# Household Food Security and Produce Intake and Behaviors of Adult Mothers Living on Prince Edward Island and Using Family Resource Center Services

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Household Food Security and Produce Intake and Behaviors of Adult Mothers Living on Prince Edward Island and Using Family Resource Center Services

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## Abstract

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Household Food Security and Produce Intake and Behaviors of Adult Mothers Living on Prince Edward Island and Using Family Resource Center Services

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Prince Edward Island is characterized by low household food security compared to other Provinces, especially among female lone parents. Low produce intake may be linked to chronic disease and has been associated with household food insecurity. This study examined differences in produce intake by food security status of adult mothers aged 18 and older with young children living on Prince Edward Island and using Family Resource Centre services. The main instrument used in this investigation was the U.S. Department of Agriculture (USDA) Household Food Security Survey Module (HFSSM), a produce intake and behavior-related instrument. The USDA HFSSM was scored using Canadian methods. Descriptive statistics were used to describe the sample. SPSS software was used to tabulate data, and, using SPSS, an ANOVA was used to assess for differences in produce intake among food security groups. Participants (n = 282) were primarily White (n = 262, 92.9%) and married (n = 164, 58.2%). Age ranged from 18-53 years (30 ± 5 years, n = 280). Regarding household adult food security of participants (n = 281), 197 (70.1%) experienced food security during the previous 12 months, while 84 (29.8%) experienced food insecurity (food insecure, moderate [n = 46, 16.4%]; food insecure, severe [n = 38, 13.5%]). Total produce ($p < .001$), fruit ($p < .001$), and vegetable ($p = .001$) differed by household food security; mothers who

experienced severe food insecurity consumed less total produce than food secure or food insecure (moderate) mothers by 1.8 and 1.3 servings daily, respectively. In summary, mothers of young children living on Prince Edward Island who experienced severe food insecurity had lower produce intake compared to other mothers. Further exploration of programs and services to improve food insecurity among these mothers is warranted.

## Dedication

*To my amazing parents, thank you for your continuous love and support. I am so grateful for all that you have inspired me to achieve.*

**Acknowledgments**

I would first like to thank my advisor, Dr. David Holben, for his direction, patience, and guidance throughout the thesis process. My sincerest gratitude to Mrs. Deborah Murray and Dr. Michele Morrone for also serving on my thesis committee. I am extremely grateful for your time, helpful revisions and suggestions, and support.

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# Chapter 1: Introduction

## Overview and Background

According to the World Health Organization (WHO, 2014), food security can be defined as access by all people at all times to enough food for an active and healthy lifestyle. Food insecurity is apparent when individuals and families have limited access to, or availability of, nutritious food for an active health life or a limited ability to acquire food in socially acceptable ways (Anderson, 1990). The prevalence of food insecurity continues to rise in Canada, affecting 450,000 additional Canadians since 2008, when 1.92 million individuals reported insecurity (Tarasuk, Mitchell, & Dachner, 2014). According to the *Report on Household Food Insecurity in Canada, 2012*, 4 million Canadians, including 1.15 million children, faced some degree of food insecurity in 2012 (Tarasuk et al., 2014). This public health problem currently affects approximately 13% of Canadian households, including both adults and children (Tarasuk et al., 2014). For the 13% Canadian households that experienced food insecurity in 2012, the degree of marginal, moderate, or severe deprivation was 4.1%, 6.0%, and 2.6%, respectively (Tarasuk et al., 2014). This rise in food insecurity has resulted in more individuals seeking emergency assistance. In 2012, 882,188 Canadians sought assistance from Food Banks, which was a 2.4% increase from 2011 (Food Banks Canada, 2012). With growing prevalence rates of food insecurity, it is imperative that research is conducted to better understand the well-being of Canada's citizens who struggle with food deprivation so that appropriate solutions can be identified to reduce food insecurity.

Certain household characteristics show an increased risk for food insecurity. In Canada, low-income persons or households, those seeking social assistance, single mothers, individuals who do not own homes, and recent immigrants to Canada are more likely to suffer a higher degree of food insecurity than others (Tarasuk et al., 2014). Since the degree of food security is considered to be a strong determinant of health, food insecurity has the ability to compromise overall health and well-being. Without sufficient funds for food, many food-insecure persons consume poor diets. Food insecurity can lead to the use of coping mechanisms to help stave off severe food security, including decreased portions sizes, skipping meals, going hungry, and fasting for an entire day (Tarasuk & Beaton, 1999). When gender is taken into account, Canadian women receiving emergency food assistance have been found to be more likely to deprive themselves of food in order to ensure their children have enough to eat (Tarasuk & Beaton, 1999). These coping strategies may have adverse health outcomes and consequences, especially for women.

Alterations of dietary intake patterns may ultimately occur. Research confirms that fruit and vegetable intake decreases as food insecurity increases (Dachner, Ricciuto, Kirkpatrick, & Tarasuk, 2010; Drewnowski & Specter, 2004), ultimately leading to increased chronic disease risk (Dixon, Winkleby, & Radimer, 2001). Unfortunately, this reality may increase the risk of encountering health disparities for food insecure individuals. A well-balanced, nutritious diet is important in the prevention and treatment of chronic disease. With strong evidence that decreased fruit and vegetable intake increases risk of the development of chronic disease, it does not come as a surprise that

many food-deprived individuals may face increased risk of compromised health (Che & Chen, 2001; McIntyre, Connor, & Warren, 2000).

Due to the lack of an effective monitoring system, Canadian food insecurity estimates were unknown throughout the 1980s and most of the 1990s. Prior to 1998, Canada relied on estimates that were based upon the number of individuals seeking assistance from food banks, soup kitchens, and other charitable organizations to monitor prevalence (Tarasuk, 2001a). Since the development of appropriate tools to measure food security, the ability to estimate food insecurity has evolved for Canada as a whole, as well as its provinces.

**Statement of the Problem**

The most recent national estimates indicate that food insecurity continues to negatively impact residents of Prince Edward Island. In 2007, food insecurity affected 14.9% (4.5% marginally food insecure, 7.7% moderately food insecure, 2.7% severely insecure) of Prince Edward Island households, and the most recent estimates indicated that it affected 16.2% of households in 2012 (4.8% marginally food insecure, 8.5% moderately food insecure, 2.9% severely insecure) (Tarasuk et al., 2014). (Note the inclusion of "marginally food insecure" households in the most recent estimates.) Overall, food insecure households had insufficient money for food to meet the needs of household members during the year. Marginally food insecure households reported running out of food and/or limiting food selections; moderately food insecure households exhibited compromises in quality and/or quantity of food consumed; and, severely food

insecure households demonstrated reduced food intake and disrupted eating patterns (Health Canada, 2012).

Of the Canadian food insecure households in 2012, 34.3% were households headed by a female lone parent, making this population the most vulnerable (Tarasuk et al., 2014). As for the 1.15 million food-insecure Canadian children, 62.2% lived in Nunavut, Canada; 31.6%, in the Northwest Territories; and, 21.9%, in Prince Edward Island; these three represent the top three highest proportions among Canadian provinces/territories (Tarasuk et al., 2014). In fact, in a study of low-income, lone-mothers in the Atlantic Canada region, 78% of households were food insecure (Glanville & McIntyre, 2006), with the most severe levels of maternal food insecurity being experienced in Prince Edward Island (McIntyre et al., 2000). Further, it was found that women appear to modify their dietary intake to spare other family members, especially children, from experiencing nutrient deprivation (McIntyre et al., 2002).

Mothers were examined in the present study, because there is evidence that mothers are vulnerable to food insecurity. This study was part of a larger project to assess the interrelationship of food insecurity, health, produce (fruit and vegetable) intake, and produce-related behaviors (perceived benefits of, perceived barriers to, and perceived control of produce intake) of adult mothers with young children living on Prince Edward Island and using Family Resource Centre services. Seven center locations across Prince Edward Island offer programs for children and families, including parent education and support groups, parent resources, prenatal nutrition programs, drop-in play,

toy-lending libraries, and outreach for smaller island communities (Government of Prince Edward Island, 2010).

**Research Questions and Significance of the Study**

This study examined the differences in produce intake and behaviors by food security status of adult mothers with young children living on Prince Edward Island and using Family Resource Centre services. Specifically, the research questions for the study were:

1. How does produce intake differ by food security status of Adult Prince Edward Island mothers of children 6 years and younger and using Family Resource Centre services?
2. How do produce related-behaviors differ by food security status of Adult Prince Edward Island mothers of children 6 years and younger who were using Family Resource Centre services?

It was hypothesized that food insecurity is associated with lower produce intake and fewer positive produce-related behaviors. Gaining deeper insight into outcomes of this vulnerable group will be a first step to finding solutions for improving their food insecurity. According to research to identify policy options to reduce food insecurity, currently there are no federal programs in Canada that have specifically been designed to improve food insecurity (Tarasuk et al., 2014). After data are collected and published, it is hoped that knowledge gained about the produce intake and produce-related behaviors of mothers with young children will lead to better food and nutrition-related programming to assist these women.

# Chapter 2: Review of Literature

## Definitions

Household food insecurity has been recognized as a public health problem, not only in developing countries, but also in the United States and Canada (Tarasuk, 2001a). As the prevalence continues to rise, it is imperative that the awareness of this issue is expressed to the public. In order to properly understand food insecurity, the framework of food security must first be discussed.

**Food security.** According to the WHO (2014), food security can be defined as access by all people at all times to enough food for an active and healthy lifestyle. The framework is complex, which calls for further description of exactly what the term encompasses. Food availability, food access, and food use are considered to be the three main pillars of food security (WHO, 2014). In this section, the definition of each pillar will be outlined in context of each other.

The first pillar, food availability, can be defined as having sufficient quantities of food available on a consistent basis (WHO, 2014). In other words, an individual who is food secure has the ability to purchase the foods that they prefer to eat and in the quantities they want on a regular basis. In order to purchase the foods that they want, food secure individuals have the monetary means or resources to obtain their desired type and quantity of food. Thus, food access, the second pillar, can be described ideally as having the ability to purchase foods that create a healthy or nutritious diet (WHO, 2014). In addition, for these two pillars, both food availability and food access must be accomplished in socially acceptable ways (WHO, 2014). Food security indicates that

individuals have the ability to obtain food without using, emergency food sources, scavenging, stealing, or begging (WHO, 2014). In addition to availability and access, food use is also emphasized in the framework of food security. This pillar defines knowledge, particularly the nutrition and sanitation knowledge of affected individuals (WHO, 2014). Basic nutrition, as well as sufficient knowledge to properly purchase, store, and prepare food, is emphasized. Additionally, putting proper food and water sanitation techniques into practice can be included in the food use category. Together, these three pillars describe the food security framework.

**Food insecurity.** With the food security basics defined, food insecurity can simply be described as the compromise of one or more of the aforementioned pillars. More specifically, food insecurity is evident when an individual, family, or household has limited or lack of access to food (Anderson, 1990; WHO, 2014). These multidimensional circumstances differ from food insufficiency, which refers specifically to the lack of types or amounts of foods (Gundersen & Ribar, 2007). An individual or entire household may seek help from food assistance programs, soup kitchens, or food pantries as a way to cope with food insufficiency, thus generally indicating that food availability or food access has diminished (Che & Chen, 2001; Radimer et al., 1997; Vozoris & Tarasuk, 2003). Additionally, a change in eating or meal patterns may arise as a means to make food last longer or to preserve the quantity of food available (Tarasuk, 2001a). In addition to receiving help and changing eating patterns, a conscious shift may be made in the types of foods eaten; oftentimes food insecure households may choose to purchase less nutritious foods in order to decrease costs (Kendall, Olson, & Frongillo, 1996). As a

result, individuals may sacrifice nutrient-dense foods for less expensive alternatives. The aforementioned coping mechanisms have been found to be utilized by many food insecure Canadian individuals (Campbell & Desjardins, 1989).

**Ranges of severity.** Table 1 defines Canadian food security-related terms. Canadian food security measurement evolved from U.S. methods. In order to express the severity, the U.S. Department of Agriculture (USDA) recently added ranges of both food security and food insecurity (USDA, Economic Research Service, 2012). In general, the severity can be described in terms of the frequency and duration of food deprivation (Tarasuk & Beaton, 1999). By setting a specific time frame, for example within the past 60 days, adults and children are able to appropriately report issues of food insecurity. In addition to ranges of severity, household characteristics can also give insight into food insecurity circumstances. Total household income, the main source of that income, and home ownership are additional indicators (Tarasuk, 2001a). With the addition of new terms to specifically define ranges, cases of food security and food insecurity can more clearly be described.

Table 1

*Canadian Food Security Status Categories*

| Category labels | Definition |
|---|---|
| Food secure | No indication of difficulty with income-related food access |
| Food insecure, marginal | One indication of difficulty with income-related food access |
| Food insecure, moderate | Indication of compromise in quality and/or quantity of food consumed |
| Food insecure, severe | Indication of reduced food intake and disrupted eating patterns |

*Note*. Table represents merged documents. Health Canada. (2008, January). Income-related household food security in Canada in 2004 (Canadian Community Health Survey, Cycle 2.2, Nutrition). Retrieved August 7, 2014, from the Health Cananda Health & Nutrition Survey website: http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/income_food_sec-sec_alim-eng.php#metho253

In terms of food security, the category labels of high and marginal have been defined. High food security indicates that there are no reports of lack of food access or limitations (USDA, Economic Research Service, 2012). Reporting one or two incidences of anxiety related to reduced access to food is categorized as marginal food security (USDA, Economic Research Service, 2012). Further, this range should include little to no report of a change in food intake patterns.

As for food insecurity terms, the use of "with hunger" or "without hunger" markers are no longer utilized in the United States. Previously, in relation to food

insecurity, hunger was described as a physiological condition that individuals may experience due to lack of availability or access to food. However, consensus indicates that hunger has not been accurately assessed; this understanding led to the adoption of new severity indicators in 2006 (USDA, Economic Research Service, 2012). As a consequence, low and very low food security ranges have been introduced.

Low food security, previously described as food security without hunger, is used in instances when reduced quality, variety, and desirability of intake are reported (USDA, Economic Research Service, 2012). However, this descriptor makes little mention of decreased food intake. Finally, very low food security, which was previously referred to as food insecurity "with hunger," qualifies as multiple reports of changes in eating or meal patterns and decreased in food intake (USDA, Economic Research Service, 2012). Thus, the new definitions refine the categories related to severity of food security and insecurity. The food security categories and definitions used by the United States are summarized in Table 2.

Similar to the United States, Canada has developed a system to categorizing households, as summarized in the next section.

Table 2

*Food Security Categories Used by the United States*

| Category | Description |
|---|---|
| High food security | Households have no problem or anxiety about steadily acquiring nutritious foods |
| Marginal food security | Households sometimes have problems or anxiety about steadily acquiring nutritious food, but did not see a large reduction in their food intake quality, variety, or quantity |
| Low food security | Households experience a reduction in the quality, variety, appeal of their diets, with the quantity of their food intake remaining relatively consistent |
| Very low food security | Households have one or more household members who repeatedly experienced a disruption in their food intake due to lack of economic resources |

*Note*. From "Household Food Security in the United States," by U.S. Department of Agriculture, Economic Research Service, 2008. Available from www.ers.usda.gov/

**Measurement of Food Security**

In an effort to accurately document the prevalence of food insecurity, the USDA developed a survey tool to measure household food security. The objective of the food security survey module is to "capture and distinguish the various levels of severity" (Bickel, Nord, Price, Hamilton, & Cook, 2000), and to document the extent of food insecurity. Monitoring food security can identify populations with patterns of severe food insecurity, and aid in the understanding of this basic threat to health and well-being. The survey creates records of experiences and behaviors documented by food insecure individuals, giving insight to the ranges of severity (see Appendix A).

Canada has adapted the food security measurement method used by the United States. The Household Food Security Survey Module (HFSSM) has been included in national surveys since 2004 (Health Canada, 2014). In addition to documenting the food security situation of households, the HFSSM serves as an assessment of Canada's policies and solutions to improve food security. Although Canada's survey stems from the one used by the United States, each country uses different standardized methods for determining food security status. Canada has adopted categories (food secure, food insecure, moderate and food insecure, severe) to describe the ranges of food security (Health Canada, 2014). Alternatively, the United States has chosen to distinguish their status levels as food secure, low food security, and very low food security, along with a marginal category.

The HFSSM is an 18-question survey that determines the food security status of an entire household over the previous 12 months (Health Canada, 2014). Since all individual members of a household may not face the same degree of food insecurity, the status represents the household as a whole. However, specific food security status of adults and children can separately be determined. The Adult Scale, consisting of 10 questions, is specific to experiences of the adult and measures the adult food security status (Health Canada, 2014). For children under the age of 18, the Child Scale consists of 8 questions specific to the experiences of the child, which measures the child food security status (Health Canada, 2014). This survey incorporates questions that indicate "insufficient or inadequate food access, availability and utilization due to limited financial resources, and the compromised eating pattern and food consumption that may

result" (Health Canada, 2014). The number of questions that are answered affirmatively determines the food security status. Table 3 summarizes the determination of food security status.

Table 3

*Canadian Food Security Status According to Affirmative Responses*

| Food security status | Adult status (based on the Adult Scale) | Child status (based on the Child Scale) | Household status (derived from Adult and Child Scales) |
|---|---|---|---|
| Food secure | No, or one, indication of difficulty with income-related food access: 0 affirmative responses | No, or one, indication of difficulty with income-related food access: 0 affirmative responses | Both adult status and child status are food secure |
| Food insecure, marginal | Some indication of worry or an income-related barrier to adequate, secure food access: 1 affirmative response | Some indication of worry or an income-related barrier to adequate, secure food access: 1 affirmative response | Both adult status and child status are marginally food insecure |
| Food insecure, moderate | Indication of compromise in quality and/or quantity of food consumed: 2 to 5 affirmative responses | Indication of compromise in quality and/or quantity of food consumed: 2 to 4 affirmative responses | Either adults or children, or both adults and children, in the household are moderately food insecure, and neither is severely food insecure |
| Food insecure, severe | Indication of reduced food intake and disrupted eating patterns: ≥ 6 affirmative responses | Indication of reduced food intake and disrupted eating patterns: ≥ 5 affirmative responses | Either adults or children in the household are severely food insecure |

Adapted from Canadian Community Health Survey, cycle 2.2, Nutrition (2004). Income related household Food Security in Canada. Retrieved August 7, 2014, from http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/insecurit/status-situation-eng.php#as

A scale score of 0-1 affirmative responses represents the food secure status. Households that fall into this category report having access at all times to the quality and quantity of food needed over the previous year (Bickel et al., 2000). The food insecure status, reporting some degree of inability to purchase enough food to properly feed all members of the household, is delineated at 2 or more affirmative answers (Bickel et al., 2000). These experiences are often linked to a lack of income or resources. The food insecure, moderate status is represented by 2-5 affirmative responses. These households indicate a compromise in the quality or quantity of food consumed by household members (Bickel et al., 2000). Affirmative responses between 6-10 indicate a food insecure, severe status. At this stage, a reduction in food consumption and change in eating patterns are characteristic of the food insecure, severe status (Bickel et al., 2000). Table 4 summarizes the comparison of the Canadian and U.S. food security status categories according to affirmative responses.

Table 4

*Comparison of Household Food Security Status Categories in the United States and Canada*

| Affirmative answers | Food security status in United States | Food security status in Canada |
|---|---|---|
| 0 | High food security | Food secure |
| 1 | Marginal food security | Food insecure, marginal |
| 2 | Low food security | Food insecure, moderate |
| 3 | | |
| 4 | | |
| 5 | Very low food security | |
| 6 | | Food insecure, severe |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

**Food Security in Canada**

Food insecurity has recently been recognized as a public health problem in Canada. Due to the lack of an effective monitoring system, food insecurity estimates went unknown throughout the 1980s and most of the 1990s. Prior to 1998, Canada relied on estimates that were based upon the number of individuals seeking assistance from food banks, soup kitchens, and other charitable organizations to monitor the prevalence

(Tarasuk, 2001a). It was not until the USDA Food Security Module was developed that it was recognized by Health Canada that more efficient data collection was needed (Kendall, Olson, & Frongillo, 1995).

The National Population Health Survey (NPHS) was the first means of collecting food insecurity estimates in 1998. This year-long survey not only helps to estimate food insecurity prevalence, but it also provides sociodemographic and health characteristics of the families or households reporting food insufficiency issues (Tarasuk, 2001a). The NPHS was able to reach 81,804 Canadians between 1998 and 1999 to assess the health of the population (Che & Chen, 2001). In order to further stratify insecurity, questions regarding food insufficiency were introduced during the second cycle of the NPHS, thus defining household food security for the first time in Canada (Tarasuk, 2001a). By including just three questions, the NPHS now encompassed the means to assess food insecurity. According to the NPHS, 3.9% of Canadians were food insufficient between 1998 and 1999, thus indicating that "sometimes or often" not having enough food to eat (Tarasuk, 2001a). Approximately 93.4% responded saying they never ran out of money for food, while the remaining 2.5% indicated that they sometimes did run out of money for food, however, they felt they still had enough to eat (Tarasuk, 2001a).

Since the initial development of tools to measure food insecurity, the ability to estimate such data has evolved. According to the 2007-2008 survey, 7% of Canadian households were food insecure (Nord & Hopwood, 2008). Of those living in food insecure households, only 2.4% fell into the very low food security range (Nord & Hopwood, 2008). In 2012, almost 13% of Canadian households experienced some

degree of food insecurity, with the degree of marginal, moderate, and severe deprivation was 4.1%, 6.0%, and 2.6%, respectively (Tarsuk et al., 2014). (Note inclusion of "marginal" in the 13%.) Although the prevalence of food insecurity has been recently brought to the forefront, there are now effective measures to both estimate the prevalence of insecurity and to more correctly define this health problem. Figures 1-4 summarize household food security status of Canada in 2012.

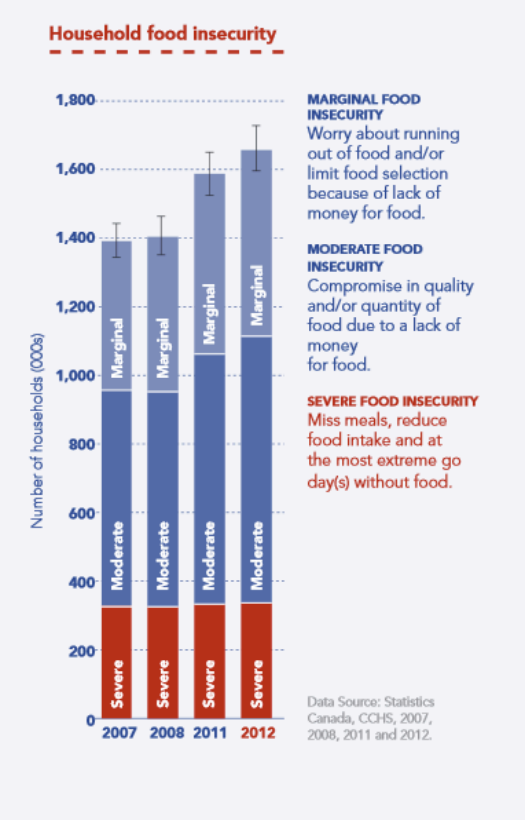


*Figure 1*. Summary of Canadian household food insecurity from 2007-2012. From the Household Food Insecurity in Canada 2012 report. Retrieved August 7, 2014, from http://nutritionalsciences.lamp.utoronto.ca/wp-content/uploads/2014/05/Household_Food_Insecurity_in_Canada- 2012_ENG.pdf. Copyright 2014 by Tarasuk et al., 2014. Reprinted with permission.

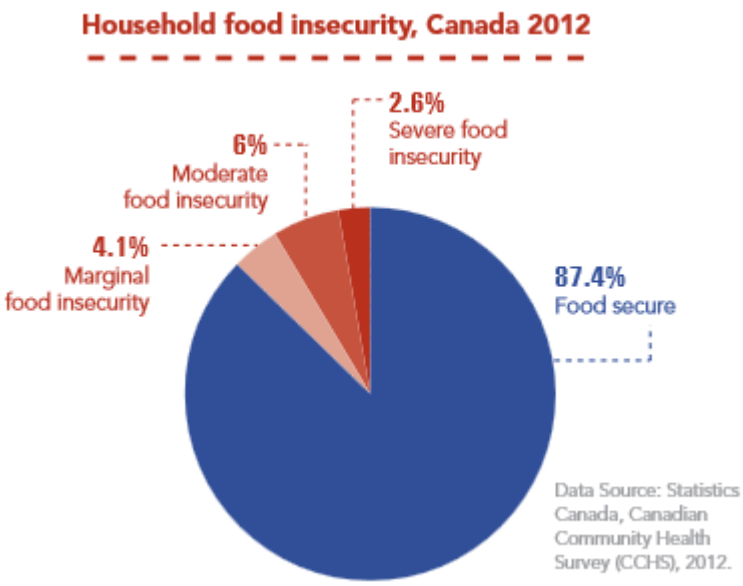


*Figure 2*. Canadian household food security status in 2012. From the Household Food Insecurity in Canada 2012 report. Retrieved August 7, 2014, from http://nutritionalsciences.lamp.utoronto.ca/wp-content/uploads/2014/05/Household_Food_Insecurity_in_Canada-2012_ENG.pdf. 

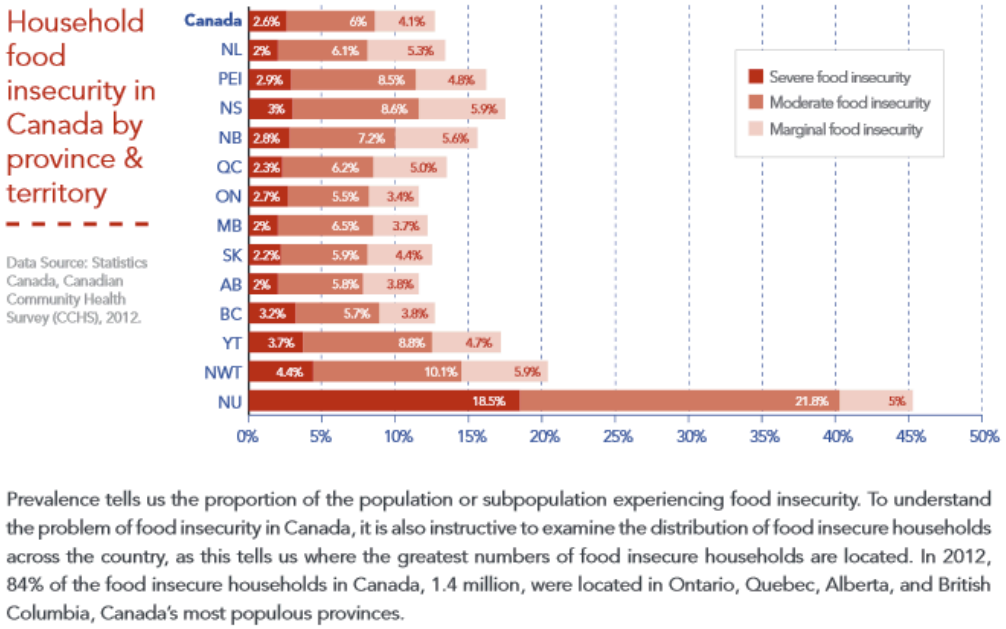


*Figure 3*. Canadian household food insecurity status by province and territory. From the Household Food Insecurity in Canada 2012 report. Retrieved August 7, 2014, from http://nutritionalsciences.lamp.utoronto.ca/wp-content/uploads/2014/05/Household_Food_Insecurity_in_Canada-2012_ENG.pdf. 

| Household food insecurity – Canada, 2005-2012 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2005 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
| Newfoundland & Labrador | | 15.7% | 14.3% | 11.8% | 11.5% | 10.6% | 13.4% |
| Prince Edward Island | 12.9% | 14.9% | 15.3% | | | 15.4% | 16.2% |
| Nova Scotia | 16.1% | 14.4% | 13.5% | 15.9% | 14.9% | 17.1% | 17.5% |
| New Brunswick | | 13.8% | 15.1% | | | 16.5% | 15.6% |
| Quebec | 11.3% | 10.9% | 9.4% | 11.3% | 9.7% | 12.5% | 13.5% |
| Ontario | 11.6% | 11.8% | 12.1% | 12.5% | 11.3% | 11.9% | 11.7% |
| Manitoba | | 12.4% | 12.9% | 10.8% | 10.0% | 12.4% | 12.1% |
| Saskatchewan | | 9.5% | 9.7% | 8.2% | 9.2% | 11.8% | 12.5% |
| Alberta | 10.4% | 9.1% | 10.0% | 10.8% | 10.9% | 12.3% | 11.5% |
| British Columbia | 11.0% | 10.8% | 11.5% | 11.9% | 11.1% | 11.0% | 12.7% |
| Yukon | | 17.8% | 13.0% | 13.9% | 12.6% | 16.7% | 17.1% |
| Northwest Territories | 14.2% | 16.5% | 17.8% | 9.8% | 12.0% | 15.2% | 20.4% |
| Nunavut | 38.0% | 35.4% | 34.6% | 31.0% | 31.0% | 36.4% | 45.2% |

Data Source: Canadian Community Health Survey (CCHS), 2005, 2007, 2008, 2009, 2010, 2011 and 2012.

*Figure 4*. Summary of household food insecurity by Canadian province from 2005-2012. From the Household Food Insecurity in Canada 2012 report. Retrieved August 7, 2014, from http://nutritionalsciences.lamp.utoronto.ca/wp-content/uploads/2014/05/Household_Food_Insecurity_in_Canada-2012_ENG.pdf. Copyright 2014 by Tarasuk et al., 2014. Reprinted with permission.

**Consequences of Food Insecurity**

Food insecurity can compromise overall health and well-being. Specifically, it is through coping mechanisms that the diminished health of food insecure individuals occurs. In an effort to offset diminished food supply, food insecurity often leads to using coping mechanisms, including decreased portions sizes, skipping meals, going hungry and fasting for an entire day (Tarasuk & Beaton, 1999). When gender is taken into account, it has been found that women are more likely to deprive themselves of food in order to ensure their children have enough to eat (McIntyre et al., 2000; Tarasuk &

Beaton, 1999). These coping strategies that are characteristic of low income women have adverse health outcomes and consequences, including dietary and chronic disease effects.

**Dietary implications.** Due to a lack of availability or lack of access to food, many food insecure women do not meet dietary intake recommendations. It is oftentimes the coping mechanisms that develop from food insecurity that cause these adults to consume a less nutritionally dense diet (Campbell & Desjardins, 1989). The most common deficiencies seen in this population are decreased total energy and decreased fruit and vegetable intakes (Campbell & Desjardins, 1989; Fitchen, 1988).

In order to assess the intake of food insecure individuals, it is important to consider them in relation to Canada's Food Guide recommendations (see Appendix B). In terms of total energy intake, it is recommended, on average, that adult females consume 2,200 kilocalories per day (Health Canada, 2014). However, in food insecure females, it has been found that averages of 1,438 kilocalories are consumed (Tarasuk & Beaton, 1999). As for fruit and vegetable intake, it is recommended that adult females consume 7-8 servings (Health Canada, 2007). In food insecure females, it has been found that they consume 3.6 servings on average (Gucciardi, Vogt, DeMelo, & Steward, 2009; Miewald, Holben, & Hall, 2012). Thus, these food insecure adults are consuming significantly less than the estimated energy recommendations. With a large pool of evidence related to adequate fruit and vegetable intake to the prevention of chronic disease, it is imperative to overall health and well-being that the produce recommendations are met. Proposed strategies for increasing produce intake within this population include farmers' market coupons, community gardens, and food boxes

(Miewald et al., 2012). Research has shown that such programs increase access through incentives and education (Anderson et al., 2001; Herman, Harrison, & Jenks, 2006; Johnson, Beaudoin, Smith, Beresford, & LoGerfo, 2004; Miewald et al., 2012; Wall, Mhurchu, Blakely, Rodgers, & Wilton, 2006).

Further, Health Canada recommends that women of childbearing age take a daily multivitamin, containing at least 400 micrograms (μg) of folic acid and between 16 and 20 milligrams (mg) of iron to support proper fetal development (Health Canada, 2011). Although folic acid intake of food insecure individuals has not specifically been studied, it has been found that food insufficient families in the United States consume only 292.1 ± 23.2 μg of folate through diet (Dixon et al., 2001). Iron consumption was reported as 15.7 mg ± 1.1 in this population (Dixon et al., 2001). Thus, the need for a supplement among women of childbearing age is intensified due to unmet dietary intakes.

Previous research examined occurrence and predictors of food insecurity among low-income mother-led households in Canada's Atlantic Provinces, which includes Newfoundland, New Brunswick, Nova Scotia, and Prince Edward Island. Over half of the women experienced some degree of food stress often, affecting not only the adults living in the household, but also the children (McIntyre et al., 2002). Further, Nova Scotia and Prince Edward Island reported higher rates of hunger than those living in New Brunswick and Newfoundland (McIntyre et al., 2002). The high rates of maternal hunger support the notion that mothers restrict their intake to decrease the effect of food insecurity on their children.

**Health implications.** Based upon research confirming fruit and vegetable intake decreases as food insecurity increases (Dachner et al., 2010; Drewnowski & Specter, 2004) and that decreased fruit and vegetable intake increases risk for developing chronic disease, it is not surprising that this population reports high rates of chronic disease (Che & Chen, 2001; McIntyre et al., 2000). Among low-income Canadian females, it was found that food insecurity was associated with poorer self-reported health, decreased physical activity, and a high prevalence of chronic disease (Tarasuk, 2001b). More specifically, high instances of chronic diseases such as heart disease, diabetes, and high blood pressure are reported (Tarasuk & Beaton, 1999). Additionally, it has also been linked to overweight and obesity (Casey, Szeto, Lensing, Bogle, & Weber, 2001; Che & Chen, 2001; Sarlio-Lähteenkorva & Lahelma, 2001; Townsend, Peerson, Love, Achterberg, & Murphy, 2001). Due to cyclic binge and starve eating patterns, it has been shown that food insecure women are more likely to be overweight or obese than their food secure counterparts. Thus, it is likely that compromised dietary intake, as a result of food insecurity, has the ability to diminish overall health and well-being.

According to the U.S. Department of Health and Human Services (DHHS), individuals who have limited resources belong to ethnic minorities and live in poverty are at an increased risk of obesity (2000). Women with low-income and low education level have much higher rates of obesity than their counterparts (Flegal, Carroll, Ogden, & Johnson, 2002; Kuumanyika, 1999; Paeratakul, Lovejoy, Ryan, & Bray, 2002; Wardle, 2002). Research has shown that the body mass index (BMI) of food insecure women are less likely to meet normal standards (BMI: 19.0-24.9 $kg/m^2$) and more likely to be

categorized as morbidly obese (BMI: $\geq$ 35 kg/m$^2$) (Vozoris & Tarasuk, 2003). Various factors, such as cost of food, the palatability of energy-dense foods, relation of poverty and food insecurity, cyclic eating, and the impact of stress may play a role in the increased obesity rates among this population (Drewnowski & Specter, 2004). Excess weight gain among food insecure individuals increases risk for diet-sensitive chronic diseases.

In terms of cost, energy-dense foods, which tend to be refined grains, and high in calories, added sugar, and fat, are often purchased by low-income individuals instead of seemingly more expensive nutrient-dense food items (Drewnowski & Specter, 2004; Laraia, 2013). Thus, low-income individuals often rely upon high-energy food sources, which contribute more calories and fewer nutrients to their diet.

Consuming a poor diet of high-energy foods may lead to over consumption, ultimately resulting in obesity (Basiotis, 1992). In addition to cost, the palatability of these food items also plays a role in over consumption. Research has shown an association between these high-energy dense foods and diminished satiation and satiety (Rolls & Barnett, 2000; Rolls, Castellanos, & Halford, 2000). Additionally, a cyclic-like pattern of eating these high-energy foods may lead to excessive weight gain (Laraia, 2013). This cyclic food consumption pattern develops when food insecure households begin to run out of food and the resources to purchase more towards the end of the month, thus leading to a binge like eating at the beginning of the month and restricting intake towards the end of the month. With time, this pattern has the ability to alter an

individual's metabolism, which results in a positive energy balance (Laraia, 2013). Unfortunately, food insecurity is characterized by these alterations in food consumption.

Chronic stress, which is often seen in food insecure individuals, may also play role in excess weight gain. The stress of providing enough food for a household, when experienced for a year or more, has been shown to produce a stress response (Laraia, 2013). The emotional and physical stressors of food insecurity can cause an individual's body to increase production of the hormone cortisol (Seligman, Laraia, & Kushel, 2010). Sustained cortisol levels are associated with increased visceral adiposity, which is linked to the development of chronic diseases, such as metabolic syndrome and diabetes (Seligman et al., 2010). Unmanaged chronic stress has potential to adversely impact an individual's personal health.

Further, the aforementioned characteristics that increase risk of excessive weight gain and obesity also impact risk of developing type 2 diabetes (U.S. DHSS, 2000). Research suggests food insecurity is associated with higher rates of diabetes among food-insecure individuals than their food-secure counterparts (Seligman et al., 2010). Additionally, it was found that poor disease control is associated with food insecurity (Seligman et al., 2010). This notion is supported by research examining the association between food insecurity and clinical indicators of the disease. Glycosylated hemoglobin (HbA1c) results levels among food insecure women were higher on average than food secure counterparts (Holben, & Pheley, 2006). Further, self-reported HbA1c levels were examined among low-income adults. Results showed that the mean HbA1c among food secure adults was 7.4% and 8.1% among food insecure adults (Seligman et al., 2010).

Poor control of blood glucose levels may be related to lack of monetary resources to purchase appropriate medications or inability to consume a healthful diet. Without proper control, an individual is more likely to develop further health complications.

Among low-income household members in Canada, the prevalence of diabetes has specifically been studied. According to data from 2009, household food insecure adults were more likely to have diabetes (type 1 or type 2) than food secure counterparts (Gucciardi, et al., 2009). Among the food-insecure individuals with diabetes, low produce intake, high rates of diabetes diagnosed ≤ 40 years of age, high rates of diabetes among females, and increased levels of stress was reported (Gucciardi, et al., 2009). This study suggests that Canadian individuals living with lack of income are at increased risk for developing chronic disease. However, in the case of diabetes, it was found that food-insecure diabetics were likely to continue self-management regimens, which could be attributed to the quality and effectiveness of the Canadian healthcare system (Gucciardi, et al., 2009).

It is evident that food insecurity has the ability to impact individuals' overall health and well-being. Insufficient dietary intake, stemming from food insecurity, has the ability to compromise various aspects of health, both physical and emotional. Alterations in food consumption, such as decreasing energy-dense foods, increasing fruit and vegetable intake, and regulating daily meal patterns, decreases the likelihood of developing health complications and chronic diseases. Appropriate strategies to support food insecure individuals are needed to diminish the health disparities among this population.

**Food Assistance Programs**

Once food insecurity was accurately assessed, food assistance programs were established to help aid those in need (Tarasuk, 2001a). Food charity is the number one response to increasing food insecurity. Although these charitable food organizations were originally planned to be temporary, high demand has justified the need to keep them available. In order to track the use of charitable food organizations, the Canadian Association of Food Banks annually collects data, which is then published as a "HungerCount" document. By 2001, the increase in demand for food assistance programs was documented, reaching 718,334 Canadians utilizing them (Canadian Association of Food Banks, 2001). This increase could be related to the increase in poverty and unemployment at the time (Riches, 1986).

However, as the demand for charitable assistance has increased, the ability to provide the food quality and quantity to meet those demands has not been met (Kennedy, Sheeshka, & Smedmor, 1992; Teron & Tarasuk, 1999; Wilson, 1999). New strategies to help aid food insecure households have been considered. In order to cope with decreased food support program satisfaction and high demand for assistance, Canada began exploring community-based strategies. Specifically, food banks, community kitchens, and redefined food systems through community gardens, farmers' markets and community-supported agriculture programs were utilized to help diminish high demands of assistance (Engler-Stringer & Berenbaum, 2005). Community-based strategies have strived to encompass the community as a whole instead of singling out the food insecure households. By building a strong sense of community and developing social cohesion

between food secure and insecure households, it is hoped that overall living conditions will improve (Holben, 2010).

Previous U.S. research has examined the characteristics of those who seek food assistance. Data collected by the USDA in 2004 and 2005 suggested that those who were more likely to utilize assistance programs were low-income households, headed by a female lone parent with children, and were of non-Hispanic black ethnicity (Nord et al., 2005; Nord, Andrews, & Bickel, 2006). Further, research done in rural Appalachia of food pantry users (n = 6217) reported that women (76.3%) and households with children (55%) were more likely to utilize resource programs (O'Connell, Holben, & Holcomb, 2007). Those who lived in nonrural counties or households with elderly and children present, were more likely food pantry or food bank users (O'Connell, Holben, & Holcomb, 2007). These studies, which reflect national trending of targeting at risk households to develop and augment assistance programs.

In order to provide a hands-on opportunity for learning, community kitchens were first developed by Canadian public health departments and community service agencies (Tarasuk, 2001a). These programs aimed to teach food use knowledge to participants, which include purchasing and preparing. In addition to food use knowledge, community kitchen programs aimed to increase self-reliance of participants, which was done by targeting and identifying food resources, and to increase food-related skills (Crawford & Kalina, 1997). Although not specifically targeted, it was found that these programs had the ability to decrease feelings of social isolation (Crawford & Kalina, 1997). Although beneficial to creating a sustainable food system, community kitchens are limited in their

potential to improve food security. It is important to highlight the underlying issue of poverty, which is characteristic of lack of access instead of improving resource management skills (Crawford & Kalina, 1997; Tarasuk, 2001a).

The Food Box program has been developed to help support food insecure Canadian individuals. Like the community kitchen program, the Food Box program is a community-based food system that has been utilized throughout Canada; Toronto, Thunder Bay, Saskaton, and the Greater Vancouver area to provide fresh fruits and vegetables at a reduced cost (Miewald et al., 2012). Individuals who choose to participate visit a convenient centralized buying location to pick up high-quality fresh produce (Food Share, n.d.). A newsletter, outlining nutrition and food preparation information, is distributed with each food box (Food Share, n.d.). Through providing affordable produce to individuals with limited food access and related preparation information, it is hoped that the intake of fruits and vegetables will increase. For example, one program was able to provide 45-50 servings of produce for only $8 (Kennedy et al., 1992). Ideally food box programs would decrease food insecurity by increasing the amount of food available to the household (Miewald et al., 2012). Strengths of this program include introducing a wide variety of produce and teaching participants about new foods. An avenue for improvement would be to increase the frequency of availability of the food box delivery and also to include a how-to manual for storing and preparing produce.

Unfortunately, cost and funding are a barrier to many assistance programs (Crawford & Kalina, 1997; Tarasuk, 2001a; Teron & Tarasuk, 1999). In terms of

community kitchens, it was hoped that participants would understand the rich benefits of the program, thus enticing individuals to pay money to participate. When first established, most community kitchens were funded by one of the following: health promotion grants, agency funds, and local donations (Crawford & Kalina, 1997). However, when program directors started the transition periods from a funded program for self-reliant, low-income individuals, participants stopped coming when asked to pay (Tarasuk, 2001a). As for food box programs, there is an inability to offer large quantities of fresh produce without any cost. Although cost has been reduced, many low-income individuals choose not to participate. With the relationship between food insecurity and financial insecurity, it has been suggested that in addition to food-based interventions, nonfood based initiatives should also be created (Tarasuk, 2001b). A proposed strategy to offset the demand is to develop programs which help to increase household incomes, assist low-income households, and decrease cost or offset costs of essential goods and services, thus diminishing income-related food insecurity (Tarasuk, 2001b).

Unlike the United States, Canada does not have federally funded food assistance programs. However, the Canadian Association of Family Resource Programs (FRP Canada) established Family Resource Centres in over a thousand communities, supporting over 400,000 Canadian families through Family Resource Programs (Canadian Association of Family Resource Programs, n.d.). These programs "enhance child and family well-being by reducing the isolation of parents with infants, toddlers and preschoolers, by providing information and resources that encourage healthy child development and positive parenting, through convenient access points to other

community services" (Canadian Association of Family Resource Programs, n.d.). Table 5 summarizes the guiding principles of family support as laid out by FRP Canada. The principles, which guide the available services, "focus on building supportive relationships, facilitating growth, respecting diversity and furthering community development" (Canadian Association of Family Resource Programs, n.d.). Table 6 summarizes common programs provided by FRP Canada, however, as the needs of communities vary, individualized programs may be created at different Family Resource Centre locations.

Table 5

*The Guiding Principles of Family Support*

| |
|---|
| Family support programs are open to all families, recognizing that all families deserve support. |
| Family support programs complement existing services, build networks and linkages, and advocate for policies, services and systems that support families' abilities to raise healthy children. |
| Family support programs work in partnership with families and communities to meet expressed needs. |
| Family support programs focus on the promotion of wellness and use a prevention approach in their work. |
| Family support programs work to increase opportunities and to strengthen individuals, families and communities. |
| Family support programs operate from an ecological perspective that recognizes the interdependent nature of families' lives. |
| Family support programs value and encourage mutual assistance and peer support. |
| Family support programs affirm parenting to be a life-long learning process. |
| Family support programs value the voluntary nature of participation in their services. |
| Family support programs promote relationships based on equality and respect for diversity. |
| Family support programs advocate non-violence to ensure safety and security for all family members. |
| Family support programs continually seek to improve their practice by reflecting on what they do and how they do it. |

Canadian Association of Family Resource Programs. (n.d.). *The guiding principles of family support*. Retrieved August 7, 2014, from http://www.frp.ca/index.cfm?fuseaction=page.viewpage&pageid=994

Table 6

*Programs Offered Through Canadian Family Resource Centers*

| | |
|---|---|
| Community development | Parent and caregiver support |
| Community outreach | Parenting education |
| Counseling and meditation | Peer contact and mutual support |
| Drop-in programs for children and adults | Play and recreation |
| Early learning and care programs | Pre-natal and post-natal support |
| Educational upgrading | Promotion of health and safety |
| Emergency or respite child care | Referral to other resources and services |
| Employment assistance | Support for home-based child care providers |
| Family literacy | Toy, book and DVD lending |
| Food and nutrition support | Parent and care giver support |

Canadian Association of Family Resource Programs. (n.d.). *What is a family resource program?* Retrieved August 7, 2014, from http://www.frp.ca/index.cfm?fuseaction=page.viewpage&pageid=1241#part2


Since 2006, FRP Canada annually evaluates their programs to gauge the effectiveness of Family Resource Programs (FRP), which is done via electronic survey (Canadian Association of Family Resource Programs, 2011). In either the fall or spring, families who participate in FRP services are encouraged to take the survey, which generates participant characteristic information and provides feedback about experiences at FRP (Canadian Association of Family Resource Programs, 2011). From 2009-2011,

approximately 12,408 participant surveys were collected (Canadian Association of Family Resource Programs, 2011). The majority of participants were women, ages 31-35, parent to the child attending programs, with an annual income less than $60,000 per year, and making 3-5 visits to a Family Resource Center per month (Canadian Association of Family Resource Programs, 2011). Although these characteristics only represent a small portion of the families attending Family Resource Programs, they give insight into the population seeking assistance from FRP Canada.

**Psychosocial Indicators of Fruit and Vegetable Intake**

To gain insight into psychosocial indicators of produce-related behaviors among low-income populations, Townsend and Kaiser developed a validated evaluation tool (2005). By collecting reliable data about psychosocial factors that predict produce intake, researchers have the ability to develop effective interventions and provide necessary education (Townsend & Kaiser, 2005). Table 7 summarizes the questions, psychosocial constructs, and related definitions that determine the health beliefs, intentions, and food behaviors in the psychosocial indicators of fruits and vegetables evaluation tool (Townsend & Kaiser, 2005).

Table 7

*Psychosocial Indicators of Fruit and Vegetable Intake*

| Psychosocial construct | Definition | Scoring ranges |
|---|---|---|
| Perceived benefit of eating fruits and vegetables | "These beliefs were outcome expectations within the Social Cognitive Theory and were defined as what a person believes will happen as a result of performing a behavior" (Bandura, 1986). "Outcome expectations provide motivation for eating fruits and vegetables" (Townsend & Kaiser, 2007). | 0 – 1 |
| Perceived control | "These items inquire about who is in charge of the food shopping and food preparation and refer to the perception of having control over the behavior" (Townsend & Kaiser, 2005). | 0 – 1 |
| Self-efficacy | "Within the Social Cognitive Theory and the Health Belief Model, self-efficacy provides the confidence that barriers can be overcome and has been shown to be an important mediator of behavior change" (Bandura, 1986). "Defined as a person's confidence that he or she can choose fruits and vegetables in a variety of circumstances or settings" (Townsend & Kaiser, 2005). | 0 – 1 |
| Perceived diet quality | "Considered a mediator of behavior" (Townsend & Kaiser, 2007). | 0 – 1 |
| Readiness to eat more fruits and to eat more vegetables | "Eating more fruit and vegetables referred to increasing the current intakes of fruit and vegetables compared to the amount eaten in the past" (Townsend & Kaiser, 2007). | 0 – 1 |

# Chapter 3: Methods

## Introduction

This study examined the differences in produce intake and behaviors by food security status of adult mothers with young children living on Prince Edward Island and using Family Resource Centre services. Specifically, the research questions for the study were:

1. How does produce intake differ by food security status of adult Prince Edward Island mothers of children 6 years and younger and using Family Resource Centre services?
2. How do produce related-behaviors differ by food security status of adult Prince Edward Island mothers of children 6 years and younger and using Family Resource Centre services?

This study was part of a larger project to assess the interrelationship of food insecurity, health, produce (fruit and vegetable) intake and, produce-related behaviors (perceived benefits of, perceived barriers to, and perceived control of produce intake) of adult mothers with young children.

## Research Design and Instrument

Prior to the collection of any data, the Institutional Review Board (IRB) at Ohio University, Athens, Ohio, and the Research Ethics Board at University of Prince Edward Island, Charlottetown, Prince Edward Island, Canada, approved this study (see Appendix G). A cross-sectional survey was used in this research. The questionnaire (see Appendix C) included questions regarding participant characteristics, such as gender, age,

household composition, and education level. Previously validated tools were also part of the survey, including the United States Household Adult 10-item Food Security Survey Module (see Appendix D) which measure the level of household adult food security status (Bickel et al., 2000), and was scored using Canadian method (see Appendix E) (Health Canada, 2012). Additionally, the Psychosocial Indicators of Fruit and Vegetable Intake in Low Income Communities questionnaire (Townsend & Kaiser, 2005) and Food Behavior Checklist for a Limited Resource Audience (Townsend, Kaiser, Allen, Joy, & Murphy, 2003) were included. Table 7 summarizes the food-related behavior constructs, definitions, and scoring ranges. Both questionnaires were scored according to standardized protocol.

**Study Population**

The study was conducted in the Prince Edward Island province of Canada. For inclusion in the study, participants had to be adult mothers 18 years and older with at least one child 0-6 of age and using Family Resource Centre services. Participants were current residents of Prince Edward Island.

**Sampling Procedure**

Prospective participants were invited to participate when they attended one of six center locations, including Alberton, Charlottetown (2 centers), Montague, Souris, and Summerside. The Francophone and First Nations centers declined to participate in the study. Prospective participants were read the survey leading paragraph (see Appendix F) that briefly described the study. Those agreeing to participate were provided a survey and instructed to complete the survey prior to leaving the family resource center. At the

completion of the survey, participants received $5 (Canadian Dollars) for their participation.

**Data Analysis**

Surveys were scored using the appropriate methods and were entered into the Statistical Package for the Social Sciences (SPSS, 2012, version 21.0, Chicago, Illinois). A p-value of less than 0.05 was used to identify statistical significance. Descriptive statistics were used to describe the sample, including demographics, household food security status, produce intake, and produce related-behaviors. Analysis of variance was used to assess for differences in produce intake and behaviors by food security group (food secure [SEC], food insecure–marginal [MAR], food insecure–moderate [MOD], and food insecure–severe [SEV]}. Chi-squared analysis was used to assess differences between food secure and food insecure participants for meeting total produce consumption recommendations, according to Canada's food guide.

# Chapter 4: Results

## Characteristics of the Participants

Our study sample consisted of 282 adult Prince Edward Island mothers using Family Resource Center services in the fall season. Participants were 30 ± 5 years, primarily White (n = 262, 92.9%), and married (n = 164, 58.2%). The demographic characteristics of the participants are summarized in Table 8.

Table 8

*Demographic Characteristics of Participating Adult Mothers Living on Prince Edward Island*

| Characteristic | Frequency (n) | Percentage (%) |
|---|---|---|
| Race (n = 282) | | |
| White | 262 | 92.9 |
| Chinese | 2 | 0.7 |
| Filipino | 2 | 0.7 |
| Latin American | 2 | 0.7 |
| Korean | 3 | 1.1 |
| Arab | 3 | 1.1 |
| West Asian | 1 | 0.4 |
| Other | 7 | 2.5 |
| Education (n = 279) | | |
| Less than high school | 23 | 8.2 |
| High school graduate | 256 | 91.8 |
| Marital status (n = 282) | | |
| Married | 164 | 58.2 |
| Living common-law | 69 | 24.5 |
| Separated | 7 | 2.5 |
| Divorced | 2 | 0.7 |
| Single, never married | 40 | 14.2 |

Table 8 (Continued)

| Characteristic | Frequency (n) | Percentage (%) |
|---|---|---|
| Employment (n = 281) | | |
| Working full-time | 84 | 29.8 |
| Working part-time | 46 | 16.3 |
| Unemployed | 72 | 25.5 |
| Student | 12 | 4.3 |
| Receiving social assistance | 1 | 0.4 |
| Applying for social assistance | 1 | 0.4 |
| Other | 65 | 23.0 |
| Tobacco use (n = 280) | | |
| Yes | 44 | 15.6 |
| No | 236 | 83.7 |

**Household Adult Food Security Status**

Out of 282 women, 168 (59.8%) were living in food secure households, and 114 (40.2%) were living in households experiencing some degree of household adult food insecurity. The household adult food security status of the survey participants is summarized in Table 9.

Table 9

*Household Adult Food Security Status of Participating Adult Mothers Living on Prince Edward Island (n = 282)*

| Level of food security | Frequency (n) | Percentage (%) |
|---|---|---|
| Food secure (SEC) | 168 | 59.6 |
| Food insecure, marginal (MAR) | 29 | 10.3 |
| Food insecure, moderate (MOD) | 46 | 16.3 |
| Food insecure, severe (SEV) | 38 | 13.5 |

**Produce Intake**

The produce intake of the study participants is summarized in Table 10, and Table 11 summarizes the proportion of the study participants that met the total daily produce intake recommendations summarized in the Canadian Food Guide (Health Canada, n.d.)

Table 10

*Produce Intake of Participating Adult Mothers Living on Prince Edward Island*

| Indicator | n | Mean ± SD (servings) |
|---|---|---|
| Daily vegetable servings | 280 | 2.7 ± 1.3 |
| Daily fruit servings | 277 | 2.3 ± 1.2 |
| Daily total fruit and vegetable servings | 275 | 5.0 ± 2.2 |

Table 11

*Proportions of the Participating Adult Mothers Living on Prince Edward Island Meeting Recommended Daily Produce Intake*

| | Met recommendation n (%) | Did not meet recommendation n (%) |
|---|---|---|
| Daily total fruit and vegetable servings[a] | 57 (20.2) | 218 (77.3) |

[a]:≥ 7 servings (Health Canada, n.d.).

Table 12 summarizes the vegetable, fruit, and total produce intake of participants by adult food security status. Table 13 summarizes the proportion that met the daily produce recommendation by food security status.

Table 12

*Produce Intake of Participating Adult Mothers Living on Prince Edward Island by Food Security Status*

| Indicator | n | Mean ± SD (servings) |
|---|---|---|
| Daily vegetable servings | 279 | |
| Food secure (SEC) | 166 | 2.9 ± 1.3 |
| Food insecure, marginal (MAR) | 29 | 2.6 ± 1.4 |
| Food insecure, moderate (MOD) | 46 | 2.4 ± 1.2 |
| Food insecure, severe (SEV) | 38 | 2.0 ± 1.3 |
| Daily fruit servings | 274 | |
| Food secure (SEC) | 165 | 2.5 ± 1.1 |
| Food insecure, marginal (MAR) | 28 | 2.1 ± 1.2 |
| Food insecure, moderate (MOD) | 45 | 2.4 ± 0.9 |
| Food insecure, severe (SEV) | 38 | 1.5 ± 1.5 |
| Daily fruit and vegetable servings | 274 | |
| Food secure (SEC) | 164 | 5.4 ± 2.1 |
| Food insecure, marginal (MAR) | 28 | 4.7 ± 2.4 |
| Food insecure, moderate (MOD) | 45 | 4.9 ± 1.6 |
| Food insecure, severe (SEV) | 37 | 3.6 ± 2.6 |

Table 13

*Proportions of the Participating Adult Mothers Living on Prince Edward Island Meeting Recommended Daily Produce Intake*[a] *by Food Security Status*

| | Met recommendation n (%) | Did not meet recommendation n (%) | p - value |
|---|---|---|---|
| Food secure | 42 (25.6) | 122 (74.4) | .010 |
| Food insecure | 15 (13.6) | 95 (86.4) | |

[a]: ≥ 7 servings (Health Canada, n.d.).

Tables 14-16 summarize the difference in vegetable, fruit, and total produce intake by household adult food security of participants.

Table 14

*Difference in Daily Vegetable Intake by Household Adult Food Security Status of Participating Adult Mothers Living on Prince Edward Island*

| | Food secure (SEC) (n = 198) | Food insecure, marginal (MAR) (n = 29) | Food insecure, moderate (MOD) (n = 46) | Food insecure, severe (SEV) (n = 38) | p-value |
|---|---|---|---|---|---|
| Daily vegetable intake | 2.9 ± 1.3 | 2.6 ± 1.5 | 2.4 ± 1.3 | 2.1 ± 1.3 | p = .001 |

*Note.* The only significant differences among groups noted was: SEC > SEV (p = .002).

Table 15

*Difference in Daily Fruit Intake by Household Adult Food Security Status of Participating Adult Mothers Living on Prince Edward Island*

| | Food secure (SEC) (n = 198) | Food insecure, marginal (MAR) (n = 29) | Food insecure, moderate (MOD) (n = 46) | Food insecure, severe (SEV) (n = 38) | p-value |
|---|---|---|---|---|---|
| Daily fruit intake | 2.5 ± 1.1 | 2.1 ± 1.3 | 2.4 ± 0.9 | 1.6 ± 1.5 | p < .001 |

*Note.* The significant differences among groups was: SEC > SEV (p < .001); MOD > SEV (p = .009).

Table 16

*Difference in Total Daily Produce Intake by Household Adult Food Security Status of Participating Adult Mothers Living on Prince Edward Island*

| | Food secure (SEC) (n = 198) | Food insecure, marginal (MAR) (n = 29) | Food insecure, moderate (MOD) (n = 46) | Food insecure, severe (SEV) (n = 38) | p-value |
|---|---|---|---|---|---|
| Daily total produce intake | 5.5 ± 2.2 | 4.7 ± 2.5 | 4.9 ± 1.7 | 3.6 ± 2.6 | p < .001 |

*Note.* The only significant differences among groups were: SEC > SEV (p < .001).

**Produce Intake Related Behaviors**

Table 17 summarizes the psychosocial indicators related to fruit and vegetable intake of the women who participated in the study. Refer to table 7 for a summary of the

psychosocial indicators of fruit and vegetable intake constructs, definitions, and scoring ranges. Tables 18-20 provide a detailed description of psychosocial indicators related to fruit and vegetable intake.

Table 17

*Produce Intake Related Behaviors of Participating Adult Mothers Living on Prince Edward Island*

| Construct/Domain | n | Mean | SD |
|---|---|---|---|
| Perceived benefit score | 280 | 0.8 | 0.2 |
| Perceived control score | 277 | 0.8 | 0.2 |
| Self-efficacy score[a] | 280 | 0.8 | 0.1 |
| Perceived diet quality score | 279 | 0.5 | 0.2 |
| Readiness to eat more vegetables score | 277 | 0.7 | 0.2 |
| Readiness to eat more fruits score | 278 | 0.7 | 0.2 |
| Enabling domain score[a] | 280 | 0.8 | 0.1 |
| Predisposing domain score | 275 | 1.6 | 0.3 |
| Change in intention domain score | 276 | 2.1 | 1.4 |
| Change in all domains score | 270 | 4.4 | 0.8 |
| 7-item fruit and vegetable scale score | 267 | 17 | 4.2 |

[a]Scoring of self-efficacy score = scoring enabling domain score.

Table 18

*A Detailed Description of Produce Intake Related Behaviors of Participating Adult Mothers Living on Prince Edward Island*

| Indicator | Frequency (n) | Percentage (%) |
|---|---|---|
| Perceived diet quality (n = 282) | | |
| Poor | 9 | 3.2 |
| Fair | 40 | 14.2 |
| Good | 131 | 46.5 |
| Very good | 81 | 28.7 |
| Excellent | 18 | 6.4 |
| Readiness to eat more vegetables (n = 282) | | |
| Pre-contemplation | 9 | 3.2 |
| Contemplation | 16 | 5.7 |
| Preparation | 17 | 6.0 |
| Action | 154 | 54.6 |
| Maintenance | 81 | 28.7 |
| Readiness to eat more fruit (n = 282) | | |
| Pre-contemplation | 8 | 2.8 |
| Contemplation | 17 | 6.0 |
| Preparation | 21 | 7.4 |
| Action | 154 | 54.6 |
| Maintenance | 78 | 27.7 |

Table 19

*Psychosocial Indicators of Produce Intake of Participating Adult Mothers Living on Prince Edward Island, Predisposing, Enabling, Intention, and Domain Scores*

| | n | Mean ± SD |
|---|---|---|
| Predisposing | 275 | 1.6 ± 0.3 |
| Enabling | 280 | 0.8 ± 0.1 |
| Intention | 276 | 2.1 ± 1.4 |
| All domains | 270 | 4.4 ± 0.8 |

Table 20

*Psychosocial Indicators of Produce Intake of Participating Adult Mothers Living on Prince Edward Island, Perceived Benefit, Self-Efficacy, and Perceived Control Construct Scores*

| | n | Mean ± SD |
|---|---|---|
| Perceived benefit | 280 | 0.8 ± 0.2 |
| Self-efficacy | 280 | 0.8 ± 0.1 |
| Perceived control | 277 | 0.8 ± 0.2 |

Table 21 summarizes the psychosocial indicators related to fruit and vegetable intake of the study participants by household adult food security status.

Table 21

*Produce Intake Related Behaviors by Household Adult Food Security Status of Participating Adult Mothers Living on Prince Edward Island*

| | Food SEC (n = 167) | Food insecure, MAR (n = 28) | Food insecure, MOD (n = 46) | Food insecure, SEV (n = 38) | p-value |
|---|---|---|---|---|---|
| Perceived benefit[a] | 0.8 ± 0.2 | 0.8 ± 0.2 | 0.8 ± 0.2 | 0.7 ± 0.2 | p = .027 |
| Self-efficacy[b] | 0.8 ± 0.1 | 0.8 ± 0.1 | 0.8 ± 0.2 | 0.7 ± 0.2 | p < .000 |
| Enabling domain[c] | 0.8 ± 0.1 | 0.8 ± 0.1 | 0.8 ± 0.2 | 0.7 ± 0.2 | p < .000 |
| Perceived control[d] | 0.8 ± 0.2 | 0.7 ± 0.2 | 0.8 ± 0.2 | 0.7 ± 0.2 | p = .499 |
| Predisposing domain[e] | 1.7 ± 0.3 | 1.6 ± 0.3 | 1.6 ± 0.3 | 1.5 ± 0.3 | p = .023 |
| Perceived diet[f] | 0.6 ± 0.2 | 0.4 ± 0.2 | 0.5 ± 0.1 | 0.3 ± 0.2 | p < .001 |
| Readiness to eat more fruit[g] | 0.7 ± 0.2 | 0.7 ± 0.1 | 0.6 ± 0.2 | 0.6 ± 0.2 | p < .001 |
| Readiness to eat more vegetables[h] | 0.7 ± 0.2 | 0.7 ± 0.2 | 0.7 ± 0.2 | 0.6 ± 0.2 | p = .001 |
| Change in intention domain[i] | 2.3 ± 1.8 | 1.9 ± 0.5 | 1.9 ± 0.4 | 1.6 ± 0.5 | p = .035 |
| Change in all domains[j] | 4.7 ± 0.7 | 4.4 ± 0.8 | 4.2 ± 0.8 | 3.7 ± .08 | p < .001 |
| Seven item fruit and vegetable score[k] | 18.0 ± 4.0 | 15.9 ± 4.4 | 16.4 ± 3.4 | 13.7 ± 4.4 | p < .001 |

*Note.* The only significant differences among groups noted were: [a]SEC > SEV (p = .016); [b]SEC > SEV (p < .001), MAR > SEV (p = .004); [c] SEC > SEV (p = .001), MAR > SEV (p = .002); [e]SEV > SEC (p = .014); [f]SEC > MAR (p = .006), SEC > MOD (p = .005), SEC > SEV (p < .001), MOD > SEV (p = .014); [g]SEC > MOD (p = .008), SEC > SEV (p = .001); [h]SEC > SEV (p = .001); [i]SEV < SEC (p = .001); [j]SEC > MOD (p = .003), SEC > SEV (p < .001), MAR > SEV (p = .004); [k]SEC > SEV (p < .001), MOD > SEV (p = .010).

# Chapter 5: Discussion, Conclusion, and Recommendations

Prince Edward Island is characterized by low household food security compared to other Provinces, especially among female lone parents (Tarasuk et al., 2014). Low produce intake may be linked to chronic disease and has been associated with household food insecurity. This study identified the differences in produce intake by food security status and differences in produce related-behaviors by food security status of adult Prince Edward Island mothers of children 6 years and younger using Family Resource Centre services.

Participant mothers (n = 282) of young children participated in the study. Overall, this study showed that adult mothers living on Prince Edward Island facing food insecurity had lower produce intake compared to their food secure counterparts. Fewer positive produce-related behaviors were also apparent among food insecure women.

## Characteristics of Participants

Collectively, mothers living on Prince Edward Island who participated in the study were 30 ± 5 years and primarily White, were high school graduates, married, working fulltime, and were nonsmokers.

According to most recent Canadian census information, the Prince Edward Island population was 140,204 in 2011 (Statistics Canada, 2012). Female residents totaled 72,600 with the median age being 43.6 (Statistics Canada, 2012). In relation to our study participants, the census reported 7,790 females or 10.7% between the ages of 25 and 34 (Statistics Canada, 2012). Figure 5 compares food security reports from Canada, Prince Edward Island, and our study. Previous research collected in Atlantic Canada about low-

income, lone-mothers had 141 participants with the mean age of 29.3 ± 5.5, which was similar to our study participants (McIntyre et al., 2003).

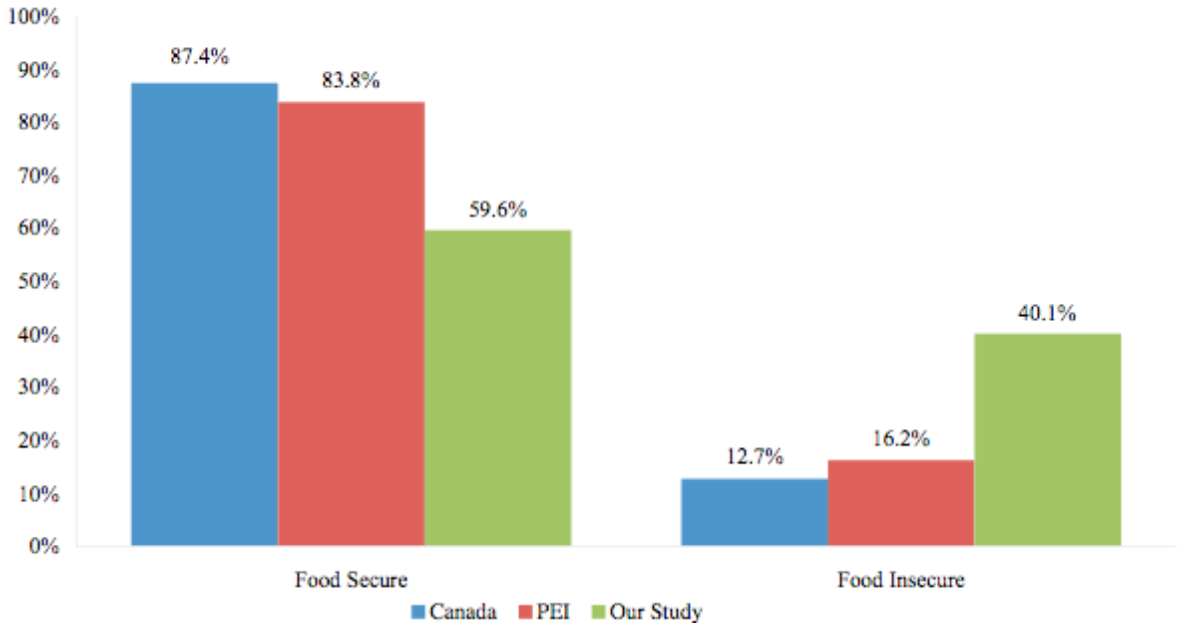


*Figure 5*. Comparison of household food security reports from Canada and Prince Edward Island in 2011 (Tarasuk et al., 2014) to the household food security status of our study participants.

Like the study participants, the majority of female Prince Edward Island residents were high school graduates (93.4% or 67,808 females) in 2011, which was also similar to the previously mentioned study of low-income, lone-mothers in Atlantic Canada (Statistics Canada, 2012). Further, census data reported the majority of females as non-smokers (83.0% or 60,270 females) in Prince Edward Island, as was also apparent in this study (Statistics Canada, 2012). According to most recent employment estimates in Prince Edward Island, 36,200 women were employed as of June 2014, with the majority

working full time (Statistics Canada, 2014). Participants in this study were also working full-time primarily.

Census data also reported that 72.7 (29,695 Prince Edward Island families) were married-couple families, similar to those participating in this study (Statistics Canada, 2012). Additionally, 26.6% (15,000 households) consisted of couple-family households with children, while 10.7% (6,040 households) were lone-parent family households (Statistics Canada, 2012). Although this study did not collect income information, Canadian census data reported 10.8% or 7,840 Prince Edward Island females were categorized as low income in 2011 (Statistics Canada, 2012).

**Food Security**

According to Canadian guidelines (Health Canada, 2008), 59.6% of study participants were living in food secure households and 40.1% were living in food insecure households. This level of food insecurity is more than three times greater than the 2012 estimates of food insecurity in Prince Edward Island (Tarasuk et al., 2013). Tarasuk and colleagues (2013) reported food security in Prince Edward Island households in 2012 was 83.8%, and 16.2% were food insecure. In the same report, it was noted that 11.4% reported moderate or severe food insecurity. When compared to study data, this value was lower than the 29.8% of households reporting food insecure moderate or severe among adult mothers living on Prince Edward Island. In relation to national Canadian data, which reported 87.4% of households as food secure and 12.7% as food insecure, our study data indicated higher rates of food insecurity. Similarly, higher rates of maternal food insecurity were reported in Atlantic Canada by McIntyre et al.,

indicating that 78% of households faced food insecurity (2003). However, only 15 Prince Edward Island women were included in McIntyre et al.'s research, thus that report may not accurately have represented the prevalence of maternal food insecurity in Prince Edward Island (2003). In addition, in that study, "marginal" food insecurity was not measured, underestimating food insecurity, compared to the current measurement standards. This study may more accurately describe the food security trends among mothers across food insecurity. Yet, our sampling frame only included a convenience sample of women using Family Resource Centre services in the fall season.

**Produce Intake and Produce Related Behaviors**

The majority of study participants did not meet the daily total fruit and vegetable servings (7 servings/day) that Health Canada recommends. According to recent Statistics Canada data, which included 38,872 females living on Prince Edward Island, 25,345 individuals or 65.2% reported fruit and vegetable consumption of 5 servings or more per day in 2013 (Statistics Canada, 2014). Our findings were similar to that of Statistics Canada, with the mean total fruit and vegetable intake of this study's participants being $5.0 \pm 2.2$ servings daily.

According to survey responses, the majority of mothers in the study reported being in the action stage of readiness to eat more vegetables and fruit. At this stage, participants are confident in the process of increasing fruit and vegetable intake in their diet. Participants also reported perceiving diet quality to be good. In terms of perceived benefit, the women reported understanding of the positive health impact that consuming fruit and vegetables can have. Overall, participants felt they had control over what foods

were purchased and prepared for the household. The women also reported feeling confident in performing specific produce-related behaviors (eating fruit and vegetables as snacks, purchasing more vegetables, planning meals or snacks with more fruit and vegetables, eating two or more servings of vegetables at dinner, and adding extra vegetables to casseroles and stews). This demonstrates their confidence in overcoming barriers to increasing produce intake.

**Household Adult Food Security and Produce Intake**

Previous research has confirmed the association between decreased produce intake as food insecurity increases (Dachner et al., 2010; Drewnowski & Specter, 2004; Gucciardi et al., 2009; Kendall et al., 1996; Miewald et al., 2012). Additionally, maternal food insecurity has been associated with modifications in dietary intake that spare the deprivation of a child's dietary intake (McIntyre et al., 2003). Therefore, it was hypothesized that household food security status would be associated with lower produce intake and fewer positive produce-related behaviors among adult mothers of young children living on Prince Edward Island.

In this study, a higher percentage of food secure mothers met the recommended daily produce intake than their food insecure counterparts. This is supported by findings of previous studies that associated food security with better fruit and vegetable consumption (Kendall et al., 1996; Kirkpatrick & Tarasuk, 2008). It has been suggested that the difference in produce intake between food secure individuals and their counterparts can be related to available resources. Additionally, previous research found that women were more likely to negatively change their dietary intake as food security

diminishes (Tarasuk & Beaton, 1999; Tarasuk, 2001b) to offset the impact upon the diet of their children (Campbell & Desjardins, 1989; Fitchen, 1988; Radimer et al., 1992).

Similar to our study participants, Tarasuk and Beaton examined the dietary intake of women receiving emergency food assistance in Toronto, Ontario, Canada, in relation to their household food security status. Data revealed lower energy and nutrient intakes among women reporting moderate or severe hunger (Tarasuk & Beaton, 1999). McIntyre and others also found lower energy intakes among low-income lone-mothers in Atlantic Canada (2003). Although our study measured produce intake, our findings support that of Tarasuk and McIntyre. In terms of daily vegetable, fruit, and total produce intake, our study found a significant difference between food secure and food insecure severe mothers, with food secure participants consuming higher mean intake. In addition, a significant difference was also reported between food insecure moderate and food insecure severe participants in terms of total daily fruit intake. Thus, our research supports the association between food insecurity and decreased produce intake among Canadian mothers living on Prince Edward Island, at least those utilizing Family Resource Centre services. Intake guidelines were met by 20.2% of our participants. However, when food security status was taken into account, 25.6% of food secure participants ate adequate amounts of produce, whereas only 13.6% of food insecure mothers met the recommended daily produce servings. These findings were statistically significant.

**Household Adult Food Security and Produce Intake Related Behaviors**

Perceived benefit of consuming produce was reported significantly higher among food secure participants than food insecure severe counterparts. This construct can be linked to the motivation an individual has to consume fruits and vegetables in relation to their belief of how it will benefit their health. Similarly, enabling domain (self-efficacy) and predisposing domain were also significantly higher among food secure than food insecure severe participants, meaning that food secure participants had more confidence in overcoming barriers to consuming fresh produce and felt they had more food purchasing and preparation control in addition to higher perceived benefit of produce intake. Since self-efficacy is an important mediator of behavior change (Bandura, 1986), our research supports the need to increase confidence among food insecure mothers living on Prince Edward Island and using Family Resource Centre services to promote the intake of produce in different settings.

Perceived diet quality among the food secure mothers was reported significantly higher than food insecure marginal, moderate, and severe women. Food secure mothers were more likely to report their diet between "very good" and "good," while food insecure mothers reported theirs between "good" and "fair." Further, food insecure moderate women reported a higher perceived diet score than those who were food insecure severe. These findings support previous research done by Glanville and McIntyre (2006), who found lower perceived diet quality among food insecure mothers in Atlantic Canada. Further, Kropf and colleagues (2007) found food insecurity to be

negatively associated with perceived diet quality among women seeking social assistance in rural Appalachian Ohio.

Readiness to consume more fruit was significantly higher among food secure mothers than food insecure moderate and severe mothers. This indicates that the food secure mothers were more likely to be in the action phase of incorporating fruit into their diet and that food insecure moderate and severe were more likely to be in the preparation stage.

Readiness to consume more vegetables was also significantly higher among food secure mothers than the food insecure severe. These data indicate that food secure mothers were more likely to be in the action stage of incorporating more vegetables into their diet, while food insecure severe mothers were more likely to be in the planning or preparing stage.

The change in intention domain was significantly higher among food secure mothers than their food insecure severe counterparts. These findings indicate that food insecure severe mothers were less likely to be ready to change their produce intake and had less perception of the impact diet has on health.

Food secure mothers reported significantly higher change in all domains scores than food insecure moderate and severe mothers. Meaning food insecure mothers were less likely to believe they could change their produce intake behaviors than food secure mothers. Resistance to change may stem from lack of confidence, food use knowledge (how to purchase, store, prepare produce) or the perception that produce is more expensive to purchase than less nutritious food options.

The 7-item fruit and vegetable score revealed that food secure mothers had significantly higher total produce intake than food insecure severe mothers. Additionally, it was reported that food insecure moderate mothers consumed significantly more total produce than food insecure severe mothers, further supporting that produce intake decreases as food insecurity increases (Dachner et al., 2010; Drewnowski & Specter, 2004; Gucciardi et al., 2009; Kendall et al., 1996; Miewald et al., 2012).

**Conclusion and Recommendations**

At the onset of this study the following research questions were asked:

1. How does produce intake differ by food security status of adult Prince Edward Island mothers of children 6 years and younger and using Family Resource Centre services?
2. How do produce related-behaviors differ by food security status of adult Prince Edward Island mothers of children 6 years and younger and using Family Resource Centre services?

Overall, this study showed that adult mothers facing severe food insecurity living on Prince Edward Island have lower daily vegetable, fruit and total produce intake compared to other mothers. Food insecure mothers were less likely to meet produce intake recommendations compared to their food secure counterparts. Fewer positive food-related behaviors, readiness to eat more fruit and vegetables and change in intention domain, were apparent among food insecure mothers compared to other mothers.

Limitations experienced during this study were minimal; however, they should be noted for consideration in future studies. Those who participated were recruited through

convenience sampling. Although we were able to recruit mothers through various Family Resource Centre locations, our data did not include French-speaking or First Nations center locations. Expanding recruitment beyond these programs could decrease bias and better represented the mothers of Prince Edward Island. Thus, our study results cannot be generalized to the entire population. Future research may consider expanding sampling methods and recruiting through additional social assistance program locations. Further, additional methods of distributing the survey may be considered to include individuals without transportation to Family Resource Centres.

Discrepancies with the self-reported survey tool may be argued. Although the Adult Household Food Security Survey Module is validated to accurately reflect food security status, due to the nature of the survey, the food security status of our participants may be under- or overstated. As for the Psychosocial Indicators of Fruit and Vegetable Intake in Low Income Communities and Food Behavior Checklist for a Limited Resource Audience questionnaires, there is no guarantee the participants honestly self-reported their intake and behaviors. Further, the open-ended response for how many servings of fruits and how many servings of vegetables they consume daily may have been misleading since a serving size was not defined. However, both questionnaires used are validated tools, which may overcome these barriers. Increasing the sample size may have decreased bias in our results.

Further exploration of programs and services to improve food insecurity among these mothers is warranted. In order to create appropriate solutions for this population, future studies should consider incorporating a produce or educational intervention with

focus group feedback. These findings could be used to develop effective programs that utilize appropriate constructs, which increase produce intake and positive food-related behaviors among adult mothers living on Prince Edward Island.

Data from our study support the need for nutrition education programs that increase self-efficacy of food insecure mothers to mediate positive changes to improve produce intake. Proposed programs may develop the framework of their intervention utilizing Social Cognitive Theory constructs. Improvement in self-efficacy related to produce intake may be seen through incorporating observational learning and facilitation of a nutrition education program (Glanz, Rimer, & Viswanath, 2008). Cooking demonstrations and grocery store tours are an example of observational learning activities, which may increase participants' food-use knowledge, thus decreasing barriers to consuming fruits and vegetables. Suggested activities would also serve as an opportunity to provide appropriate tools and resources through facilitation. However, it should also be noted that such programs cannot exist without proper funding. The need for federally funded social assistance programs that support Canada's most valuable asset, their citizens, should be considered to protect the health and well-being of food insecure Canadians.

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## Appendix A: The Household Food Security Survey Module

| Question Number | Question |
|---|---|
| HH1 | "Which of these statements best describes the food eaten in your household in the last 12 months: —enough of the kinds of food (I/we) want to eat; —enough, but not always the kinds of food (I/we) want; — sometimes not enough to eat; or, —often not enough to eat? |
| HH2 | "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more." Was that often true, sometimes true, or never true for (you/your household) in the last 12 months? |
| HH3 | "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months? |
| HH4 | "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months? |
| AD1 | In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food? |
| AD1a | How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months? |
| AD2 | In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? |
| AD3 | In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food? |
| AD4 | In the last 12 months, did you lose weight because there wasn't enough money for food? |
| AD5 | In the last 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food? |
| AD5a | How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months? |

Appendix A (Continued)

| | |
|---|---|
| CH1 | "(I/we) relied on only a few kinds of low-cost food to feed (my/our) child/the children) because (I was/we were) running out of money to buy food." Was that often, sometimes, or never true for (you/your household) in the last 12 months? |
| CH2 | "(I/We) couldn't feed (my/our) child/the children) a balanced meal, because (I/we) couldn't afford that." Was that often, sometimes, or never true for (you/your household) in the last 12 months? |
| CH3 | "(My/Our child was/The children were) not eating enough because (I/we) just couldn't afford enough food." Was that often, sometimes, or never true for (you/your household) in the last 12 months? |
| CH4 | In the last 12 months, since (current month) of last year, did you ever cut the size of (your child's/any of the children's) meals because there wasn't enough money for food? |
| CH5 | In the last 12 months, did (CHILD'S NAME/any of the children) ever skip meals because there wasn't enough money for food? |
| CH5a | How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months? |
| CH6 | In the last 12 months, (was your child/were the children) ever hungry but you just couldn't afford more food? |
| CH7 | In the last 12 months, did (your child/any of the children) ever not eat for a whole day because there wasn't enough money for food? |

*Note*. From "Guide to measuring household food security," by U.S. Department of Agriculture, Food and Nutrition Service, 2000. Available from http://www.fns.usda.gov/fsec/files/fsguide.pdf

## Appendix B: Health Canada Dietary Recommendations for Women

| Food group | Age (years) 14-18 | 19-50 | 51+ |
|---|---|---|---|
| Vegetables and fruits | 7 | 7-8 | 7 |
| Grain products | 6 | 6-7 | 6 |
| Milk and alternatives | 3-4 | 2 | 3 |
| Meat and alternatives | 2 | 2 | 2 |

Health Canada. (2007). *How much food you need every day*. Retrieved August 7, 2014, from the Canada's Food Guide website: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/basics-base/quantit-eng.php

Females (calories per day)

| Age | Sedentary Level | Low Active Level | Active Level |
|---|---|---|---|
| 17-18 | 1750 | 2100 | 2400 |
| 19-30 | 1900 | 2100 | 2350 |
| 31-50 | 1800 | 2000 | 2250 |

Health Canada. (2014). *Estimated energy requirements*. Retrieved August 7, 2014, from the Canada's Food Guide website: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/basics-base/1_1_1-eng.php

## Appendix C: Participant Characteristic Survey Questions

### Information About You.

**How old are you?** _____years

**People living in Canada come from many different cultural and racial backgrounds.**
**Which best describe you? (Circle any that apply) ▼**

| | | | | | |
|---|---|---|---|---|---|
| White | Chinese | South Asian (For example, East Indian, Pakistani, Sri Lankan) | Black | Filipino | Latin American |
| Korean | Arab | West Asian (For example, Afghan, Iranian) | Japanese | Southeast Asian (For example, Cambodian, Indonesian, Laotian, Vietnamese) | |
| Aboriginal – North American Indian | Aboriginal – Metis | Aboriginal – Inuit | Other (Please specify): | | |

**Including you, how many people live in your household?**
_____ adults (18 years and older)
_____ children (younger than 18 years)

**What is your marital status?** (Circle one) ▼

| | | | | | |
|---|---|---|---|---|---|
| Married | Living common-law | Widowed | Separated | Divorced | Single, Never Married |

| **What is the highest grade of elementary or high school you have ever completed?** (check one box )▼ | |
|---|---|
| Grade 8 or lower (Québec: Secondary II or lower) | |
| Grade 9 - 10 (Québec: Secondary III or IV, Newfoundland and Labrador: 1st year of secondary) | |
| Grade 11-13 (Québec: Secondary V, Newfoundland and Labrador, 2nd to 4th year of secondary) | |

| **Did you graduate from high school (secondary school)?** | (check one box) ▼ | |
|---|---|---|
| | Yes | |
| | No | |

| **What is your occupation type?** **(Check one box only) ▼** | |
|---|---|
| Working full-time (35 or more hours per week) | |
| Working part-time (fewer than 35 hours per week) | |
| Unemployed | |
| Student (either full or part-time) | |
| Social Security Disability | |
| Applying for Social Security | |
| Retired | |
| Other (Please explain) | |

| | | |
|---|---|---|
| **Do you smoke cigarettes/ tobacco?** **(Circle one answer)►** | Yes<br>My average number of cigarettes smoked per day/average use of tobacco per day:<br>_____<br>cigarettes/tobacco | No |

| **In general my health is excellent, very good, good, fair, or poor. (Circle one answer) ▼** | | | | |
|---|---|---|---|---|
| Excellent | Very Good | Good | Fair | Poor |

## Appendix D: U.S. Household Adult 10-item Food Security Survey Module

| **Which of these statements best describes the food eaten in your household in the last 12 months?** **(Check one box only.)** | |
|---|---|
| Enough of the kinds of food I/we want to eat | |
| Enough but not always the kinds of food I/we want | |
| Sometimes not enough to eat | |
| Often not enough | |
| Don't Know or Refused | |

| **Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why <u>YOU</u> don't always have enough to eat.** | Yes | No | Don't Know |
|---|---|---|---|
| Not enough money for food | | | |
| Not enough time for shopping or cooking | | | |
| Too hard to get to the store | | | |
| On a diet | | | |
| No working stove available | | | |
| Not able to cook or eat because of health problems | | | |

| **Here are some reasons why people don't always have the quality or variety of food they want. For each one, please tell me if that is a reason why <u>YOU</u> don't always have the kinds of food you want to eat.** | Yes | No | Don't Know |
|---|---|---|---|
| Not enough money for food | | | |
| Kinds of food (I/we) want not available | | | |
| Not enough time for shopping or cooking | | | |
| Too hard to get to the store | | | |
| On a special diet | | | |

| **In the past 12 months, (I/we) worried whether (my/our) food would run out before (I/we) got money to buy more.** **(Circle only one.)▼** | | | |
|---|---|---|---|
| Often true | Sometimes true | Never true | Don't Know or Prefer Not to Answer |

| **In the past 12 months, the food that (I/we) bought just didn't last, and (I/we) didn't have money to get more.** **(Circle only one.)▼** | | | |
|---|---|---|---|
| Often true | Sometimes true | Never true | Don't Know or Prefer Not to Answer |

| **In the past 12 months, (I/we) couldn't afford to eat balanced meals.** **(Circle only one.)▼** | | | |
|---|---|---|---|
| Often true | Sometimes true | Never true | Don't Know or Prefer Not to Answer |

| **In the past 12 months, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food? (Check one box only)▼** | | | | |
|---|---|---|---|---|
| Yes. Almost every month | Yes. Some months but not every month | Yes. Only 1 or 2 months | No. | Don't Know or Prefer Not to Answer |

| **In the past 12 months, did you (personally) ever eat less than you felt you should because there wasn't enough money to buy food?** (Check one box only)▼ | | |
|---|---|---|
| Yes | No | Don't Know or Prefer Not to Answer |

| **In the past 12 months, were you (personally) ever hungry but didn't eat because you couldn't afford enough food? (Check one box only)▼** | | |
|---|---|---|
| Yes | No | Don't Know or Prefer Not to Answer |

| **In the past 12 months, did you (personally) lose weight because you didn't have enough money for food? (Check one box only)▼** | | |
|---|---|---|
| Yes | No | Don't Know or Prefer Not to Answer |

| **In the past 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food? (Check one box only)▼** | | | | |
|---|---|---|---|---|
| Yes. Almost every month | Yes. Some months but not every month | Yes. Only 1 or 2 months | No. | Don't Know or Prefer Not to Answer |

*Note*. From "Guide to measuring household food security," by U.S. Department of Agriculture, Food and Nutrition Service, 2000. Available from http://www.fns.usda.gov/fsec/files/fsguide.pdf

## Appendix E: Canadian Thresholds for Defining Food Security Categories

| *Food Security Status* | |
|---|---|
| Category Labels | |
| Food Secure | no indication of difficulty with income-related food access<br><br>0 affirmed responses |
| Food Insecure, Marginal | one indication of difficulty with income-related food access<br><br>1 affirmed responses |
| Food Insecure, Moderate | indication of compromise in quality and/or quantity of food consumed<br><br>2 to 5 affirmed responses |
| Food Insecure, Severe | Indication of reduced food intake and disrupted eating patterns<br>≥ 6 affirmed responses |

*Note*: Table represented merged documents.
Health Canada. (2008, January). Income-related household food security in Canada in 2004 (Canadian Community Health Survey, Cycle 2.2, Nutrition). Retrieved from the Health Canada Health & Nutrition Survey website: http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/income_food_sec-sec_alim-eng.php#metho253

## Appendix F: Introduction to Study and Survey

### Prince Edward Island Mother's Food and Nutrition Survey

You are being asked to participate in research. For you to be able to decide whether you want to participate in this project, you should understand what the project is about, as well as the possible risks and benefits in order to make an informed decision. This process is known as informed consent. The beginning of this packet describes the purpose, procedures, possible benefits, and risks. It also explains how your personal information will be used and protected. Once you have read this and your questions about the study are answered, you may complete the rest of the survey packet if you are interested. Completion of this survey will imply your consent and will allow your participation in this study. You should receive a copy of the study information (pages 1 & 2) to take with you.

**Explanation of Study**

This study is being done because some women in Prince Edward Island do not have access to adequate amounts of food for an active, healthy life. This survey is being done to gain a better understanding of the food and nutrition habits of adult mothers with at least one child less than six years of age and using a Family Resource Centre on Prince Edward Island.

If you agree to participate, you will be asked to complete this survey.

You should not participate in this study if you are less than 18 years of age, do not have at least one child less than six years of age, or do not use a Family Resource Centre. Your participation in the study will last about 10 minutes.

**Risks and Discomforts**

Risks or discomforts that you might experience are feelings of embarrassment related to your food and/or nutrition habits.

**Benefits**

This study is important to science/society because it will help us better to understand the food and nutrition habits of mothers with young children. This may lead to better food- and nutrition-related programming to assist these women. Individually, you may benefit from participation by feeling gratified that you are helping us to better understand mothers of young children on Prince Edward Island.

**Confidentiality and Records**

Your study information will be kept confidential. We are not asking you for your name today. In addition, your survey is assigned a numerical code for when we tabulate the information. No one but the researchers will see your individual answers, and all surveys will be destroyed at the end of the study.

**Compensation**

As compensation for your time/effort, you will receive $5.00.

Contact Information

This study has been reviewed and approved by both the Institutional Review Board at Ohio University and the Research Ethics Board at University of Prince Edward Island.

If you have any questions regarding this study, please contact David H. Holben, Visiting Research Chair of Nutrisciences and Health, University of Prince Edward Island, (902) 566-0620, holben@ohio.edu.

If you have any questions regarding your rights as a research participant or have concerns about the ethical conduct of this study, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664. You may also contact the Chair of the Research Ethics Board via the Office of Research Services at University of Prince Edward Island, (902) 566-0637.

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By completing the survey, you are agreeing that:

- you have read this consent information (or it has been read to you) and have been given the opportunity to ask questions and have them answered;
- you have been informed of potential risks and they have been explained to your satisfaction;
- you understand Ohio University or the University of Prince Edward Island have no funds set aside for any injuries you might receive as a result of participating in this study;
- you are 18 years of age or older and have at least one child less than six years of age;
- your participation in this research is completely voluntary; and
- you may leave the study at any time. If you decide to stop participating in the study, there will be no penalty to you and you will not lose any benefits to which you are otherwise entitled.

## Appendix G: Ohio University Institutional Review Board Approval

OHIO UNIVERSITY
Office of the Vice President for Research

13E211

Office of Research Compliance
RTEC 117
Athens, OH 45701-2979

T: 740.593.0664
F: 740.593.0638
www.research.ohiou.edu

A determination has been made that the following research study is exempt from IRB review because it involves:

Category 2 - research involving the use of educational tests, survey procedures, interview procedures or observation of public behavior

**Project Title:** Food Insecurity and Nutritional Outcomes of At-Risk Mothers in Prince Edward Island

**Primary Investigator:** David H. Holben

**Co-Investigator(s):**

**Advisor:**
(if applicable)

**Department:** Applied Health Sciences and Wellness

Jo Ellen Sherow

7-24-13

Jo Ellen Sherow, MPA
Office of Research Compliance

Date

The approval remains in effect provided the study is conducted exactly as described in your application for review. Any additions or modifications to the project must be approved (as an amendment) prior to implementation.


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