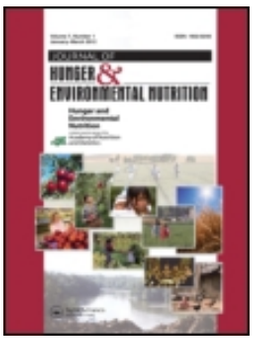

Journal of Hunger & Environmental Nutrition

ISSN: 1932-0248 (Print) 1932-0256 (Online) Journal homepage: https://www.tandfonline.com/loi/when20

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To cite this article: Urshila Sriram & Valerie Tarasuk (2016) Economic Predictors of Household Food Insecurity in Canadian Metropolitan Areas, Journal of Hunger & Environmental Nutrition, 11:1, 1-13, DOI: 10.1080/19320248.2015.1045670

To link to this article: https://doi.org/10.1080/19320248.2015.1045670

Published online: 12 Jan 2016.

Journal of Hunger & Environmental Nutrition, 11:1–13, 2016

ISSN: 1932-0248 print/1932-0256 online
DOI: 10.1080/19320248.2015.1045670

Taylor & Francis
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Economic Predictors of Household Food Insecurity in Canadian Metropolitan Areas

URSHILA SRIRAM and VALERIE TARASUK
Department of Nutritional Sciences, University of Toronto, Toronto, Ontario, Canada

In Canada, household food insecurity is largely an urban problem, but there is little understanding of how the conditions in urban areas influence households' vulnerability. The present study used data on 42 355 households from the 2011–2012 Canadian Community Health Survey to examine the influence of local area economic characteristics on household food insecurity in 20 census metropolitan areas. Substantial variability in food insecurity rates was observed across metropolitan areas, with part of this variation being attributed to differences in costs of living. Higher area-level shelter costs were associated with elevated household food insecurity risk, independent of household sociodemographic characteristics. This finding suggests that strategies to ensure affordable housing can mitigate the burden of household food insecurity at a local level.

KEYWORDS household food insecurity, metropolitan areas, local economic contexts, shelter costs, affordable housing

INTRODUCTION

Household food insecurity—inadequate access to a sufficient quantity and quality of food due to financial constraints—is a growing public health concern in Canada. In 2012, 12.6% of households experienced some level of food insecurity, and this proportion has risen significantly since 2008.[1] Food insecurity is associated with heightened nutritional vulnerability,[2] as well as a wide spectrum of physical and mental health problems.[3–7]

Address correspondence to Urshila Sriram, Division of Nutritional Sciences, Cornell University, Savage Hall, Room 417, Ithaca, NY 14850, USA. E-mail: us54@cornell.edu

Although food insecurity rates vary regionally, 85% of food insecure households live in urban areas.[1] Though cities have limited jurisdictional authority over the social policies that are believed to underpin problems of food insecurity in Canada, they are the closest level of government to the community and comprise the front-line of response to this problem. Food insecurity is one of many concerns behind the recent development of food charters, as well as various community food programs and strategies at the municipal level.[8] Despite these efforts, there is a paucity of research regarding the role of local area characteristics in relation to household food insecurity. Understanding how these factors influence food insecurity could help inform municipal approaches to tackling this public health concern.

To date, analyses of household food insecurity in Canada have focused on household-level determinants of this condition, documenting the increased probability of food insecurity with declining income and a variety of sociodemographic characteristics.[3,4,6,9–12] These factors include single parenthood, renting versus owning a dwelling, reliance on social assistance as the primary source of household income, being Aboriginal, and low levels of education. The effects of place have been explored through household-level measures of social capital, social cohesion, and food retail access,[13–16] but the extent to which the economic conditions and costs of living in different areas impacts households' vulnerability is not well understood. Some indication of the importance of area-level factors comes from a recent examination of interprovincial variation in food insecurity rates, which revealed an association between heating cost inflation and food insecurity rates among home owners in Canada.[17] In addition, U.S. studies of interstate variation have elucidated the importance of state differences in unemployment, housing costs, accessibility of food assistance programs, and the state tax burden on low-income households.[18–20]

Drawing on data from the 2011–2012 Canadian Community Health Survey, this study was undertaken to determine the relationship between metropolitan area economic characteristics and food insecurity, independent of known household sociodemographic risk factors. The area characteristics of interest were economic prosperity and costs of living.

METHODS

Data

Since 2007, the Canadian Community Health Survey (CCHS) has been conducted annually to monitor the health of Canadians. The annual sample comprises approximately 65 000 individuals 12 years or older living in private dwellings in Canada, selected to be population representative, excluding people living on Aboriginal reserves, institutional residents, full-time members of the Canadian Forces, and residents of certain remote locations. Using geographic boundaries from the 2006 Census, 33 census metropolitan areas

(CMAs) have been defined in the CCHS. A CMA consists of one or more neighboring municipalities situated around a core and with a minimum total population size of 100 000.

Data from CCHS 2011 and 2012 were pooled to generate food insecurity prevalence estimates for individual CMAs and conduct multilevel modeling to identify contextual characteristics associated with household food insecurity. Household food security status over the past 12 months was determined from participants' responses to the 18-item Household Food Security Survey Module, applying the classification scheme developed by Health Canada to define food insecure households as those with moderate or severe food insecurity.[21] Our analytic sample includes the households surveyed in the 20 CMAs for which income distribution statistics were available.

Multilevel Modeling

To determine the association between CMA-level characteristics and household food insecurity, a series of multilevel logistic regression models were conducted. A null random intercept model (model 1) was used to estimate the variance in food insecurity risk attributable to differences between CMAs, as denoted by the intraclass correlation coefficient (ICC). Household sociodemographic characteristics established through prior research as being strongly associated with household food security status[3,4,6,9,10,12] were then added to the model to assess the extent to which between-CMA variation in food insecurity risk could be attributed to household-level factors (model 2). These were household income (adjusted for family size by dividing by the square root of household size), highest level of education in the household, homeownership, household type, main source of household income, as well as aboriginal status and immigrant status of the respondent (used as proxies for household status). For all categorical variables, the category with the largest number of observations served as the reference group. The highly skewed nature of the household income variable impeded multilevel modeling, even after adjustment for household size. To resolve this problem, households with adjusted incomes above the 99.5th percentile were excluded from the analysis (< 1% of respondents). The final study population, including sample size adjustments for missing household-level covariate data, was 42 355 households.

The third model run included CMA-level variables indicative of economic prosperity and cost of living, in addition to household sociodemographic covariates (model 3). CMA-level characteristics examined included percentage of persons below the low-income measure after tax (LIM-AT), average low income gap ratio (i.e. the average difference between household income and the LIM-AT among low-income persons, expressed as a percentage of the LIM-AT), peak unemployment rate over the year, average number of Employment Insurance (EI) beneficiaries per month, rental vacancy rate, average monthly shelter cost (tenants and owners),

housing affordability, and residential stability, as measured by the percentage of individuals living at the same address as 5 years earlier. Data on vacancy rates, unemployment rates, and number of EI beneficiaries per month were available for 2011 and 2012; in all other cases, 2011 data were applied to both years. Summary statistics and data sources for these variables are presented in Table 1.

Recognizing the potential for collinearity among CMA-level factors in model 3, Pearson correlation coefficients were computed between variables were computed. Because significant collinearity was observed between housing affordability and both average monthly shelter cost ($r = 0.67$) and the average number of EI beneficiaries per month ($r = 0.62$), the former variable was removed from the final model. Likelihood ratio testing against an extended model containing all CMA-level predictors confirmed better fit of the model without housing affordability.

As a sensitivity test, model 3 was rerun substituting the average monthly shelter cost of tenant households alone for the average monthly shelter cost of both tenants and owners. We only report the coefficient for tenant shelter cost from this model, because all other coefficients were not substantially different from the previous model.

To explore the possibility that variation in food insecurity across CMAs might be explained by provincial differences, recognizing that provinces are responsible for several policies that directly impact the financial well-being of low-income households (eg, minimum wages, social assistance benefits, social housing, etc), the above multilevel regression models were rerun including province as a third level. Likelihood ratio testing of the 3-level models against simpler 2-level models confirmed a lack of significant variation at the provincial level. Thus, our finals models were restricted to a 2-level hierarchy of households (level 1) nested within CMAs (level 2).

To account for differences in population distribution between the 2 survey years, initial regression models included a variable for survey year. Because no significant differences were observed, the year variable was excluded from the final model.

All analyses were carried out using STATA version 12.1 (Stata Corp., 2011, College Station, TX, USA). Descriptive statistics and CMA-level food insecurity rates were generated using survey commands with household and bootstrap weights provided by Statistics Canada.[21] Because sampling weights for the CCHS were not calibrated at the level of CMAs, multilevel models were run unweighted.

RESULTS

Substantial variability in food insecurity rates was observed across CMAs in 2011–2012, ranging from a high of 13.48% in Halifax to a low of 4.79% in Quebec City (Table 2).

TABLE 1 Data Source Information and Summary Statistics for CMA-Levela Variables[22–28]

Variable ($n = 20$)	Source	2011 Mean[b] ± SE	2012 Mean[b] ± SE
Percentage of persons below the LIM-AT[c]	Survey of Labour and Income Dynamics (CANSIM Table 202-0802)	11.77 (3.42)	Unavailable
Average low income gap ratio[d] (%)	Survey of Labour and Income Dynamics (CANSIM Table 202-0802)	30.11 (4.14)	Unavailable
Peak unemployment rate (%)	Labour Force Survey (CANSIM Table 282-0116)	6.85 (1.38)	6.76 (1.60)
Rental vacancy rate[e] (%)	Canada Mortgage and Housing Corporation (CANSIM Table 027-0035)	2.56 (1.69)	2.80 (1.43)
Average number of Employment Insurance beneficiaries per month (1000s)	Employment Insurance Statistics (CANSIM Table 276-0031)	13.83 (19.20)	12.38 (17.40)
Average monthly shelter cost ($100s)	National Household Survey (Table 99-014-X2011031)	10.85 (1.68)	Unavailable
Housing affordability[f] (%)	National Household Survey (Table 99-014-X2011031)	25.30 (3.49)	Unavailable
Percentage of nonmovers[g]	National Household Survey (Table 99-013-X2011026)	59.60 (4.06)	Unavailable

[a]CMA indicates census metropolitan area.
[b]Refers to the average value of each variable across all 20 CMAs included in the analysis.
[c]LIM-AT, low-income measure after tax.
[d]The gap ratio is the difference between the LIM-AT and household income, expressed as a percentage of the LIM-AT. The average of the gap ratio is calculated over the population of individuals below the LIM-AT.
[e]Based on privately initiated rental apartment structures of 3 or more units.
[f]Percentage of households spending 30% or more of their average monthly total income on shelter costs.
[g]Percentage of persons living at the same address as 5 years earlier.

TABLE 2 Prevalence of Household Food Insecurity by CMA[29]

CMA (n = 48, 830)[a]	(%)	95% CI[b]
St. John's	8.32	(6.2–11.1)
Halifax	13.48	(10.9–16.5)
Quebec City	4.79[c]	(3.4–6.6)
Sherbrooke	5.93[c]	(4.1–8.5)
Montreal	9.29	(8.3–10.4)
Ottawa–Gatineau	7.60	(6.3–9.1)
Oshawa	8.47	(6.4–11.2)
Toronto	8.37	(7.5–9.4)
Hamilton	6.20	(4.8–8.0)
St. Catherines–Niagara	7.60	(5.8–10.0)
Kitchener	10.52	(8.0–13.7)
London	7.47	(5.6–10.0)
Windsor	10.15[c]	(5.8–17.2)
Winnipeg	6.99	(5.5–8.8)
Regina	9.88[c]	(6.3–15.1)
Saskatoon	7.68[c]	(5.3–11.0)
Calgary	8.51	(6.9–10.5)
Edmonton	8.89	(7.2–10.9)
Vancouver	6.83	(5.7–8.1)
Victoria	10.87	(8.4–14.0)

[a]CMA indicates census metropolitan area.
[b]CI, confidence interval.
[c]Use with caution (coefficient of variation 16.6% to 33.3%).

Consistent with the existing literature, higher odds of food insecurity were observed among households with lower incomes, those headed by female single parents, those reliant on social assistance or Employment Insurance or workers' compensation, and households renting versus owning a home (Table 3, models 2 and 3). After controlling for household sociodemographic risk factors, living in an area with higher average monthly shelter costs increased a household's odds of food insecurity (Table 3, model 3). This relationship was intensified when the average shelter costs of tenant households alone were considered (odds ratio = 1.220, 95% confidence interval, 1.114, 1.337, $P < .001$). Specifically, these results imply that a $100 increase in renter shelter cost was associated with a 22% increase in food insecurity risk, independent of sociodemographic characteristics. No significant associations were observed between the odds of household food insecurity and any other metropolitan area characteristics examined.

A small but significant proportion of the variance in food insecurity risk was a function of CMA of residence (ICC = 1.01%, $P < .001$). Adjusting for household sociodemographic characteristics caused this proportion to increase (ICC = 2.73%, $P < .001$), suggesting that demographic differences across CMAs were masking some area-level effects. The inclusion of metropolitan area characteristics reduced the proportion of variance at the

TABLE 3 Distribution of Sociodemographic Characteristics Within Households and Multilevel Models Showing Odds Ratios and 95% Confidence Intervals for Household Food Insecurity[29]

		Model 2[b]		Model 3[c]	
(n = 42 355)[a]	Distribution of category (%)	Odds ratio	(95% CI)	Odds ratio	(95% CI)
Household-level characteristics					
Adjusted total household income ($1000s)	48.9 (0.25)	0.956**	(0.953, 0.958)	0.955**	(0.953, 0.958)
Household structure					
Unattached, living alone	29.0	1.49**	(1.30, 1.72)	1.49**	(1.30, 1.72)
Unattached, living with others	4.2	1.69**	(1.34, 2.13)	1.68**	(1.33, 2.12)
Couple with no children, others	25.2	1.00	ref	1.00	ref
Couple with children <18, others	24.2	1.57**	(1.35, 1.83)	1.57**	(1.35, 1.82)
Couple with children >18, others	7.4	1.29*	(1.03, 1.62)	1.28*	(1.02, 1.61)
Female single parent with children <18, others	4.9	1.82**	(1.51, 2.20)	1.82**	(1.51, 2.19)
Female single parent with children >18, others	2.8	1.71**	(1.34, 2.18)	1.70**	(1.33, 2.17)
Male single parent and other household structure	2.3	1.32	(0.97, 1.80)	1.31	(0.96, 1.80)
Education level					
Less than secondary	7.0	1.74**	(1.47, 2.06)	1.75**	(1.48, 2.06)
Secondary school graduate, no postsecondary	11.1	1.42**	(1.22, 1.65)	1.42**	(1.22, 1.65)
Some postsecondary, not completed	4.3	1.97**	(1.62, 2.38)	1.98**	(1.63, 2.40)
Completed postsecondary, below bachelor's degree	37.8	1.66**	(1.48, 1.87)	1.67**	(1.48, 1.87)
Completed bachelor's degree or higher	39.8	1.00	ref	1.00	ref
Main source of household income					
Wages, salaries or self-employment	73.9	1.00	ref	1.00	ref
Senior's income, including dividends and interest	19.1	0.32**	(0.28, 0.37)	0.32**	(0.28, 0.37)
Employment Insurance or workers' compensation	0.9	2.06**	(1.58, 2.68)	2.07**	(1.59, 2.70)
Social assistance	2.9	2.79**	(2.37, 3.29)	2.80**	(2.37, 3.29)
Other or none	3.3	1.01	(0.84, 1.21)	1.02	(0.83, 1.21)
Housing tenure					
Dwelling owned by member of household	64.6	1.00	ref	1.00	ref
Dwelling rented	35.4	2.31**	(2.10, 2.56)	2.32**	(2.10, 2.56)

(*Continued*)

TABLE 3 (Continued)

(n = 42 355)[a]	Distribution of category (%)	Model 2[b]		Model 3[c]	
		Odds ratio	(95% CI)	Odds ratio	(95% CI)
Aboriginal status of respondent					
Non-Aboriginal	97.5	1.00	ref	1.00	ref
Aboriginal	2.5	1.98**	(1.64, 2.39)	1.98**	(1.64, 2.39)
Immigrant status of respondent					
Nonimmigrant	71.3	1.00	ref	1.000	ref
Nonrecent immigrant (>5 years)	24.1	0.88*	(0.79, 0.98)	0.88*	(0.78, 0.98)
Recent immigrant (<5 years)	4.6	0.66**	(0.53, 0.82)	0.66**	(0.53, 0.82)
CMA-level characteristics					
Percentage of persons below the low-income measure after tax (%)				0.969	(0.926, 1.015)
Average low income gap ratio (%)				1.007	(0.980, 1.034)
Unemployment rate (%)				0.998	(0.913, 1.091)
Average number of Employment Insurance beneficiaries per month (1000s)				0.997	(0.992. 1.003)
Rental vacancy rate (%)				1.084	(0.994–1.182)
Average monthly shelter cost ($100s)				1.156**	(1.080–1.238)
Percentage of nonmovers				0.993	(0.962–1.026)

[a]CI indicates confidence interval; CMA, census metropolitan area.

[a]Excludes households with adjusted household incomes above the 99.5th percentile and those missing household-level characteristics.

[b]Model 2 includes household-level characteristics.

[c]Model 3 includes household-level and CMA-level characteristics.

*$P < .05$. **$P < .001$.

CMA-level more than 2-fold (ICC = 0.99%, $P < .001$). However, these characteristics do not account for all of the variation attributable to differences between CMAs.

DISCUSSION

Our results highlight substantial variability in food insecurity rates across metropolitan areas (CMAs) in Canada. This variation persisted at the CMA-level even after household sociodemographic characteristics were taken into account, with our analysis highlighting the importance of average monthly shelter costs. Our finding that the association with shelter costs increased when only average rental costs were considered consistent with the higher food insecurity risk observed among tenant households. The proportion of income allocated to housing is inversely related to food expenditures,[31] and within households, spending on shelter is relatively inelastic compared to food. In the context of scarce financial resources, low-income households typically report compromising spending on food as a way to free up money for rent.[32,33]

CMA unemployment and low income rates were not associated with household food security status in the multilevel models, likely because income and employment status were controlled for at the household level. These findings suggest that the economic prosperity within a CMA does not influence the risk of food insecurity above and beyond the employment status and income level of a given household.

Our examination of contextual factors at the level of CMAs was limited to the economic conditions and costs of living that are routinely monitored at this population level. Because CMAs are larger than their corresponding cities, more robust estimates of food insecurity prevalence can be generated at this level of geography. However, policies related to infrastructure and supports for low-income households are generally made by cities, rather than CMAs. By focusing on CMAs, we were unable to explore the specific effects of city-level investments in social infrastructure, which serve to mitigate the effects of unemployment and income inadequacy among vulnerable populations.[34] It is important to note that certain local-level policies related to affordable housing, such as subsidies, may have been indirectly captured through our use of the average shelter cost variable.

Our study design also precluded an examination of the impact of municipal-level policies and programs related to food security,[8] because the scale and scope of these initiatives could not be accurately characterized at the CMA level. Other potentially important explanatory factors unexplored due to the lack of available data include characteristics of the local food environment. Though food bank usage has not been found to impact household food security status in Canada,[35,36] the effects of food prices and food retail

access on this problem are less well understood. Research on food deserts in Canadian cities is limited and conflicting.[37] A study by Kirkpatrick and Tarasuk[15] showed no significant association between food access and household food insecurity in low-income Toronto neighborhoods, but studies in other urban areas are needed. Research is also needed to assess the effects of regional differences in food prices and food price inflation on food insecurity rates across CMAs.

Recent reports by the Federation of Canadian Municipalities (FCM) have highlighted the contribution of a healthy housing sector to the economic and social well-being of a community.[38,39] In light of rising homeownership costs, the FCM stresses the importance of purpose-built rental housing to increase housing affordability.[39] Though the FCM's position is not explicitly linked to household food insecurity, our results suggest that improving the availability of low-cost housing can lessen the prevalence of food insecurity.

Lastly, although income assistance programs typically fall outside municipal jurisdiction, the markedly elevated odds of food insecurity among households reliant on social assistance, Employment Insurance, and workers' compensation highlight the interplay between provincial and federal policies and the observed prevalence of food insecurity in CMAs. Given the high burden of ill health and consequent lost productivity associated with household food insecurity, metropolitan areas have a vested interest in provincial and federal policy reforms to ensure that these income assistance programs provide adequate support for individuals outside the labor market.

In conclusion, the present study constitutes the first systematic examination of household food insecurity across metropolitan areas in Canada. Our findings suggest that, in addition to household sociodemographic characteristics, the average monthly shelter costs contribute to the observed prevalence of food insecurity locally. Thus, intervening at the level of housing may be an effective strategy to reduce food insecurity in urban areas.

FUNDING

This research was supported by a Canadian Institutes of Health Research (CIHR) programmatic grant in Health and Health Equity (FRN 115208).

REFERENCES

1. Tarasuk V, Mitchell A, Dachner N. *Household Food Insecurity in Canada, 2012*. Toronto, ON, Canada: PROOF; 2014. Available at: http://nutritionalsciences.lamp.utoronto.ca/resources/proof-annual-reports/annual-report-2012/. Accessed May 27, 2014.

2. Kirkpatrick SI, Tarasuk V. Food insecurity is associated with nutrient inadequacies among Canadian adults and adolescents. *J Nutr*. 2008;138:604–612.
3. Che J, Chen J. Food insecurity in Canadian households. *Health Rep*. 2001;12:11–22.
4. Vozoris N, Tarasuk V. Household food insufficiency is associated with poorer health. *J Nutr*. 2003;133:120–126.
5. Kirkpatrick SI, McIntyre L, Potestio ML. Child hunger and long-term adverse consequences for health. *Arch Pediatr Adolesc Med*. 2010;164:754–762.
6. Tarasuk V, Mitchell A, McLaren L, McIntyre L. Chronic physical and mental health conditions among adults may increase vulnerability to household food insecurity. *J Nutr*. 2013;143:1785–1793.
7. McIntyre L, William J, Lavorato D, Patten S. Depression and suicide ideation in late adolescence and early adulthood are an outcome of child hunger. *J Affect Disord*. 2013;150:123–129.
8. MacRae R, Donahue K. *Municipal Food Policy Entrepreneurs: A Preliminary Analysis of How Canadian Cities and Regional Districts Are Involved in Food System Change*. Toronto, ON, Canada: Toronto Food Policy Council; 2013. Available at: http://capi-icpa.ca/pdfs/2013/Municipal_Food_Policy_Entrepreneurs_Final_Report.pdf. Accessed May 27, 2014.
9. McIntyre L, Connor SK, Warren J. Child hunger in Canada: results of the 1994 National Longitudinal Survey of Children and Youth. *Can Med Assoc J*. 2000;163:961–965.
10. Willows ND, Veugelers P, Raine K, Kuhle S. Prevalence and sociodemographic risk factors related to household food insecurity in Aboriginal peoples in Canada. *Public Health Nutr*. 2009;12:1150–1156.
11. Tarasuk V, Mitchell A, Dachner N. *Household Food Insecurity in Canada, 2011*. Toronto, ON, Canada: PROOF; 2013. Available at: http://nutritionalsciences.lamp.utoronto.ca/resources/proof-annual-reports/annual-report/. Accessed May 27, 2014.
12. Tarasuk V, Vogt J. Household food insecurity in Ontario. *Can J Public Health*. 2009;100:184–188.
13. Carter MA, Dubois L, Tremblay MS, Taljaard M. Local social environmental factors are associated with household food insecurity in a longitudinal study of children. *BMC Public Health*. 2012;12:1–11.
14. Carter MA, Dubois L, Tremblay MS. Place and food insecurity: a critial review and synthesis of the literature. *Public Health Nutr*. 2014;17:94–112.
15. Kirkpatrick SI, Tarasuk V. Assessing the relevance of neighbourhood characteristics to the household food security of low-income Toronto families. *Public Health Nutr*. 2010;13:1139–1148.
16. Martin KS, Rogers BL, Cook JT, Joseph HM. Social capital is associated with a decreased risk of hunger. *Soc Sci Med*. 2004;58:2645–2654.
17. Emery JH, Bartoo AC, Matheson J, et al. Evidence of the assocation between household food insecurity and heating cost inflation in Canada, 1998–2001. *Can Public Policy*. 2012;38:181–215.
18. Tapogna J, Suter A, Nord M, Leachman M. Explaining variation in state hunger rates. *Fam Econ Nutr Rev*. 2004;16:12–22.

19. Bernell S, Weber B, Edwards M. Restricted opportunities, poor personal choices, failed policies, social decay? What explains food insecurity in Oregon? *J Agric Resour Econ*. 2004;31:193–211.
20. Bartfeld J, Dunifon R. State-level predictors of household food security among households with children. *J Policy Anal Manage*. 2006;25:921–942.
21. Office of Nutrition Policy and Promotion. *Income-Related Household Food Security in Canada*. Ottawa, ON, Canada: Health Canada; 2007. Report No. H164-42/2007E.
22. Gagne C, Roberts G, Keown LA. Weighted estimation and bootstrap variance estimation for analyzing survey data: how to implement in selected software. *The Research Data Centers Information and Technical Bulletin*. 2014;6(1):23–31.
23. Statistics Canada. Table 202-0802, Persons in low income families, annual, CANSIM (database). Accessed August 2, 2015.
24. Statistics Canada. Table 202-0802, Persons in low income families, annual, CANSIM (database). Accessed August 2, 2015.
25. Statistics Canada. Table 282-0116, Labour force survey estimates (LFS), by census metropolitan area based on 2006 census boundaries, 3-month moving average, seasonally adjusted and unadjusted, monthly (persons unless otherwise noted), CANSIM (database). Accessed August 2, 2015.
26. Canada Mortgage and Housing Corporation. Table 027-0035, Canada Mortgage and Housing Corporation, vacancy rates, row and apartment structures of three units and over, privately initiated in census metropolitan areas, weighted average, annual (rate). CANSIM (database). Accessed August 2, 2015.
27. Statistics Canada. Table 276-0031, Employment Insurance program (EI), beneficiaries receiving regular income benefits by province, census metropolitan area and census agglomeration, seasonally adjusted, monthly (persons). CANSIM (database). Accessed August 2, 2015.
28. Statistics Canada. 2011 National Household Survey. Statistics Canada Catalogue no. 99-014-X2011031. Accessed August 2, 2015.
29. Statistics Canada. 2011 National Household Survey. Statistics Canada Catalogue no. 99-014-X2011026. Accessed August 2, 2015.
30. Statistics Canada. Canadian Community Health Survey (CCHS), 2011–2012: Annual Component [Master File]; 2013. Ottawa ON: Statistics Canada.
31. Kirkpatrick SI, Tarasuk V. Housing circumstances are associated with household food access among low-income urban families. *J Urban Health*. 2011;88:284–296.
32. Hamelin AM, Beaudry M, Habicht J-P. Characterization of household food insecurity in Quebec: food and feelings. *Soc Sci Med*. 2002;54:119–132.
33. Dachner N, Riccuito L, Kirkpatrick SI, Tarasuk V. Food purchasing and food insecurity among low-income families in Toronto. *Can J Diet Pract Res*. 2010;71:e50–e56.
34. Federation of Canadian Municipalities. *Theme Report #6: Mending Canada's Frayed Social Safety Net: The Role of Municipal Governments*. Ottawa, ON, Canada: Federation of Canadian Municipalities; 2006. Available at: https://www.fcm.ca/Documents/reports/Mending_Canadas_Frayed_Social_Safety_Net_The_role_of_municipal_governments_EN.pdf. Accessed May 27, 2014.

35. Loopstra R, Tarasuk V. The relationship between food banks and household food insecurity among low income Toronto families. *Can Public Policy*. 2012;38:497–514.
36. Loopstra R, Tarasuk V. Food bank use is a poor indicator of food insecurity: insights from the Canada. *Soc Policy Soc*. 2015;14:443–455.
37. Health Canada. *Measuring the Food Environment in Canada*. Ottawa, ON, Canada: Health Canada; 2013. Available at: http://www.foodsecuritynews.com/resource-documents/MeasureFoodEnvironm_EN.pdf. Accessed January 23, 2015.
38. Federation of Canadian Municipalities. *No Vacancy: Trends in Rental Housing in Canada*. Ottawa, ON, Canada: Federation of Canadian Municipalities; 2012. Available at: http://www.fcm.ca/Documents/reports/FCM/No_Vacancy_Trends_in_Rental_Housing_in_Canada_EN.pdf. Accessed May 27, 2014.
39. Pomeroy S. *The Housing Market and Canada's Economic Recovery*. Ottawa, ON, Canada: Federation of Canadian Municipalities; 2012. Available at: http://www.fcm.ca/Documents/reports/The_Housing_Market_and_Canadas_Economic_Recovery_EN.pdf. Accessed May 27, 2014.