An Exploration of the Unprecedented Decline in the Prevalence of Household Food Insecurity in Newfoundland and Labrador, 2007–2012

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De 2007 à 2011, la prévalence de l'insécurité alimentaire des ménages a baissé de 15,7 à 10,6 pour cent à Terre-Neuve-et-Labrador. Dans cet article, à l'aide de données de l'Enquête sur la santé dans les collectivités canadiennes, nous faisons des analyses exploratoires pour déterminer les facteurs qui ont pu contribuer à cette baisse sans précédent. Nos résultats montrent que la baisse pourrait être attribuée en partie à des améliorations des revenus. Toutefois, on observe que l'insécurité alimentaire a également diminué de façon importante chez les ménages recevant de l'aide sociale. De plus, alors que l'insécurité alimentaire a augmenté dans l'ensemble de la province en 2012, elle a continué de diminuer parmi les ménages recevant de l'aide sociale. Cela pourrait être dû aux effets cumulatifs des modifications que la province a apportées à sa stratégie de réduction de la pauvreté.

Mots clés : insécurité alimentaire, réduction de la pauvreté, aide sociale, politique sociale

From 2007 to 2011, the prevalence of household food insecurity in Newfoundland and Labrador fell from 15.7 to 10.6 percent. Using data from the Canadian Community Health Survey, we undertook exploratory analyses to identify potential drivers of this unprecedented decline. We found that the decrease could in part be attributed to shifts in household income, but it also reflected a dramatic decline in food insecurity among social assistance recipients. While food insecurity rose in the province overall in 2012, it continued to decline among households receiving social assistance, possibly reflecting the cumulative impact of changes introduced through the province's poverty reduction strategy.

Keywords: food insecurity, poverty reduction, social assistance, social policy

Introduction

Household Food Insecurity in Canada

Household food insecurity, defined as "inadequate or insecure access to food due to financial constraints" (Tarasuk, Mitchell, and Dachner 2014), is an important measure of population well-being in high-income countries. It captures a level of financial vulnerability where, at minimum, households experience anxiety that their food supplies will run out, and at more severe levels, members of the household go without food. In Canada, household food insecurity is monitored through the use of Household Food Security Survey Module (HFSSM) on the Canadian Community Health Survey. The module includes 18 items querying household experiences of food insecurity ranging in severity and chronicity (Appendix Box A.1). Based on the number of affirmative responses, household food insecurity is classified as marginal, denoting concern or anxiety about food supplies running out; moderate, denoting qualitative and/or quantitative

changes in food intake; or severe, which indicates experiences of hunger and going without food. In 2012, a total of 12.6 percent of households were food insecure in Canada, affecting four million adults and children (Tarasuk, Mitchell, and Dachner 2014).

Measurement of food insecurity in Canada has yielded an understanding of its consequences for health and well-being. Food insecurity is associated with inadequate nutritional intakes (Kirkpatrick and Tarasuk 2008b), numerous chronic health conditions (Fuller-Thomson, Nimigon-Young, and Brennenstuhl 2012; Gucciardi, et al. 2009; McIntyre, Connor, and Warren 2000; McIntyre et al. 2013; Muldoon et al. 2013; Tarasuk et al. 2013; Vozoris and Tarasuk 2003), poorer self-rated physical and mental health (Che and Chen 2001; McIntyre et al. 2000; Vozoris and Tarasuk 2003; Willows et al. 2011), and higher health care costs (Fitzpatrick et al. 2015). In addition, children repeatedly exposed to hunger have been found to have higher rates of multiple chronic health conditions in the long term (Kirkpatrick, McIntyre, and Potestio 2010).

The measurement of food insecurity in Canada has also allowed the social epidemiology of this condition to be well documented. Low annual income is the strongest risk factor for food insecurity, highlighting that households need enough income to maintain adequate and secure access to food. Annual income measures do not fully capture financial vulnerability, however, which can be worsened by high housing costs, unexpected household expenses, sudden income losses, and medical expenses (Kirkpatrick and Tarasuk 2011; Tarasuk et al. 2013; Leete and Bania 2010). Hence, additional risk factors for food insecurity in Canada include unaffordable housing, chronic health conditions, and other indicators of financial vulnerability, such as relying on income from social assistance or Employment Insurance. Specifically, compared to households reliant on employment incomes, those on social assistance have 2–4 times higher risk of experiencing food insecurity (Che and Chen 2001; Tarasuk et al. 2013; Tarasuk and Vogt 2009; Vozoris and Tarasuk 2003). In contrast, households reliant on pensions or retirement incomes are less likely to be food insecure (Emery, Fleisch, and McIntyre 2013; Tarasuk et al. 2013). Other characteristics indicative of vulnerability to poverty and disadvantage in Canada are also associated with greater risk of food insecurity. These include lack of homeownership, household structure (specifically the presence of children or lack of a partner), Aboriginal status, and low education (Che and Chen 2001; Tarasuk et al. 2013; Willows et al. 2009).

What Policy Interventions Reduce Food Insecurity?

In light of the number of households affected by food insecurity and what food insecurity means for health and well-being, there is a pressing need to understand the types of public policy interventions that can reduce food insecurity. Few studies have examined the impact of policy interventions on food insecurity in Canada. The ability to conduct such studies has been limited by the use of different survey instruments to capture food insecurity before 2004 and varying sampling methodologies between CCHS cycles before 2007 (Kirkpatrick and Tarasuk 2008a). There are two recent exceptions, however. Ionescu-Ittu and colleagues (2015) used a difference-in-differences approach to estimate the effect of a specific policy intervention, the introduction of the Universal Child Care Benefit, on risk of food insecurity, and second, Emery and colleagues (2013) examined the impact of eligibility for old-age income support payments on risk of food insecurity.

The targeted nature of the policies examined in these studies made it possible to employ econometric techniques to evaluate their protective effects on food insecurity. In contrast, recent poverty reduction strategies introduced across many provinces and territories have involved numerous simultaneous interventions, which make it difficult to isolate the effects of a particular policy intervention on food insecurity. Doing so is further complicated by the 2008 financial crisis and subsequent recession, which resulted in elevated levels of unemployment, stagnating wages, and cuts to social spending. Nonetheless, examining trends in food insecurity following the introduction of such strategies is an important part of evaluating whether they have improved material well-being in the population. Most provinces have focused on measures of the proportion of households living below low-income thresholds to assess their progress on poverty reduction, but these income measures do not capture the actual ability of households to meet basic needs (Iceland and Bauman 2007; Leete and Bania 2010).

Here, we carry out a case study of Newfoundland and Labrador (NL) to explore whether there is evidence that the dramatic decline in food insecurity observed in the province (Tarasuk, Mitchell, and Dachner 2014) can be attributed to their poverty reduction strategy. We begin by describing how household food insecurity in the province of NL changed following introduction of the poverty reduction strategy in 2006 in contrast to other provincial trends in food insecurity. Next, we describe elements of the NL poverty reduction strategy and outline related hypotheses about the mechanisms through which the strategy could have impacted food insecurity risk in the population. We then present the analyses we conducted to test these hypotheses. We close with a discussion of strengths and limitations of our evaluation, outlining key directions for future research to evaluate the impact of social policies on household food insecurity.

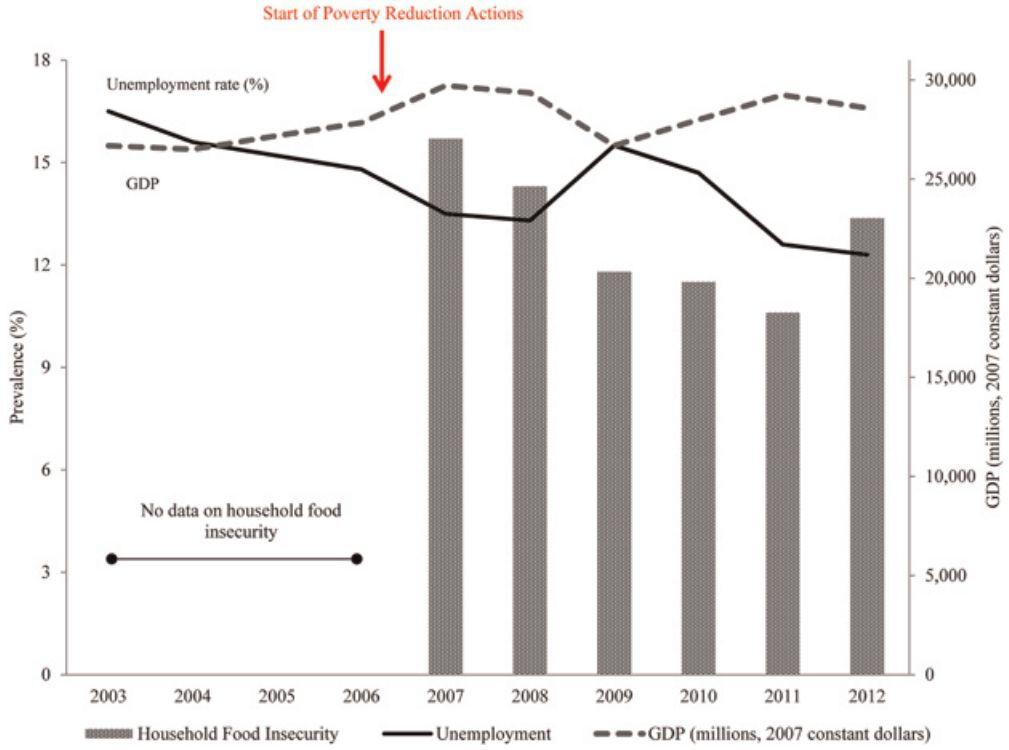

Figure 1: Household Food Insecurity in Newfoundland and Labrador, CCHS 2007–2012
Note: N = 11,239 households.

Sources: Authors' calculations from Canadian Community Health Surveys, 2007–2012.

Statistics Canada. 2014. Table 384-0038 Gross domestic product, expenditure-based, by province and territory. CANSIM (database). Last updated 5 November 2014. Accessed 15 March 2014 at http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ15-eng.htm

Statistics Canada. 2014. Table 282-0002 Labour force survey estimates by sex and detailed age group, annual. CANSIM (database). Last updated 27 January 2015. Accessed: 15 March 2014 at http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=2820002

Provincial Trends in Household Food Insecurity

The prevalence of food insecurity has been monitored annually in all but two Canadian provinces since 2007 (New Brunswick and Prince Edward Island chose not to include the module in 2009 and 2010). In 2007, NL had the highest rate of food insecurity among provinces, affecting 15.7 percent of households (Tarasuk, Mitchell, and Dachner 2014). Other Atlantic provinces ranged in prevalence from 13.8 to 14.9 percent, and the remainder of provinces had rates that ranged from 9.1 percent in Alberta to 12.4 percent in Manitoba.

In the years following 2007, NL experienced a steady decline in food insecurity to 2011, with food insecurity falling by five percentage points to reach a low of 10.6 percent (Figure 1). Food insecurity also remained lower in 2012 than it had been in 2007.

In contrast to NL, food insecurity fluctuated by only one percentage point in either direction in the immediate years following 2007 in most other provinces (Figure 2), and in 2011 and 2012, most provinces had prevalence rates that were 2–3 percentage points higher than they had been in 2007. NL was the only province to have experienced a dramatic decline and sustained lower rate of food insecurity.

Reducing Poverty: Newfoundland and Labrador's Poverty Reduction Strategy

As highlighted in Figure 1, NL was experiencing a period of growing prosperity before 2008, with Gross Domestic Product steadily increasing and unemployment rates falling in the years before 2007 when food insecurity measurement began. However, the trend in food insecurity prevalence in the province does not mirror economic trends reflected by GDP and unemployment rates. In particular, in 2009, the aftermath of the economic crisis of 2008, GDP fell and unemployment rates spiked, but food insecurity continued to decline. Thus, it appeared that economic drivers did not explain the decline in food insecurity over 2007 to 2011.

Instead, it is possible that the unprecedented decline in household food insecurity in NL can be attributable to the actions initiated under the multiyear poverty reduction strategy that began in 2006 (Government of Newfoundland and Labrador 2006). NL was one of the

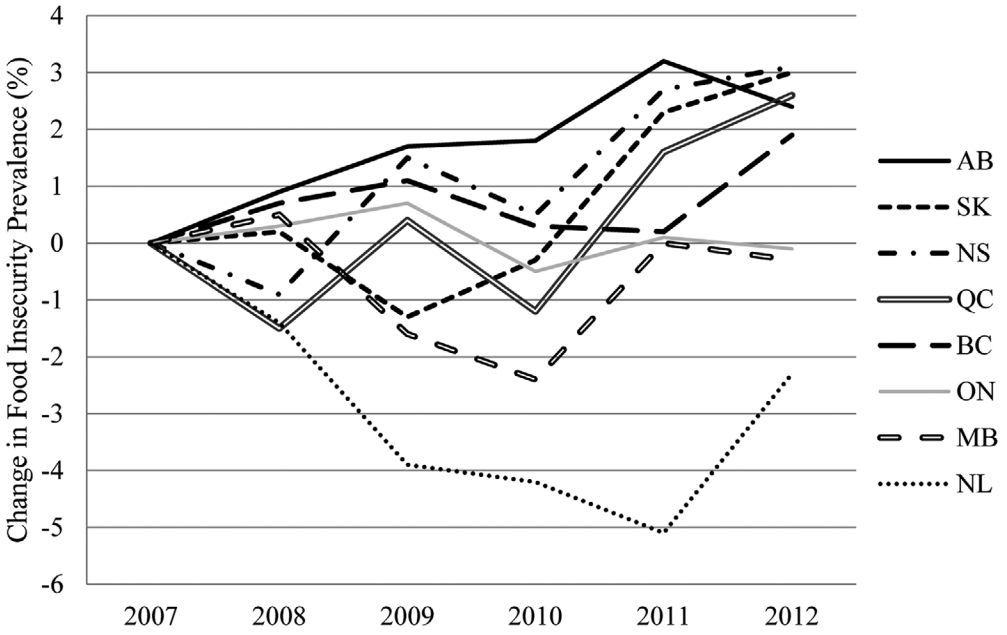

Figure 2: Change in Prevalence of Household Food Insecurity across Canadian Provinces from 2007
Note: Provinces are those that included measurement of household food insecurity in every survey cycle over 2007 to 2012.
Source: Authors' calculation from the Canadian Community Health Survey.

first provinces to introduce a formal action plan to reduce poverty and made the explicit goal to move from being the province with one of the highest levels of poverty to one with the lowest level of poverty by 2014. Core goals of the strategy were: (a) Improved coordination of services for those with low incomes; (b) a stronger social safety net; (c) improved earned incomes; (d) increased emphasis on early childhood development; and (e) a better-educated population (Government of Newfoundland and Labrador 2006).

While actions to meet these goals included a variety of interventions at the community level and interventions that would have an impact in the longer term (e.g., education), we focus on those of most relevance to risk of food insecurity: addressing insufficient incomes, moving Income Support clients into work, and addressing the financial vulnerability of Income Support clients. Actions to improve incomes included incremental increases in minimum wage from $6.00 per hour in 2006 to $10.00 per hour in 2010 (Economics and Statistics Branch 2014) and low-income tax reduction, which eliminated and reduced provincial income tax for lowest and mid-low income individuals and families, respectively, in 2009 (Government of Newfoundland and Labrador 2014). In addition, actions were also taken to reduce the costs of living for low-income households through the introduction of comprehensive measures to decrease and subsidize rents and increase the stock of affordable housing (Government of Newfoundland and Labrador 2014). Importantly, prescription drug coverage was extended to people working on low incomes, thereby reducing potential living costs for low-income families (Government of Newfoundland and Labrador 2014). This intervention was also intended to encourage movement from Income Support into employment since benefits would remain unchanged for low-income earners. Other actions to encourage Income Support clients to move into work included permitting the retention of full benefits for the first month of employment (Government of Newfoundland and Labrador 2006). One-time cash transfers were also given to those transitioning to employment, and child care support was enhanced, thus reducing living costs for Income Support clients transitioning to employment (Government of Newfoundland and Labrador 2014). The province also increased earnings exemptions, allowing clients to retain a higher proportion of earnings before their income support was reduced, thereby enhancing their overall income. Further, Income Support payments were increased by 5 percent in 2006, and subsequently, indexed to inflation in subsequent years (Government of Newfoundland and Labrador 2006). Rates of support were also increased for health benefits (e.g., eye care, dentures) and the special diet allowance. In 2011, additional actions included increasing the Shelter Rate and increasing the liquid asset level (Government of Newfoundland and Labrador 2014).

We hypothesized that these cumulative poverty reduction initiatives could explain the observed trend in household food insecurity in three ways. First, we expected that there should be fewer households in the

lowest end of the income distribution over time, and that this should partially explain the reduced risk for food insecurity. Second, we expected that more people moving away from Income Support to employment could have explained the reduced risk of food insecurity, given the high level of financial vulnerability associated with relying on social assistance. But third, we expected the vulnerability of people receiving Income Support to have changed over the period, owing to both the improvement of incomes and in-kind transfers extended to this group. Importantly, we also tested the alternative explanation that changes in the sociodemographic characteristics of the survey population could spuriously lead to reductions in the estimated prevalence of food insecurity over survey cycles.

Data

We accessed the Master files from the CCHS through the Toronto Research Data Centre. The survey is a de-identified repeated cross-sectional survey that is representative of 98 percent 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 (Statistics Canada 2013). Household response rates ranged from 77 to 85 percent. We pooled annual data from the years 2007 to 2012 from the province of NL, which resulted in a sample of 11,239 households that had information on household food insecurity (approximately 98 percent of the NL sample)[1]. We used normalized household weights to provide estimated population prevalence rates for the sample. Bootstrap weights ($n = 500$) and SAS survey procedures were used to correct standard errors for survey sampling design (Statistics Canada 2013).

Household food insecurity was assessed using the HFSSM in all survey years. The full set of questions included in the module is available in Box A.1 in the Appendix. A household was considered food insecure if an affirmative response was given to any question on the HFSSM. While this is a more liberal threshold than the one initially proposed by Health Canada (Office of Nutrition Policy and Promotion 2007), it has been argued that this threshold should be adopted for monitoring, as households in this group are more similar to those with more severe food insecurity and demonstrate high levels of financial vulnerability compared to households with no affirmative responses (Coleman-Jensen 2010; Tarasuk et al. 2013). We also ran our analyses using Health Canada's threshold for food insecurity to test whether our results were robust to this specification.

In the CCHS, household income is reported as the best estimate of the household's pretax total income from all sources in the past 12 months. Of note is that incomes are not reported by about 30 percent of the sample. We used the imputed income values provided by Statistics Canada for these households.[2] In sensitivity analyses, we checked the robustness of our findings after including a dummy variable denoting use of an imputed income value.

Incomes were converted to 2007 constant dollars by using the Consumer Price Index values for NL over the time period (Statistics Canada 2014) and adjusted for household size by dividing by the square root of household size (Frechet et al. 2010). To examine if the population in the lowest end of the income distribution of household incomes shifted to a higher level of income over the study period, we constructed income quintiles based on the total income distribution over the six-year period in 2007 constant dollars, and then looked at the proportion that had incomes below the first income quintile threshold over survey years.

Information on sources of income included identification of the main source of income and all other sources of income, including Income Support (welfare and disability support payments). Other household characteristics of interest included household composition, Aboriginal status, immigrant status, education, and household ownership.

Analysis

First, we examined study population characteristics over the 2007 to 2012 period, highlighting those that might have accounted for the observed decline in food insecurity attributable to the poverty reduction strategy and those that could have resulted from survey population compositional changes that could spuriously cause changes in the estimated prevalence of food insecurity over the period.

Next, we examined the risk of being food insecure in the province of NL by survey year, testing whether there was a significant decline in risk associated with survey year in comparison to 2007. We then tested whether (a) a shift in the population away from the lowest income distribution explained the significant decline in risk of food insecurity observed over the survey years; (b) whether fewer Income Support clients in later survey cycles explained the decline in risk observed; and (c) whether the decline in risk was still observed after accounting for sociodemographic characteristics of the survey sample.

We then turned to our third hypothesis, which was that the vulnerability of Income Support clients to food insecurity changed over the survey period. We examined whether the effect of survey year on food insecurity differed by household source of income over the study period by testing interactions between source of income and year in the fully adjusted logistic regression model. Upon observing one significant interaction between any receipt of social assistance and year, we conducted a further set of analyses among Income Support recipients

Table 1: Household Characteristics by Survey Year for 11,239 Households in Newfoundland and Labrador, 2007–2012

	2007	2008	2009	2010	2011	2012	P value for Chi Square
n	1,940	2,056	1,868	1,846	1,822	1,707	
Main source of household income, %							0.1195
Employment/self-employment	62.1	60.6	61.2	63.0	65.3	63.4	
Seniors income/dividends	24.7	26.2	25.4	24.0	23.4	23.1	
EI/WC	2.4	2.6	3.5	3.5	2.2	2.7	
Income support	5.7	5.1	4.0	3.3	4.6	3.7	
Other/not stated	5.0	5.5	5.9	6.1	4.6	7.1	
Any income from Social Assistance, %							0.0572
Yes	9.0	8.5	6.1	6.2	7.0	6.8	
No/not stated	91.0	91.5	93.9	93.8	93.0	93.2	
Any income from EI, %							0.1238
Yes	22.6	21.3	25.5	26.4	23.9	24.5	
No/not stated	77.4	78.7	74.5	73.6	76.1	75.5	
Income distribution,[a] %							<0.0001
Lowest quintile ≤$15,100	24.6	22.7	19.4	18.7	17.9	16.3	
Low-mid quintile ≤$23,950	18.8	19	19.2	21.6	19.4	21.9	
Middle quintile ≤$35,000	19.4	22.5	22	17.5	20.6	17.5	
High-mid quintile ≤$53,300	18.7	16.8	20.2	20.3	23.5	21	
Highest quintile >$53,300	18.5	18.9	19.3	21.9	18.6	23.2	
Household composition,[b] %							0.2517
Single	25.2	25.1	25.6	25.1	24.7	26.5	
Couple	31.9	32.4	34.8	32.5	33.2	30.9	
Couple with children	31.7	31.0	30.6	32.8	31.8	32.3	
Single mother with children	8.4	8.3	6.4	7.4	7.8	7.9	
Single father with children	1.2	1.8	1.5	0.5	1.0	1.0	
Other	1.5	1.4	1.2	1.7	1.5	1.4	
Children under 18, %							0.5784
No	84.7	85.5	84.6	83.3	85.3	84.6	
Yes	15.3	14.5	15.4	16.7	14.7	15.4	
Highest level of education in household, %							<0.0001
<High school	32.6	31.1	31.1	31.1	28.6	30.4	
High school/not stated	13.6	14.3	14.4	14.2	17.1	17.2	
Some postsecondary	8.6	8.4	8.2	6.1	3.1	3.6	
Trades/diploma/college	30.8	30.9	32.1	29.8	35.5	32.4	
University	14.4	15.4	14.2	18.8	15.8	16.4	
Respondent identified as Aboriginal person, %							<0.0001
Yes	5.6	6.9	8.2	7.7	8.2	10.6	
No/not stated	94.4	93.1	91.8	92.3	91.8	89.4	
Respondent immigration status, %							0.0894
Non-immigrant/not stated	97.4	97.4	96.0	96.8	98.0	97.6	
Immigrated	2.6	2.6	4.0	3.2	2.0	2.4	
Home ownership, %							0.9541
Yes	77.6	79.5	79.0	78.2	78.1	78.2	
No	22.4	20.5	21.0	21.8	21.9	21.8	

[a] Income quintile cut-offs for pooled years in 2007 constant CAN$ adjusted for household size.

[b] Categories include households with these designations where others (i.e., denoting relationships other than parent, child, or partner) also could have been present.

Source: Authors' calculations from Canadian Community Health Surveys.

Table 2: Odds of Food Insecurity among 11,239 Households in Newfoundland and Labrador by Survey Year, 2007 to 2012

	Food Insecurity (Odds Ratio (95% CI))			
Survey Year	Model 1: Unadjusted	Model 2: Adjusted for income in lowest income quintile[a]	Model 3: Adjusted for receipt of social assistance[b]	Model 4: Fully adjusted[c]
2007	Reference	Reference	Reference	Reference
2008	0.89 (0.71–1.13)	0.92 (0.72–1.19)	0.90 (0.71–1.13)	0.95 (0.75–1.22)
2009	**0.72 (0.57–0.90)**	0.79 (0.62–1.01)	**0.77 (0.61–0.98)**	**0.76 (0.59–0.98)**
2010	**0.70 (0.54–0.90)**	0.78 (0.59–1.02)	**0.74 (0.57–0.97)**	**0.74 (0.56–0.98)**
2011	**0.63 (0.49–0.81)**	**0.72 (0.55–0.93)**	**0.65 (0.50–0.85)**	**0.70 (0.53–0.92)**
2012	0.83 (0.62–1.10)	1.00 (0.73–1.37)	0.88 (0.65–1.19)	0.96 (0.70–1.31)

[a] Adjusted for variable denoting if household was in lowest income quintile in 2007 constant dollars for pooled survey years.

[b] Adjusted only for receipt of any income from social assistance.

[c] Adjusted for location in lowest income quintile, receipt of any income from social assistance, main sources of income from employment or seniors income, any income from Employment Insurance, household structure, children <18 in household, Aboriginal status, immigrant status, home ownership, household level of education.

Source: Authors' calculations from Canadian Community Health Surveys.

alone. We tested the linear trend in the odds of households being food insecure using year as a continuous variable, and then adjusted for household characteristics, to confirm that the observed trend was not a function of compositional changes in sociodemographic characteristics among households receiving Income Support over this period.

We concluded our analysis by charting the magnitude and composition of households who were food insecure from 2007 to 2012, differentiating between subgroups defined by income source. Charting trends by income source over this period allowed us to examine whether the decline on food insecurity was equal for all groups across the study period and where they diverged. Households were categorized into five mutually exclusive groups based on their main source of income in the past 12 months (i.e., whether from wages and salaries; self-employment; dividends/interest; Employment Insurance (EI); Worker's Compensation; pensions; retirement savings; the Guaranteed Income Supplement for seniors; social assistance (SA); or other sources such as child tax benefits, child support, or scholarships) and whether they had received any income from SA or EI over this period.

Findings

Study Population Characteristics, 2007–2012

Our examination of changes in the study population characteristics (Table 1) over the period from 2007 to 2012 revealed significant differences that could be attributed to the poverty reduction strategy. Specifically, we observed that from 2007 to 2012, the percent of households falling into the lowest income quintile for the period (household income $\leq$\$15,100 in 2007 constant CAN$) significantly declined from a prevalence of 24.6 percent (95 percent CI: 21.1 to 28.2 percent) in 2007 to 16.3 percent (95 percent CI: 12.3–20.4 percent) in 2012. Comparing individual years, we observed that the proportion of households receiving income from social assistance was borderline significantly lower in 2009 (6.1 percent; 95 percent CI: 4.8–7.4 percent) than in 2007 (9.0 percent; 95 percent CI: 7.4–10.7 percent). We also observed that characteristics of the study population changed between cycles in ways that were unlikely due to the poverty strategy and more likely to be due to sampling error. These included that in 2010, households were significantly more likely to have completed university (18.8 percent; 95 percent CI: 16.3–21.2 percent) than in 2007 (14.4 percent; 95 percent CI 12.5–16.3 percent), and significantly fewer households had only some post-secondary in 2011 (3.08 percent; 95 percent CI: 1.9–4.3 percent) and 2012 (3.4 percent; 95 percent CI: 2.4–4.7 percent) compared to 2007 (8.6 percent; 95 percent CI: 6.8–10.4 percent). The proportion of respondents identifying as Aboriginal in later years was significantly higher in 2011 (8.2 percent; 95 percent CI: 6.9–9.6 percent) and 2012 (10.6 percent; 95 percent CI: 8.7–12.6 percent), compared to 2007 (5.6 percent; 95 percent CI: 4.3–6.8 percent). This likely reflects a change in how individuals identified rather than a true change in the proportion of households who were Aboriginal in the samples from year to year.[3]

Risk of Food Insecurity in the Province over Time

As shown in Table 2 (Model 1), there was a significant decline in the risk of being food insecure in NL associated with the years 2009, 2010, and 2011 in comparison to 2007. Specifically, the odds of being food insecure were 0.72 (95 percent CI: 0.57–0.90), 0.70 (95 percent CI: 0.54–0.90), and 0.63 (95 percent CI: 0.49–0.81), in 2009, 2010, and 2011, compared to 2007, respectively. The odds of

being food insecure were also lower in 2012 but did not reach statistical significance (OR 0.83; 95 percent CI: 0.62–1.10).

Next, we tested whether there was evidence that the reduced risk of food insecurity observed for survey year could be attributed households having more income in later survey years. We observed that once a variable denoting whether households were in the lowest income quintile was added to the model, the odds of being food insecure for the years 2009 through 2012 were attenuated, and in the case of 2009 and 2010, were no longer statistically significant (Table 2, Model 2). This suggests that the lower risk of food insecurity observed in 2009 through 2012 could in part be explained by more households having higher incomes in these years compared to 2007.

Similarly, we examined what happened to the risk of being food insecure in 2009 through 2012 after we accounted for whether or not households were receiving income from Income Support. We also observed that lower odds of food insecurity associated with 2009 through 2011 remained robust after controlling for receipt of Income Support (Table 2, Model 3), suggesting that fewer households receiving income from Income Support did not explain the lower risk of food insecurity in these years.

Lastly, we tested if the lower odds of food insecurity observed in 2009 through 2011 remained after we controlled for survey population characteristics unlikely to be due to the poverty reduction strategy. We observed that the risk of food insecurity remained significantly lower in 2009 through 2011 compared to 2007 after we adjusted for these characteristics.

Risk among Income Support Clients

Next, we turned to the possibility that the vulnerability of Income Support clients to food insecurity could have changed over this period. We conducted tests of interaction between income sources and the year trend and found that there were not significant interactions between year effects and having sources of income from employment, seniors income, or any receipt of Employment Insurance, but that the effect of survey year on food insecurity was significantly different for households receiving any income from social assistance in comparison to those who did not (p value for interaction term: 0.016). As shown in Figure 3, the trend in prevalence of household food insecurity for households who were receiving income from social assistance differed from the trend for those not receiving income from social assistance. Among households that received income from social assistance, there was a sustained decreasing trend in prevalence of food insecurity, with the prevalence falling from 59.9 percent in 2007 to 33.5 percent in 2012 (Figure 3).

In a logistic regression analysis carried out only among households in receipt of Income Support (n = 727), we found that for every year increase, the odds of being food insecure decreased by 0.81 (0.71–0.92). This finding remained unchanged in a model fully adjusted for household characteristics (OR 0.80; 95 percent CI: 0.70–0.91), suggesting that the observed drop in food insecurity was not explained by changes in who received social assistance over this period. This suggests that unobserved factors, such as interventions that were part of the poverty reduction strategy aimed at improving the well-being of people receiving Income Support, could underscore lower risk of food insecurity observed in this group after 2007.

Explaining the Provincewide Decrease in Number of Food Insecure Households

The decomposition of the total prevalence of food insecure households from 2007 to 2012 into groups based on household income sources is presented in Table 3. Households receiving income from social assistance made up the largest proportion of food insecure households in the province in 2007 but one of the smallest proportions in 2012. The decline among these households made up the single greatest proportion of the drop in food insecurity prevalence for the province between 2007 and 2011, accounting for 44 percent of the observed difference in the provincial prevalence. Lower food insecurity in this group offset the increase in food insecurity among households with income from employment in 2012. The prevalence of food insecure households with their main income from employment was higher in the NL population in 2012 than it was in 2007.

Sensitivity Analyses

We ran a series of sensitivity analyses to test whether our findings were robust to alternate model specifications. First, rather than only include a variable denoting whether a household was in the lowest income quintile or not, we reran our models including either a variable denoting income quintile or with a continuous income variable (Appendix Table A.1). Adjusting for the whole income distribution yielded the same results as the model adjusted for the lowest income quintile. Including income as a continuous variable did not explain the year effect to the same extent, however. This suggests it was particularly the income shift of the population away from the lowest quintile observed in later years that explained the lower risk of food insecurity in these years.

Next, we included a dummy variable in the model denoting whether or not incomes were imputed for the household (Appendix Table A.2). Doing so did not change our findings.

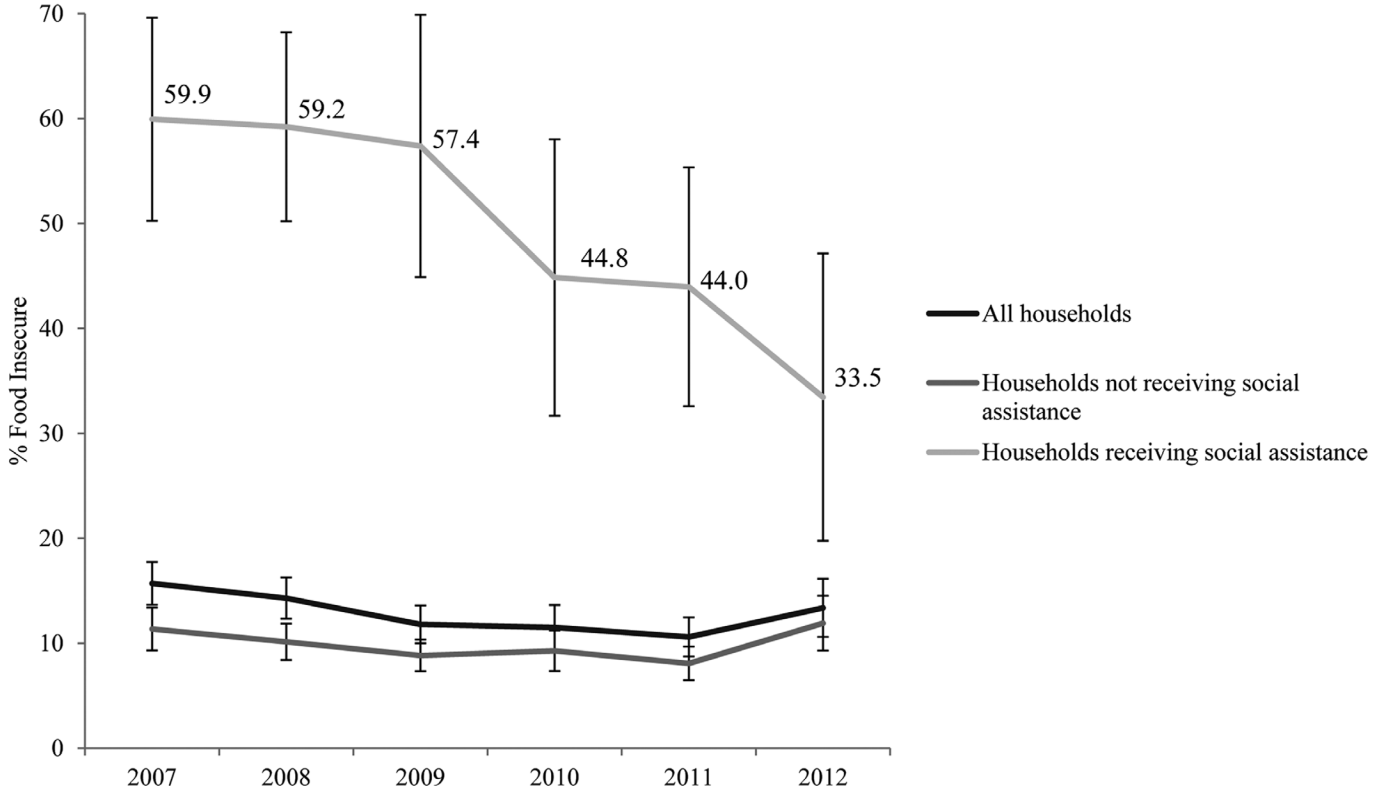

Figure 3: Prevalence of Household Food Insecurity in Newfoundland and Labrador for All Households and by Receipt of Social Assistance
Note: All households, N = 11,239; households not receiving social assistance, n = 10,512; households receiving social assistance, n = 727.
Source: Authors' calculations from Canadian Community Health Surveys.

Table 3: Contribution to Total Food Insecurity Prevalence by Household Source of Income in Newfoundland and Labrador among 11,239 Households, 2007–2012

	2007	2008	2009	2010	2011	2012	Difference 2007 to 2011	Difference 2007 to 2012
Total prevalence of food insecurity	**15.7**	**14.3**	**11.8**	**11.5**	**10.6**	**13.4**	**5.2**	**2.4**
Any income from social assistance	5.4	5.0	3.5	2.8	3.1	2.3	−2.3	−3.1
Main source employment, no EI	3.5	2.7	2.8	3.5	2.2	4.1	−1.3	0.5
Main source employment, received EI	2.6	2.3	1.5	2.0	2.0	3.4	−0.6	0.8
Main source Seniors Income[a]	2.7	2.9	2.5	2.0	1.6	1.8	−1.0	−0.9
Other main source[b]	1.6	1.3	1.6	1.1	1.7	1.9	0.1	0.3

[a] Includes pensions, retirement savings, the Guaranteed Income Supplement for seniors, and dividends/interest.
[b] Includes child tax benefits, child support, and scholarships.
Source: Authors' calculations from Canadian Community Health Surveys.

Lastly, we reran our models using a more conservative threshold for food insecurity, specifically, the threshold used by Health Canada, which requires that a household answers affirmatively to at least two questions on the HFSSM pertaining to adults and/or pertaining to children. Appendix Figure A.1 shows the difference in prevalence rates of food insecurity by this threshold over 2007 to 2012 in comparison to the more liberal threshold. Generally, the trends for these thresholds were matched, although food insecurity by the Health Canada threshold began to rise in 2011, whereas food insecurity by the marginal threshold rose sharply in 2012, then catching up to the trend for the more conservative threshold. Our logistic regression analyses

yielded results broadly consistent with use of the marginal threshold. The odds of being food insecure were significantly lower for households in 2009 (OR 0.70; 95 percent CI: 0.53 to 0.93), 2010 (0.59; 95 percent CI: 0.42 to 0.83), and 2011 (OR: 0.70; 95 percent CI: 0.52 to 0.95) compared to 2007 (Appendix Table A.3). We found that adjustment for the lowest income quintile explained the lower risk observed in most years. One difference was that we also saw that accounting for Income Support claimants had a stronger attenuating effect. In agreement with observations that risk of more severe food insecurity is associated with reliance on Income Support (Tarasuk et al. 2013), this suggests moving the population off Income Support is associated with a reduced risk of more severe food insecurity but not necessarily food insecurity at the marginal level. The addition of sociodemographic characteristics did not additionally explain the trends observed beyond those observed for the addition of low income and receipt of Income Support.

When we reran models for Income Support clients alone using the Health Canada threshold, consistent with findings using the marginal threshold, the odds of food insecurity significantly declined with every one-year increase (OR 0.86; 95 percent CI 0.76–0.98), and this effect was not affected by adjustment for sociodemographic characteristics (OR 0.86; 95 percent CI 0.76–0.99).

Summary and Discussion

We observed that there was a significant decline in household food insecurity in NL in the years following the introduction of the poverty reduction strategy. Our examination of the potential mediating effects of income improvement and movement of Income Support clients into work over 2007 to 2012 suggested that the observed drop in prevalence of food insecurity can in part be attributed to these changes. Importantly, a major component of the observed decline in prevalence of food insecurity from 2007 to 2011 was the significant decrease in the vulnerability of households receiving income from social assistance over this period. The receipt of social assistance is a well-documented independent risk factor for food insecurity in Canada; in fact, no other defined population subgroup has such a high probability of being food insecure as those reliant on social assistance (Che and Chen 2001; McIntyre et al. 2000; Tarasuk et al. 2013; Vozoris and Tarasuk 2003). The dramatic decline in prevalence that we observed among Income Assistance recipients in NL suggests substantial changes in the conditions that predispose this group to food insecurity.

It is important to acknowledge the limitations of our study. First, although income improvement and incentives to move Income Support clients into work were part of the poverty reduction strategy, we cannot know whether the observed changes in the population were attributable to these interventions or rather reflected economic changes occurring in the province over this period, such as economic growth and increased job opportunities. There are no data available that would enable us to test hypotheses related to specific policy interventions that were part of the strategy, such as risk of food insecurity before and after low-income households were given a low-income tax exemption. We note, however, that significant decline in risk of food insecurity among Income Support clients would unlikely be due to changes in the economy, and the trend observed for this group lends strong support to the hypothesis that actions taken to improve the support provided to Income Support clients over this period, such as enhancing access to savings, improving incomes, and providing non-cash benefits, improved their food security.

Second, given the location of household food insecurity measurement within a health survey, only crude indicators of sources of income and employment were available. We could not test for differences based on the extent to which households relied on these different sources. We also note that incomes were imputed for a significant proportion of the sample, although the rise in incomes observed mirrors patterns reported from other sources in the province over this period (Government of Newfoundland and Labrador 2014).

Lastly, while we controlled for household characteristics to reduce the likelihood that year effects were spuriously caused by sampling differences between study years, the repeated cross-sectional nature of this survey does not rule out the possibility that samples were not comparable from year to year. Longitudinal data are needed for within-household comparisons to test the effects of changing household income, income sources, and impact of targeted social policy interventions on household food insecurity in Canada. The consistent monitoring of food insecurity on the CCHS is now yielding a wealth of cross-sectional survey data, prompting questions about the reasons for observed temporal, regional, and sociodemographic patterns in the occurrence of food insecurity in Canada. Yet the limited descriptors of household circumstances included in this survey preclude analyses of the effects of specific federal and provincial/territorial policy interventions on food insecurity prevalence or severity. Given the current scale of the problem and its indisputable links to population health, more extensive examination of household food insecurity in conjunction with detailed data on household incomes, expenditures, and exposure to various social welfare interventions is needed to inform effective policy action.

It is important to note that while food insecurity declined among households receiving social assistance into 2012, this trend was not sustained over 2012 for the population as a whole. Of note is that the prevalence in 2012 was not significantly different from the prevalence in 2011 (Appendix Figure 1.A), so subsequent years of data are needed to explore if this represents a real reversal. Our decomposition analysis indicated that the rise appeared to be driven by households receiving income from employment. This could indicate that although unemployment did not change in 2012, the types of employment that households had did not provide sufficient amounts of income. As shown in Figure 1, the growth of the economy slightly declined in 2012. In particular, we note that the minimum wage was not raised after 2010 until 2014 (Economics and Statistics Branch 2014), and there were few initiatives taken under the poverty reduction strategy that directly impacted the incomes of households in 2012, and even then, only for select Income Support clients (Government of Newfoundland and Labrador 2014). Unfortunately, NL elected not to include the food insecurity module on the 2013 and 2014 cycles of the CCHS, so further examination of vulnerability to food insecurity in years after 2012 will not be possible until data for 2015 is released.

Despite data limitations, our results provide evidence of the sensitivity of food insecurity among social assistance recipient households to policy intervention. While the data on which our study is based were too crude to allow for more specific conclusions about what changed the vulnerability among social assistance recipients, the diversity of targeted interventions included in the NL poverty reduction strategy appears to have improved the material well-being of these households. In 2012, the rate of food insecurity among households whose main source of income was social assistance was 46 percent in NL, but in other provinces this prevalence ranged from 65 percent in Ontario to 79 percent in Alberta (Tarasuk, Mitchell, and Dachner 2014). The results of this study suggest that the extraordinarily high rates of food insecurity observed among social assistance recipients are the product of provincial policies governing these programs and can be altered by policy changes that improve the resources of recipient household.

In conclusion, this study adds to the very small but growing body of literature attempting to elucidate the social policy underpinnings of observed differences in the prevalence of household food insecurity in Canada (Emery et al. 2013; Ionescu-Ittu, Glymour, and Kaufman 2015). Such evidence is critically important given the virtual absence of public policy actions targeted toward the reduction of food insecurity in our country and the paucity of empirical research to guide such policy interventions. For several decades now, concerned community groups attempted to fill this policy vacuum with the establishment of charitable food assistance programs. Indeed, food banks have become the de facto public policy response to food insecurity in Canada, despite widespread recognition of their limitations (Loopstra and Tarasuk 2012; Tarasuk, Dachner, et al. 2014). The large and growing prevalence of food insecurity, coupled with its apparent sensitivity to existing social policy, argues strongly for the need for effective policy interventions targeting this problem.

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Notes

1. A small proportion of households were missing data on other predictor variables of interest (<5 percent of sample for each variable of interest). Rather than reduce the sample further because of missing data, households with missing data were given a value consistent with the majority in the study population or the value of "Other" when this response was an option. Sensitivity analyses were conducted to test whether excluding households missing data altered findings, but results were consistent across these specifications. Due to rules governing small cell sizes, we cannot disclose the proportion of households missing data for particular characteristics.
2. Because information on income is missing for approximately 30 percent of the CCHS sample, Statistics Canada provides an imputed income value for households missing this information.
3. In November 2007, the Federal Government of Canada announced that official status under the Indian Act would be extended to the Mi'kmaq of Newfoundland. This could mean that individuals who would have previously not identified as Aboriginal on the CCHS survey would have identified this way in later years.

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Appendix

Box A.1: Health Canada Household Food Security Survey Module Used on the Canadian Community Health Survey.

Before module begins, households asked an opening question for comparability with other household food insecurity indicators used in United States.	
Q1. Which of the following statements best describes the food eaten in your household in the past 12 months, that is since [current month] of last year?	[ ] You and other household members always had enough of the kinds of foods you wanted to eat. [ ] You and other household members had enough to eat, but not always the kinds of food you wanted. [ ] Sometimes you and other household members did not have enough to eat. [ ] Often you and other household members didn't have enough to eat.
Beginning of Household Food Security Survey Module Now I'm going to read you several statements that may be used to describe the food situation for a household. Please tell me if the statement was often true, sometimes true, or never true for you and other household members in the past 12 months.	
Q2) You and other household members worried that food would run out before you got money to buy more. Was that often true, sometimes true, or never true in the past 12 months?	[ ] Often true [ ] Sometimes true [ ] Never true
Q3) The food that you and other household members bought just didn't last, and there wasn't any money to get more. Was that often true, sometimes true, or never true in the past 12 months?	[ ] Often true [ ] Sometimes true [ ] Never true
Q4) You and other household members couldn't afford to eat balanced meals. In the past 12 months was that often true, sometimes true, or never true?	[ ] Often true [ ] Sometimes true [ ] Never true
IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q5 AND Q6; OTHERWISE, SKIP TO FIRST LEVEL SCREEN.	
Q5) You or other adults in your household relied on only a few kinds of low-cost food to feed the child(ren) because you were running out of money to buy food. Was that often true, sometimes true, or never true in the past 12 months?	[ ] Often true [ ] Sometimes true [ ] Never true
Q6) You or other adults in your household couldn't feed the child(ren) a balanced meal, because you couldn't afford it. Was that often true, sometimes true, or never true in the past 12 months?	[ ] Often true [ ] Sometimes true [ ] Never true
FIRST LEVEL SCREEN (screener for Stage 2): If AFFIRMATIVE RESPONSE to ANY ONE of Q1-Q5 (i.e., "often true" or "sometimes true") OR response [3] or [4] to Q1, then continue to STAGE 2; otherwise, skip to end. IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q7; OTHERWISE SKIP TO Q8.	
Q7. The child(ren) were not eating enough because you and other adult members of the household just couldn't afford enough food. Was that often, sometimes or never true in the past 12 months?	[ ] Often true [ ] Sometimes true [ ] Never true
Q8. In the past 12 months, since last [current month] did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?	[ ] Yes [ ] No (Go to Q9)
Q8b. How often did this happen?	[ ] Almost every month [ ] Some months but not every month [ ] Only 1 or 2 months
Q9. In the past 12 months, did you (personally) ever eat less than you felt you should because there wasn't enough money to buy food?	[ ] Yes [ ] No

Q10. In the past 12 months, were you (personally) ever hungry but didn't eat because you couldn't afford enough food?	[ ] Yes [ ] No
Q11. In the past 12 months, did you (personally) lose weight because you didn't have enough money for food?	[ ] Yes [ ] No

SECOND LEVEL SCREEN (screener for Stage 3): If AFFIRMATIVE RESPONSE to ANY ONE of Q7-Q11, then continue to STAGE 3; otherwise, skip to end.

Q12. In the past 12 months, did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?	[ ] Yes [ ] No
Q12b. How often did this happen?	[ ] Almost every month [ ] Some months but not every month [ ] Only 1 or 2 months

IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q13-16; OTHERWISE SKIP TO END.

Q13. In the past 12 months, did you or other adults in your household ever cut the size of any of the children's meals because there wasn't enough money for food?	[ ] Yes [ ] No
Q14. In the past 12 months, did any of the children ever skip meals because there wasn't enough money for food?	[ ] Yes [ ] No
Q14b. How often did this happen?	[ ] Almost every month [ ] Some months but not every month [ ] Only 1 or 2 months
Q15. In the past 12 months, were any of the children ever hungry but you just couldn't afford more food?	[ ] Yes [ ] No
Q16. In the past 12 months, did any of the children ever not eat for a whole day because there wasn't enough money for food?	[ ] Yes [ ] No

Source: Health Canada. http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/income_food_sec-sec_alim-eng.php#appa

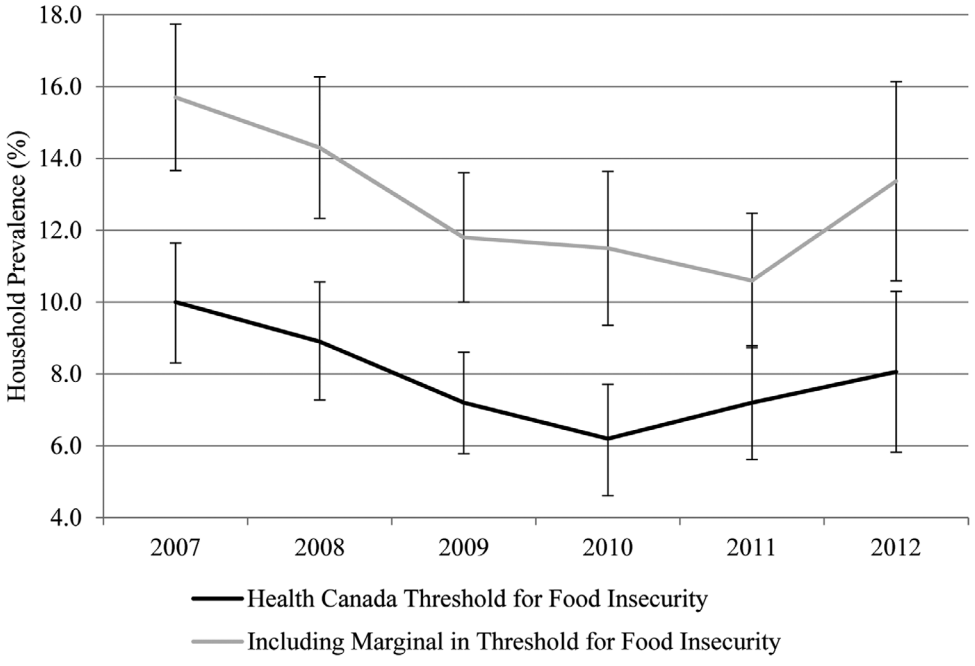

Figure A.1: Prevalence of Household Food Insecurity Using Marginal Threshold and Health Canada Threshold in Newfoundland and Labrador, 2007 to 2012

Note: N = 11,239 households.

Source: Authors' calculations from Canadian Community Health Surveys, 2007–2012.

Table A.1: Odds of Food Insecurity among Households in Newfoundland and Labrador by Survey Year (N = 11,239) Including Adjustment for Income Quintile or Continuous Income Variable, 2007 to 2012

	Model 1		Model 2	
	Unadjusted	w/ adjustment for lowest income quintile	w/ adjustment for income distribution	w/ adjustment for continuous income
Year				
2007	Ref	Ref	Ref	Ref
2008	0.89 (0.71–1.13)	0.92 (0.72–1.19)	0.91 (0.71–1.18)	0.88 (0.70–1.12)
2009	**0.72 (0.57–0.90)**	0.79 (0.62–1.01)	0.79 (0.62–1.00)	**0.76 (0.60–0.96)**
2010	**0.70 (0.54–0.90)**	0.78 (0.59–1.02)	0.78 (0.59–1.02)	**0.76 (0.59–0.99)**
2011	**0.63 (0.49–0.81)**	**0.72 (0.55–0.93)**	**0.72 (0.55–0.94)**	**0.70 (0.54–0.90)**
2012	0.83 (0.62–1.10)	1.00 (0.73–1.37)	1.02 (0.74–1.41)	0.95 (0.69–1.30)
Income in lowest quintile				
Yes	–	6.32 (5.41–7.38)		–
No	–	Ref		
Income distribution, %				–
Lowest quintile ≤$15,100	–	–	25.40 (17.18–37.56)	–
Low-mid quintile ≤$23,950	–	–	8.55 (5.70–12.83)	–
Middle quintile ≤$35,000	–	–	4.76 (3.02–7.51)	–
High-mid quintile ≤$53,300	–	–	2.37 (1.47–3.81)	–
Highest quintile >$53,300			Ref	
Continuous income variable ($)	–	–	–	0.94 (0.93–0.94)

Source: Authors' calculations from Canadian Community Health Surveys.

Table A.2: Odds of Food Insecurity among Households in Newfoundland and Labrador by Survey Year (N = 11,239) Including Dummy Variable for Income Imputation, 2007 to 2012

	Model 1	Model 2[a]	Model 2 w/ adjustment for income imputation
2007	Reference	Reference	Reference
2008	0.89 (0.71–1.13)	0.92 (0.72–1.19)	0.93 (0.72–1.21)
2009	**0.72** (0.57–0.90)	0.79 (0.62–1.01)	0.80 (0.63–1.03)
2010	**0.70 (0.54–0.90)**	0.78 (0.59–1.02)	0.80 (0.61–1.05)
2011	**0.63 (0.49–0.81)**	**0.72 (0.55–0.93)**	**0.73 (0.55–0.95)**
2012	0.83 (0.62–1.10)	1.00 (0.73–1.37)	1.00 (0.73–1.37)
Income imputed			
No	–	–	Reference
Yes	–	–	0.70 (0.59–0.82)

[a] Adjusted for variable denoting if household was in lowest income quintile in 2007 constant dollars for pooled survey years.

Source: Authors' calculations from Canadian Community Health Surveys.

Table A.3: Odds of Food Insecurity Using Health Canada Threshold for Food Insecurity Among Households in Newfoundland and Labrador by Survey Year (N = 11,239), 2007 to 2012

Year	Model 1: Unadjusted	Model 2: Adjusted for income in lowest income quintile[a]	Model 3: Adjusted for receipt of social assistance[b]	Model 4: Fully adjusted[c]
2007	Reference	Reference	Reference	Reference
2008	0.88 (0.67–1.17)	0.92 (0.67–1.27)	0.89 (0.66–1.20)	0.96 (0.70–1.31)
2009	**0.70 (0.53–0.93)**	0.79 (0.59–1.08)	0.78 (0.58–1.05)	0.77 (0.56–1.04)
2010	**0.59 (0.42–0.83)**	**0.68 (0.47–0.97)**	**0.65 (0.46–0.91)**	**0.63 (0.43–0.92)**
2011	**0.70 (0.52–0.95)**	0.84 (0.60–1.16)	0.74 (0.53–1.04)	0.80 (0.56–1.15)
2012	0.79 (0.54–1.16)	1.01 (0.67–1.54)	0.86 (0.57–1.32)	0.94 (0.62–1.44)

[a] Adjusted for variable denoting if household was in lowest income quintile in 2007 constant dollars for pooled survey years.

[b] Adjusted only for receipt of any income from social assistance.

[c] Adjusted for location in lowest income quintile, receipt of any income from social assistance, main sources of income from employment or seniors income, any income from Employment Insurance, household structure, children < 18 in household, Aboriginal status, immigrant status, home ownership, and household level of education.

Source: Authors' calculations from Canadian Community Health Surveys.