brevoort Park	Brevoort Park	0	0	0	
Brownell	Silverwood Heights	0	1	0	
Brunskill	Varsity View	0	2	2	
Buena Vista	Buena Vista	0	0	0	
Cardinal Leger	College Park	0	0	0	
Caroline Robins	Westview	0	2	0	
Caswell	Caswell Hill	0	0	0	
College Park	College Park	0	0	4	
Confederation Park	Confederation Park	0	0	0	
Dr. John G. Egnatoff	Erindale	0	1	0	
Dundonald	Dundonald	0	3	1	
Henry Kelsey	Hudson Bay Park	1	0	0	
Fairhaven	Fairhaven	0	0	0	
Father Robinson	Erindale	0	0	0	

School	Neighbourhood	Grocery Store	Convenience	Fast Food	Chain Coffee Shop
Father Vachon	Pacific Heights	0	0	0	
Forest Grove	Forest Grove	0	1	1	
Georges Vanier	Avalon	0	0	1	
Greystone Heights	Greystone Heights	0	0	1	
Holliston	Holliston	2	1	5	
Howard Coad	Mount Royal	0	0	0	
Hugh Cairns V.C.	Adelaide/Churchill	0	0	0	
James L. Alexander	Parkridge	0	0	0	
John Lake	Avalon	0	0	1	
King George	King George	0	1	0	
Lakeridge	Lakeridge	0	0	0	
Lakeview	Lakeview	0	0	0	
Lawson Heights	Lawson Heights	0	1	0	
Lester B. Pearson	Pacific Heights	0	0	0	
Mayfair	Mayfair	1	1	4	
Montgomery	Montgomery Place	0	0	0	
Mother Teresa	Silverspring	0	0	0	
North Park Wilson	North Park	0	1	0	
Pleasant Hill	Pleasant Hill	0	4	4	
Pope John Paul II	Eastview	0	0	0	
Prince Philip	Nutana Park	0	1	0	
Princess Alexandra	Riversdale	0	6	5	
Queen Elizabeth	Queen Elizabeth	0	2	0	
River Heights	River Heights	0	0	0	
Roland Michener	College Park East	0	1	0	
Saskatoon French	Holiday Park	0	0	0	
Saskatoon Misbah	Grosvenor Park	0	0	0	
Silverspring	Silverspring	0	0	0	
Silverwood Heights	Silverwood Heights	0	1	0	
Sister O'Brien	Silverwood Heights	0	1	0	
St. Angela	Silverwood Heights	0	1	0	
St. Anne	River Heights	1	2	6	
St. Augustine	College Park East	0	0	0	
St. Bernard	Lakeview	0	0	0	
St. Dominic	Montgomery Place	0	0	0	
St. Edward	Hudson Bay Park	1	1	0	
St. Frances	Exhibition	1	0	0	
St. George	Lawson Heights	0	0	0	
St. Gerard	Mount Royal	1	3	1	
St. John	Holiday Park	0	1	0	

School	Neighbourhood	Grocery Store	Convenience	Fast Food	Chain Coffee Shop
St. Luke	Lakeridge	0	0	0	
St. Marguerite	Parkridge	0	0	0	
St. Maria Goretti	Mount Royal	1	2	2	
St. Mark	Fairhaven	0	1	0	
St. Mary	Pleasant Hill	0	4	3	
St. Matthew	Brevoort Park	0	1	0	
St. Michael	Kelsey Woodlawn	0	1	5	
St. Paul	North Park	0	1	0	
St. Peter	Dundonald	0	0	0	
St. Philip	Adelaide/Churchill	1	1	2	
St. Volodymyr	Forest Grove	0	1	1	
Sutherland	Sutherland	0	1	2	
Victoria	Nutana	1	1	2	
Vincent Massey	Massey Place	0	1	0	
W.P. Bate	Meadowgreen	0	1	0	
Westmount	Westmount	0	1	0	
Wildwood	Wildwood	0	0	0	
Saskatoon Christian	Outside Saskatoon	0	0	0	

