Prevalence of affirmative responses to questions of food insecurity: International Polar Year Inuit Health Survey, 2007–2008

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ABSTRACT

Objectives. Assess the prevalence of food insecurity by region among Inuit households in the Canadian Arctic.

Study design. A community-participatory, cross-sectional Inuit health survey conducted through face-to-face interviews.

Methods. A quantitative household food security questionnaire was conducted with a random sample of 2,595 self-identified Inuit adults aged 18 years and older, from 36 communities located in 3 jurisdictions (Inuvialuit Settlement Region; Nunavut; Nunatsiavut Region) during the period from 2007 to 2008. Weighted prevalence of levels of adult and household food insecurity was calculated.

Results. Differences in the prevalence of household food insecurity were noted by region, with Nunavut having the highest prevalence of food insecurity (68.8%), significantly higher than that observed in Inuvialuit Settlement Region (43.3%) and Nunatsiavut Region (45.7%) (p<0.01). Adults living in households rated as severely food insecure reported times in the past year when they or other adults in the household had skipped meals (88.6%), gone hungry (76.9%) or not eaten for a whole day (58.2%). Adults living in households rated as moderately food insecure reported times in the past year when they worried that food would run out (86.5%) and when the food did not last and there was no money to buy more (87.8%).

Conclusions. A high level of food insecurity was reported among Inuit adults residing in the Canadian Arctic, particularly for Nunavut. Immediate action and meaningful interventions are needed to mitigate the negative health impacts of food insecurity and ensure a healthy Inuit population.

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INTRODUCTION

The Inuit Health Survey conducted as part of the International Polar Year (IPY) 2007–2008 provided a unique opportunity for a comprehensive and uniform assessment of health, socio-economic status, dietary habits and food security in 36 communities in the Canadian Arctic. The IPY Inuit Health Survey was designed to provide communities and organizations with a unique glimpse into the depth and the severity of food insecurity among Inuit, and to aid in the development of public health interventions.

The National Aboriginal Health Organization defines food security as a condition where all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice (1). To be food secure, individuals and households must be able to reliably access food via income levels that are sufficient to offset the high cost of food (2,3), and must have access to a sufficient supply of nutritious market and traditional food at the community level (4).

Inuit residing in the Canadian Arctic suffer disproportionately from food insecurity when compared to the general Canadian population (5). A number of studies have previously reported high levels of food insecurity among Inuit living in isolated, northern communities (6–9). Results from the Nunavut Inuit Child Health Survey, conducted in 2007 and 2008, recently reported that a substantial proportion of children aged 3 to 5 years old were living in food insecure households (10). In other study populations, food insecurity has been identified as being associated with poor nutrition, poor physical and mental health (11,12), poor self-reported health and an increase of self-reported chronic health problems, including heart disease, diabetes, high blood pressure and food allergies (13).

Without proper access to nutritious and sufficient food, a population's health and well-being is compromised (11,12,14–16). Numerous studies have described the nutritional and cultural transitions under way in Canada's Inuit communities and their implications for increasing the burden of disease associated with poor diet (17–20). Traditionally sustained by nutrient-dense country foods such as caribou, fish, whale and seal, the current trend in Arctic populations is characterized by an increased consumption of energy-dense and highly processed market foods, which contribute to reduced diet quality and nutrient intakes when traditional food is not consumed (17–18,20–22). In addition, the environmental changes resulting from climate change are influencing the nutritional content of Inuit diets as they impact the availability and accessibility of traditional foods (9,23–25). Considering the varied factors influencing diet, food security has emerged as a significant health priority for Inuit populations.

This study assessed the prevalence of food insecurity among Inuit adults from 36 communities in the Canadian Arctic. In these communities, we identified a weighted prevalence of moderately food insecure households of 33.6%, and severely food insecure households of 29.1%, with a total household food insecurity prevalence rate of 62.6% (26). The current paper explores regional differences in adult, child and total household food insecurity prevalence rates and presents the item-by-item affirmative response prevalence to the 18-item questionnaire used to assess food insecurity.
MATERIAL AND METHODS

A cross-sectional Inuit health survey was conducted in the late summer and fall of 2007 and 2008, in 36 communities (33 coastal and 3 land-based communities) within 3 jurisdictions: Inuvialuit Settlement Region (ISR), Nunavut and Nunatsiavut (Fig. 1), details of which are described elsewhere (20,27). The communities were located between the latitudes of 54°10’N and 76°25’N. All non-pregnant, self-identified Inuit adults 18 years of age and older were eligible to participate. Adults were recruited using community housing lists. Stratified random sampling was carried out by trained research staff; communities were strata and homes were randomized using either a computerized random generation of numbers or a random digit table. The survey was developed with the participation of members of the steering committee of each jurisdiction. The steering committees included members from the government health agencies responsible for public health in each jurisdiction, community representatives, land-claim organizations, the University of Toronto and the Centre for Indigenous Peoples’ Nutrition and Environment (CINE) at McGill University. Details of steering committee membership are provided elsewhere (http://www.inuithealthsurvey.ca/?nav=home). The committees reviewed and developed questionnaires and facilitated all aspects of the survey work. Scientific research licences were obtained from the Nunavummi Qaujisaqtulirijikkut (Nunavut Research Institute) and from the Aurora Research Institute at Aurora College (Inuvik, Northwest Territories). The Nunatsiavut review board waived the requirement for a licence due to the extensive community consultations involved in the study. A certificate of ethical acceptability was awarded by the McGill Faculty of Medicine Institutional Review Board. Consent forms, questionnaires and the DVD were translated into different Inuit dialects appropriate for the regions surveyed and all participants signed a written consent form.

Figure 1. Map of Inuvialuit Settlement Region (ISR), Nunavut and Nunatsiavut showing communities that participated in the Inuit Health Survey, 2007-2008. Adapted and used with permission from Inuit Tapiriit Katanami (2009/07/28), Inuit regions of Canada, http://www.itk.ca/sites/default/files/InuitNunaat_Basic.pdf, retrieved July 22, 2010.
The survey involved 3 land teams that recruited participants and coordinated survey activities, followed by a ship team that conducted individual assessments. Each of the 3 land teams included trained bilingual (English and Inuit dialects) assistants and a nurse who interviewed the primary respondent of the household to collect information on household composition, traditional food harvesting and consumption, food security and socio-economic indicators.

Food security was assessed using the 18-item United States Department of Agriculture (USDA) Food Security Survey Module (28–29), slightly modified by Indian and Northern Affairs Canada (INAC) to improve acceptability among Inuit populations (7). Ten questions were related to the status of adults and 8 questions pertained to children in the household.

Each response to the 18-item Food Security Survey Module was used to construct a 12-month food security scale. Scoring was based on the number of increasingly severe indications of food insecurity experienced by each household, as indicated by affirmative responses to food insecure conditions presented in the module (28). Answers to the 18 questions were each given a value of either 0 or 1. A value of 1 corresponded to affirmative responses such as “yes,” “often,” “sometimes” and “almost every month,” or “some months” and “1–2 months” for questions about frequency. Negative responses were constructed from answers which indicated “no,” “never” and “not applicable.”

The 18-item scale was then used to classify households into 3 categories of food insecurity status according to the new classification method adopted by Health Canada (30). The Health Canada categories differ from the current U.S. standard method by considering food insecure households based on 2 or more affirmative responses on the Household Food Security Survey Module – using either the 10-item adult scale or 8-item child scale. In contrast, the U.S. method classifies food insecure households based on 3 or more affirmative responses (28,29). The Health Canada methodology lowered the threshold to better capture the degree of food insecurity at the household level. The 3 categories include food secure, food insecure moderate (inadequate food supplies in households resulting in reduced quality or desirability of food consumed) and food insecure severe, represented by the conditions of the previous category including disrupted eating patterns and reduced food intake.

Following the guidelines of Health Canada, the adult food security status in households without children was equal to the household’s overall food security status. In households with children, the overall food security status of the household was determined by combining the food security status of the adults with that of the children, with the worst of the 2 statuses determining the household’s overall status. If both adults and children in the household were food secure, the household overall was considered food secure. If either adults or children, or both adults and children, in the household were moderately food insecure, and neither was severely food insecure, the household was considered moderately food insecure; and if either adults or children in the household were severely food insecure, the household was considered severely food insecure.

We calculated the weighted prevalence and 95% confidence intervals (95% CI) of food insecurity and affirmative responses to individual questionnaire items, stratified by community. Stata/SE 11.1 (StataCorp LP, College Station, TX) were used. Sampling weights reflected the proportion of participating households in each community. The weighted prevalence of demographic variables reflected the proportion of participating individuals.
RESULTS

Of 2,796 households contacted, 68% agreed to participate with a total of 2,595 individuals, representing an average of 1.3 participants per household. Striking regional differences were noted in food insecurity prevalence rates, with Nunavut experiencing a greater prevalence of food insecurity and severe food insecurity than the Inuvialuit Settlement Region and Nunatsiavut Region (Table I). Further, child food insecurity was statistically significantly higher in Nunavut (56.5%) than in Inuvialuit Settlement Region (32.7%) and Nunatsiavut region (25.8%) (Table I). However, nearly 75% of households distributed country food, and nearly 65% of households had an active hunter (“Is there an active hunter in your household?” (yes/no) was asked to the household respondent.). The average weekly cost for groceries was $380 Canadian dollars (95% CI $367.0–392.0), equivalent to $19,760 Canadian dollars a year, while 49.6% of adults had earned less than $20,000 in the past year (Table II).

Table I. Weighted prevalence (%) and 95% confidence intervals (CI) of household, adult and child food security status by Inuit jurisdiction: International Polar Year Inuit Health Survey, 2007-2008.

| Region (n) | Percent food secure (95% CI) | Percent total food insecure* (FI) (95% CI) | Percent moderately FI (95% CI) | Percent severely FI (95% CI) |
|-----------|-------------------------------|---------------------------------------------|-------------------------------|-------------------------------|
| Households |                               |                                             |                               |                               |
| Nunavut (1,298) | 31.2 (28.6–33.9) | 68.8 (66.1–71.4) | 34.6 (31.9–37.3) | 34.1 (31.5–36.8) |
| ISR (266) | 56.7 (50.7–62.8) | 43.3 (37.2–49.3)** | 31.1 (25.3–36.8)** | 12.2 (8.3–16.1)** |
| Nunatsiavut (224) | 54.3 (48.3–60.3) | 45.7 (39.7–51.7)** | 29.2 (23.3–35.1)** | 16.5 (11.7–21.4)** |
| Adults |                               |                                             |                               |                               |
| Nunavut (1,298) | 32.4 (29.7–35.1) | 67.6 (64.9–70.3) | 35.8 (33.0–38.6) | 31.8 (29.2–34.5) |
| ISR (266) | 57.2 (51.1–63.2) | 42.8 (36.8–48.9)** | 30.6 (24.9–36.4)** | 12.2 (8.3–16.1)** |
| Nunatsiavut (224) | 54.3 (48.3–60.3) | 45.7 (39.7–51.7)** | 30.5 (24.6–36.5)** | 15.2 (10.5–19.9)** |
| Children |                               |                                             |                               |                               |
| Nunavut (1,015) | 43.5 (40.4–46.7) | 56.5 (53.3–59.6) | 30.9 (27.9–33.9) | 25.6 (22.8–28.3) |
| ISR (166) | 67.3 (60.0–74.5) | 32.7 (25.5–40.0)** | 26.6 (19.6–33.6)** | 6.1 (2.8–9.3)** |
| Nunatsiavut (118) | 74.2 (66.4–82.0) | 25.8 (18.0–33.6)** | 14.8 (8.3–21.3)** | 11.0 (5.4–16.6)** |

*p ≤ 0.10, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001 (ISR and Nunatsiavut separately compared to Nunavut as reference), χ² for differences in proportion.

Table II. Weighted prevalence (%) and 95% confidence intervals (CI) of demographic characteristics of participants by Inuit jurisdiction: International Polar Year Inuit Health Survey, 2007-2008.

| Characteristics | Nunavut | ISR | Nunatsiavut | Overall |
|-----------------|---------|-----|-------------|---------|
| Education – incomplete secondary school | 64.3 (61.3–67.3) | 48.0 (40.6–55.4)** | 49.5 (42.3–56.8)** | 60.9 (58.3–63.6) |
| Job status – employed | 39.3 (36.1–42.4) | 48.6 (41.1–56.1)* | 35.7 (29.0–42.4) | 40.2 (37.5–42.9) |
| Income – less than $20,000 CAD | 53.1 (49.8–56.4) | 32.1 (25.8–38.4)** | 46.1 (38.3–53.9) | 49.6 (46.8–52.4) |
| Income support (any household member) | 48.7 (45.9–51.4) | 18.2 (13.9–22.4)** | 33.7 (27.7–39.7)** | 42.1 (39.9–44.4) |
| No. of people in home | 4.5 (4.4–4.6) | 3.4 (3.2–3.6)** | 3.7 (3.5–3.9)** | 4.2 (4.1–4.3) |
| Weekly cost for groceries (CAD) | 415.53 | 300.98 | 220.30 | 379.76 |
| Household distributes traditional food | 75.7 (73.2–78.2) | 69.2 (63.6–74.8)* | 80.2 (75.1–85.3) | 74.9 (72.8–77.1) |

*p ≤ 0.10, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001 (ISR and Nunatsiavut separately compared to Nunavut as reference), χ² for differences in proportion, Wald test for differences in mean.

Unless otherwise noted as mean (95% confidence intervals).
### Table III. Prevalence (%) and 95% confidence interval (CI) of affirmative responses\(^a\) to questions about food security: International Polar Year Inuit Health Survey, 2007-2008.

| Questions “In the last 12 months…” | Prevalence, % (95% CI) | Food secure households | Moderately food insecure households | Severely food insecure households |
|-----------------------------------|------------------------|------------------------|------------------------------------|----------------------------------|
| 1. Did you ever worry whether the food for you and your family would run out before you had enough money to buy more? | 61.1 (58.7–63.4) | 11.1 (8.5–13.7) | 86.5 (83.7–89.3) | 96.0 (94.2–97.7) |
| 2. Were there times when the food for you and your family just did not last and there was no money to buy more? | 59.7 (57.4–62.0) | 5.4 (3.7–7.1) | 87.8 (85.1–90.4) | 97.2 (95.6–98.7) |
| 3. Were there times when you and your family could not afford to eat healthy food? | 50.0 (47.6–52.4) | 4.5 (2.9–6.0) | 63.2 (59.1–67.3) | 93.1 (90.8–95.4) |
| 4. Were there times when you could only feed your children less expensive foods because you were running out of money to buy food? | 57.5 (54.7–60.2) | 8.4 (5.6–11.3) | 71.0 (66.5–75.5) | 94.9 (92.7–97.1) |
| 5. Were there times when it was not possible to feed the children a healthy meal because there was not enough money? | 48.5 (45.8–51.3) | 1.0 (0.0–1.9) | 52.3 (47.3–57.3) | 94.1 (91.8–96.4) |
| 6. Were there times when the children in the house were not eating enough because there was no money to buy enough food? | 40.4 (37.7–43.1) | 0 | 32.1 (27.4–36.8) | 90.3 (87.3–93.3) |
| 7. 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? | 31.2 (28.9–33.4) | 0 | 16.1 (13.0–19.2) | 88.6 (85.8–91.5) |
| 8. How often did this happen?| 25.9 (23.8–28.0) | 0 | 10.1 (7.6–12.5) | 77.4 (73.6–81.2) |
| 9. Did you ever eat less than you felt you should because there wasn’t enough food? | 32.4 (30.2–34.7) | 0 | 18.3 (15.0–21.6) | 90.4 (87.7–93.1) |
| 10. Were you ever hungry but didn’t eat because you couldn’t afford enough food? | 24.5 (22.5–26.6) | 0 | 6.5 (4.4–8.6) | 76.9 (73.0–80.7) |
| 11. Did you lose weight because you didn’t have enough money for food? | 18.2 (16.3–20.0) | 0 | 3.7 (2.1–5.4) | 58.2 (53.7–62.6) |
| 12. Did you or other adults in your household ever not eat for a whole day because there wasn’t enough money for food? | 17.6 (15.8–19.4) | 0 | 1.9 (0.7–3.0) | 58.6 (54.1–63.0) |
| 13. How often did this happen? | 17.1 (15.3–18.9) | 0 | 1.7 (0.6–2.7) | 57.0 (52.5–61.5) |
| 14. Did you ever cut the size of the children’s meals because there wasn’t enough money for food? | 21.9 (19.5–24.2) | 0 | 6.6 (4.1–9.0) | 59.5 (54.7–64.4) |
| 15. Did any of the children ever skip meals because there wasn’t enough money for food? | 19.3 (17.1–21.5) | 0 | 2.0 (0.4–3.5) | 56.4 (51.5–61.3) |
| 16. How often did any of the children ever skip meals because there wasn’t enough money for food? | 16.2 (14.1–18.2) | 0 | 0.6 (0.1–1.2) | 48.2 (43.3–53.2) |
| 17. Were the children ever hungry but you just couldn’t afford more food? | 23.1 (20.8–25.5) | 0 | 5.4 (3.1–7.8) | 64.5 (59.8–69.3) |
| 18. Did your children ever not eat for a whole day because there wasn’t enough money for food? | 13.1 (11.3–15.0) | 0 | 0.7 (0.1–1.5) | 39.0 (34.2–43.8) |

CI=Confidence interval.

\(^a\) “Yes,” “often” and “sometimes” were considered to be affirmative responses.

\(^b\) “Almost every month,” “some months” and “1–2 months” were considered to be affirmative responses.
Among all respondents, 17.6% (95% CI 15.8%–19.4%) gave affirmative responses (i.e., often, sometimes or yes) to the question, “In the last 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?” Among respondents from homes rated as having severe adult food insecurity, 58.6% (95% CI 54.1%–63.0%) answered this question affirmatively. When asked, “In the last 12 months, were you ever hungry but didn’t eat because you couldn’t afford enough food?” 24.5% (95% CI 22.5%–26.6%) of all respondents and 76.9% (95% CI 73.0%–80.7%) of respondents from homes with severe adult food insecurity answered affirmatively. To the question “In the last 12 months, did you ever eat less than you felt you should because there wasn’t enough food?” 32.4% (95% CI 30.2%–34.7%) of all respondents and 90.4% (95% CI 87.7%–93.1%) of respondents from homes with severe adult food insecurity answered affirmatively. Finally, when asked, “In the last 12 months, 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?” 31.2% (95% CI 28.9%–33.4%) of all respondents and 88.6% (95% CI 85.8%–91.5%) of respondents from homes with severe adult food insecurity answered affirmatively (Table III).

Responses from homes with moderate and severe adult food insecurity indicated a high prevalence of worry that food will run out; times when the food for the adult and their family did not last and there was no money to buy more; and times when the adult and their family could not afford to eat healthy food (Table III).

**DISCUSSION**

A number of studies have reported high levels of food insecurity among Indigenous peoples residing in Canadian Arctic communities (5–8), however, the IPY Inuit Health Survey represents the most comprehensive assessment to date. Regardless of region, the results from the study showed a high prevalence of food insecurity among adults living in ISR (43.3%), Nunavut (68.8%) and Nunatsiavut region (45.7%), with those living in Nunavut having the highest prevalence of food insecurity. By contrast, the Canadian Community Health Survey, Cycle 2.2, found that 9.2% of Canadian households (including 33% of off-reserve Aboriginal households) experienced food insecurity in 2004, based on the same 18-item scale and classification system used in this study (30). The food insecurity rate as currently experienced by Inuit in Nunavut is 6 times higher, and the rate experienced in ISR and Nunatsiavut region is nearly 5 times higher than the Canadian national average. Further, the results of the 36 community surveys found high rates of child food insecurity among Inuit households, particularly for Nunavut. The rate of child food insecurity observed in the current study in Nunavut (56.5%) agreed with the 16-community Nunavut Inuit Child Health Survey of preschoolers, in which 56% of homes with preschoolers were identified as food insecure (10). Also, within each region, the prevalence of child food insecurity was lower than that of adult food insecurity, which suggests that adults modify their food intake to protect children within the household.

Food security assessments from previous
Canadian surveys using 3 indicator questions found that 10% of Canadians were living in households identified as food insecure during the National Population Health Survey of 1998–1999, conducted by Statistics Canada (13). In 2005, using the same 3 questions, the Canadian Community Health Survey, Cycle 1.1 found that 21% of households in the Yukon Territory, 28% in the Northwest Territories and 56% in Nunavut were classified as food insecure (5). Studies conducted by Indian and Northern Affairs Canada in 2003 and 2004, using the modified 18-item Household Food Security Survey Module, found that 83% of homes in Kugaaruk, Nunavut, and 40% of homes in Kangiqsujuaq, Nunavik, were identified as food insecure (7,8).

Given the high cost of market food and the high prevalence of a yearly income of less than $20,000 CAD, it is no surprise that a large percentage of Inuit continue to live in food insecure households. Others have noted the high cost of food and pervasive rates of poverty commonly experienced by communities in the Canadian Arctic as determinants of diet quality and food insecurity (16,31,32). Inuit are highly vulnerable to food insecurity as a result of geographic location; high levels of under-employment and unemployment; and low income, all of which affect the purchase of perishable, healthy food from local stores and limit the purchase of equipment needed to maintain traditional activities (2,3,7,31,32). Current survey results demonstrated that nearly 80% of households distributed country food, and nearly 72% of households had an active hunter. While the prevalence of active hunters was lower in households in ISR, indicators of socio-economic well-being were higher in ISR relative to the other regions. In another analysis of the current study population, having an active hunter in the home was significantly related to a lower prevalence of food insecurity (26). Dependence on informal, traditional social support networks may play an important role in filling the gap between a household’s economic constraints and its accessibility to country food. Country foods are rich in nutrients, contribute to higher dietary quality, promote good health and provide a sense of wellness that comes from the participation in cultural activities (16–18,31,33,34).

Considering the importance of food security in population health, a multi-faceted approach is needed to help mitigate the negative health impacts of household food insecurity. Possible solutions include increased income support; greater traditional- and market-food sharing and distribution networks; programs targeted to those at greatest risk; supporting community hunters and trappers’ organizations; and increasing economic opportunities in communities, as well as general efforts to mitigate risks associated with climate change.

**Limitations**

The validated instrument of the USDA Household Food Security Survey Module is widely recognized as the best available instrument for assessing household level food insecurity in the context of financial resource constraints; however, the module did not include questions related to access to traditional indigenous food systems. It will be advantageous for future investigations to evaluate the availability of traditional foods in determining overall food security status so that the assessment will be more meaningful to the Indigenous peoples in Canada. Further, we were not able to assess total household income, which limited us from characterizing total household food costs relative to total income. Finally, the assessment of
whether the household had an “active hunter” was entirely subjective; there was no attempt made by the survey to define “active hunter.” Thus, we anticipate variability in the extent to which households had access to traditional food when an active hunter was present in the household.

Conclusions
Inuit residing in Canadian Arctic communities suffer disproportionately from food insecurity compared to the general Canadian population. Considering the established relationship between food insecurity and poorer health outcomes, the high rate of food insecurity among Inuit calls for immediate action to help safeguard the health of Inuit populations. Establishing a monitoring system of food-security indicators relevant to Inuit, which incorporate impacts of climate change on traditional food consumption, will contribute to an ongoing understanding of the dynamic relationship between household food security and the underlying social and economic conditions under which Inuit live, and will be essential to future policy, program evaluation and development.

Conflict of interest statement
The authors declare no conflict of interest.

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Food insecurity among Inuit in the Canadian Arctic

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