RESEARCH

'Hunger in early life': exploring the prevalence and correlates of child food insecurity in Canada

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Abstract

Background: Although food is a basic human right, food insecurity remains a major problem in the Global North including Canada. Children constitute a subgroup that is particularly vulnerable to food insecurity, with recent evidence showing that 1 in 6 Canadian children are food insecure. The rising rate of child food insecurity alongside its links with several adverse health outcomes reinforce the need to pay attention to its determinants. Although food insecurity is a multidimensional phenomenon shaped by diverse factors, in the Global North, including Canada, it is generally framed as a financial problem. Consequently, food policy has largely prioritized income support programs to the neglect of potentially important non-monetary factors. These non-monetary factors are also rarely explored in the literature despite their potentially relevant role in shaping policy responses to child food insecurity. Drawing data from the Canadian Community Health Survey ($N = 21,455$ households with children) and broadening the scope of potential predictors, this paper examined the correlates of child food insecurity in Canada.

Results: Findings show children in visible minority households (OR = 1.12, $p < 0.01$), single-parent households (OR = 1.55, $p < 0.001$), households with five or more members (OR = 1.35, $p < 0.001$), households with the highest level of education being secondary education or lower (OR = 1.14, $p < 0.05$), households where the adult respondent reported a very weak sense of community belonging (OR = 1.32, $p < 0.001$), poor physical health (OR = 1.61, $p < 0.001$) and poor mental health (OR = 1.61, $p < 0.001$) had higher odds of being food insecure. Children in lower income households were also more likely to be food insecure.

Conclusions: This study demonstrates the multidimensional nature of child food insecurity and highlights the need for food policy to pay attention to relevant social factors. Although commonly highlighted economic factors such as household income and employment status remain important correlates of child food insecurity in Canada, non-monetary factors such as visible minority status, sense of community belonging and living arrangement of parents/guardians are noteworthy predictors of child food insecurity that need equal policy attention.

Keywords: Food insecurity, Children, Canada, Food Policy

Background

This paper explores the prevalence and predictors of child food insecurity in Canada. Although food is a basic human need and an important determinant of health, food insecurity—defined in the Canadian context as the limited access to food resources due to financial constraints—remains a major problem [1]. In the year 2020, one in seven (14.6%) Canadians lived in a household that experienced food insecurity [2], an increase from 12.4% in 2018 [3]. Although these household-level statistics provide a good picture of the increasing food insecurity situation in Canada, there is the potential for these

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statistics to mask differences across population subgroups [4]. Children are a subgroup particularly vulnerable to food insecurity [5]. Recent statistics show that 1 in 6 Canadian children (under 18 years) are affected by food insecurity [6]. At the household level, 15.6% of households with children below 18 were food insecure compared to households without children (10.4%) [6]. The current rate of child food insecurity is remarkably higher compared to the prevalence of 1.2% and 1.6% reported in the National Longitudinal Survey of Children and Youth in 1994 and 1996, respectively [7]. Child food insecurity in Canada is also geographically variable, with Nunavut and the Northwest Territories having the highest prevalence rates —— 60% and 29%, respectively.

Although considerable scholarly work has focused on food insecurity in Canada, the majority of studies have been at the broader household level with very little attention to child food insecurity [6, 8]. This broader focus at the household level, has the potential to mask the food insecurity experiences of children. This is despite the fact that children are a population sub-group who are in a crucial phase of growth, where adequate nutrition is crucial [9]. The rising rate of child food insecurity in Canada, coupled with its links with several adverse physiological and psychosocial health outcomes further reinforce the need to pay attention to its determinants. For instance, empirical research demonstrates a link between child food insecurity and compromised immune function (Gundersen and Ziliak, 2015), retarded physical development [11, 12], poor physical health-related quality of life [13, 14], and reduced cognitive ability and psychosocial dysfunction [15]. Severely food insecure children have also been found to be more likely to be lethargic, withdrawn, and nervous [13, 16, 17]. Food insecurity among children has also been found to be associated with chronic conditions such as cardiovascular disease and diabetes [18–21]. Some studies [10, 22–24] have also demonstrated how food insecurity related illnesses and associated hospitalization of children further impoverish already struggling families. Particularly worrisome is the fact that compromised nutrition during the early periods of growth can adversely shape current and future well-being [25–27].

The high prevalence of child food insecurity in Canada is despite enormous policy attention at the provincial and national levels [1]. Since gaining policy attention in the 1980s, food insecurity in the Canadian context has been framed as a function of socioeconomic vulnerability linked to the lack of financial resources [28]. Resultant policy efforts have, therefore, also focused largely on poverty alleviation measures that target increasing the real incomes of poor households. This income-based approach to addressing child food insecurity gained

traction following the landmark 'House of Commons' resolution in 1989 that mandated the government to eliminate child poverty by the year 2000. Following this policy commitment, several poverty alleviation strategies have been implemented including the Canada Child Benefit program. The CCB is a monthly payment (a maximum amount of $553.25 per month per eligible child under 6 years and $466.83 per month per child for children aged six to 17) made to families to subsidize the cost of childcare. Payments from the CCB are income-based and tend to decrease as family income increases. These income-based approaches are meant to ensure the affordability of healthy foods [4].

While there is evidence of the positive effect of income-based interventions such as the CCB on the overall well-being of Canadian children, especially children in low-income households [29, 30], the increasing prevalence of food insecurity points to the need for food security research to further explore the possible role of other socio-political factors. For instance, aside from income, child food insecurity may be shaped by factors such as the sense of belonging, living arrangement, race and culinary skills of parents [4, 5, 31], some of which remain underexplored. This study contributes in this regard by broadening the scope to explore the role of other conceptually relevant social factors such as sense of community belonging, living arrangement and mental health of parents and/or guardians on the food security experiences of children. Moreover, food insecurity is a temporal experience, with the potential for its drivers to change markedly over time. This further reinforces the need for continuous research to enhance understanding of its dynamic nature and associated predictors to inform the design and implementation of time-sensitive and contextually relevant policies. To the best of the author's knowledge this is the first study focusing exclusively on the predictors of child food insecurity in Canada using a child status measure from a nationally representative data set.

Materials and methods
This study is based on data from the 2017–2018 round of the Canadian Community Health Survey (CCHS). The CCHS is a nationally representative survey that uses three sampling frames (i.e., an area frame, a list frame, and a random digit dialing frame) to obtain health information from Canadians aged 12 and older from ten provinces and three territories. The sampling frameworks excluded residents living on reserves, full-time members of the Canadian Forces, and the institutionalized populations. The CCHS asked adult respondents (18 years or older) about children's experiences on food security in their households. Therefore, respondents aged 17 or younger were excluded, bringing the analytical sample to

21,455 adult respondents whose households included at least one child. In terms of geographical scope, this analysis covers the 10 provinces and territories that administered the food security model in the 2017–2018 round of the CCHS. Figure 1 shows the study provinces and their respective child food insecurity levels relative to the survey sample.

Dependent variable

Our dependent variable is 'food insecurity status', which was constructed based on the Household Food Security Survey Module—Child Scale. Specifically, there are seven indicators to measure the food experience of children in the last year: (1) did you or other adults in your household rely on only a few kinds of low-cost food to feed children, (2) did you or other adults in your household couldn't feed children a balanced meal, (3) children were not eating enough, (4) did you or other adults in your household ever cut the size of any of the children's meals, (5) were any of the children ever hungry (6) did any of the children ever skipped meals, and (7) did any of the children ever not eat for a whole day. Based on responses to these questions, the CCHS generates three food security categories (0 = food secure; 1 = moderately food insecure; 2 = severely food insecure). While this food insecurity variable is originally ordinal, as shown in Table 1, because the proportion of severely food insecure is very small, analyzing this variable with an ordered logistic regression presents serious analytical challenges, especially with concomitant biased and higher odds ratios. Consequently, the 'moderately food insecure' and 'severely food insecure' categories were combined into a single category called 'food insecure' (0 = food secure; 1 = food insecure).
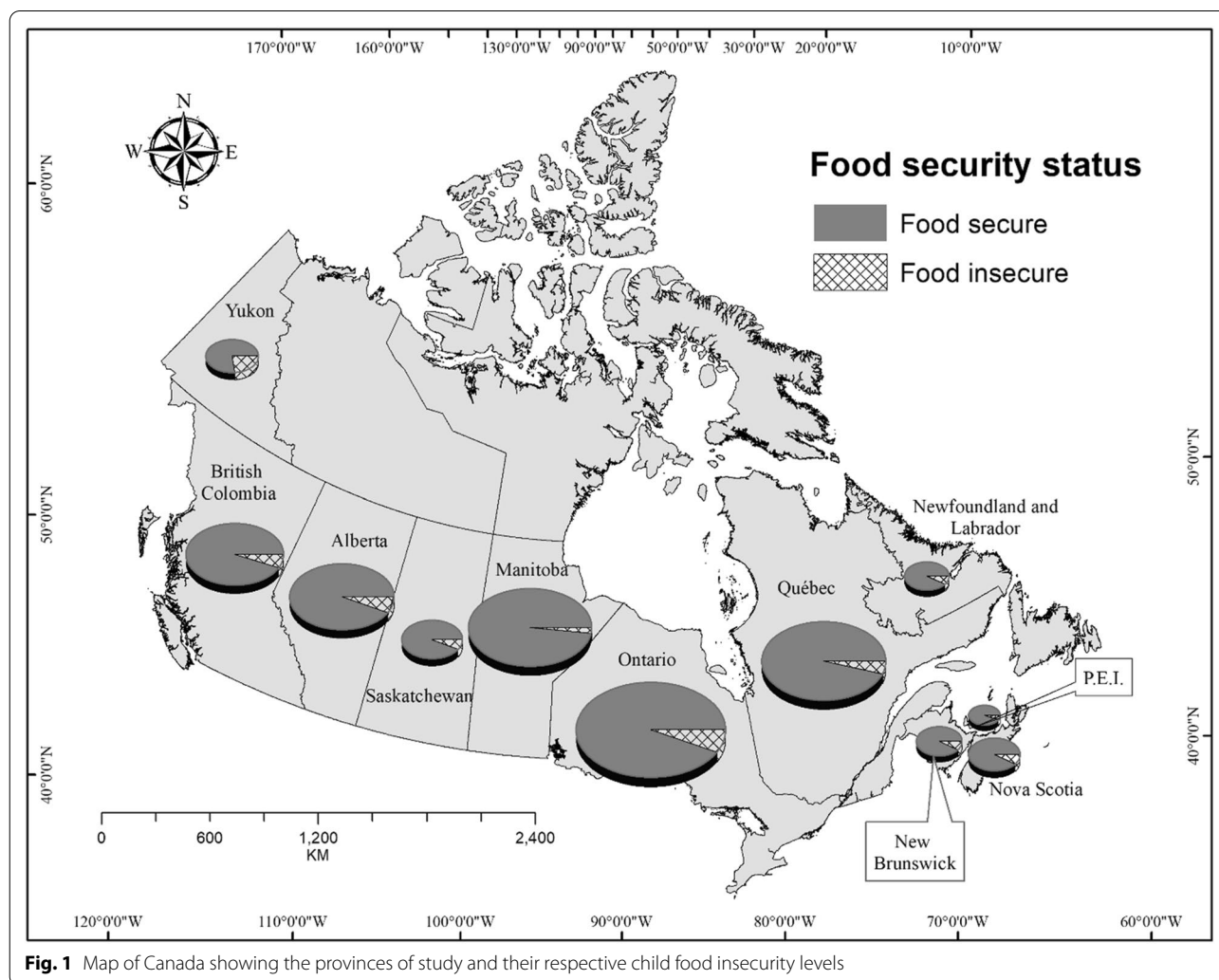

Fig. 1 Map of Canada showing the provinces of study and their respective child food insecurity levels

Table 1 Sample characteristics

Variable	Percentage
Child food insecurity	
Food secure	94.85
Food insecure	5.15
Immigrant status	
No	76.51
Yes	23.49
Visible minority status	
No	79.71
Yes	20.29
Living arrangement	
Couple	73.74
Lone	17.11
Other	9.15
Household size	
2	7.72
3	29.41
4	40.51
5 or more	22.36
Province of residence	
Quebec	21.72
Newfoundland and Labrador	2.42
Prince Edward Island	1.46
Nova Scotia	3.57
New Brunswick	2.80
Ontario	29.87
Manitoba	5.12
Saskatchewan	4.36
Alberta	14.68
British Columbia	12.56
Territories	1.44
Household education	
More than secondary education	86.12
Secondary education	10.84
Less than secondary education	3.03
Household income	
More than $80 K	62.13
60 K to 80 K	12.33
40 K to 60 K	11.00
20 K to 40 K	9.15
Less than 20 K	5.37
Employment	
Yes	79.91
No	20.09
Sense of belonging to community	
Very strong	17.43
Somewhat strong	53.45
Somewhat weak	23.24
Very weak	5.88
Self-rated physical health	

Table 1 (continued)

Variable	Percentage
Excellent	26.54
Very good	40.96
Good	25.31
Fair	5.63
Poor	1.56
Self-rated mental health	
Excellent	31.26
Very good	38.74
Good	23.37
Fair	5.43
Poor	1.20
Total	21,455

Independent variables

A range of relevant demographic, economic/social and health-related variables of adults in the household were adjusted for in the analysis. Demographic variables include immigrant status (0 = no; 1 = yes), visible minority status (0 = no; 1 = yes), living arrangement (0 = couple; 1 = lone; 2 = other), household size (0 = 2; 1 = 3; 2 = 4; 3 = 5 or more), province of residence (0 = Quebec; 1 = Newfoundland and Labrador; 2 = Prince Edward Island; 3 = Nova Scotia; 4 = New Brunswick; 5 = Ontario; 6 = Manitoba; 7 = Saskatchewan; 8 = Alberta; 9 = British Columbia; 10 = territories). Four socioeconomic factors including household education (0 = more than secondary education; 1 = secondary education; 2 = less than secondary education), household income (0 = more than 80 K; 1 = 60 K to 80 K; 2 = 40 K to 60 K; 3 = 20 K to 40 K; 4 = less than 40 K), employment (0 = yes; 1 = no), and sense of belonging to community (0 = very strong; 1 = somewhat strong; 2 = somewhat weak; 3 = very weak) were also included. Finally, two health indicators, namely self-rated physical health (0 = excellent; 1 = very good; 2 = good; 3 = fair; 4 = poor) and mental health (0 = excellent; 1 = very good; 2 = good; 3 = fair; 4 = poor) of adult respondents in surveyed households were also included in the analysis.

Statistical analysis

There are three separate analyses for this study. First, univariate analysis is employed to understand the characteristics of the study sample. Second, bivariate analysis is conducted to understand the independent relationship between the covariates and child food insecurity. Finally, multivariate analysis was conducted to examine the adjusted relationship between the independent variables and child food insecurity. For the bivariate and

multivariate analyses, negative log–log regression was used. Although the dependent variable is dichotomous (as shown in Table 1), the distribution is skewed and not equally probable, with 5.15% of the respondents falling under the 'yes' category. In this case, the negative log–log link function is recommended, since a simple logit model that assumes a symmetric distribution can generate biased estimates (Smith and McKenna, 2012). The Akaike Information Criteria for three different models, namely negative log–log, complementary log–log, and logit models was calculated. The negative log–log technique produced the lowest score, implying the best model fit. To ensure robustness, it was also important to employ alternative measures of food insecurity. Although data limitations associated with the CCHS militated against the use of alternative measures, such as the Rasch model, a principal component analysis was employed to reduce the different variables used in creating the dependent variable into a scale. This variable was subsequently used as the dependent variable to produce estimates using ordinary least squares regression analysis. The results were largely consistent with the results from the negative log–log regression.

For the bivariate and multivariate analyses, findings are reported with odd ratios (ORs). ORs larger than 1 imply that respondents are more likely to be food insecure, while those smaller than 1 indicate the lower odds of experiencing food insecurity. Sampling weights provided by Statistics Canada were applied to all the analyses.

Results

Table 1 shows results from univariate analysis. About 5.15% of households reported child food insecurity. The majority of adults respondents from households surveyed were native-born (76.51%), non-visible minority (79.71%), and employed (79.91%). In the majority of households (73.74%), children lived with both parents. In most households (86.12%), the highest level of education was above secondary education. About 62% of households had an annual household income of more than $80,000. The largest proportion of households are in Ontario (29.87%), followed by Quebec (21.72%), Alberta (14.68%), and Saskatchewan (4.36%). It is also noteworthy that only 26.54% and 31.26% of adult respondents in sampled households reported excellent physical and mental health, respectively.

Table 2 shows results from the bivariate analysis. Immigrant (OR = 1.08, $p < 0.01$) and visible minority (OR = 1.13, $p < 0.001$) households were more likely to report child food insecurity than their native-born and non-visible minority counterparts, respectively. Similarly, children living under lone parental care or family arrangement were more likely to be food insecure than those in

Table 2 Bivariate analysis of the dependent and independent variables

Variable	OR	SE	95% CI	
Immigration status				
No	Reference			
Yes	1.08**	0.02	1.02	1.12
Visible minority status				
No	Reference			
Yes	1.13***	0.03	1.08	1.18
Living arrangement				
Couple	Reference			
Lone	1.85***	0.04	1.76	1.94
Other	1.22	0.04	1.14	1.30
Household size				
2	Reference			
3	0.65***	0.02	0.60	0.70
4	0.58***	0.02	0.54	0.62
5 or more	0.67***	0.02	0.62	0.72
Province of residence				
Quebec	Reference			
Newfoundland and Labrador	1.27***	0.08	1.12	1.43
Prince Edward Island	1.18*	0.10	1.00	1.39
Nova Scotia	1.22***	0.07	1.10	1.36
New Brunswick	1.28***	0.08	1.14	1.44
Ontario	1.14***	0.03	1.08	1.20
Manitoba	1.03	0.05	0.93	1.14
Saskatchewan	1.07	0.06	0.96	1.19
Alberta	1.14***	0.04	1.07	1.22
British Columbia	1.04	0.04	0.97	1.11
Territories	0.89	0.09	0.73	1.08
Household education				
More than secondary education	Reference			
Secondary education	1.42***	0.04	1.34	1.50
Less than secondary education	1.71***	0.08	1.55	1.88
Household income				
More than $80 K	Reference			
60 K to 80 K	1.42***	0.05	1.33	1.51
40 K to 60 K	1.63***	0.05	1.53	1.74
20 K to 40 K	2.27***	0.07	2.13	2.41
Less than 20 K	2.57***	0.10	2.38	2.78
Employment				
Yes	Reference			
No	1.38***	0.03	1.32	1.44
Sense of belonging to community				
Very strong	Reference			
Somewhat strong	1.05	0.03	0.99	1.11
Somewhat weak	1.21***	0.04	1.13	1.29
Very weak	1.59***	0.07	1.46	1.74
Self-rated physical health				
Excellent	Reference			
Very good	1.11***	0.03	1.05	1.17
Good	1.37***	0.04	1.30	1.45

Table 2 (continued)

Variable	OR	SE	95% CI	
Fair	2.04***	0.09	1.88	2.22
Poor	2.46***	0.17	2.15	2.82
Self-rated mental health				
Excellent	Reference			
Very good	1.08**	0.03	1.03	1.14
Good	1.35***	0.04	1.28	1.43
Fair	1.92***	0.08	1.77	2.08
Poor	2.68***	0.22	2.29	3.14

SE Standard Errors

* *p* < 0.05

** *p* < 0.01

*** *p* < 0.001

households, where parents lived as a couple (OR = 1.85, *p* < 0.001). In terms of geographical location, living in Newfoundland and Labrador (OR = 1.27, *p* < 0.001), Prince Edward Island (OR = 1.18, *p* < 0.05), Nova Scotia (OR = 1.22, *p* < 0.001), New Brunswick (OR = 1.28, *p* < 0.001), Ontario (OR = 1.14, *p* < 0.001) and Alberta (OR = 1.14, *p* < 0.001) is positively correlated with child food insecurity comapred to Quebec. However, children in households of five or more (OR = 0.67, *p* < 0.001), four (OR = 0.58, *p* < 0.001), and three people (OR = 0.65, *p* < 0.001) had lower odds of experiencing child food insecurity than those in households with only two people. In terms of socioeconomic factors, households with lower education, income, and unemployment were more likely to report child food insecurity than households with higher education, income, and employment. In addition, households with a very weak (OR = 1.59, *p* < 0.001) and somewhat weak (OR = 1.21, *p* < 0.001) sense of belonging to the community were more likely to report child food insecurity than those with a very strong sense of community belonging. Finally, self-rated physical and mental health were significantly associated with child food insecurity. Specifically, the poorer physical and mental health of the adult respondent in the household is positively associated with child food insecurity.

Table 3 shows results from multivariate analysis. Consistent with the bivariate level, visible minority households (OR = 1.12, *p* < 0.01) were more likely to report child food insecurity. In addition, children in lone parental households were still significantly more likely to be food insecure than those in households, where parents lived as a couple (OR = 1.55, *p* < 0.001). Moreover, living in Newfoundland and Labrador (OR = 1.35, *p* < 0.001), Nova Scotia (OR = 1.24, *p* < 0.01), New Brunswick (OR = 1.33, *p* < 0.001), Ontario (OR = 1.18, *p* < 0.001), Saskatchewan

Table 3 Multivariate analysis of the dependent and independent variables

Variable	OR	SE	95% CI	
Immigrant status				
No	Reference			
Yes	1.02	0.04	0.94	1.11
Visible minority status				
No	Reference			
Yes	1.12**	0.05	1.03	1.21
Living arrangement				
Couple	Reference			
Lone	1.55***	0.06	1.44	1.67
Other	1.05	0.04	0.97	1.13
Household size				
2	Reference			
3	1.03	0.05	0.94	1.13
4	1.19**	0.06	1.07	1.31
5 or more	1.35***	0.07	1.21	1.49
Province of residence				
Quebec	Reference			
Newfoundland and Labrador	1.35***	0.10	1.17	1.57
Prince Edward Island	1.14	0.11	0.94	1.39
Nova Scotia	1.24**	0.08	1.09	1.41
New Brunswick	1.33***	0.09	1.16	1.53
Ontario	1.18***	0.04	1.10	1.27
Manitoba	1.09	0.07	0.97	1.23
Saskatchewan	1.19**	0.07	1.05	1.34
Alberta	1.28***	0.05	1.18	1.39
British Columbia	1.12*	0.05	1.03	1.22
Territories	1.18	0.13	0.95	1.48
Household education				
More than secondary education	Reference			
Secondary education	1.11**	0.04	1.04	1.19
Less than secondary education	1.14*	0.07	1.02	1.28
Household income				
More than $80 K	Reference			
60 K to 80 K	1.35***	0.05	1.26	1.44
40 K to 60 K	1.46***	0.05	1.36	1.57
20 K to 40 K	1.88***	0.07	1.74	2.02
Less than 20 K	1.95***	0.09	1.78	2.15
Employment				
Yes	Reference			
No	1.03	0.03	0.98	1.09
Sense of belonging to community				
Very strong	Reference			
Somewhat strong	1.07*	0.04	1.00	1.15
Somewhat weak	1.15***	0.04	1.07	1.24
Very weak	1.32***	0.07	1.19	1.46
Self-rated physical health				
Excellent	Reference			
Very good	1.07*	0.04	1.01	1.15
Good	1.21***	0.04	1.12	1.30

Table 3 (continued)

Variable	OR	SE	95% CI	
Fair	1.55***	0.08	1.40	1.71
Poor	1.61***	0.14	1.36	1.90
Self-rated mental health				
Excellent	Reference			
Very good	1.05	0.03	0.99	1.12
Good	1.14***	0.04	1.07	1.23
Fair	1.35***	0.07	1.22	1.50
Poor	1.53***	0.14	1.28	1.84
Log likelihood	−3433.233			
AIC	6938.466			
BIC	7225.519			

SE Standard errors

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

(OR = 1.19, $p < 0.01$), Alberta (OR = 1.28, $p < 0.001$), and British Columbia (OR = 1.12, $p < 0.05$) was positively correlated with child food insecurity. The direction of the association between household size and child food insecurity reversed at the multivariate level. Children living in households with five or more (OR = 1.35, $p < 0.001$) and four (OR = 1.19, $p < 0.01$) members were now significantly more likely to be food insecure than those in households with two people. Similarly, children in households, where the highest level of education among adults was secondary education or lower had a higher chance of being food insecure than their counterparts with tertiary education. In addition, higher income households were still less likely to report child food insecurity. Households with the adult respondents having a very weak (OR = 1.32, $p < 0.001$) and somewhat weak (OR = 1.15, $p < 0.001$) sense of belonging to a community (OR = 1.07, $p < 0.05$) were still more likely to report child food insecurity than those with a very strong sense of community belonging. Finally, children in households, where the adult respondent reported poor self-rated physical and mental health had higher odds of being food insecure than those living in households, where the adult respondents had excellent self-rated physical and mental health.

Discussion

The study examined the correlates of child food insecurity in Canada using data from the 2017–2018 CCHS. Child food insecurity is primarily a consequence of parent's inability to provide food [10, 32]. This inability, is typically an outcome of a complex blend of socio-economic factors. Notwithstanding growing literature on household food security in the Global North [8, 30, 33], child food insecurity remains less well understood.

Findings from this study show that children living in lower income households were more likely to be food insecure. This is consistent with other studies that confirmed the crucial role of income in household food security [34, 35]. Specific to child food insecurity, household income shapes the food purchasing power of parents/guardians. Thus, households with higher incomes may be in a better position to provide quality and diverse foods for child nourishment than households with lower incomes. Aside from access, income further plays a key role in the food desirability aspects of food security. Children in wealthier households may have access to different foods to choose from when compared to children from households with lower incomes, who may be restricted to consuming cheaper foods.

Children who lived with a single parent were more susceptible to food insecurity than children living with both parents. Parental support is important in child food security both in terms of food provisioning and utilization [10]. Financially, a single-parent household may indicate a single stream of income which limits the parent's purchasing power to meet all children's dietary and nutritional needs. It is, therefore, not surprising that higher income households were significantly less likely to report child food insecurity. More so, children living with a single parent, especially in divorce or the death of the other parent, may not have the adequate emotional and psychological support to efficiently utilize food. Familial social capital as expressed in the presence of a spouse at home may also improve the food security of children in the household [36]. Aside from providing support in doing groceries and helping with food preparation for children in the household, having both parents in the household may also provide constant emotional and companionship to ensure children eat regularly. Indeed previous studies have highlighted the role of familial social capital in the food consumption of the elderly [37, 38]. The buffering role of spousal support on food insecurity is even crucial for younger children who require constant parental support to be able to feed [39].

The positive association between having a weak sense of community belongingness and child food

insecurity further reinforces the potential role of social capital on household food security [33, 37]. Sense of community belonging as expressed through feeling connected, secure, and accepted in the community is an indicator of the social capital and networks which can be vital in food provisioning as demonstrated in other settings in the Global North and Global South (Dean et al., 2011; Díaz et al., 2002; Locher et al., 2005; Ogg, 2005). A sense of community enhances social support and reciprocity among community members which can promote sharing of vital resources including food. Thus, the social connections of parents who may be financially constrained can serve as fall back in getting financial assistance or in-kind food assistance to feed children. More so, having a weak sense of community belonging may also impact the emotional well-being of children and lead to poor food utilization even, where supplies are available.

Children in visible minority households were also more likely to be food insecure than those in white households. This finding is consistent with Kansanga et al. [33] and may be explained by the low-income status of visible minorities in Canada and the potential effect of racial discrimination in accessing food support programs. Given that most visible minorities are typically in lower income categories, accessing nutritious food consistently may be a challenge for such households due to low purchasing power. Although food assistance programs such as food banks are a crucial fallback for such households, visible minorities are often victims of racial discrimination, which may prevent them from accessing food from such public outlets [42].

The size of the household was also a significant predictor of the odds of child food insecurity in Canada. Larger households had high odds of child food insecurity compared to two-member households. This finding is consistent with Olabiyi & McIntyre (2014), who suggest that larger family sizes have adverse impacts on household food security outcomes. Larger family sizes may translate to increased food expenditure and competition for limited household resources among the many members. This may be particularly relevant in situations, where the majority of family members are not part of the labor force (i.e., children and older adults) and must depend on a few working individuals. This dependency burden is important to consider given that Canada's population structure reveals a significant young adult population, the majority of whom must depend on their parents for basic needs including food.

Consistent with previous studies on food security among other population sub-groups (see [8, 33, 43]), poor self-rated mental and physical health of adult respondents in the household was associated with child food insecurity. First, physical health can directly limit parents' ability to access food. For example, poor physical health may hinder parents/guardians from doing groceries and preparing meals for children. In addition, poor physical health may negatively affect parents' food purchasing power by limiting their engagement in income-generating activities. Health care may also compete with household food budgets. In the long run, food insecurity may in turn reinforce ill-health given the demonstrated bidirectional relationship between food security and health [44].

Living in Ontario, New Brunswick, Alberta, Saskatchewan, and Nova Scotia was also associated with higher odds of child food insecurity than Quebec. This is finding consistent with Leroux et al.'s (2018) analysis of food insecurity among older adults in Canada. The observed spatial differences in child food insecurity may be understood through provincial socio-economic initiatives and policies. As highlighted earlier, in Canada, food insecurity is mitigated largely by provincial support programs [30]. These programs and the associated financial packages vary, affecting households' purchasing power. The protection associated with residing in Quebec may reflect the relatively better financial support for households in the province compared to other provinces [44]. For example, Quebec has subsidized childcare and much longer paid parental leaves [43]. In addition, the Provincial Government of Quebec in 2002 initiated legislation (Act to Combat Poverty and Social Exclusion), in which the government prioritized financial support and food security [46].

Despite the relevance of this study to policy and literature on child food insecurity in Canada, the findings ought to be interpreted with consideration of a number of limitations. First, the study used a cross-sectional survey, thus limiting the study's ability to infer causality. In addition, the measure of child food insecurity was based on a self-reported measure by parents, which may not directly reflect children's actual food insecurity levels. Moreover, food insecurity is a differentiated experience, thus parents' perception of their food security may differ from children's. Given that distance to grocery stores is important in food access, a heterogeneity analysis based on distance grocery stores would have been important in further contextualizing our findings. This was, however, not possible given due to data limitations with the CCHS.

Food insecurity is also a temporal phenomenon, future research may, therefore, benefit from using longitudinal studies to understand how food insecurity may vary across different temporal periods. Another area of focus for future studies on this theme is a comparative analysis across countries in the Global North.

Conclusions and policy implications

As highlighted earlier, despite the complex set of factors that shape child food security outcomes, food insecurity in Canada is generally framed as a problem of income. In line with this income-based framing, food policy has focused largely on income support programs as a way to improve the purchasing power of low-income households. While these programs are necessary and timely as expressed through the link between household income and food insecurity in this analysis, this study makes an important contribution by demonstrating the important role of other socioeconomic factors such as visible minority status, parental living arrangement, sense of and community belonging in shaping child food insecurity. Consistent with the arguments of other scholars (e.g., [47, 48]), I argue that food insecurity is not merely a financial issue that can be addressed by providing income support to households. By extending the scope of analysis to include other conceptually relevant factors, this study contributes to the literature by going beyond commonly tested predictors of child food insecurity opens the space for more research and policy conversations on the relevance of non-monetary strategies and programs in addressing child food insecurity. While income support and other economic programs have been demonstrated to alleviate food insecurity in Canada [1, 30], this study demonstrates such income-based programs may not be sufficient in the fight to end child food insecurity. A combination of income-based initiatives and attention to constraints in the social environment may ensure a more robust fight against child food insecurity. For instance, food security policy that promotes programs to enhance the well-being and sense of community belonging of parents, particularly among low-income immigrant and minority groups may be more promising in addressing child food insecurity.

Author' contributions

MMK performed the conceptualization, methodological design, data curation, and writing of the manuscript. The author read and approved the final manuscript.

Appendix

See Table 4

Table 4 Ordinary least squares regression analysis of child food insecurity

Variable	COEF	p	95% CI	
Immigration status				
No	Reference			
Yes	− 0.01	0.57	−0.07	0.04
Visible minority status				
No	Reference			
Yes	0.11	0.00	0.05	0.16
Living arrangement				
Couple	Reference			
Lone	0.38	0.00	0.33	0.44
Other	0.00	0.93	−0.06	0.05
Household size				
2	Reference			
3	0.08	0.03	0.01	0.15
4	0.16	0.00	0.08	0.23
5 or more	0.23	0.00	0.15	0.31
Province				
Quebec	Reference			
Newfoundland And Labrador	0.14	0.01	0.04	0.24
Prince Edward Island	0.05	0.43	−0.07	0.18
Nova Scotia	0.11	0.01	0.03	0.20
New Brunswick	0.14	0.00	0.04	0.23
Ontario	0.10	0.00	0.06	0.15
Manitoba	0.03	0.44	−0.04	0.10
Saskatchewan	0.06	0.14	−0.02	0.13
Alberta	0.09	0.00	0.04	0.14
British Columbia	0.03	0.20	−0.02	0.09
Yukon	0.07	0.26	−0.05	0.20
Household education				
More than secondary education	Reference			
Secondary education	0.08	0.00	0.03	0.13
Less than secondary education	0.27	0.00	0.18	0.36
Household income				
More than $80 K	Reference			
60 K to 80 K	0.12	0.00	0.07	0.16
40 K to 60 K	0.21	0.00	0.16	0.26
20 K to 40 K	0.49	0.00	0.43	0.54
Less than 20 K	0.71	0.00	0.63	0.78
Employment				
Yes	Reference			
No	0.05	0.01	0.01	0.09
Sense of belonging to community				
Very strong	Reference			
Somewhat strong	0.02	0.25	−0.02	0.06
Somewhat weak	0.09	0.00	0.05	0.14
Very weak	0.22	0.00	0.15	0.30
Self-rated physical health				
Excellent	Reference			
Very good	0.02	0.43	−0.02	0.05
Good	0.06	0.01	0.02	0.11

Table 4 (continued)

Variable	COEF	p	95% CI	
Fair	0.39	0.00	0.31	0.46
Poor	0.59	0.00	0.46	0.72
Self-rated mental health				
Excellent	Reference			
Very good	0.04	0.03	0.00	0.08
Good	0.10	0.00	0.06	0.15
Fair	0.39	0.00	0.31	0.46
Poor	0.88	0.00	0.74	1.03

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The author declares that there are no competing interests.

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