



**Priority  
health equity indicators  
for British Columbia:**

**Household food  
insecurity indicator  
report**

August 2016

## Prepared for the Population and Public Health Program, BC Centre for Disease Control (BCCDC), Provincial Health Services Authority (PHSA)

Trish Hunt, Senior Director, Health Promotion, Chronic Disease and Injury Prevention, British Columbia Centre for Disease Control, Provincial Health Services Authority

### Authors:

#### **University of Toronto, Faculty of Medicine, Department of Nutritional Sciences:**

Dr. Na Li, PhD, Postdoctoral Fellow  
Naomi Dachner, MSc, Research Manager  
Dr. Valerie Tarasuk, PhD, Professor

#### **Population and Public Health, BCCDC, Provincial Health Services Authority:**

Rita Zhang, MPH, Epidemiologist  
Melanie Kurrein, MA, RD, Provincial Manager Food Security  
Theresa Harris, RD, Project Manager  
Sarah Gustin, MPH, Knowledge Translation & Communications Manager  
Dr. Drona Rasali, PhD, Director, Population Health Surveillance and Epidemiology

This report is collaboration between PHSA and PROOF. PROOF is an interdisciplinary research team working to identify effective policy interventions to reduce household food insecurity in Canada. It is supported by a Programmatic Grant in Health and Health Equity, Canadian Institutes of Health Research (CIHR) (FRN 115208).

### PHSA contact:

This report can be found at: [www.phsa.ca/populationhealth](http://www.phsa.ca/populationhealth)

For further information contact:  
Provincial Health Services Authority  
BC Centre for Disease Control  
Population and Public Health Program  
#700 - 1380 Burrard Street  
Vancouver, B.C. V6Z 2H3  
[pph@phsa.ca](mailto:pph@phsa.ca)

# Table of contents

Executive Summary . . . . .	1
Introduction . . . . .	1
Key findings based on 2011-12 data . . . . .	2
Conclusion . . . . .	3
Introduction . . . . .	4
Context for this report . . . . .	6
Methods . . . . .	7
Findings . . . . .	8
Food insecurity prevalence in BC . . . . .	8
Food insecurity and geographic location . . . . .	12
Food insecurity and household characteristics . . . . .	14
Food insecurity and health indicators . . . . .	25
Conclusion . . . . .	27
Technical Notes . . . . .	28
Appendix: Data Tables . . . . .	31
References . . . . .	38

# Executive Summary

## Introduction

Food insecurity is recognized as a key public health issue in British Columbia (BC). Simply put, household food insecurity is when a household worries about or lacks the financial means to buy healthy, safe, personally acceptable food. Evidence shows that food insecure families struggle to afford a healthy diet and that food insecurity impacts physical, social and mental health and well-being.

Adults who are food insecure are at an increased risk of chronic conditions and have greater difficulty managing their diseases. They also face an increased likelihood of depression, distress, and social isolation. Children and youth also suffer the impacts of food insecurity, which is associated with micronutrient deficiencies, as well as increased risk of chronic conditions such as asthma and depression. A recent Ontario study shows that people who are food insecure place a greater burden on the health care system, with severely food insecure adults using 121% more healthcare dollars compared to those who are food secure.

## Context for this report

Decreasing food insecurity is part of the overall goals and objectives included in the BC Ministry of Health's *Model Core Program Paper: Food Security* (2014). Some ways that the Population and Public Health (PPH) program at Provincial Health Services Authority (PHSA) works towards the Core Program Paper goals and objectives are to increase knowledge and awareness about food insecurity (for example, with this report), as well as to monitor the affordability of a nutritionally adequate, balanced diet across BC (see the *Food Costing in BC 2015* report).

In addition, food insecurity prevalence is one of the 52 health equity indicators included in the suite of indicators developed by PHSA (see the *Development of priority health equity indicators for British Columbia* report). This report's analysis contributes toward the PHSA priority health equity indicators initiative, by taking an in-depth look into the household food insecurity indicator.

This report supports the PHSA health equity indicators work and it responds to the health authorities' request for more detailed BC food insecurity data. The information presented here provides data that can help inform planning and policy development.

## Methods

The PPH program collaborated with the PROOF team at the University of Toronto to assess the prevalence of household food insecurity in BC. The findings presented in this report are based on data collected through the Canadian Community Health Survey (CCHS) in the four survey cycles between 2005 and 2011-12.

## Key findings based on 2011-12 data

- **Over one in 10 BC households (11.8%), representing 485,500 British Columbians, experienced some level of food insecurity. About 3% of households, representing 91,100 British Columbians, experienced severe food insecurity.**

- **About one in six BC children under the age of 18 lived in households experiencing some level of food insecurity (15.6%).**

- **The rate of household food insecurity varied within the province:**

- In general, the lower mainland and the south coast of BC had lower rates of household food insecurity and northern BC had higher rates.
- Northern Health had the highest overall food insecurity rate (16.4%); however, the highest rate of severe food insecurity was in Island Health, affecting almost one in 25 households (3.8%).

- **Household food insecurity rates in BC differ depending on different household characteristics:**

- Female lone parent-led BC households, with children less than 18 years of age, had the highest rate of food insecurity (34.2%).
- In all of the health authorities, households with children had higher rates of food insecurity compared to those without. In Fraser and Vancouver Coastal Health, over one in 10 households with children were food insecure (12.3% and 11.0%, respectively), whereas in Northern, Island, and Interior Health one in about four to five households with children was food insecure (24.8%, 20.6%, and 20.8%, respectively).
- Among food-insecure households in BC, about two thirds (65.0%) reported their main sources of income were wages, salaries, or self-employment.
- Food insecurity affected over three quarters (76.0%) of BC households reliant on social assistance as their main source of income and about a third (32.7%) of those reliant on Employment Insurance or Workers' Compensation.
- Renter households in BC experience disproportionately high rates of food insecurity compared to owner households.

### Definitions

**Food secure** – report no problems with income-related food access

**Marginally food-insecure** – indicate being worried about having enough food, or experiencing an income-related barrier to adequate, secure food access.

**Moderately food insecure** – experience compromises in the quality and/or quantity of food consumed due to a lack of money for food.

**Severely food insecure** – report more extensive compromises, including disrupted eating patterns and reduced food intake.

### ■ Food insecurity is associated with less favourable health outcomes in British Columbians:

- Compared to individuals living in food secure households, those living in food insecure households reported significantly lower rates of positive general health (43.4% vs 62.2%) and positive mental health (55.1% vs 68.9%).
- Those living in food insecure households also reported significantly higher rates of adult obesity and mood/anxiety disorder compared to those living in food secure households (19.5% vs 14.1% and 24.1% vs 9.4%).

## Conclusion

Over one in 10 BC households are food insecure. Food insecurity is a public health concern as it affects a household's ability to afford nutritious food and influences both physical and mental health across the lifespan of the affected individuals.

The prevalence of household food insecurity varies across the province and affects some households more than others:

- Households with children, especially those led by single mothers are at highest risk for food insecurity.
- About three quarters (76.0%) of households whose main source of income is social assistance are food insecure; however, working households comprise the majority of the food insecure households in BC (65.0%).
- Fewer households whose main source of income is from government support to seniors (public pensions) are food insecure compared to households reliant on social assistance (12.6% vs 76.0%).

People in BC living in food insecure households have poorer health than their food secure counterparts for all five health indicators analyzed. Individuals in food insecure households had lower rates of positive self-perceived general health and mental health, reported lower rates of healthy eating, and experienced higher rates of obesity and mood/anxiety disorders.

The findings presented in this report describe household food insecurity in BC over time, and will support the health authorities in food insecurity planning. It is important that BC monitors household food insecurity on a regular and consistent basis through surveillance opportunities from the Canadian Community Health Survey (CCHS).

The purpose of this report is not to recommend specific policies or programs, but it is broadly recognized that reducing household food insecurity at a population level will require policy changes that improve a household's financial circumstances. Recent Canadian studies have found that food insecurity is sensitive to policy changes that improve a household's financial resources. There is also some evidence that the risk of food insecurity among very low-income adults drops in half when they turn 65 and become eligible for public pensions (i.e., Old Age Security and Guaranteed Income Supplement), highlighting the importance of adequate, secure incomes to protect individuals and families from food insecurity.

# Introduction

It is well established that overall health is primarily determined by social factors, such as working or living conditions, income and educational opportunities. These factors affect the rates of chronic disease and injury, contributing to health inequity, which has significant social and economic costs for both individuals and society as a whole.<sup>1</sup> Food insecurity is a social determinant of health that is closely linked with poverty, and affects an individual's physical and mental health.

Using the work of Davis and Tarasuk, Health Canada defines household food insecurity as “the inability to acquire or consume an adequate diet quality or a sufficient quantity of food in socially acceptable ways or the uncertainty that one will be able to do so”<sup>2</sup> which is most often the result of inadequate income.<sup>3</sup>

As reported in the Ministry of Health's document, *Core Functions Food Security Evidence Review*,<sup>4</sup> food security is foundational to healthy eating. A number of health and social challenges may arise for food insecure households:

## Definitions

**Food secure** households report no problems with income-related food access. Those who are considered **marginally food insecure** indicate being worried about having enough food, or experiencing an income-related barrier to adequate, secure food access. Households classified as **moderately food insecure** experience compromises in the quality and/or quantity of food consumed due to a lack of money for food. **Severely food insecure** households report more extensive compromises, including disrupted eating patterns and reduced food intake.

## Birth outcomes and maternal health

- Inadequate nutrition during pregnancy can have negative health impacts on both the mother and baby. For example, low-income women who are unable to meet their dietary requirements during pregnancy have an increased risk for a low birth weight baby.<sup>5</sup> US research has also linked maternal food insecurity to increased risk of birth defects.<sup>6</sup>
- Household food insecurity can also adversely impact infant feeding behaviours and limit the sustainability of breastfeeding.<sup>7,8</sup>

## Child development

- Food insecurity can impede growth and development in early life.<sup>9,10</sup>
- Food insecure children may have poorer academic outcomes and social skills compared to children who do not experience food insecurity.<sup>11,12</sup>
- Food insecure children have poorer general health.<sup>13</sup>
- Among Canadian children and youth, food insecurity is associated with iron deficiency anemia and has been linked to the subsequent development of a variety of chronic conditions, including asthma and depression.<sup>13,14,15</sup>

- A Quebec study observed a two-fold increase in the likelihood of persistent hyperactivity/inattention among children eight years old and younger who experienced food insecurity between ages one and a half and four and a half years, even after accounting for family socioeconomic circumstances and parental mental health.<sup>16</sup>

## Health status and chronic diseases

- Among food insecure families, the quality and quantity of women's food intake is very likely to deteriorate as household incomes dwindle.<sup>17</sup> An analysis of low-income women's dietary intakes found that among moderately and severely food insecure women, energy, carbohydrate, vitamin B-6, and fruit and vegetable intakes significantly declined over the course of a month, as the time since the receipt of income increased, whereas food secure and marginally food insecure women showed no significant patterns within the month.
- Household food insecurity is a strong marker of nutritional vulnerability in Canada with food insecure youth and adults experiencing a greater prevalence of inadequate intakes of vitamin A, folate, calcium, magnesium, and zinc than their food secure counterparts.<sup>18</sup>
- Food insecure individuals report higher levels of: poor or fair self-rated health, diabetes, heart disease, high blood pressure, and food allergies.<sup>19,20</sup>
- People who are food insecure are more likely to suffer from a myriad of chronic conditions, including both mental and physical health problems.<sup>21,22,23,24,25,26,27</sup>
- Being food insecure poses additional barriers to chronic disease management, increasing the likelihood of adverse outcomes.<sup>28,29,30,31</sup> For example, food insecure individuals with diabetes experience greater emotional distress and have a harder time managing their blood sugars and following a diabetic diet.<sup>31</sup>

## Mental health and emotional well-being

- Food insecurity impacts social and mental well-being and can increase the likelihood of depression, distress (including feelings of worthlessness and hopelessness), and social isolation.<sup>20</sup>
- Child hunger is an independent risk factor for depression and suicidal symptoms in adolescence and early adulthood.<sup>15</sup>

## Health care costs

In addition to poorer health outcomes, recent research in Ontario shows increased health care costs associated with food insecurity. After adjusting for other well-established social determinants of health (e.g., education, income), total annual health care costs in Ontario were higher for adults living in food insecure households compared to those living in food secure households. Specifically, costs were 23% higher for adults in marginally food insecure households, 49% higher for those in moderately food insecure households, and 121% higher for those in severely food insecure households.<sup>32</sup> Food insecurity has also been shown to increase the probability that adults will become high-cost users of health care.<sup>33</sup>



## Context for this report

Addressing food insecurity is one of the priorities for the Population and Public Health (PPH) program at Provincial Health Services Authority (PHSA). PPH's ongoing work on food costing in BC demonstrates the challenges families, especially low income families face in affording healthy food. For example, the most recent report showed that the average monthly cost of a nutritious food basket for a family of four in BC was \$974 in 2015.<sup>34</sup> Analysis by Dietitians of Canada estimates that a family of four on income assistance would have to spend 79% of their income to buy the nutritious food basket.<sup>35</sup>

An individual or household's lack of financial means to obtain the food required to meet their needs (food insecurity) is considered a health inequity. As such, the prevalence of household food insecurity is a priority health equity indicator for BC.<sup>36</sup> Food insecurity is also recognized as a key public health issue and is addressed in the *BC Model Core Program Paper: Food Security* and the accompanying evidence review.<sup>37,38</sup>

This report contributes to, and complements, the PHSA report series: *Priority health equity indicators for British Columbia*.<sup>i</sup> As part of the health equity prioritization process, participants recommended the development of focused reports that provide an in-depth look at specific indicators. Collaboration with University of Toronto researchers who are part of PROOF, an interdisciplinary research team studying policy interventions to reduce household food insecurity in Canada, provided the support required to develop a focused report on food insecurity. The information presented also responds to the need for more detailed BC food insecurity data, identified by health authority public health dietitians. Greater partnership with academia on household food insecurity is also a recommendation put forward by the Food Access and Availability Action Team during the consultations into a provincial healthy eating strategy.<sup>39</sup> The background information and findings in this report will support the health authorities in food security program planning and policy development.

### Definition

Health equity exists when all people can reach their full health potential and are not disadvantaged from attaining it because of their race, ethnicity, religion, gender, age, social class, socioeconomic status, sexual orientation or other socially determined circumstance.<sup>40</sup>

<sup>i</sup> During 2012-13 and 2013-14, the Provincial Health Services Authority (PHSA) Population and Public Health Program (PPH) worked in collaboration with health sector partners and developed a prioritized set of 52 health equity indicators for use in BC.

# Methods

Data used in this report comes from the Canadian Community Health Survey (CCHS). The CCHS covers the Canadian population 12 years of age and over living in the provinces and territories. Excluded from the survey's coverage are: persons living on reserves and other Aboriginal settlements in the provinces; full-time members of the Canadian Forces; the institutionalized population and persons living in two Quebec health regions. Altogether, these exclusions represent less than 3% of the target sample population. Further information about the data sources and methods used for generating the statistics in this report can be found in the Technical Notes (pages 28-29).

## Additional information

All rates in this report represent estimates based on self-reported data from full-cycle CCHS (2005, 2007-08, 2009-10, and 2011-12). As such, potential bias around self-reported data should be considered when interpreting the results, and the rates may not reflect values calculated based on annual data; caution should be exercised when comparing rates in this report to those in other reports. While the definitions for some groups remain broad, we presented rates for subgroups as much as sample size allowed.

As BC did not participate in the optional food insecurity module during the 2013-14 CCHS cycle, 2011-12 represents the most recent data available for the province.

## Additional information

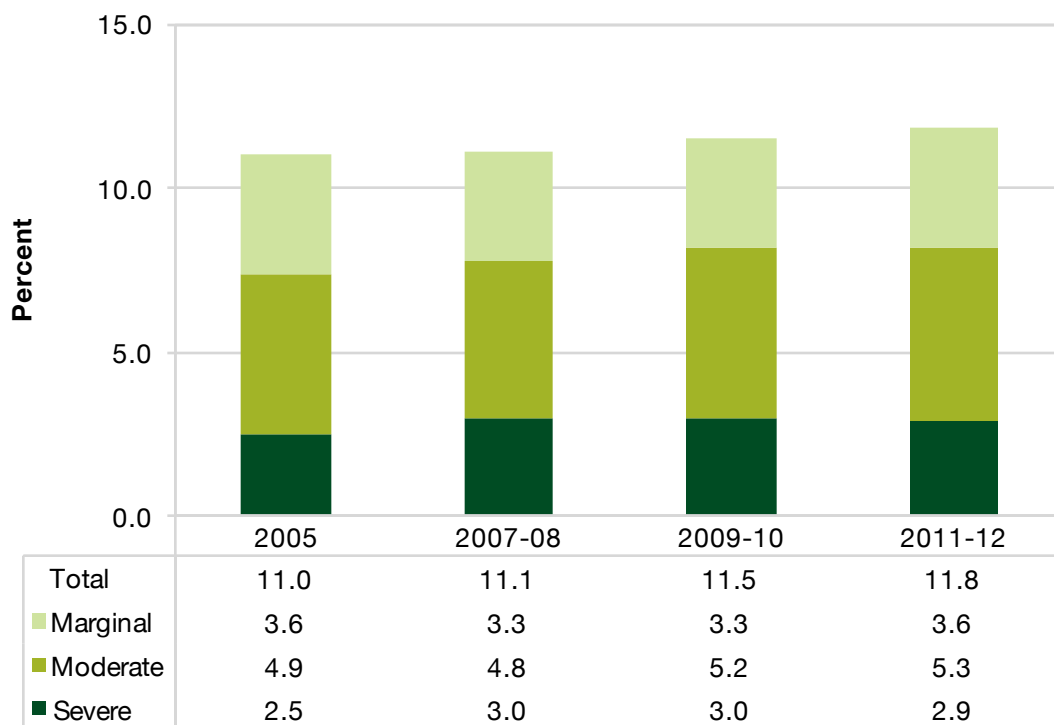
Detailed estimates and statistical measures including confidence limits for all the data presented in the Findings section can be found in under data tables in the appendix. While significant pairwise differences in rates can be assessed based on the confidence limits, formal statistical tests of significance for the rates are beyond the scope of this report, unless specified otherwise.

# Findings

## Food insecurity prevalence in BC

This section presents data on overall household food insecurity and data on children living in food insecure households in BC.

**Figure 1. Prevalence of household food insecurity in British Columbia, by food insecurity level, 2005 to 2011-12**



- Over one in 10 households in BC experienced some level of food insecurity between 2005 and 2011-12.
- About 3% of households in BC experienced severe food insecurity during this time period.
- The overall prevalence of household food insecurity in BC increased gradually during this time period, reaching 11.8% in 2011-12.

### Definition

#### Prevalence of household food insecurity

is defined as the total number of households that are food insecure among the total number of households. In this report, food insecurity prevalence is used to describe households rather than individuals and are expressed in the unit of percentage.

Figure 2. Number of people living in food insecure households in British Columbia, 2011-12

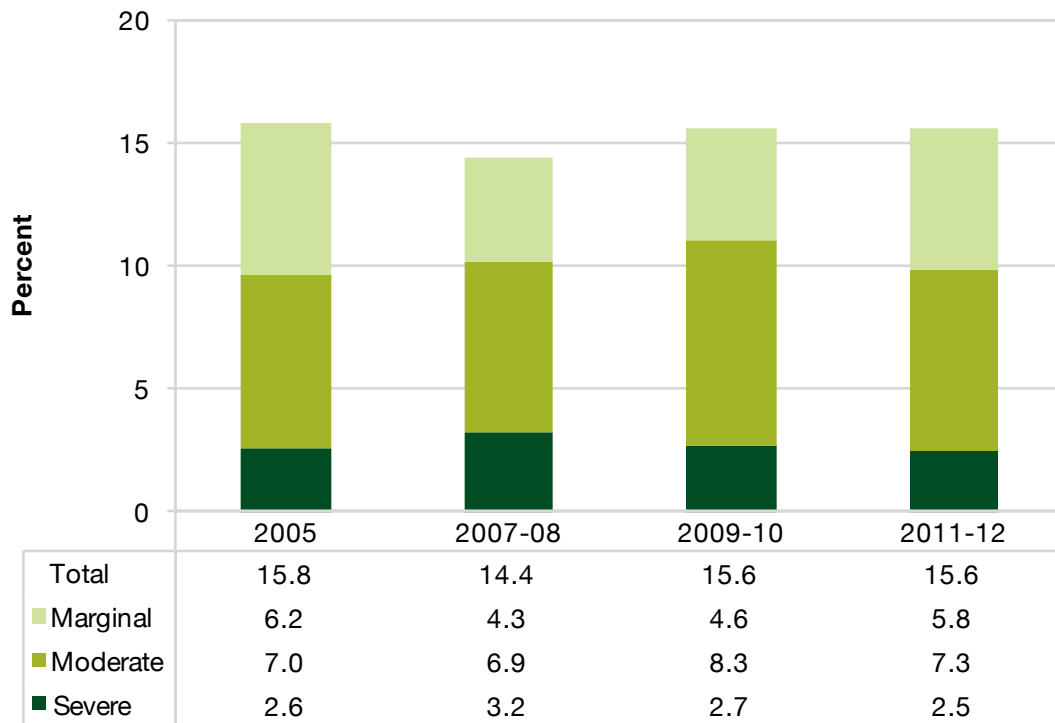


Table 1: Number of people living in food insecure households in British Columbia, by food insecurity level, 2005 to 2011-12

	2005	2007-08	2009-10	2011-12
Marginal	149,400	135,000	138,600	169,100
Moderate	185,800	195,700	235,300	225,300
Severe	77,000	96,500	102,200	91,100
<b>Total</b>	<b>412,200</b>	<b>427,200</b>	<b>476,100</b>	<b>485,500</b>

- There has been a steady increase in the overall number of British Columbians living in food insecure households between 2005 and 2011-12.

**Figure 3. Proportion of children living in food insecure households, British Columbia, 2005 to 2011-2012**



- About one in six BC children under the age of 18 lived in a household experiencing some level of food insecurity between 2005 and 2011-12; the majority of them experienced marginal to moderate levels of food insecurity.
- The proportion of children living in food insecure households in BC remained relatively stable during this time period.

Figure 4. Number of children living in food insecure households in British Columbia, 2011-12

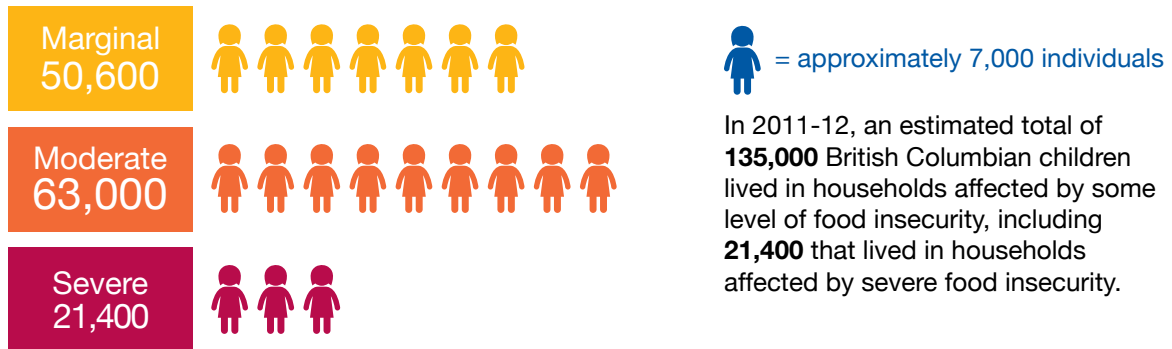


Table 2: Number of children (under 18) living in food insecure households, by food insecurity level, 2005 to 2011-12

	2005	2007-08	2009-10	2011-12
Marginal	49,200	35,000	39,100	50,600
Moderate	55,900	56,400	71,400	63,000
Severe	20,700	26,500	23,100	21,400
<b>Total</b>	<b>125,800</b>	<b>117,900</b>	<b>133,600</b>	<b>135,000</b>

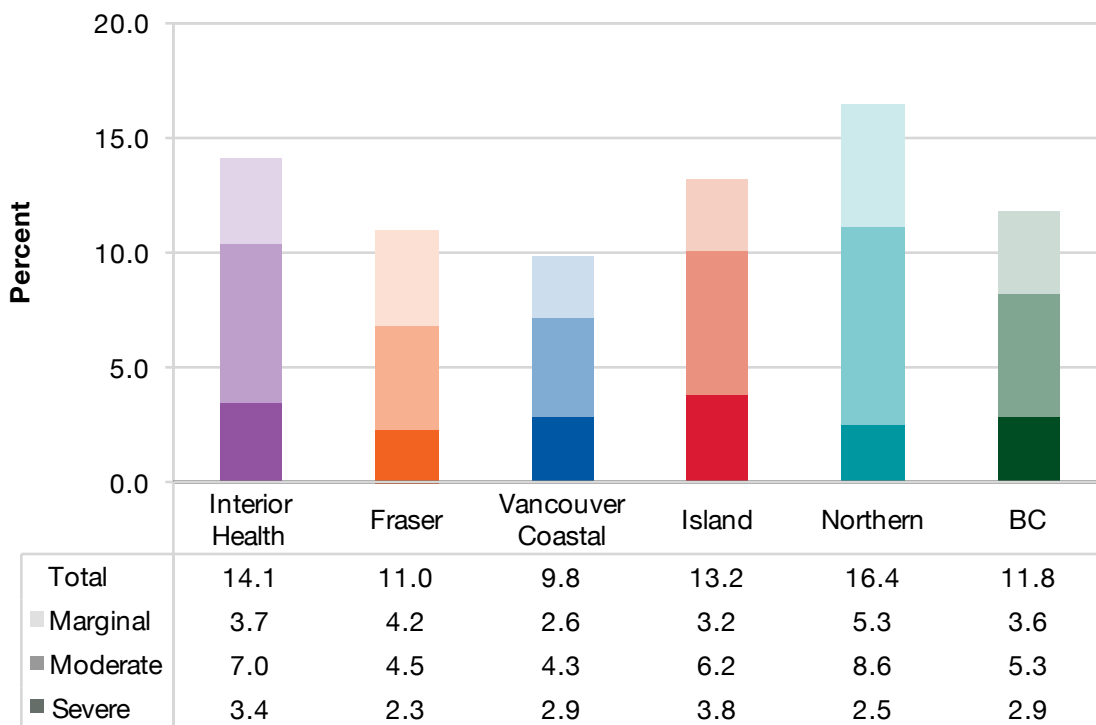
- There has been an increase in the overall number of BC children living in food insecure households from 2005 to 2011-12.

## Food insecurity and geographic location

This section explores food insecurity in BC based on geographic location by examining the prevalence of household food insecurity by:

1. Health authority
2. Health Service Delivery Area (HSDA)
3. Urban and rural residence

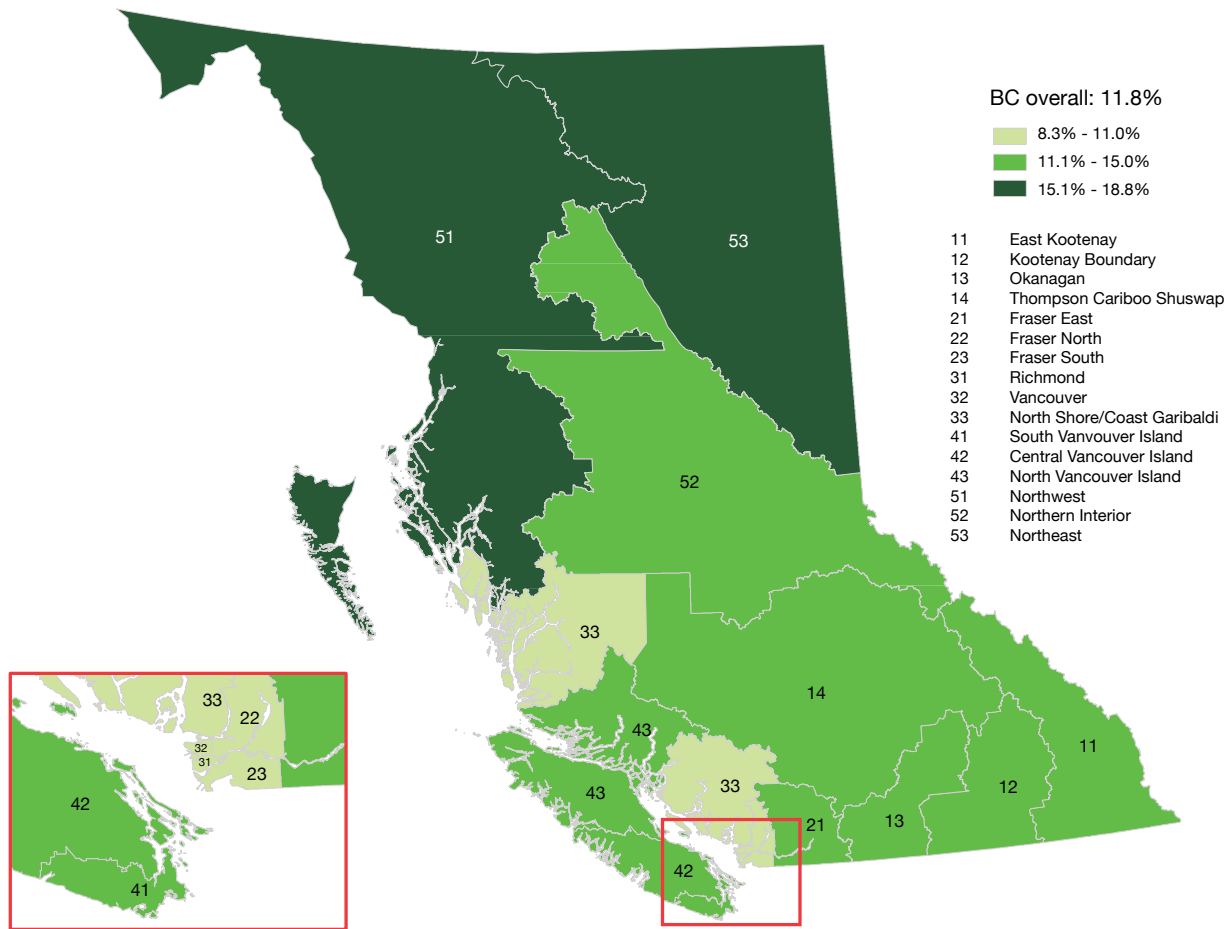
**Figure 5. Prevalence of household food insecurity in British Columbia, by food insecurity level across health authorities, 2011-12**



Note: The marginal food insecurity rates for Vancouver Coastal and Northern health authorities and the severe food insecurity rates for Fraser, Vancouver Coastal, and Northern health authorities should be interpreted with caution due to their high variability.

- In 2011-12 across the health authorities in BC, the overall rate of household food insecurity ranged from 9.8% in Vancouver Coastal Health to 16.4% in Northern Health.
- Marginal and moderate food insecurity contributed to Northern Health having the highest overall food insecurity rate; however, the highest rate of severe food insecurity was in Island Health, affecting almost one in 25 households (3.8%).

**Figure 6. Prevalence of household food insecurity in British Columbia, across Health Service Delivery Areas (HSDAs), 2011-12**



Data source: Canadian Community Health Survey 2011-12  
Prepared by: Population and Public Health Program, Provincial Health Services Authority

Note: The prevalence of food insecurity for East Kootenay, Kootenay Boundary, Fraser East, Richmond, North Shore/Coast Garibaldi, Northwest, and Northern Interior should be interpreted with caution due to their high variability.

- In 2011-12, the rate of household food insecurity varied across the 16 HSDAs in BC, with a more than two-fold difference between the highest (Northwest, 18.8%) and lowest (Richmond, 8.3%) rates.
- In general, the lower mainland and the south coast of BC had lower rates of household food insecurity and northern BC had higher rates.

### Additional data

In 2011-12, the rate of food insecurity among rural households was comparable to that of urban households in BC (11.8% vs 11.9%).



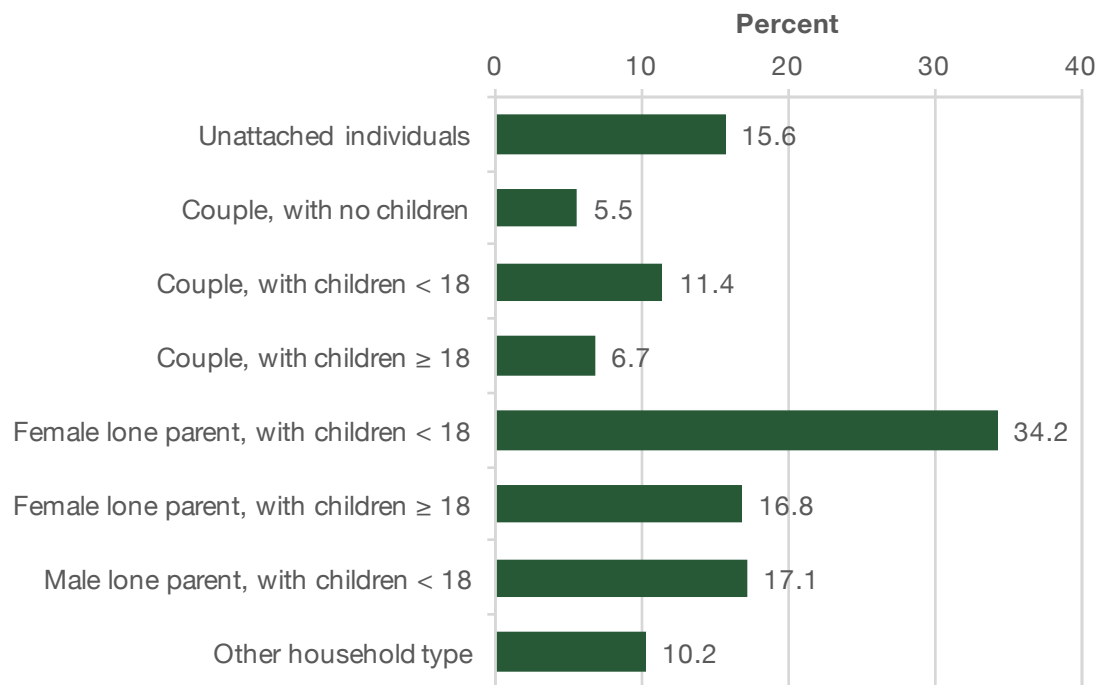
## Food insecurity and household characteristics

This section presents food insecurity prevalence in relation to five household characteristics:

1. Household composition
2. Education
3. Income
4. Home ownership
5. Demographics

### Food insecurity and household composition

**Figure 7. Prevalence of household food insecurity in British Columbia, by household composition, 2011-12**

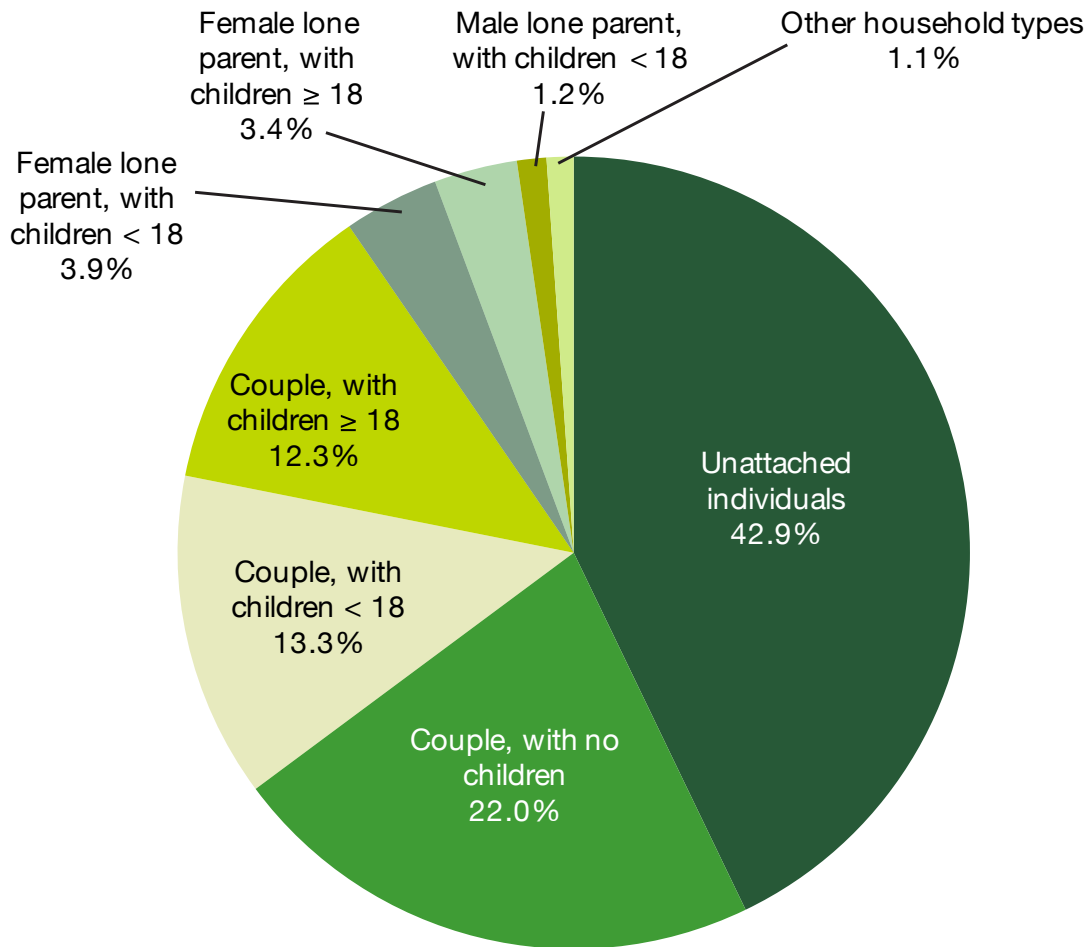


Note: Other household structures include male lone parents with children ≥ 18 (since the cell size is too small to warrant a reliable estimate) and anyone else who cannot be clearly put into one of the above categories. Rates for male lone parent with children < 18 and other household types should be interpreted with caution due to high variability.

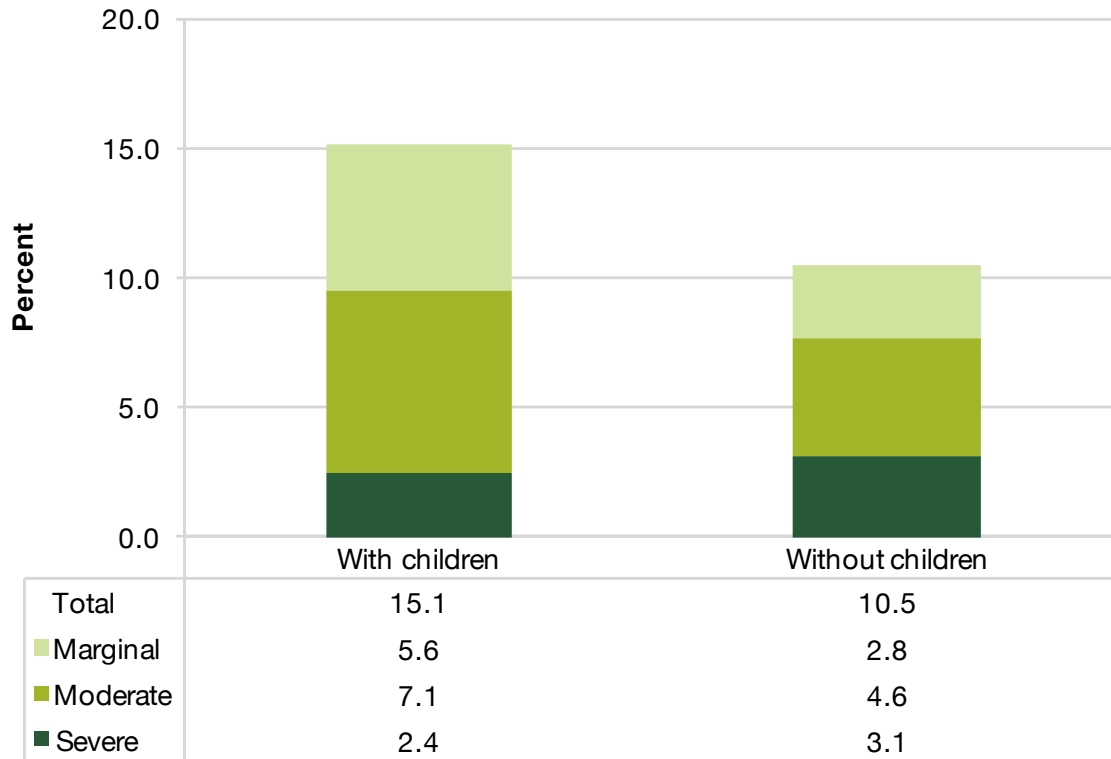
- In 2011-12, female lone parent-led households with children less than 18 years of age in BC had the highest rate of food insecurity (34.2%).
- Households comprised of a couple with no children experienced the lowest rate of food insecurity (5.5%) among the household types explored.

Although the prevalence of food insecurity among households made up of unattached individuals was 15.6% in 2011-2012, this group made up the largest proportion (42.9%) of food insecure households in British Columbia (Figure 8).

**Figure 8. Compositions of food insecure households in British Columbia, 2011-12**

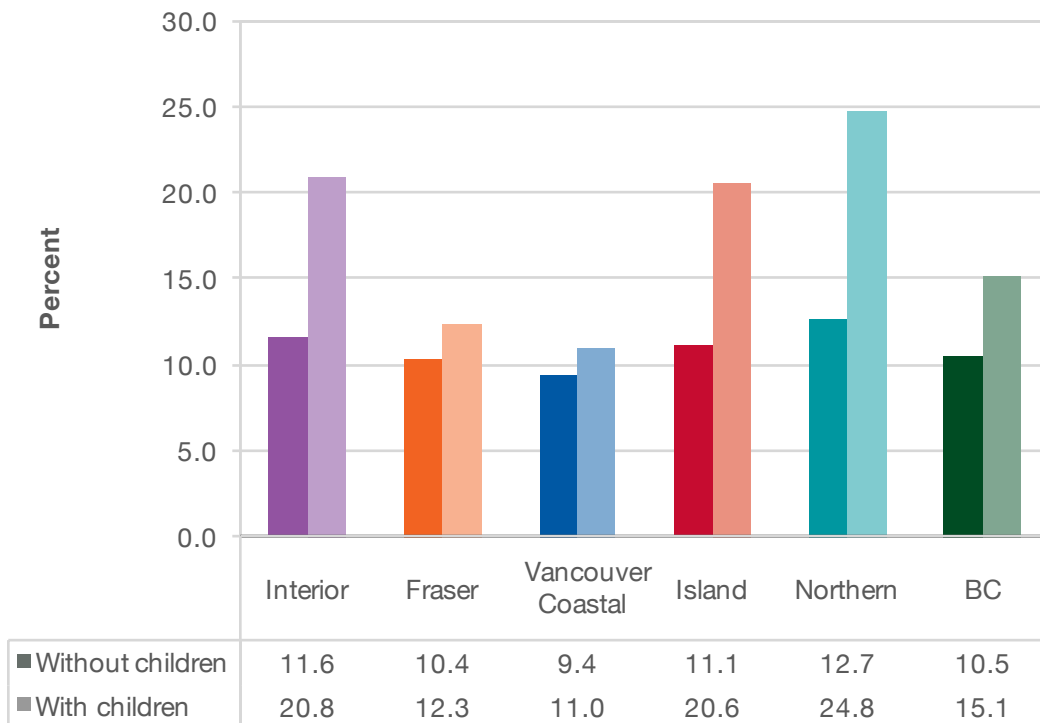


**Figure 9. Prevalence of household food insecurity in British Columbia, by food insecurity level for households with and without children, 2011-12**



- In 2011-12, the overall food insecurity rate was higher among BC households with children under the age of 18 compared to households without children (15.1% vs 10.5%).
- Compared to households with children, the rate of severe food insecurity was higher for households without children (3.1% vs 2.4%).

**Figure 10. Prevalence of household food insecurity in British Columbia, for households without and with children, across health authorities, 2011-12**

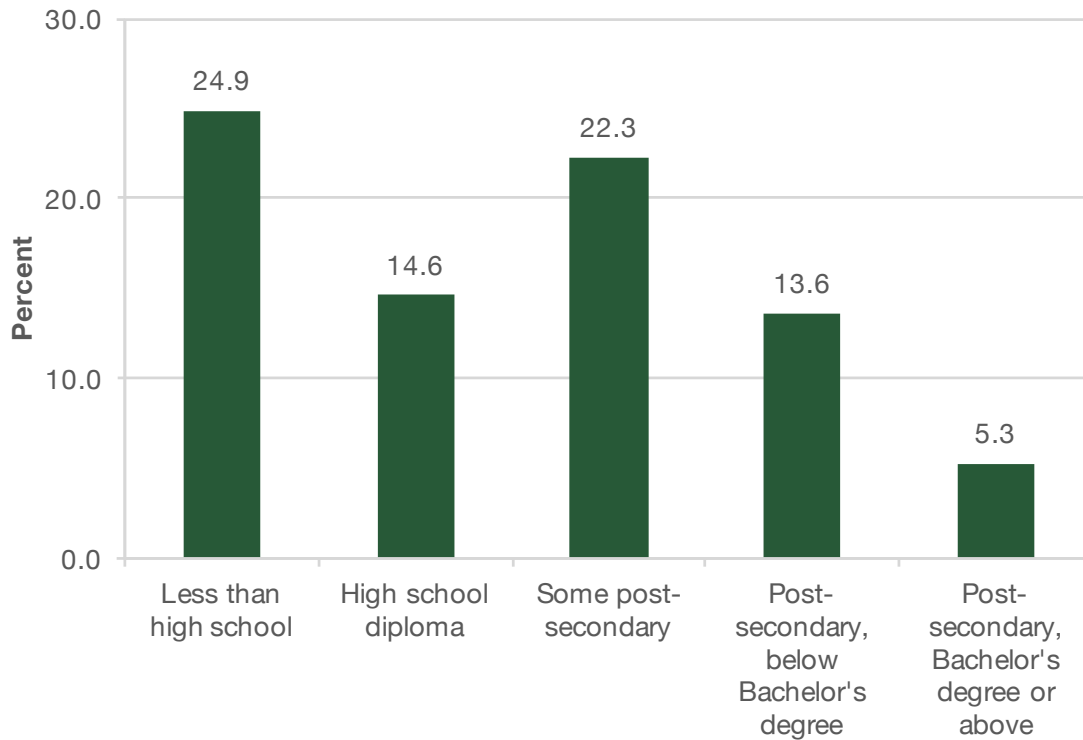


Note: Rate for household with children in Vancouver Coastal health authority should be interpreted with caution due to high variability.

- In 2011-12, households with children had higher rates of food insecurity compared to those without, in all of the health authorities. The differences were statistically significant for Interior, Island, and Northern Health.
- While the food insecurity rates among households without children were similar across the health authorities, food insecurity rates for households with children varied drastically.
- In Fraser and Vancouver Coastal Health, over one in 10 households with children were food insecure (12.3% and 11.0%, respectively), whereas in Northern, Island, and Interior Health one in about four to five households with children was food insecure (24.8%, 20.6%, and 20.8%, respectively).

## Food insecurity and education

**Figure 11. Prevalence of household food insecurity in British Columbia, by highest level of education achieved among household members, 2011-12**



- In 2011-12, among all BC households with different levels of education achievement, those in which no member had finished high school had the highest rate of food insecurity (24.9%, or about one in four).
- Households with at least one member attaining a bachelor's degree or above had the lowest rate of food insecurity (5.3%, or about one in 20).

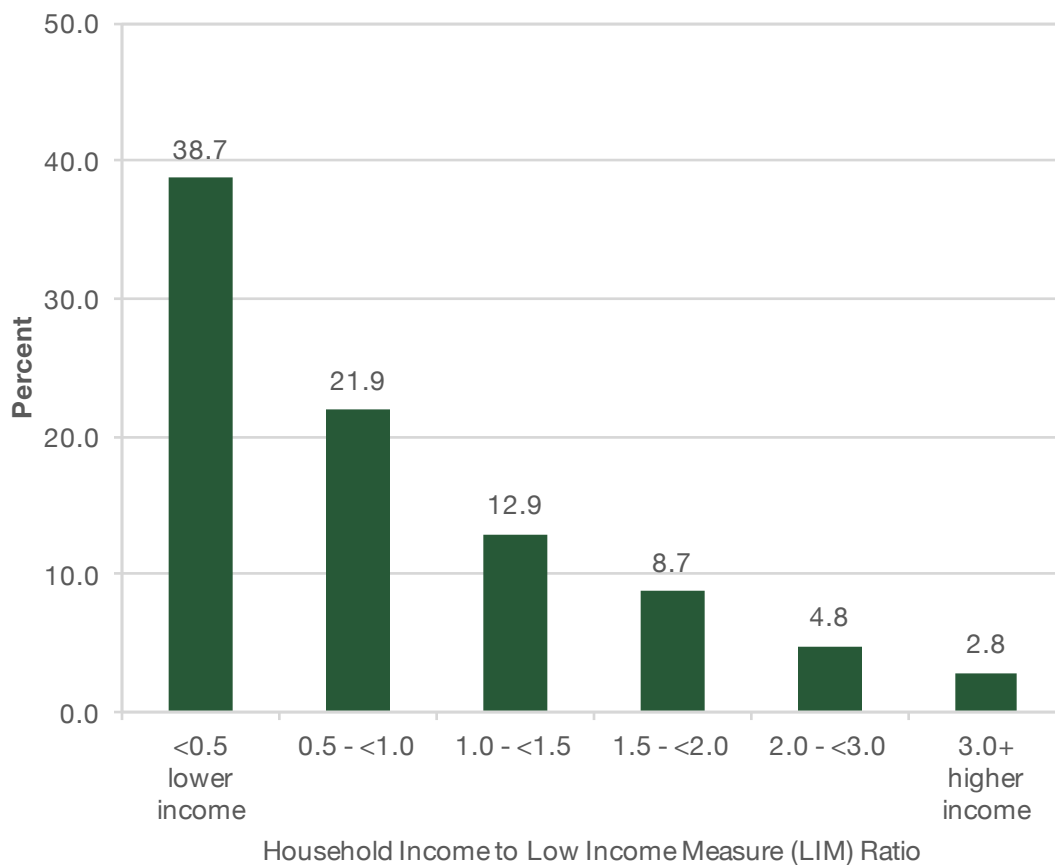
### Definition

For this report, education refers to the highest level of education achieved by any member of the household.

## Food insecurity and household income

Because food insecurity is largely a result of a household's inability to access food for financial reasons, it is not surprising that income is closely related to food insecurity. While there is no official measure of poverty in Canada, Statistics Canada's Low Income Measure (LIM) is commonly used in Canada and for making international comparisons. The LIM is 50% of median household income, adjusted for household size to take into account that a household's needs increase with additional members.

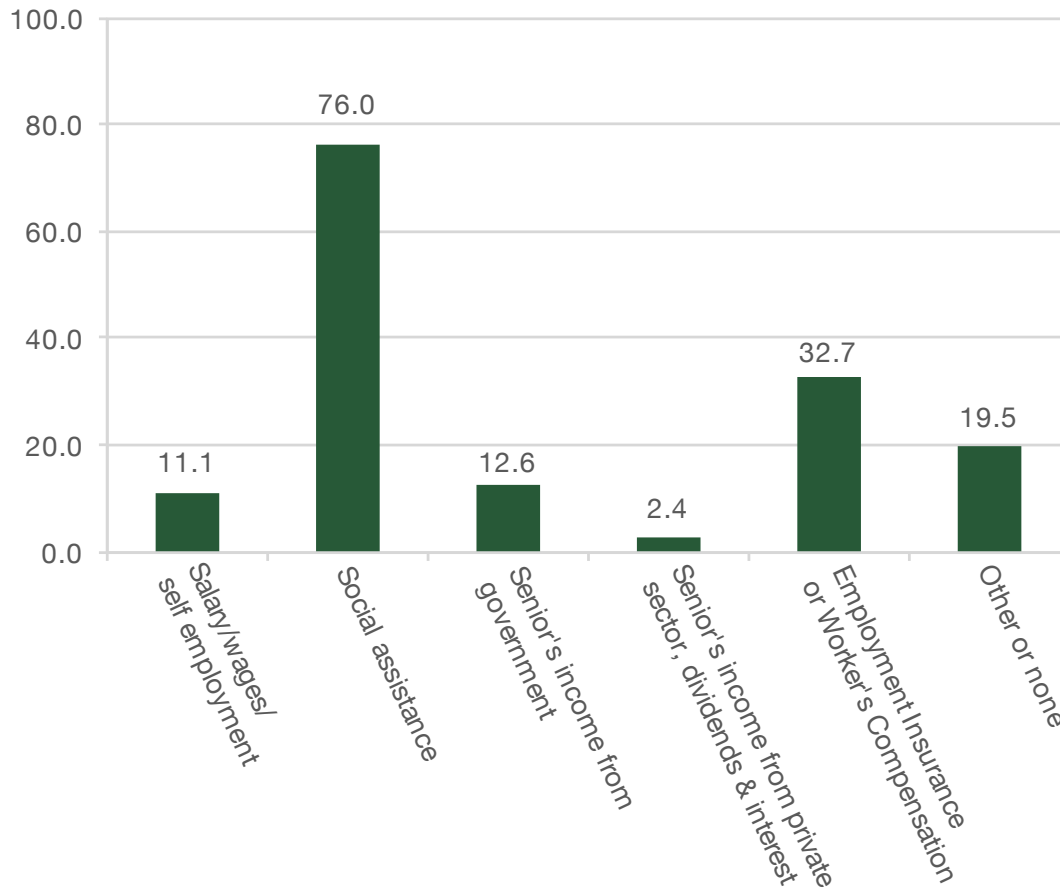
**Figure 12. Prevalence of household food insecurity in British Columbia, by household income to Low Income Measure (LIM) ratio, 2011-12**



Note: Rate for household with incomes that are three times or more than the LIM should be interpreted with caution due to high variability.

- In 2011-12 among all BC households, the lower the household income as compared to the LIM, the higher the rate of household food insecurity.
- Specifically, over 60% of households with income less than the LIM (<1.0) were food insecure (38.7% plus 21.9%). On the other hand, less than 3% of households with incomes greater than three times the LIM were food insecure.

**Figure 13. Prevalence of household food insecurity in British Columbia, by household’s main source of income, 2011-12**



Note: Rates for households whose main source of income was senior's income from private sector or dividends and interest, Employment Insurance or Worker's Compensation, and other or none, should be interpreted with caution due to their high variability.

- Food insecurity varies greatly with different sources of income. In 2011-12, food insecurity affected over three quarters (76.0%) of BC households reliant on social assistance as the main source of income, followed by 32.7% of those reliant on Employment Insurance or Workers' Compensation.
- Among seniors, 12.6% of households reliant on public pensions were food insecure, as compared to only 2.4% of households with income from private sector pensions, dividends or interest.

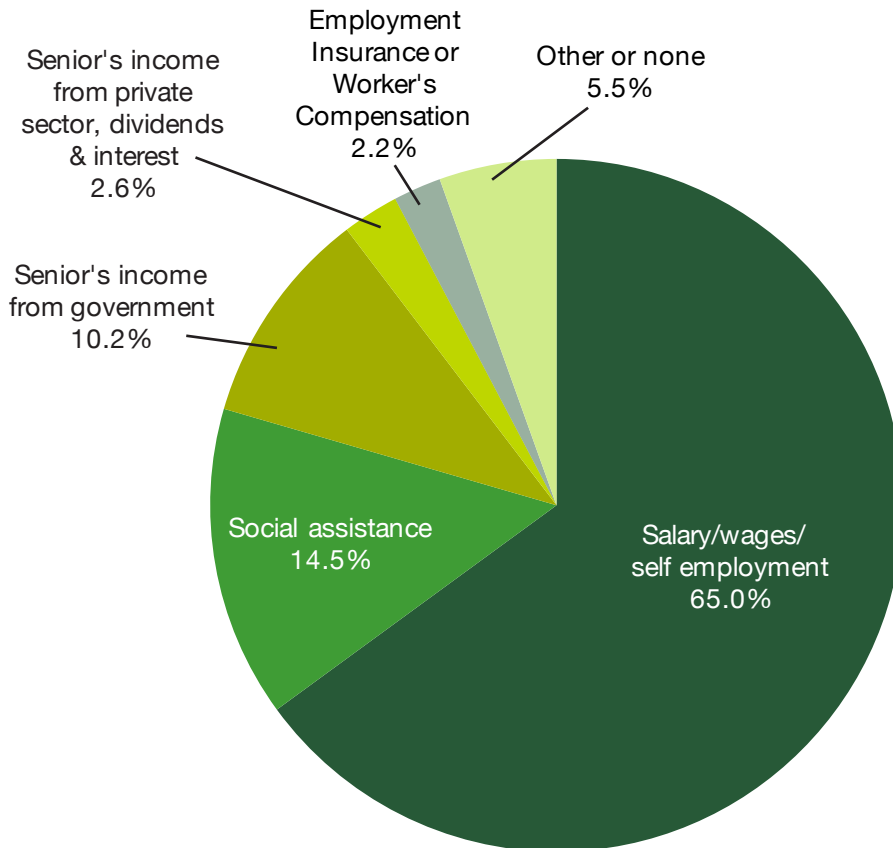
### Definitions

**Social assistance** includes welfare and disability support programs.

**Senior's income from private sector** includes job-related retirement pensions, superannuation and annuities, RRSP/RRIF.

Although the prevalence of food insecurity among households whose main source of income was wages and salaries was 11.1% in 2011-2012, this group made up the majority (65.0%) of food insecure households in British Columbia (Figure 14).

**Figure 14. Main sources of income among food insecure households in British Columbia, 2011-12**



### Definitions

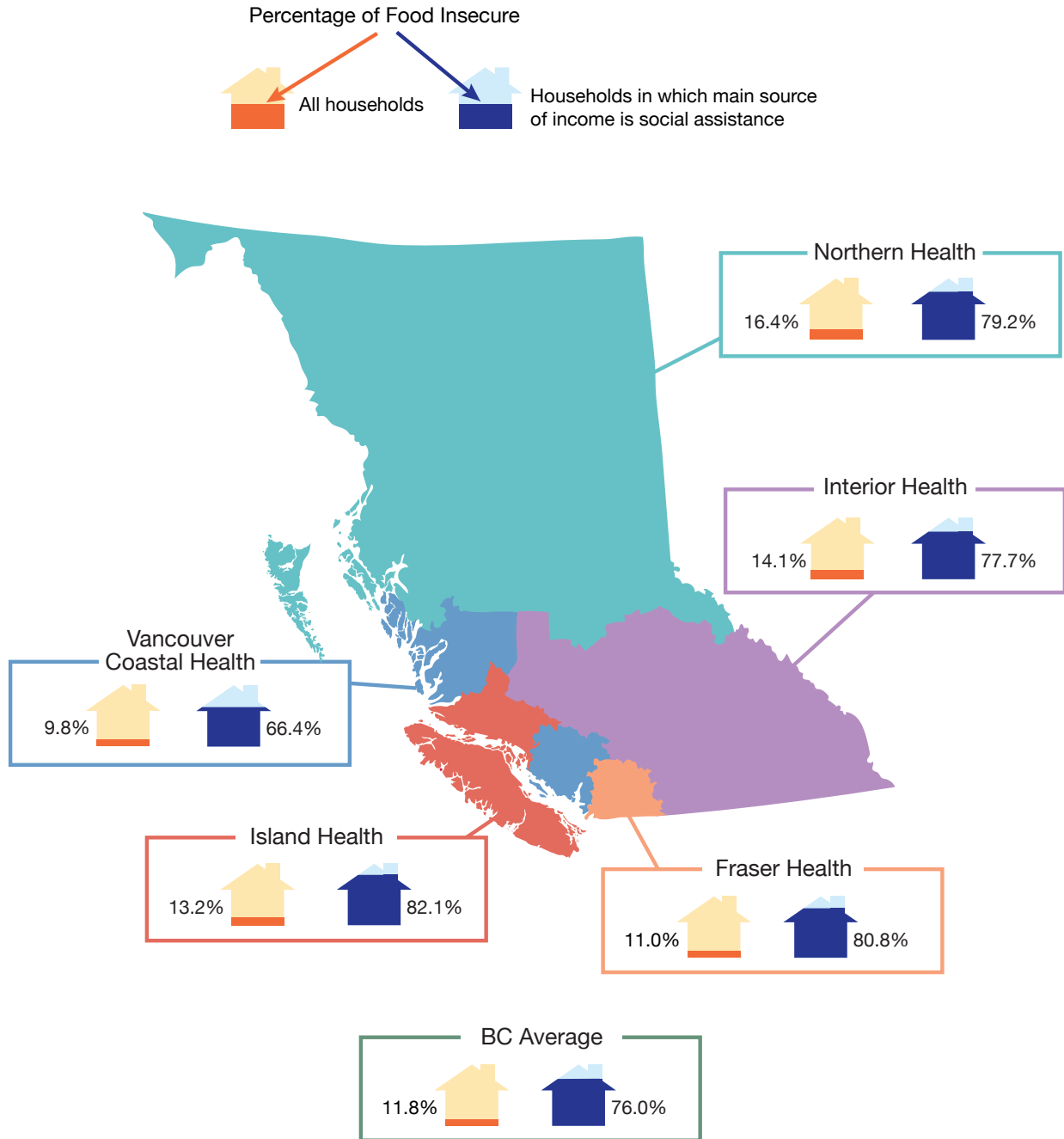
**Senior's income from government** includes benefits from Canada/Quebec Pension Plans, Old Age Security and Guaranteed Income Supplement.

**Other income** includes child tax benefits, child support, alimony and other (e.g. rental income, scholarships).



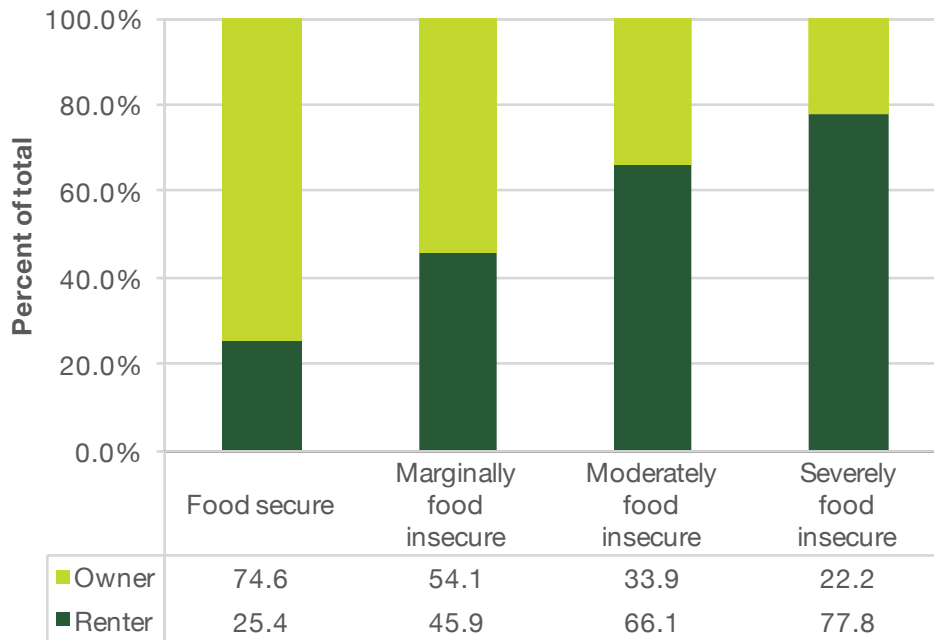
**Figure 15. Prevalence of household food insecurity for all households and households in which the main source of income is social assistance in British Columbia, across health authorities, 2011-12**

Within each health authority, households that relied on social assistance as the main source of income had four-to-seven-fold higher rates of food insecurity compared to all households combined.



## Food insecurity and home ownership

**Figure 16. Proportion of households in British Columbia that rented/owned their dwelling, across food security levels, 2011-12**



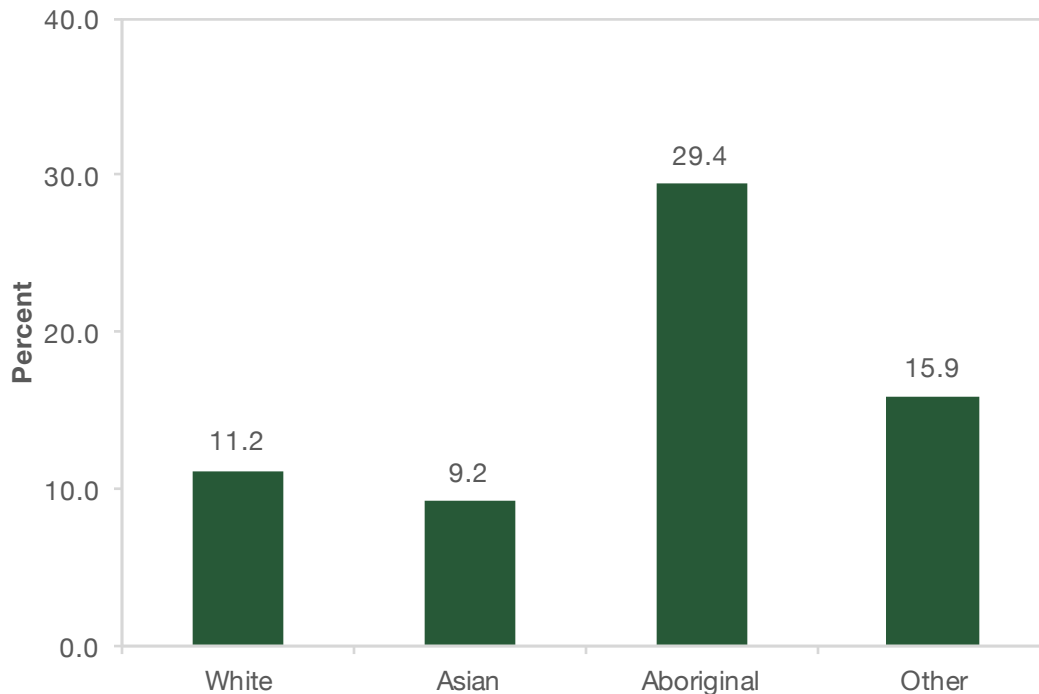
- Most households in BC reported owning their dwelling; yet all levels of food insecurity were disproportionately experienced by BC households that rented compared to those that owned their dwelling.
- In 2011-12 the proportion of renters went up with each level of food insecurity. Among marginally food insecure households in BC, nearly half (45.9%) rented their dwellings. The majority of moderately (66.1%) and severely (77.8%) food insecure households rented their dwellings. In contrast, three quarters of food secure households were dwelling owners.

### Definition

The definition of dwelling ownership includes households with mortgages.

## Food insecurity and demographics

**Figure 17. Prevalence of household food insecurity in British Columbia, by respondent's race, 2011-12**



- In 2011-12, BC households where the respondent self-identified as Aboriginal experienced the highest rate of food insecurity (29.4%).
- Households where the respondent self-identified as Asian experienced the lowest rate of food insecurity (9.2%).

### Additional information

Self-reported race and immigration status of the survey respondent was used to represent their household in the analysis.

Persons living on reserves and other Aboriginal settlements were excluded from CCHS survey coverage.

Asian refers to respondents who identify as belonging to Korean, Filipino, Japanese, Chinese, South Asian, Southeast Asian and West Asian racial or cultural groups.

## Additional data

The rate of food insecurity among households with a Canadian-born respondent was **13.1%**. This rate was significantly higher than that for households with a respondent who immigrated to Canada five or more years ago (**8.8%**), but was not statistically different from households with a recent immigrant to Canada (less than 5 years, **10.1%**).

## Food insecurity and health indicators

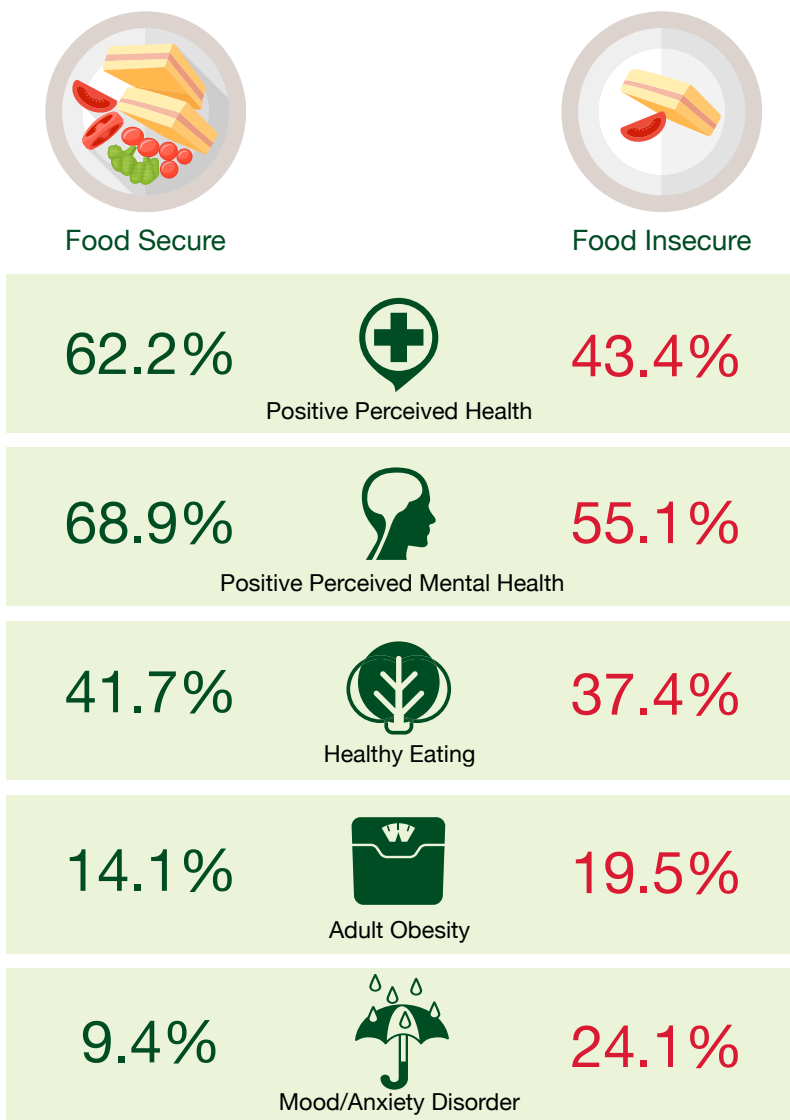
This section presents selected health outcome indicators of individuals living in food secure households in comparison to those living in households experiencing some level of food insecurity. The results provide insight into the prevalence of population health indicators by food security status, including:

1. Perceived health
2. Perceived mental health
3. Healthy eating
4. Adult obesity
5. Mood/anxiety disorder

## Additional information

Detailed estimates and statistical measures including confidence limits and P-values for chi-square tests for all the data presented in this section can be found in Table 4.1 under data tables in the appendix.

**Figure 18. Prevalence of selected health outcomes in British Columbian population, by food security status, 2011-12**



- Compared to individuals living in food secure households, those living in food insecure households reported significantly lower rates of positive (very good or excellent) perceived health (43.4% vs 62.2%) and positive (very good or excellent) perceived mental health (55.1% vs 68.9%).
- Compared to individuals living in food secure households, those living in food insecure households reported significantly lower rates of healthy eating as measured by consuming fruits and vegetables at least five times a day (37.4% vs 41.7%).
- The rate of adult obesity<sup>ii</sup> was significantly greater among individuals living in food insecure households as compared to those who are food secure (19.5% vs 14.1%).
- About one in four individuals living in food insecure households reported mood/anxiety disorder, more than two-fold and significantly higher than that among individuals living in food secure households (24.1% vs. 9.4%).

<sup>ii</sup> Adult obesity rates were estimated based on self-reported height and weight, using Health Canada's Body Mass Index (BMI) cut-off of 30 or over.

# Conclusion

Food insecurity affects a household's ability to afford nutritious food and influences both physical and mental health across the lifespan. It is a public health concern and a key indicator of health equity. The findings presented in this report show that over one in 10 households were food insecure and nearly one in six children lived in food insecure households in BC in 2011-12.

The prevalence of food insecurity varied across the province, with generally lower rates in the Lower Mainland and the south coast of BC and higher rates in northern BC.

Food insecurity affects some households more than others:

- Households with children had a higher prevalence of food insecurity than households without children; households led by female lone parents were particularly vulnerable.
- The majority (76.0%) of households reliant on social assistance experienced food insecurity.
- Although the prevalence of food insecurity was lower among households whose main source of income was wages and salaries (11.1%) compared to households with other primary sources of income, this group made up the majority (65%) of food insecure households in British Columbia in 2011-2012.
- Seniors whose primary income came from job-related pensions or investments experienced very low rates of food insecurity (2.4%), whereas seniors reliant only on public pensions were significantly more vulnerable (12.6%).
- Fewer households whose main source of income was from government support to seniors (i.e., public pensions) were food insecure compared to households reliant on social assistance (12.6% vs 76.0%).
- Food insecurity was disproportionately experienced by BC households that rented compared to those that owned their dwelling.

This report demonstrates that food insecurity negatively affects health equity. People in BC living in food insecure households have poorer health than their food secure counterparts for all five health indicators analyzed. Individuals in food insecure households reported poorer self-perceived health and mental health, lower rates of healthy eating, and higher rates of mood/anxiety disorders and obesity.

This is the first detailed report on household food insecurity in BC, and the findings will be valuable for supporting the health authorities and other sectors in food insecurity planning. Given the health implications of food insecurity, it is important that BC monitors household food insecurity on a regular and consistent basis through surveillance opportunities from the Canadian Community Health Survey (CCHS).

The purpose of this report is to present food insecurity data and not to analyze or recommend specific policies or programs to address food insecurity; however, it is broadly recognized that reducing household food insecurity at a population level will require policy changes that improve a household's financial circumstances. Recent Canadian studies have found that food insecurity is sensitive to policy changes that improve a household's financial resources.<sup>41,42</sup> There is also some evidence that the risk of food insecurity among very low-income adults drops in half when they turn 65 and become eligible for public pensions (i.e., Old Age Security and Guaranteed Income Supplement).<sup>43,44,45</sup> These findings highlight the importance of adequate, secure incomes to protect individuals and families from food insecurity.

# Technical Notes

Researchers at the University of Toronto (the researchers) analyzed data from the Canadian Community Health Survey (CCHS) to produce this report. CCHS is a de-identified repeated cross-sectional survey that is representative of 98% of the Canadian population aged 12 and over, omitting individuals living on First Nation reserves, in institutions, in the Canadian Armed forces, or in some remote areas. The analyses done in this report used confidential master files of CCHS from 2005 to 2011-12, available through the Toronto Research Data Centre.

Until 2005, the Canadian Community Health Survey (CCHS) data were collected every two years over a one year period, and a dataset was released every two years by Statistics Canada. Since 2007, data for the CCHS are collected yearly, and Statistics Canada produces an annual data file and a data file combining two years of data. All rates in this report represent estimates based on full-cycle CCHS data. For data collected after 2007, the file combining two years of sample data was used and so the rates may not reflect values calculated based on annual data. Therefore, caution should be exercised when comparing rates in this report to those in other reports.

CCHS assesses household food insecurity using the 18-item Household Food Security Survey Module, which asks questions and collects information about the prior 12 months. The number of affirmative responses to the questions posed determines household food security status. Food secure households are those who gave no indication of any income-related problem of food access over the past 12 months. Food insecure households are classified as marginally, moderately, or severely food insecure (Table 3).

**Table 3. Food insecurity status, based on 18-item questionnaire in the Canadian Community Health Survey**

Status	Interpretation	10 item adult food security scale	8 item child food security scale
Food Secure	No report of income-related problems of food access	No items affirmed	No items affirmed
Marginal food insecurity	Some indication of worry or an income-related barrier to adequate, secure food access	Affirmed no more than 1 item	Affirmed no more than 1 item
Moderate food insecurity	Compromise in quality and/or quantity of food consumed by adults and/or children due to a lack of money for food	2 to 5 positive responses	2 to 4 positive responses
Severe food insecurity	Disrupted eating patterns and reduced food intake among adults and/or children	6 or more positive responses	5 or more positive responses

It should be noted that the overall prevalence estimates presented in this report are larger than estimates of household food insecurity presented for BC in previous reports by Health Canada and Statistics Canada.<sup>46,47,48,49</sup> This is because the definition of food insecurity used for calculations in this document include marginal food insecurity, whereas the other reports have only considered moderately and severely food insecure households as being food insecure. The inclusion of marginal food insecurity here reflects the finding from a growing body of research demonstrating that even a single affirmative response on this module denotes some degree of vulnerability,<sup>29,50,51,52</sup> and marginally food insecure households are more similar to moderate and severe food-insecure households than food-secure households. A bootstrap variance estimation method and weights supplied by Statistics Canada were used to generate the estimates in this report.

The Prevalence of food insecurity is measured at the level of the household. The researchers used sample weighting, using household weights supplied by Statistics Canada, for estimating household level prevalence of food insecurity.<sup>53</sup> In addition to prevalence, the number of people in the province and the number of children in the province living in food insecure households is also reported. The researchers calculated the number of people by multiplying the household weights by household size, and the number of children by multiplying the household weights by the number of children less than 18 years of age in the household. The researchers used person weights to estimate all population level health indicators used since health outcomes were measured at the individual level.

Data presented on education considers the highest level of education in the household, and income data refers to the household's main source of income. In the case of race/ethnicity and immigration, characteristics of the respondent were used as a proxy. The examination of food insecurity and health conditions uses health outcome and dietary intake information (i.e. obesity, general health, mental health, mood/anxiety disorder and fruit and vegetable consumption) recorded by respondents.

Urban areas are defined as areas having a population concentration of 1,000 or more and a population density of 400 or more per square kilometre based on current census population counts; Statistics Canada calls these areas "population centres". Areas not belonging to urban centres/population centers are considered rural. Renters are defined as households that live in rented dwellings, even if no cash rent is paid, and owners own their dwelling. Asian refers to respondents who identify as belonging to Korean, Filipino, Japanese, Chinese, South Asian, Southeast Asian and West Asian racial or cultural groups.

To calculate the low income measure (LIM), household income is adjusted by the equivalent household size (by dividing household income by the square root of the number of household members) and the median of all individuals in the population is taken. The LIM for a single person household is 50% of the median of this adjusted household income. The LIM for households of other sizes are computed by multiplying the single person LIM by the equivalent household size.

For analysing household food insecurity rates based on main source of income, the 'other or none' income category refers to income from child tax benefits, child support, alimony and other (e.g. rental income, scholarships).

Findings of significant differences in prevalence of food insecurity are based on 95% confidence intervals. Where confidence intervals do not overlap, observed differences in estimates are considered statistically significant. To identify significant differences in the average health outcomes between food secure and



food insecure households, chi-square tests were applied with P-values less than 0.05 indicating statistical significance.

The reliability of the estimates was assessed by the magnitude of the coefficient of variation (CV), a measure of precision (standard error divided by the survey estimates) in a relative term and expressed as a percentage. Estimates with CVs between 16.6% and 33.3% should be interpreted with caution and those with CVs greater than or equal to 33.3% are not reliable. In this report, estimates to be interpreted with caution are flagged in the tables and graphs.

# Appendix: Data Tables

CI: confidence interval

CV: coefficient of variation

## Provincial data

**Table 1.1 Prevalence of household food insecurity in British Columbia, by food insecurity level, 2005 to 2011-12**

	Marginal			Moderate			Severe		
	%	95% CI	CV	%	95% CI	CV	%	95% CI	CV
2005	3.6	(3.3, 4.0)	4.8%	4.9	(4.5, 5.3)	4.3%	2.5	(2.2, 2.8)	6.1%
2007-08	3.3	(2.9, 3.7)	4.8%	4.8	(4.3,5.4)	4.3%	3.0	(2.6,3.4)	6.1%
2009-10	3.3	(2.8, 3.7)	7.5%	5.2	(4.7,5.7)	7.5%	3.0	(2.6,3.5)	9.7%
2011-12	3.6	(3.1, 4.1)	9.1%	5.3	(4.7,6.0)	8.8%	2.9	(2.5,3.3)	10.1%

**Table 1.2 Number of people living in food insecure households in British Columbia, by food insecurity level, 2005 to 2011-12**

	Marginal			Moderate			Severe		
	N (000s)	95% CI	CV	N (000s)	95% CI	CV	N (000s)	95% CI	CV
2005	149.4	(133.3, 165.5)	5.5%	185.8	(167.6, 204.0)	5.0%	77.0	(66.3, 87.7)	7.1%
2007-08	135.0	(117.2, 152.7)	6.7%	195.7	(166.6, 224.7)	7.6%	96.5	(80.2, 112.8)	8.6%
2009-10	138.6	(118.5, 158.7)	7.4%	235.3	(207.6, 263.3)	6.0%	102.2	(86.1, 118.3)	8.0%
2011-12	169.1	(142.3, 195.9)	8.1%	225.3	(195.9, 254.7)	6.6%	91.1	(75.4, 106.9)	8.8%

**Table 1.3 Proportion of children living in food insecure households in British Columbia, by food insecurity level, 2005 to 2011-12**

	Marginal			Moderate			Severe		
	%	95% CI	CV	%	95% CI	CV	%	95% CI	CV
2005	6.2	(5.2, 7.1)	7.7%	7.0	(6.0, 8.0)	7.2%	2.6	(2, 3.2)	11.5%
2007-08	4.3	(3.4,5.2)	10.7%	6.9	(5.5,8.3)	10.5%	3.2	(2.4,4)	12.7%
2009-10	4.6	(3.5,5.6)	11.3%	8.3	(6.8,9.8)	9.0%	2.7	(1.9,3.5)	15.0%
2011-12	5.8	(4.5,7.2)	12.0%	7.3	(5.8,8.7)	10.1%	2.5	(1.7,3.3)	16.3%

**Table 1.4 Number of children living in food insecure households in British Columbia, by food insecurity level, 2005 to 2011-12**

	Marginal			Moderate			Severe		
	N (000s)	95% CI	CV	N (000s)	95% CI	CV	N (000s)	95% CI	CV
2005	49.2	(41.6, 56.9)	7.9%	55.9	(47.7, 64.1)	7.6%	20.7	(16.0, 25.4)	5.4%
2007-08	35.0	(27.6, 42.3)	10.7%	56.4	(44.1, 68.8)	11.1%	26.5	(19.8, 33.3)	13.0%
2009-10	39.1	(30.4, 47.8)	11.3%	71.4	(58.3, 84.5)	9.4%	23.1	(16.1, 30.0)	15.3%
2011-12	50.6	(38.5, 62.6)	12.1%	63.0	(50.6, 75.3)	10.0%	21.4	(14.5, 28.2)	16.4%

## Regional data

Table 2.1 Prevalence of household food insecurity in British Columbia, by food insecurity level across health authorities, 2011-12

Health authority	Total			Marginal			Moderate			Severe		
	N (000s)	%	CV	N (000s)	%	CV	N (000s)	%	CV	N (000s)	%	CV
Interior	282.1	3.7	14.4%	10.4	3.7	14.4%	19.7	7.0	11.0%	9.7	3.4	15.4%
Fraser	628.7	4.2	12.5%	26.7	4.2	12.5%	28.0	4.5	12.0%	14.7	2.3	17.1%*
Vancouver Coastal	447.6	2.6	17.7%*	11.6	2.6	17.7%*	19.1	4.3	15.8%	12.9	2.9	16.9%*
Island	300.9	3.2	12.9%	9.7	3.2	12.9%	18.6	6.2	11.0%	11.3	3.8	15.5%
Northern	96.8	5.3	18.5%*	5.1	5.3	18.5%*	8.3	8.6	12.8%	2.4	2.5	17.8%*

\* Prevalence with coefficients of variation (CV) from 16.6% to 33.3% should be interpreted with caution.

**Table 2.2 Prevalence of household food insecurity in British Columbia, across Health Service Delivery Areas (HSDA), 2011-12**

HSDA	Total households	Food Insecure			
	N (000s)	N (000s)	%	95% CI	CV
East Kootenay	30.4	3.8	12.5	(8.3,16.6)	16.9%*
Kootenay Boundary	30.1	4.2	14.0	(8.4,19.3)	20.1%*
Okanagan	135.6	19.2	14.2	(10.6,17.7)	12.7%
Thompson Cariboo Shuswap	85.9	12.6	14.7	(10.7,18.7)	13.8%
Fraser East	106.6	13.3	12.5	(7.2,17.7)	21.4%*
Fraser North	243.4	26.2	10.8	(7.8,13.7)	14.1%
Fraser South	278.8	30.0	10.8	(8.5,13.0)	10.8%
Richmond	79.5	6.6	8.3	(3.0,13.7)	32.4%*
Vancouver	259.6	25.4	9.8	(6.9,12.7)	14.9%
North Shore/Coast Garibaldi	108.6	11.5	10.6	(7.0,14.2)	17.2%*
South Vancouver Island	148.2	19.3	13.0	(9.9,16.2)	12.2%
Central Vancouver Island	101.8	14.0	13.8	(10.1,17.5)	13.5%
North Vancouver Island	50.9	6.3	12.4	(8.4,16.4)	16.4%
Northwest	24.0	4.5	18.8	(11.6,25.9)	19.4%*
Northern Interior	50.6	7.5	14.8	(9.9,19.8)	17.0%*
Northeast	22.1	3.8	17.2	(11.7,22.5)	16.1%

\* Prevalence with coefficients of variation (CV) from 16.6% to 33.3% should be interpreted with caution.

**Table 2.3 Prevalence of household food insecurity in British Columbia, by rural/urban residence, 2011-12**

	Food insecure		
	%	95% CI	CV
<b>Urban/rural</b>			
Population centre	11.9	(10.8, 12.9)	4.6%
Rural	11.8	(9.2, 14.4)	11.3%

## Characteristics of food insecure households

**Table 3.1 Prevalence of household food insecurity in British Columbia, by household characteristics, 2011-12**

	Food insecure		
	%	95% CI	CV
<b>Household composition</b>			
Unattached	15.6	(13.7, 17.5)	6.2%
Couple, with no children	5.5	(4.5, 6.6)	9.7%
Couple, with children < 18	11.4	(9.5, 13.3)	8.4%
Couple, with children ≥ 18	6.7	(4.7, 8.8)	15.2%
Female lone parent, with children < 18	34.2	(27.3, 41.2)	10.4%
Female lone parent, with children ≥ 18	16.8	(11.5, 22.0)	16.0%
Male lone parent, with children < 18	17.1	(6.1, 28.0)	32.8%*
Other household types	10.2	(3.3, 17.2)	34.5%*
<b>Education</b>			
< Secondary	24.9	(19.9, 29.9)	10.2%
Sec. school grad.	14.6	(11.8, 17.5)	10.1%
Some Post-Sec.	22.3	(17.0, 27.6)	12.2%
Completed Post-secondary, below bachelor's degree	13.6	(12.1, 15.1)	5.5%
Bachelor's degree or above	5.3	(4.3, 6.3)	9.8%
<b>Main source of household income</b>			
Salary/wages/self-employment	11.1	(10.0, 12.2)	2.8%
Senior's income from private sector, dividends & interest	2.4	(1.5, 3.4)	20.5%*
EI and WC	32.7	(20.5, 44.8)	23.5%*
Senior's income from government	12.6	(10.2, 15.1)	10.4%
Social Assistance	76.0	(69.0, 82.9)	10.0%
Other/None	19.5	(13.0, 26.0)	17.9%*
<b>Home ownership</b>			
Owner	6.3	(5.5, 7.1)	6.3%
Renter	24.9	(22.4, 27.4)	5.1%
<b>Race/ethnicity</b>			
White	11.2	(10.2, 12.2)	4.5%
Asian	9.2	(7.1, 11.4)	11.8%
Other	15.9	(10.9, 20.9)	16.0%
Aboriginal	29.4	(23.4, 35.4)	10.4%

	Food insecure		
	%	95% CI	CV
<b>Immigrant/Canadian born</b>			
Canadian born	13.1	(12, 14.3)	4.5%
Immigrant < 5 years	10.1	(4.9, 15.3)	26.1%*
Immigrant 5+ years	8.8	(7.1, 10.5)	9.9%
<b>Household income/LIM ratio</b>			
<0.5	38.7	(33.1, 44.3)	7.5%
0.5-<1.0	21.9	(19.3, 24.5)	6.1%
1.0- <1.5	12.9	(10.9, 14.9)	7.8%
1.5- <2	8.7	(6.9, 10.5)	10.6%
2- <3	4.8	(3.7, 5.9)	11.8%
3.0+	2.8	(1.7, 3.9)	20.2%*

\* Prevalence with coefficients of variation (CV) from 16.6% to 33.3% should be interpreted with caution.

**Table 3.2 Prevalence of household food insecurity in British Columbia, by food insecurity level for households with and without children, 2011-12**

	With children			Without children		
	%	95% CI	CV	%	95% CI	CV
Marginally food insecure	5.6	(4.4, 6.9)	11.2%	2.8	(2.3, 3.3)	8.9%
Moderately food insecure	7.1	(5.8, 8.5)	9.6%	4.6	(4.0, 5.3)	7.2%
Severely food insecure	2.4	(1.6, 3.1)	15.7%	3.1	(2.6, 3.7)	8.6%

**Table 3.3 Prevalence of household food insecurity in British Columbia, for households with and without children, across health authorities, 2011-12**

Health Authority	With children			Without children		
	%	95% CI	CV	%	95% CI	CV
Interior	20.8	(15.6, 26.2)	12.9%	11.6	(9.3, 14.0)	10.3%
Fraser	12.3	(9.0, 15.5)	13.4%	10.4	(8.5, 12.2)	9.1%
Vancouver Coastal	11.0	(6.6, 15.3)	20.4%*	9.4	(7.1, 11.6)	12.4%
Island	20.6	(15.2, 26.0)	13.4%	11.1	(9.1, 13.0)	9.2%
Northern	24.8	(18.2, 31.6)	13.7%	12.7	(9.9, 15.4)	11.0%

\* Prevalence with coefficients of variation (CV) from 16.6% to 33.3% should be interpreted with caution.

**Table 3.4 Prevalence of household food insecurity for households in which the main source of income is social assistance in British Columbia, across health authorities, 2011-12**

Health Authority	%	95% CI		CV
Interior	77.7	63.0	92.4	9.7%
Fraser	80.8	68.8	92.9	7.6%
Vancouver Coastal	66.4	50.5	82.4	12.2%
Island	82.1	69.3	95.0	8.0%
Northern	79.2	66.4	92.0	8.2%

**Table 3.5 Proportion of households in British Columbia that rented/owned their dwelling, across food security status, 2011-12**

		%	95% CI	CV
Renter	Food secure	25.4	(23.9, 27.0)	3.2%
	Marginally food insecure	45.9	(38.8, 53.0)	7.9%
	Moderately food insecure	66.1	(60.5, 71.8)	4.4%
	Severely food insecure	77.8	(71.4, 84.1)	4.2%
Homeowner	Food secure	74.6	(73.0, 76.1)	1.1%
	Marginally food insecure	54.1	(47.0, 61.2)	6.7%
	Moderately food insecure	33.9	(28.2, 39.5)	8.5%
	Severely food insecure	22.2	(15.9, 28.6)	14.6%

## Health outcomes

**Table 4.1 Prevalence of selected health outcomes in British Columbia, by food security status, 2011-12**

	Food secure			Food insecure			P-value
	%	95% CI	CV	%	95% CI	CV	
<b>Chronic health conditions</b>							
%Adult obesity	14.1	(13.1,15.2)	3.9%	19.5	(16.2,22.9)	8.7%	0.0007
<b>Perceived health</b>							
%Very good or excellent general health	62.2	(60.6,63.8)	1.3%	43.4	(39.5,47.3)	3.5%	<.0001
<b>Mental health</b>							
%Very good or excellent mental health	68.9	(67.4,70.3)	1.1%	55.1	(51.3,58.9)	3.5%	<.0001
%mood/anxiety disorder	9.4	(8.5,10.2)	4.6%	24.1	(20.5,27.7)	7.6%	<.0001
<b>Dietary practices</b>							
%Consuming fruits & vegetables 5+ times/day	41.7	(40.1,43.2)	2.0%	37.4	(33.5,41.3)	5.3%	0.0403



# References

- 1 Provincial Health Services Authority (2016). *Priority health equity indicators for British Columbia: Selected indicators report*. Vancouver, BC: Provincial Health Services Authority, Population and Public Health Program.
- 2 Health Canada. *Household Food Insecurity in Canada: Overview*. (2012). Retrieved from: <<http://www.hc-sc.gc.ca/fnan/surveill/nutrition/commun/insecurit/index-eng.php>>
- 3 Davis B & Tarasuk V. (1994). Hunger in Canada. *Agriculture and Human Values*. 11:50-57.
- 4 British Columbia Ministry of Health. *Evidence Review Food Security, Core Public Health Functions for BC*. (2013). Retrieved from: <<http://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/public-health/healthy-living-and-healthy-communities/food-security-evidence-review.pdf>>
- 5 Fowles ER. (2004). Prenatal nutrition and birth outcomes. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*. 33: 809-822.
- 6 Carmichael SL, Yang W, Herring A, et al. (2007). Maternal food insecurity is associated with increased risk of certain birth defects. *Journal of Nutrition*. 137:2087-2092.
- 7 Frank L. (2015). Exploring infant feeding practices in food insecure households: what is the real issue? *Food and Foodways*. 23(3):186-209
- 8 Partyka, B., Whiting, S., Grunerud, D., Archibald, K., Quennell, K. (2010). Infant nutrition in Saskatoon: Barriers to infant food security. *Canadian J of Dietetic Practice and Research*. 71(2):79-84
- 9 Melchior M, Chastang J, Falissard B. et al. Food insecurity and children's mental health: a prospective birth cohort study. *PLoS One*. 7:e52615.
- 10 Pirkle C, Lucas M, Dallaire R et al. (2014). Food insecurity and nutritional biomarkers in relation to stature in Inuit children from Nunavik. *Can J Public Health*. 105:e233-e238.
- 11 Alaimo K, Olsen C, & Frongillo E. (2001). Food insufficiency and American school-aged children's cognitive, academic and psychological development. *Pediatrics*. 108:44-53.
- 12 Jyoti DF, Frongillo EA, & Jones SJ. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *Journal of Nutrition*. 135:2831-2839.
- 13 Kirkpatrick SI, McIntyre L, & Potestio ML. (2010). Child hunger and long-term adverse consequences of health. *Archives of Pediatric and Adolescent Medicine*. 164(8):754-762.
- 14 Eicher-Miller HA, Mason AC, Weaver CM, McCabe GP, & Boushey CJ. (2009). Food insecurity is associated with iron deficiency anemia in US adolescents. *American Journal of Clinical Nutrition*. 90: 1358-71.
- 15 McIntyre L, Williams J, Lavorato D, Patten S. (2012). Depression and suicide ideation in late adolescence and early adulthood are an outcome of child hunger. *Journal of Affective Disorders*. 150(1):123-9.
- 16 Melchior M, Chastang J-F, Falissard B, Galéra C, Tremblay RE, Côté SM, et al. (2012). Food insecurity and children's mental health: a prospective birth cohort study. *PLoS One*. 7(12): e52616
- 17 Tarasuk, V, McIntyre, L, & Li, J. (2007). Low-income women's dietary intakes are sensitive to the depletion of household resources in one month. *Journal of Nutrition*. 137(8):1980-1987.

- 18 Kirkpatrick S, Dodd K, Parsons R, Ng C, Garriguet D, Tarasuk V. (2015). Household food insecurity is a stronger marker of adequacy of nutrient intakes among Canadian compared to American youth and adults. *Journal of Nutrition*. 145(7):1596-1603.
- 19 Che J & Chen J. (2001) Food insecurity in Canadian households. *Health Reports*. 12(4):11-22. Ottawa, ON: Statistics Canada. (Catalogue No. 82-003-XIE).
- 20 Vozoris N & Tarasuk V. (2003). Household food insufficiency is associated with poorer health. *Journal of Nutrition*. 133(1):120-126.
- 21 Galesloot S, McIntyre L, Fenton T, Tyminski S. (2012). Food insecurity in Canadian adults receiving diabetes care. *Canadian Journal of Dietetic Practice and Research*. 73:e261-e266.
- 22 Gucciardi E, DeMelo M, Vogt J, Stewart D. (2009). Exploration of the relationship between household food insecurity and diabetes care in Canada. *Diabetes Care*. 32(12):2218-2224.
- 23 Fuller-Thomson E, Nimigon-Young J, Brennenstuhl S. (2011). Individuals with fibromyalgia and depression: findings from a nationally representative Canadian survey. *Rheumatology International*. 32(4):853-862.
- 24 Gordon K & Dooley J. (2015). Food insecurity and epilepsy in a nationally representative sample. *Epilepsy & Behavior*. 43:139-42.
- 25 Muldoon K, Duff P, Fielden S, Anema A. (2012). Food insufficiency is associated with psychiatric morbidity in a nationally representative study of mental illness among food insecure Canadians. *Social Psychiatry and Psychiatric Epidemiology*. 48(5):795-803.
- 26 Davison K, Marshall-Fabien G, Tecson A. (2015). Association of moderate and severe food insecurity with suicidal ideation in adults: national survey data from three Canadian provinces. *Social Psychiatry and Psychiatric Epidemiology*. 50(6):963-972.
- 27 Tarasuk V, Mitchell A, McLaren L, McIntyre L. (2013). Chronic physical and mental health conditions among adults may increase vulnerability to household food insecurity. *Journal of Nutrition*. 143(11):1785-1793.
- 28 Anema A, Chan K, Weiser S, Montaner J, Hogg R. (2013). Relationship between food insecurity and mortality among HIV-positive injection drug users receiving antiretroviral therapy in British Columbia, Canada. *PLoS ONE*. 8(5):e61277.
- 29 Ford E. (2013). Food security and cardiovascular disease risk among adults in the United States: findings from the National Health and Nutrition Examination Survey, 2003-2008. *Preventing Chronic Disease*. 10:130244.
- 30 Marjerrison S, Cummings E, Glanville NT, Kirk S, Ledwell M. (2010). Prevalence and associations of food insecurity in children with diabetes mellitus. *The Journal of Pediatrics*. 158(4):607-611.
- 31 Seligman HK, Davis T, Schillinger D, Wolf M. (2010). Food insecurity is associated with hypoglycemia and poor diabetes self-management in a low-income sample with diabetes. *Journal of Health Care for the Poor and Underserved*. 21(4):1227-1233.
- 32 Tarasuk V, Cheng J, de Oliveira C, Dachner N, Gundersen C, Kurdyak P. (2015). Association between household food insecurity and annual health care costs. *Canadian Medical Association Journal*. 187(14): E429-E436.
- 33 Fitzpatrick T, Rosella L, Calzavara A et al. (2015). Looking beyond income and education: socioeconomic status gradients among future high-cost users of health care. *Am J Prev Med*. 49(2):161-171
- 34 Provincial Health Services Authority. (2016). *Food Costing in BC 2015*. Vancouver, BC: Provincial Health Services Authority, Population and Public Health Program.

- 35 Dietitians of Canada. (2016). *Submission to the Ministry of Social Development and Social Innovation*. Retrieved from: <<http://www.dietitians.ca/Downloads/Public/2016-BC-Min-SDSI-Submission.aspx>>
- 36 Provincial Health Services Authority. (2014) *Development of priority health equity indicators for British Columbia: Process & outcome report*. Vancouver, BC: Provincial Health Services Authority, Population and Public Health Program.
- 37 British Columbia Ministry of Health. (2014). *Core Public Health Functions for BC: Model Core Program Paper Food Security*. Victoria, BC: Province of British Columbia
- 38 British Columbia Ministry of Health. (2013). *Core Public Health Functions for BC: Food Security Evidence Review*. Victoria, BC: Province of British Columbia
- 39 BC Ministry of Health. (2015). *Access to and availability of healthy safe food: Action Plan Team report*. (not publicly available).
- 40 National Collaborating Centre for Determinants of Health. (2015). *English Glossary of Essential Health Equity Terms*. Retrieved from: < [http://nccdh.ca/images/uploads/comments/Glossary\\_EN.pdf](http://nccdh.ca/images/uploads/comments/Glossary_EN.pdf)>
- 41 Loopstra, R., Dachner, N., Tarasuk, V. (2015). An exploration of the unprecedented decline in the prevalence of household food insecurity in Newfoundland and Labrador, 2007-2012. *Can Public Pol* . 41: 191-206.
- 42 Ionescu-Iltu R, Glymour M, Kaufman J. (2015). A difference-in-differences approach to estimate the effect of income-supplementation on food insecurity. *Prev Medicine*. 70:108-116.
- 43 Emery JH, Fleisch V, McIntyre L. (2013). How a guaranteed annual income could put food banks out of business. *SPP Research Papers*. 6:1-20.
- 44 Emery JH, Fleisch V, McIntyre L. (2013). Legislated changes to federal pension income in Canada will adversely affect low income seniors' health. *Prev Med*. 57:963-966.
- 45 McIntyre L, Dutton DJ, Kwok C, Emery JH. (2016). Reduction of food insecurity in low-income Canadian seniors as a likely impact of a Guaranteed Annual Income. *Canadian Public Policy*. 42(3): Forthcoming, September 2016.
- 46 Office of Nutrition Policy and Promotion Health Canada. (2011). *Summary Tables on Household Food Insecurity in Canada in 2009-10*. Ottawa, ON: Health Canada.
- 47 Office of Nutrition Policy and Promotion Health Canada. (2010). *Summary Tables on Household Food Insecurity in Canada in 2007-08*. Ottawa, ON: Health Canada.
- 48 Office of Nutrition Policy and Promotion Health Canada. (2010). *Household Food Insecurity in Canada in 2007-08: Key Statistics and Graphics*. Ottawa, ON: Health Canada.
- 49 Roshanafshar S, Hawkins E. (2015). *Food insecurity in Canada*. Ottawa ON: Statistics Canada. Report No.: 86-624-X.
- 50 Coleman-Jensen A. (2010). U.S. food insecurity status: toward a refined definition. *Social Indicators Research*. 95:215-30.
- 51 Laraia BA, Siega-Riz AM, Gundersen C, Dole N. (2006). Psychosocial factors and socioeconomic indicators are associated with household food insecurity among pregnant women. *Journal of Nutrition*. 136:177-82.
- 52 Seligman HK, Bindman AB, Vittinghoff E, Kanaya AM, Kushel MB. (2007). Food insecurity is associated with diabetes mellitus: results from the National Health Examination and Nutrition Examination Survey (NHANES) 1999-2002. *Journal of General Internal Medicine*. 22:1018-23.

- 53 Statistics Canada. (2010). *Canadian Community Health Survey (CCHS): Household weights documentation*. Retrieved from: <[http://www23.statcan.gc.ca/imdb-bmdi/document/3226\\_D57\\_T9\\_V1-eng.htm#a3](http://www23.statcan.gc.ca/imdb-bmdi/document/3226_D57_T9_V1-eng.htm#a3)>