

Food insecurity in Canadian households

Janet Che and Jiajian Chen

Abstract

Objectives

This article examines the prevalence of food insecurity in Canada, the characteristics of people most likely to live in households lacking sufficient funds for food, and several related health problems.

Data source

The data are from the cross-sectional household component of the 1998/99 National Population Health Survey and the Food Insecurity Supplement to that survey.

Analytical techniques

Cross-tabulations were used to estimate the percentage of Canadians experiencing food insecurity and the prevalence of five selected health outcomes among people who were and were not food insecure. Multivariate logistic regression was used to assess the association of several socio-demographic and economic factors with food insecurity and to determine the association of food insecurity with the selected health outcomes.

Main results

In 1998/99, 10% of Canadians, or about 3 million people, were living in food-insecure households. Low-income households, households depending on social assistance, lone-parent families headed by women, tenants, children, and Aboriginal people had significantly high odds of experiencing food insecurity. Food insecurity was significantly associated with poor/fair health, multiple chronic conditions, obesity, distress and depression.

Key words

nutrition, food deprivation, diet

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In North America, hunger rarely reaches the drastic levels of deprivation that exist in poorer parts of the world. Consequently, to suit the North American context, researchers look beyond hunger to a broader concept, food insecurity.¹ Food insecurity tends to be a continuum, progressing from uncertainty and anxiety about the household's food supplies, to depletion of those supplies, altering the eating patterns of adults, and ultimately, when food supplies and resources are exhausted, hunger among children (see *Food insecurity*).²⁻⁴

A number of studies have examined the impact of food insecurity on nutrient intake and health.⁵⁻¹¹ Compromised nutrition can affect an individual's physical and mental health and quality of life. At the community level, the consequences of poor nutrition are felt by the health care system. Poorly nourished people are usually less resistant to infections, and they tend to heal more slowly, have more diseases and longer hospital stays, and incur higher health care costs.^{12,13}

Lack of food is not a problem generally associated with Canada. Canadians enjoy a high standard of living,¹⁴ and the prospect of hunger should be remote. Nonetheless, the number of food banks across the country continues to

increase,¹⁵ and their substantial presence suggests that food insecurity not only exists, but persists.¹⁶⁻¹⁸

Until recently, estimating the prevalence of food insecurity in Canada has been constrained by a lack of data at the national level. Several studies have been conducted, but they were based on relatively

small samples,^{10,20-22} such as food bank users, and therefore cannot be used to describe food insecurity across the country.

In 1998/99, on behalf of Human Resources Development Canada, Statistics Canada asked questions about food insecurity on the National

Methods

Data source

This analysis is based on cross-sectional data from Statistics Canada's National Population Health Survey (NPHS), weighted to represent the household population in the 10 provinces. The NPHS, which began in 1994/95, collects information about the health of the Canadian population every two years. It covers household and institutional residents in all provinces and territories, except persons living on Indian reserves, on Canadian Forces bases, and in some remote areas. The NPHS has both a longitudinal and a cross-sectional component. The analyses in this article are based on the 1998/99 (cycle 3) cross-sectional household component, which is made up mostly of longitudinal respondents and their cohabitants.

Socio-demographic and some health information was obtained for each member of participating households and is found in the General file. In-depth health information, which was collected for one randomly selected household member, as well as the information in the General file pertaining to that person, is in the Health file.

In 1998/99, individuals who were part of the longitudinal sample usually provided information on all household members for the General file, as well as in-depth health information about themselves. The overall response rate for cycle 3 was 88.2% at the household level.

For cycle 3, Statistics Canada added three questions about food insecurity to the NPHS questionnaire on behalf of Human Resources Development Canada¹⁹ to select respondents to participate in the Food Insecurity Supplement.

The analysis of the socio-demographic and economic characteristics associated with food insecurity in this article was based on the General file. Estimates from this file have the advantage of a large sample size, as they pertain to all members of selected households. The sample used for this analysis comprises the 48,952 respondents for whom food insecurity information was available (Appendix Table A).

With data from the Health file, residents of food-insecure households were compared with those in food-secure households with respect to five health outcomes. The sample for this analysis consists of the 17,226 respondents who answered the questions on food insecurity (Appendix Table B).

This article also includes data from the Food Insecurity Supplement. Respondents identified as living in food-insecure households were asked additional questions on topics such as food bank use and problems feeding children. The sample from the Supplement file used for this analysis comprises 1,265 respondents (Appendix Table C).

The estimates of individuals living in food-insecure households were similar for the three files: 10.4% from the General file, 10.2% from the Health file, and 10.1% from the Supplement file.

More detailed descriptions of the NPHS design, sample and interview procedures can be found in other reports.²³⁻²⁵

Analytical techniques

Cross-tabulations were used to estimate the percentage of people living in food-insecure households and the prevalence of five health outcomes among people who were and were not food insecure: self-reported poor or fair health, multiple chronic conditions, obesity, high distress, and depression. Multiple logistic regression was used to assess relationships between selected factors and food insecurity. Based on a review of the literature and availability from the NPHS, several variables were included in the regression model: age, sex, household income, major source of income, household type, home ownership, marital status, immigrant status, and Aboriginal status. The regression models for associations between the five health outcomes and "any" food insecurity controlled for age, sex and household income. The standard errors for the prevalence and odds ratios of food insecurity and health outcomes were calculated using the bootstrap technique, which fully accounts for the design effects of the NPHS.²⁶⁻²⁸

Population Health Survey (NPHS) in order to select respondents to participate in a Food Insecurity Supplement. The result was data from a nationally representative sample (see *Methods* and *Definitions*). This article uses those data to examine the extent and possible determinants of food insecurity, several related health outcomes, and the use of food banks, soup kitchens or other charitable agencies by people who were food insecure.

One in ten affected

Food insecurity tends to follow a predictable sequence, from worrying about not having enough money to buy food, to compromising the quality, and then the quantity, of food.²⁹

Food insecurity

Substantial effort has been devoted to defining and measuring food insecurity.^{2,30-33} A widely accepted definition is that of the Life Sciences Research Office of the Federation of American Societies for Experimental Biology.³⁴ It states that *food insecurity* exists “whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain.” *Food security* is “assured access at all times to enough food for an active, healthy life.”

Respondents to the National Population Health Survey were considered to be living in a food-insecure household if they answered “yes” to at least one of the following questions:

In the past 12 months, did you or anyone in your household:

- (1) worry that there would not be enough to eat because of a lack of money?
- (2) not eat the quality or variety of foods that you wanted because of a lack of money?
- (3) not have enough food to eat because of a lack of money?

Response patterns to food insecurity questions generally follow this progression. That is, people who reply affirmatively to a question at a given level of food insecurity also reply affirmatively to the questions at less severe levels.³⁵

For this analysis, respondents who reported only that they had worried about not having enough to eat because of a lack of money (question 1) were considered to be “worried.” Those who answered “yes” to questions (2) or (3) were defined as having a “compromised diet,” whether the reduction was in quality or quantity of food.

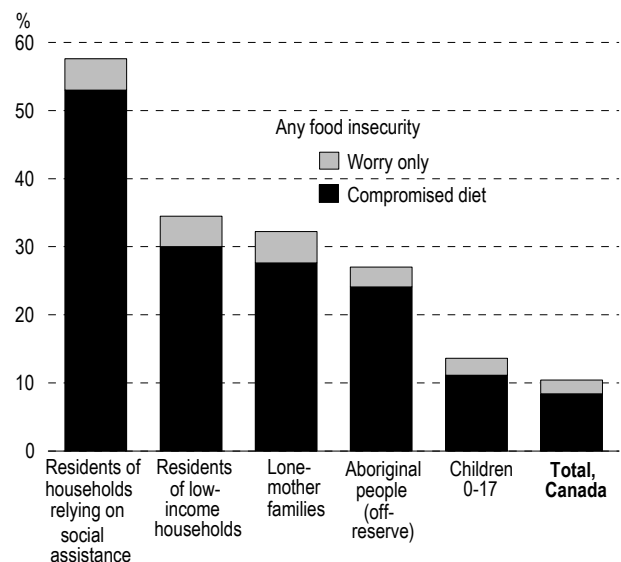
According to the 1998/99 NPHS, over 10% of Canadians, or an estimated 3 million people, were living in food-insecure households (Table 1). That is, because of a lack of money, at least once in the previous 12 months they worried that there would not be enough to eat, and/or they did not eat the variety or quality of food that they wanted, and/or they did not have enough to eat.

When those who worried about having enough money to buy food but who had not experienced compromised quality and/or quantity of food were excluded, the prevalence of food insecurity dropped to 8%.

Associated with household income

Since food insecurity is defined as stemming from a lack of money, it was strongly associated with household income. Close to 35% of people in low-income households reported some form of food insecurity in 1998/99 (30% had compromised their food intake) (Chart 1; Table 1). However, consistent with findings from the United States,^{36,37} food insecurity was not limited to low-income households. About 14% of people in middle-income households

Chart 1
Prevalence of food insecurity, by level and selected characteristics, household population, Canada excluding territories, 1998/99



Data source: 1998/99 National Population Health Survey, cross-sectional sample, General file

Definitions

Information on age at the time of the 1998/99 National Population Health Survey (NPHS) interview was collected for each member of participating households. For this analysis, four *age groups* were established: 0 to 17, 18 to 44, 45 to 64, and 65 or older.

Household income groups were based on household size and total household income from all sources in the 12 months before the interview. The following income groups were derived:

Household income group	People in household	Total household income
Low	1 or 2	Less than \$14,999
	3 or 4	Less than \$19,999
	5 or more	Less than \$29,999
Middle	1 or 2	\$15,000 to \$29,999
	3 or 4	\$20,000 to \$39,999
	5 or more	\$30,000 to \$59,999
Upper-middle/High	1 or 2	\$30,000 or more
	3 or 4	\$40,000 or more
	5 or more	\$60,000 or more

Major source of income was grouped into five categories: wages, salaries, self-employment; Employment Insurance (EI), Workers' Compensation, Child Tax Benefit, support, alimony, none; social assistance, welfare; Canada or Québec Pension Plan (CPP or QPP), Old Age Security (OAS), Guaranteed Income Supplement (GIS); and other (for example, dividends and interest, rental income, scholarships).

Based on the relationship of each respondent to other household members, six *household types* were defined: couple with child(ren) younger than 25; couple without child(ren) younger than 25; lone mother with child(ren) younger than 25; lone father with child(ren) younger than 25; unattached individual; and others.

Home ownership refers to whether the respondent resided in an owned or rented dwelling.

Respondents were asked their *marital status*. Five groups were established: married; common-law (including living with partner); single (never-married); widowed; and divorced or separated.

Immigrant status was defined by place of birth. For this analysis, immigrants who had been in Canada for less than 10 years were considered to be recent immigrants.

Aboriginal status was based on responses to NPHS questions on race (or colour) and the ethnic (or cultural) groups with which respondents identified. Those who indicated Native or Aboriginal peoples of North America, such as North American Indian, Métis, Inuit or Eskimo, were considered to be Aboriginal persons. The NPHS includes only Aboriginal people living off reserves.

Respondents rated their health as excellent, very good, good, fair or poor. For this analysis, two categories were established: poor/fair and good/very good/excellent.

Respondents were asked if they had chronic conditions that had lasted or were expected to last six months or more and that had been diagnosed by a health professional. The conditions listed were: food allergies, other allergies, asthma, arthritis or rheumatism, back problems, high blood pressure, migraine headaches, chronic bronchitis or emphysema, sinusitis, diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, effects of stroke, urinary incontinence, bowel disorders, Alzheimer's disease or other dementia, cataracts, glaucoma, thyroid condition, and any other long-term condition. In this article, respondents were considered to have *multiple chronic conditions* if they reported having at least three.

Body mass index (BMI), which was calculated by dividing weight in kilograms by the square of height in metres, was grouped into two categories: *obese* (BMI of 30 or more) and not obese. Values were calculated for all age groups except pregnant women.

The distress index was based on six questions. Respondents were asked: "During the past month, how often did you feel: so sad that nothing could cheer you up? nervous? restless or fidgety? hopeless? worthless? that everything was an effort?" The response options—all of the time, most of the time, some of the time, a little of the time, and none of the time—were given weights of 5, 4, 3, 2, and 1, respectively. The index was the sum of the assigned weights from the six questions. Respondents scoring 7 or more were classified as having *distress*; this amounted to about 12% of the respondents who answered the food insecurity questions.

Using the methodology of Kessler et al.,³⁸ the NPHS identifies a major depressive episode (MDE) with a subset of questions from the Composite International Diagnostic Interview. These questions cover a cluster of symptoms for depressive disorder that are listed in the *Diagnostic and Statistical Manual of Mental Disorders (DSM III-R)*.³⁹ Responses to these questions were scored on a scale and transformed into a probability estimate of a diagnosis of MDE. If the estimate was 0.9 (90% certainty of a positive diagnosis), the respondent was considered to have experienced *depression* in the previous 12 months.

The Food Insecurity Supplement to the 1998/99 NPHS asked respondents identified as food insecure: "In the past 12 months, how often did you or anyone else in your household receive food from a food bank, soup kitchen or other charitable agency because there was not enough money for food?" The response options were: often, sometimes and never. Those who had used *food assistance* were asked if this happened mostly at the end of the month.

The Supplement also contained questions about children younger than 16 who were living in food-insecure households. Responsible adults were asked if, because of a lack of money, in the past year: he/she worried that he/she could not afford to feed the child(ren); if he/she was unable to give the child(ren) balanced meals; if she/he had to reduce the size of the child(ren)'s meals; if the child(ren) missed any meals; or if the child(ren) had ever been hungry. In this analysis, a three-level hierarchy was used to determine the *food security status of children*: food-secure; worry only; and compromised diet.

Table 1
Prevalence of food insecurity, by level and selected characteristics, household population, Canada excluding territories, 1998/99

	Estimated population	Level of food insecurity	
		Any	Compromised diet
	'000		%
Total	29,439	10.4	8.4
Sex			
Males	14,587	9.9*	8.0*
Females†	14,852	10.8	8.8
Age group			
0-17	7,091	13.6*	11.1*
18-44	12,200	11.9*	9.7*
45-64	6,666	7.5*	6.0*
65+†	3,481	3.9	3.2
Household income			
Low	3,886	34.5*	30.1*
Middle	7,361	14.3*	11.5*
Upper-middle/High†	16,202	3.3	2.3
Missing	1,990	5.7*	4.6*
Major source of income			
Wages, salaries, self-employment†	22,628	8.1	6.2
EI, Worker's Compensation, Child Tax Benefit, support, alimony, none	497	27.7*	23.3*
Social assistance, welfare	1,270	57.6*	53.0*
CPP, QPP, OAS, GIS	4,008	5.8*	4.8*
Other	1,034	10.3	8.7
Household type			
Couple with child(ren) < 25†	15,564	8.5	6.6
Couple without child(ren) < 25	6,602	5.5*	4.3*
Lone mother with child(ren) < 25	2,185	32.2*	27.6*
Lone father with child(ren) < 25	397	16.9*	13.2*
Unattached individual	4,096	13.0*	11.3*
Other	595	9.9	7.8
Home ownership			
Owner†	21,099	5.8	4.5
Tenant	8,315	21.9*	18.4*
Missing	25	--	--
Marital status			
Married†	12,539	6.5	5.1
Common-law/With partner	1,531	11.7*	9.1*
Single (never married)	12,111	12.9*	10.6*
Widowed	1,383	7.1	5.9
Divorced/Separated	1,874	21.3*	18.2*
Missing	--	--	--
Immigration status			
Canadian-born†	24,110	10.5	8.6
Immigrated 0-9 years	1,621	13.0	11.1
Immigrated 10+ years	3,660	8.2*	6.4*
Missing	47	--	--
Aboriginal status			
Yes	789	27.0*	24.1*
No†	28,650	9.9	8.0

Data source: 1998/99 National Population Health Survey, cross-sectional sample, General file

Note: Because of rounding, detail may not add to totals.

† Reference category

* Significantly different from reference category ($p \leq 0.05$)

-- Sample size too small to provide reliable estimate

were food insecure to some extent at least once in the previous year (nearly 12% reported having compromised their diet).

Of course, many other factors may be related to both food insecurity and household income: sex, age, source of income, household type, home ownership, marital status, immigrant status, and Aboriginal status, for instance. But even when these factors were taken into account, household income remained significantly associated with food insecurity (Table 2). The odds that people in low-income households would report experiencing food insecurity at least once in the past year were about 8 times those for people in upper-middle/high-income households. Even residents of middle-income households had over 4 times the odds of being food insecure, compared with those in more affluent households.

The reason why food insecurity exists at higher income levels may have to do with the fact that annual income is a static measure and may not be sensitive to sudden economic changes that contribute to temporary bouts of food insecurity.³⁶ For instance, the impact of a job loss or the death of the sole breadwinner around the time of the NPHS interview would not be reflected in reported income, which covered the previous 12 months.

Varies by source of income

People in households relying on social assistance were at much greater risk of experiencing food insecurity than those in households depending on other income sources (Table 1). The prevalence of at least one episode of food insecurity was 58% for residents of households where the major source of income was social assistance. Food insecurity was also relatively common among people in households dependent upon Employment Insurance, Workers' Compensation, Child Tax Benefit, support or alimony, or with no income (28%). Even when the other factors such as household income and age were taken into consideration, residents of households depending on social assistance, Employment Insurance, Workers' Compensation, Child Tax Benefit, support or alimony, or with no income had significantly high odds of food

Table 2
Adjusted odds ratios for food insecurity, by level and selected characteristics, household population, Canada excluding territories, 1998/99

	Any food insecurity		Compromised diet	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Sex				
Males	1.06	0.99, 1.15	1.07	0.98, 1.17
Females†	1.00	...	1.00	...
Age group				
0-17	4.82*	3.32, 7.00	4.86*	3.18, 7.42
18-44	4.22*	3.07, 5.81	4.32*	2.98, 6.25
45-64	2.71*	2.04, 3.60	2.75*	2.00, 3.79
65+†	1.00	...	1.00	...
Household income				
Low	7.96*	6.21, 10.20	8.79*	6.51, 11.87
Middle	4.31*	3.50, 5.30	4.86*	3.78, 6.25
Upper-middle/High†	1.00	...	1.00	...
Major source of income				
Wages, salaries, self-employment†	1.00	...	1.00	...
EI, Workers' Compensation, Child Tax Benefit, support, alimony, none	1.71*	1.15, 2.56	1.79*	1.12, 2.84
Social assistance, welfare	3.06*	2.32, 4.03	3.43*	2.60, 4.52
CPP, QPP, OAS, GIS	0.93	0.71, 1.22	1.02	0.76, 1.37
Other	1.02	0.71, 1.46	1.08	0.73, 1.57
Household type				
Couple with child(ren) <25†	1.00	...	1.00	...
Couple without child(ren) <25	0.98	0.78, 1.23	1.01	0.78, 1.31
Lone mother with child(ren) <25	1.41*	1.10, 1.81	1.39*	1.07, 1.80
Lone father with child(ren) <25	1.02	0.59, 1.78	0.92	0.50, 1.70
Unattached individual	0.95	0.74, 1.24	1.08	0.81, 1.43
Other	0.99	0.58, 1.71	0.99	0.55, 1.77
Home ownership				
Owner†	1.00	...	1.00	...
Tenant	2.01*	1.67, 2.41	1.91*	1.56, 2.33
Marital status				
Married†	1.00	...	1.00	...
Common-law/With partner	1.06	0.80, 1.41	1.02	0.76, 1.38
Single (never married)	0.79*	0.66, 0.93	0.80*	0.66, 0.95
Widowed	1.04	0.75, 1.44	0.98	0.70, 1.38
Divorced/Separated	1.45*	1.20, 1.75	1.41*	1.15, 1.73
Immigration status				
Canadian-born†	1.00	...	1.00	...
Immigrated 0-9 years	0.66*	0.49, 0.88	0.71*	0.52, 0.98
Immigrated 10+ years	1.05	0.87, 1.28	1.02	0.81, 1.27
Aboriginal status				
Yes	1.48*	1.08, 2.05	1.62*	1.16, 2.26
No†	1.00	...	1.00	...

Data source: 1998/99 National Population Health Survey, cross-sectional sample, General file

Notes: Analysis is based on the sample of 48,872 who answered the questions on food insecurity and the other covariates. A missing category for the household income variable was included in the model to maximize sample size, but the odds ratios are not shown.

† Reference category, for which odds ratio is always 1.00

... Not applicable

* $p \leq 0.05$

insecurity, compared with those in households that relied on employment income (Table 2).

Few people in households depending on employment (wages, salaries or self-employment) or government pension income (Canada Pension Plan/ Québec Pension Plan, Old Age Security, Guaranteed Income Supplement) reported having experienced food insecurity in the previous year.

Lone-parent households at high risk

The variations in the prevalence of food insecurity by level and source of household income suggest which groups are at risk. Many lone-parent households, particularly those headed by women, have low incomes and depend on social assistance. Consequently, it is not surprising that 32% of lone-mother households had been food insecure to some extent in the previous year, and 28% reported a compromised diet (Table 1). While the corresponding rates were only about half this high in households headed by male lone-parents (17% and 13%), they were still well above the national figures. When household income, source of income, and the other factors were taken into account, the odds that people in lone-mother households would experience food insecurity were about one and a half times those for people in couple-with-child households (Table 2).

Food insecurity was also relatively common among unattached individuals (13%). However, this high percentage largely reflects the fact that unattached individuals often have other characteristics associated with food insecurity. When these characteristics were taken into account, the odds that unattached individuals would live in a food-insecure household were no greater than the odds for couples with children.

Divorced/Separated vulnerable

To some extent, the prevalence of food insecurity by household type reflects marital status. More than one in five (21%) divorced or separated people, many of whom were lone parents, lived in households that had experienced food insecurity at least once in the past year (Table 1). Food insecurity was also relatively common among single people (13%). By

contrast, just 7% of married people lived in food-insecure households.

When household income, household type and the other factors were taken into account, the odds that divorced or separated people would experience food insecurity were about one and a half times the odds for married people, but the odds for single people were actually significantly low.

More prevalent among children

Children were the age group most likely to live in food-insecure households, while seniors were least likely to do so. In 1998/99, about 14% of children younger than 18 were in where there had been at least one instance of food insecurity in the past year, and 11% were in households reporting a compromised diet (Table 1). At ages 18 to 44, the figures were only slightly lower: 12% and 10%, respectively. By contrast, just 4% of seniors were in food-insecure households, and only 3% were in households where diet had been compromised (see *Limitations*).

Even when the other potentially confounding factors such as household income and household type were considered, children still had almost 5 times the odds of living in a food-insecure household as did seniors (Table 2). But children in such households are not necessarily undernourished. Adult caregivers tend to sacrifice their own diet so that children will not be hungry.²⁹ In fact, data from the Food Insecurity Supplement to the 1998/99 NPHS indicate that fully half of children younger than 16 in food-insecure households were food secure, and another fifth experienced worry only. However, the remaining 29% had compromised their diet (data not shown).

To some degree, the low prevalence of food insecurity among seniors may be related to the tendency for calorie needs and food consumption to decline with age.⁴⁰ Nonetheless, it is unclear if seniors were more reluctant than other age groups to state that they did not have enough to eat, which would contribute to a lower estimate of food insecurity.⁴¹

Less risk for home owners

Given that food insecurity is defined in the context of a lack of money, it is not surprising that it was uncommon among people who owned a home. Just 6% of home owners reported at least one episode of food insecurity in the past year, and about 5% reported a compromised diet (Table 1). On the other hand, 22% of people in rented dwellings had at least some degree of food insecurity, and for 18% of them, diet was compromised. Even when factors such as household income and age were considered, those in rented dwellings had twice the odds of experiencing food insecurity as did individuals in owned units. This echoes US research showing that home owners are less likely than tenants to have insufficient food.^{36,42}

Limitations

In some respects, the number of people experiencing food insecurity is likely to be underestimated by the National Population Health Survey (NPHS). The NPHS is household-based and thereby excludes homeless people among whom food insecurity is high. Also, because food insecurity is defined as lacking funds for food, this analysis may underestimate the percentage of seniors who were food insecure. Seniors may have other risk factors that can contribute to food insecurity: health problems, disabilities, and functional impairments that limit one's ability to purchase food or prepare meals.

On the other hand, all members of a food-insecure household are not necessarily food insecure. The person chosen to respond to the NPHS provided information on behalf of everyone in the household. The degree of food insecurity that person reported was applied to all household members, whether or not they had the same experience.

Because this analysis is based on cross-sectional data, relationships between variables can be described, but causality cannot be inferred. As well, the cross-sectional nature of the data means that long-term consequences of food insecurity cannot be assessed.

Finally, the three screening questions focus on "lacking sufficient funds for food." Dimensions of food insecurity such as the length of deprivation or its periodicity are not covered.

Low among immigrants/High among Aboriginal people

It might be expected that recent immigrants (those who came to Canada within the last 10 years) would be more likely than the Canadian-born population to feel financial pressure as they adjust to a new culture. They may therefore be more at risk of food insecurity. However, the proportion of recent immigrants reporting at least one episode of food insecurity in the past year was not significantly higher than the figure among the Canadian-born (13% versus 11%) (Table 1). In fact, when the other factors were taken into account, recent immigrants actually had lower odds of living in a food-insecure household than did the Canadian-born (Table 2).

By contrast, the prevalence of food insecurity was high among Aboriginal people living off reserves. More than one-quarter (27%) reported at least some food insecurity, and 24% experienced a compromised diet (Table 1). Even controlling for the other factors, the odds that Aboriginal people would live in a food-insecure household were about one and a half times those for non-Aboriginal people.

Food insecurity and health

Inadequate nutrition is significantly correlated with food insecurity.^{5,6,11,43} In turn, prolonged inadequate nutrition that may derive from food insecurity can have serious health implications. For example, poor nutrition in children can affect the development of the intellectual, social and emotional skills needed to function in society.^{44,45} During infancy and childhood, poor nutrition is related to growth retardation and impaired psychomotor development.⁴⁶ Inadequate nutrition has also been associated with decreased ability to concentrate and poor school performance.⁴⁷

At any age, insufficient consumption of fruits and vegetables can put individuals at greater risk of chronic diseases such as cancer and cardiovascular disease.⁴⁸ A deficiency in nutrients such as zinc, copper, selenium, and Vitamins A, C and D can compromise the immune system and increase susceptibility to infections.^{49,50}

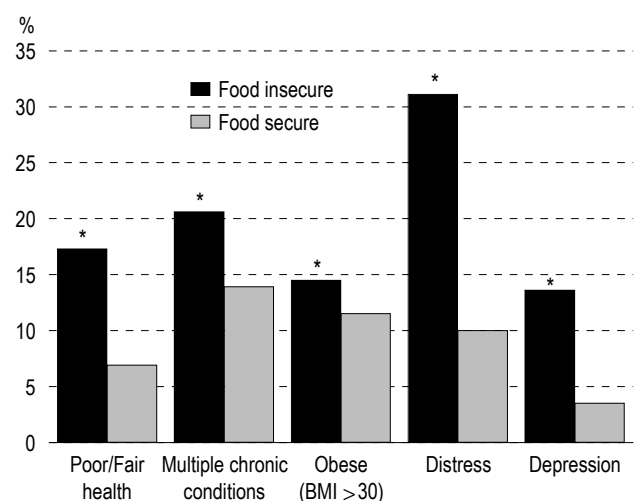
Seniors are at particular risk. Malnutrition in older people results in loss of muscle mass and strength, which can lead to disability and loss of independence.⁵¹ A compromised immune system also leaves elderly people more susceptible to pneumonia and other infections that may be life-threatening.⁵¹

According to the 1998/99 NPHS, several health problems were more prevalent among residents of food-insecure households than among people in households where the ability to pay for food was not a concern (Chart 2). Those in food-insecure households were significantly more likely to describe their health as “fair” or “poor”: 17% versus 7%. This disparity held even when the effects of age, sex and household income were taken into account (Table 3).

A comparatively high percentage—21%—of residents of food-insecure households reported having at least three chronic conditions. The figure was significantly less (14%) for those in food-secure households, and remained so when age, sex and household income were considered.

Paradoxically, food insecurity is associated with obesity. Some research has shown food-insecure people to be more likely to binge eat or choose

Chart 2
Prevalence of selected health outcomes, by food security status, household population, Canada excluding territories, 1998/99



Data source: 1998/99 National Population Health Survey, cross-sectional sample, Health file

* Significantly higher than food secure ($p \leq 0.05$)

higher calorie foods when food is available.^{43,52,53} Other studies found that women in food-insecure households had, on average, a higher body mass index (BMI) than those in food-secure household.^{54,55} NPHS data, too, show that 15% of residents of food-insecure households were obese (a BMI of 30 or more), a significantly higher percentage than for residents of food-secure households (12%). When age, sex and household income were taken into account, food-insecure people still had significantly higher odds of being obese.

Worry that food is running out can create emotional upset.^{10,56,57} In 1998/99, 31% of people in food-insecure households reported distress, compared with 10% in food-secure households. As well, 14% of residents of food-insecure households reported symptoms suggesting a high probability of having had a major depressive episode in the previous year, compared with just 4% of residents

of food-secure households. Even controlling for age, sex and household income, the odds that food-insecure people would experience distress or a major depressive episode were at least three times the odds for people who were food-secure.

Food banks, soup kitchens

Past research has shown that about 20% of food-insecure or economically disadvantaged people use food banks.^{56,58} Similarly, the 1998/99 Food Insecurity Supplement to the NPHS found that 22% of respondents in food-insecure households had sought help from food banks, soup kitchens or other charitable agencies in the past year (19% reported occasional use; 3% used food assistance often) (data not shown). Use of food assistance, of course, may be related to accessibility. Some municipalities may not offer such services, and in those that do, many people who are food insecure may live some distance away.

For people with limited budgets, money is most likely to be scarce near the end of the month. In fact, the majority who used food assistance (60%) reported receiving it mainly at the end of the month (data not shown).

Table 3
Adjusted[†] odds ratios for selected health outcomes, by food security status, household population, Canada excluding territories, 1998/99

	Odds ratio	95% confidence interval
Poor/Fair health		
Food secure [‡]	1.0	...
Food insecure	3.2*	2.6, 4.0
Multiple chronic conditions		
Food secure [‡]	1.0	...
Food insecure	2.2*	1.8, 2.7
Obese (BMI ≥ 30)		
Food secure [‡]	1.0	...
Food insecure	1.5*	1.2, 1.8
High distress		
Food secure [‡]	1.0	...
Food insecure	3.2*	2.7, 3.8
Depression		
Food secure [‡]	1.0	...
Food insecure	3.7*	2.9, 4.7

Data source: 1998/99 National Population Health Survey, cross-sectional sample, Health file

Note: Analyses are based on the sample of 17,226 who answered the questions on food insecurity, health and the other covariates.

[†] Adjusted for age, sex and household income

[‡] Reference category, for which odds ratio is always 1.00

... Not applicable

* $p \leq 0.05$

Concluding remarks

Estimates of the extent of food insecurity in Canada from the 1998/99 National Population Health Survey establish a benchmark for future monitoring. Overall, about 1 in 10 Canadians were living in food-insecure households in 1998/99, and 8% reported that they had compromised their diet.

The factors shown to be associated with food insecurity in this analysis are consistent with earlier US studies.^{36,42} Compromised diets were particularly prevalent among specific groups: households depending on social assistance, low-income households, lone-mother families, off-reserve Aboriginal people, and children.

Children in food-insecure households are a particular concern because more than adults, they need calories and nutrients. And while the NPHS shows that the majority of children in food-insecure households are not undernourished, over one-quarter had compromised their diet.

Although a cross-sectional analysis such as this cannot determine causality, it does identify socio-economic correlates of food insecurity—information that is essential for planning preventive strategies and devising measures to reach the population at risk. As well, food insecurity was shown to be associated with health problems, both physical and emotional. Thus, efforts to reduce food insecurity might eventually contribute to reductions in the costs of treating the associated medical problems. ●

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Appendix

Table A

Distribution of selected characteristics, household population, cross-sectional sample, General file, National Population Health Survey, Canada excluding territories, 1998/99

	Sample size	Estimated population	
		'000	%
Total	48,952	29,439	100.0
Sex			
Males	23,902	14,587	49.6
Females	25,050	14,852	50.5
Age group			
0-17	14,472	7,091	24.1
18-44	19,868	12,200	41.4
45-64	9,891	6,666	22.6
65+	4,721	3,481	11.8
Household income			
Low	6,569	3,886	13.2
Middle	13,343	7,361	25.0
Upper-middle/High	25,874	16,202	55.0
Missing	3,166	1,990	6.8
Major source of income			
Wages, salaries, self-employment	38,968	22,628	76.9
EI, Workers' Compensation, Child Tax Benefit, support, alimony, none	823	4,971	1.7
Social assistance, welfare	2,123	1,270	4.3
CPP, QPP, OAS, GIS	5,621	4,008	13.6
Other	1,417	1,034	3.5
Household type			
Couple with child(ren) <25	30,565	15,564	52.9
Couple without child(ren) <25	9,172	6,602	22.4
Lone mother with child(ren) <25	3,727	2,185	7.4
Lone father with child(ren) <25	518	397	1.4
Unattached individual	4,100	4,096	13.9
Other	870	595	2.0
Home ownership			
Owner	37,471	21,099	71.7
Tenant	11,460	8,315	28.3
Missing	21	25	0.1
Marital status			
Married	20,910	12,539	42.6
Common-law/With partner	2,489	1,531	5.2
Single (never married)	21,435	12,111	41.1
Widowed	1,817	1,383	4.7
Divorced/Separated	2,300	1,874	6.4
Missing	1	--	--
Immigration status			
Canadian-born	42,382	24,110	81.9
Immigrated 0-9 years	2,135	1,621	5.5
Immigrated 10+ years	4,377	3,660	12.4
Missing	58	47	0.2
Aboriginal status			
Yes	1,635	789	2.7
No	47,317	28,650	97.3

Note: Because of rounding, detail may not add to totals. As a result of sampling variation, estimates in the General file, Health file and Food Insecurity Supplement are not identical.

-- Sample size too small to provide reliable estimate

Table B

Distribution of selected characteristics, household population, cross-sectional sample, Health file, National Population Health Survey, Canada excluding territories, 1998/99

	Sample size	Estimated population	
		'000	%
Total	17,226	29,469	100.0
Sex			
Males	8,015	14,585	49.5
Females	9,211	14,884	50.5
Age group			
0-17	3,087	6,927	23.5
18-44	7,194	12,383	42.0
45-64	4,096	6,675	22.7
65+	2,489	3,484	11.8
Household income			
Low	2,781	3,870	13.1
Middle	4,625	7,375	25.0
Upper-middle/High	8,730	16,202	55.0
Missing	1,090	2,022	6.9
Food insecurity			
Yes	1,837	2,992	10.2
No	15,389	26,477	89.8

Note: Because of rounding, detail may not add to totals. As a result of sampling variation, estimates in the General file, Health file and Food Insecurity Supplement are not identical.

Table C

Age distribution of population in food-insecure households, cross-sectional sample, Food Insecurity Supplement, National Population Health Survey, Canada excluding territories, 1998/99

	Sample size	Estimated population	
		'000	%
Total	1,265	3,015	100.0
Age group			
0-15	296	853	28.3
16-64	906	2,038	67.6
65+	63	123	4.1

Note: Because of rounding, detail may not add to totals. As a result of sampling variation, estimates in the General file, Health file and Food Insecurity Supplement are not identical.