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Food insecurity and epilepsy in a nationally representative sample

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ABSTRACT

Background: Food insecurity amongst patients with epilepsy has not been previously studied. The aim of this study was to compare the presence of food insecurity within a nationally representative sample of individuals reporting epilepsy with that within the general population.
Methods: The Canadian Community Health Survey, Cycle 3.1, is a cross-sectional survey that uses a stratified cluster sample design to obtain information on Canadians 12 years of age or older. Data on food insecurity were compared for those who reported having epilepsy and the remainder of the population.
Results: Of the 102,927 eligible survey respondents, 654 reported having epilepsy. Food insecurity was considerably more likely to be reported amongst those also reporting epilepsy with a rate of 10.8% compared with those not reporting epilepsy with a rate of 5.2% (odds ratio = 2.2, (95% CI = 1.6, 3.0)). Binary bivariate prediction of food insecurity within the population of respondents reporting epilepsy included the following: education, income, family size, and home ownership.
Conclusions: The experience of food insecurity appears to be more frequent amongst persons living with epilepsy. Whether this is related directly to epilepsy or factors within the epilepsy experience is unclear.

1 . Introduction

Food insecurity has evolved from the more loosely defined concept of hunger [1] and exists when there is limited or intermittent access to nutritionally adequate, safe, and acceptable foods, accessed in socially acceptable ways [2].

Food security should be the right of all and, as such, is a measure of society's values. Households with threatened food security report worrying about the adequacy of their food supply, running out of food, having an inability to afford balanced meals, and omitting or reducing the size of meals [3]. They are more likely to eat energy-dense foods with added saturated fats and sugars and to have less variety in their diets, consuming less fruits, vegetables, dairy products, and vitamins [3,4]. The adverse health associations of disrupted food security include hyperlipidemia, hypertension, and diabetes [5,6]. Households encountering interruptions in their food security are more likely to include children with iron-deficiency anemia, acute infections, chronic illness, and both developmental and mental health problems [7–13].

The reasons for household food insecurity in North America are many and complex. The inability to afford appropriate food choices and difficulty accessing stores are amongst the more obvious causes. In the United States, the risk is increased amongst those with low income, in households with children, and in those headed by a single man or woman [14,15]. In Canada, food insecurity is also more prevalent in low-income households, with 30% of individuals reporting that they had compromised their food intake [16]. Middle-income families are not immune to the problem. Approximately 15% of Canadians in middle-income households reported disruption in their food security to some extent during the previous year [16,17]. Divorced and separated individuals seem particularly vulnerable, with 21% experiencing food insecurity at least once during the previous year [16]. Children are also at increased risk with compromised diet reported by 14% of children less than 18 years of age compared with only 4% of seniors [16].

We hypothesized that some Canadians who report having epilepsy might encounter household food insecurity as a result of competing budgetary priorities, reduced access to transportation, and financial limitations. Patients with epilepsy are more likely to be disadvantaged by having lower educational achievements, employment, and income [18–20]. They are also more likely to have worse self-reported health [18], lower quality of life, and lower health-related quality of life [20,21].

Using a national health status survey, we examined the prevalence of household food insecurity, and its associated factors in a population of individuals reporting epilepsy within a large population-based Canadian cohort. We subsequently assessed whether this experience was unique to epilepsy or common to individuals with chronic health conditions.

2. Methods

The Canadian Community Health Survey is a cross-sectional survey that collects information related to health status, health-care utilization, and health determinants for the Canadian population. A stratified

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cluster sample design is used to obtain information on Canadians 12 years of age or older living in private dwellings in the 10 provinces and 3 territories, exclusive of persons living on First Nations Reserves or Crown lands, residents of institutions, full-time members of the Canadian Armed Forces, and residents of certain remote regions. Information has been collected every 2 years [22]. At a national level, the response rate for this iteration (Cycle 3.1) of the survey was 78.9% [23].

Our analysis was based on the Canadian Community Health Survey, Cycle 3.1 (data collection: January–December 2005) [23]. Within this survey, there are question sequences that are addressed to all respondents and sections that are addressed to specific subpopulations, generally to residents of specific provinces or health districts. All respondents were asked, "I'd like to ask about certain chronic health conditions which you may have. We are interested in "long-term conditions" which are expected to last or have already lasted 6 months or more and that have been diagnosed by a health professional. Do you have epilepsy? [24]." A subsample of respondents (81%) was subsequently asked a series of questions about their food insecurity. A summative assessment of household food security was derived, indicating whether household members were able to afford the food they needed in the previous 12 months. The questions ranged in severity from worrying about running out of food, through the unavailability of nutritious food, to children within the household not eating for the whole day. Ten of the 18 questions were specific to the experiences of adults within the household or the household in general, while the remaining eight were specific to the experiences of children in the household [25]. The Canadian food security status was adopted from the US model of food security status published by the US Department of Agriculture in 2000 [26,27].

Our analysis was limited to individuals responding yes or no to having epilepsy diagnosed by a health professional who resided in the provinces participating in the food security section and for whom a classification of either food secure household or food insecure household could be made.

The data were analyzed using STATA/SE v12 [28]. Weights were recoded to reflect the sample size (an average weight of 1). The primary analysis was to describe the prevalence of food security within the population of persons reporting epilepsy compared with the underlying population. We subsequently examined variables associated with food security within the population of persons reporting epilepsy using bivariate analysis. These variables were derived from a previous analysis by Statistics Canada on food security in Canadian households [3,16,29] and dichotomized (see Table 1) in order to maximize cell size. We also chose to include a single question on self-perceived health. In order to determine whether reduced food security is unique to persons reporting epilepsy, we developed a multivariate model of food security within the population and then assessed the impact of adding reported epilepsy and then two other reported medical conditions: asthma and diabetes.

Measures of associations are reported as odds ratios (ORs), with 95% confidence intervals. The OR results were rounded to one significant digit where appropriate. All statistics shown are for nonmissing data. With the complex sampling design of the Canadian Community Health Survey, all analyses were corrected through the use of weighting and bootstrapping. Adjustment through weighting increases generalizability and external validity to the Canadian population. Bootstrapping replicate procedures are done to accurately reflect the sample variance. Analyses were completed within "best practice" parameters outlined for analysis by Statistics Canada.

Table 1
Factors assessed for association with food insecurity.

Factor	Coding
Gender	Male, female
Age	12–44 years old, ≥45 years old
Household education	Not a secondary school graduate, ≥secondary school graduate
Marital status	Married or common law, single, widowed, separated, or divorced
Race	White, visible minority or aboriginal
Immigrant	Yes, no
Total household income	<CDN $30,000, ≥CDN $30,000
Family size	Single, multiple
Own dwelling	Yes, no
Self-perceived health	Excellent or very good, good, fair, or poor

3. Results

Of the 132,947 survey respondents, 102,927 were 12 years of age or older; resided in the Canadian provinces of British Columbia, Alberta, Ontario, Quebec, Nova Scotia, and Prince Edward Island and the Nunavut and Northwest territories (77.4% of total respondents); responded affirmatively or not to whether they had epilepsy diagnosed by a health professional (99.9% of total respondents); and had evaluable responses as to whether they resided in a food secure household or not (95.6% of eligible respondents).

Six hundred fifty-four individuals reported having epilepsy, accounting for a point prevalence of 0.6% and representing 134,900 youth and adults reporting epilepsy nationwide. A total of 5.2% of the sample was assessed as experiencing household food insecurity (95% CI = 5.0–5.4).

Household food insecurity was considerably more likely to be reported amongst those reporting epilepsy when compared with respondents not reporting epilepsy (10.8% vs. 5.2%, respectively; OR = 2.2, 95% CI = 1.6, 3.0).

When we examined variables previously shown to be associated with food insecurity within the population of individuals reporting epilepsy, several factors seemed to be associated with an increased likelihood of reporting food insecurity, namely, failure to achieve a household secondary school graduation, low total household income (<CDN $30,000), single family size; and not owning their dwelling (Table 2).

We examined our variables which had been previously associated with household food insecurity in bivariate analysis within the entire sample. Immigrant status was dropped, and the remaining variables were fitted into a logistic regression model with backward stepping, with education being dropped on the first iteration. Ultimately, a model was developed, retaining gender (female), age (12–44 years), marital status (single or widowed/separated/divorced), race (non-white), income (<CDN $30,000), family size (single), own dwelling (no), and future health (good, fair, or poor). We then independently entered the reported health condition (epilepsy, asthma, or diabetes). When reported epilepsy is entered into the model, its association may persisted with an increased rate of household food insecurity, with an OR = 1.4, 95% CI = 0.99, 2.0). The results for the other reported medical conditions are presented in Table 3.

4. Discussion

Public awareness about food insecurity has lagged behind the attention which obesity has received. Approximately 15% of US and 7.7% of Canadian households experience disruptions in their food security [30,31]. Within the United States, this number appears to be either

Table 2
Factors associated with food insecurity amongst individuals reporting epilepsy, master file, Canadian Community Health Survey, Cycle 3.1 (2005), Canada excluding Saskatchewan, Manitoba, New Brunswick, Newfoundland, and Yukon Territory.

Factor	Risk factor	Odds ratio (95% CI)	P-value
Household education	<Secondary graduate	3.2 (1.5, 6.5)	=0.002
Income (all sources)	<CDN $30,000	13.2 (5.3, 32.5)	<0.001
Family size	Single	3.4 (1.9, 6.1)	<0.001
Own dwelling	No	7.7 (4.0, 14.7)	<0.001