Original Article

Prevalence and Predictors of Food Allergy in Canada: A Focus on Vulnerable Populations

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What is already known about this topic? We previously found that 8% of Canadians self-report food allergy. However, the prevalence of food allergy among those of low education, those with low income, new Canadians, and individuals of Aboriginal identity (vulnerable populations) has not been estimated.

What does this article add to our knowledge? In this first Canadian study to estimate the prevalence of food allergy in vulnerable populations, those of low education and new Canadians reported fewer allergies, but no differences were found according to income or Aboriginal status.

How does this study impact current management guidelines? Vulnerable populations report fewer allergies possibly due to insufficient knowledge or inadequate health care access, which suggests important policy gaps that must be addressed to ensure equal opportunity for all Canadians to seek and receive health care.

BACKGROUND: Studies suggest that individuals of low education and/or income, new Canadians (immigrated <10 years ago), and individuals of Aboriginal identity may have fewer food allergies than the general population. However, given the difficulty in recruiting such populations (hereafter referred to as vulnerable populations), by using conventional survey methodologies, the prevalence of food allergy among these populations in Canada has not been estimated.

OBJECTIVES: To estimate the prevalence of food allergy among vulnerable populations in Canada, to compare with the nonvulnerable populations and to identify demographic characteristics predictive of food allergy.

METHODS: By using 2006 Canadian Census data, postal codes with high proportions of vulnerable populations were identified and households were randomly selected to participate in a telephone survey. Information on food allergies and demographics was collected. Prevalence estimates were weighted by using Census data to account for the targeted sampling. Multivariable logistic regression was used to identify predictors of food allergy.

RESULTS: Of 12,762 eligible households contacted, 5734 households completed the questionnaire (45% response rate). Food allergy was less common among adults without postsecondary education versus those with postsecondary education (6.4% [95% CI, 5.5%-7.3%] vs 8.9% [95% CI, 7.7%-10%]) and new Canadians versus those born in Canada (3.2% [95% CI, 2.2%-4.3%] vs 8.2% [95% CI, 7.4%-9.1%]). There was no difference in prevalence between those of low and of high income or those with and without Aboriginal identity.

CONCLUSION: Analysis of our data suggests that individuals of low education and new Canadians self-report fewer allergies, which may be due to genetics, environment, lack of appropriate health care, or lack of awareness of allergies, which reduces self-report. **(J Allergy Clin Immunol Pract 2015;3:42-9)**

Key words: *Food allergy; Self-reported food allergy; Perceived food allergy; Probable food allergy; New Canadians; Low education; Low income; Aboriginal identity; Vulnerable populations*

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Supported by Allergy, Genes, and Environment (AllerGen NCE) Network of Centres of Excellence, Health Canada.
Conflicts of interest: L. K. Soller has received research support from the Fonds de Recherche Santé-Quebec and the Research Institute of the McGill University Health Centre; has received travel support from AllerGen NCE and the Canadian Institutes of Health Research. M. Ben-Shoshan has received research support from Allergen NCE and Health Canada. D. W. Harrington is employed by Queen's University; and has received research support from the Canadian Institutes of Health Research, Population Health Intervention Research Network. M. Knoll has received research support from AllerGen NCE; and is employed by McGill University Health Centre. Y. St. Pierre and A. E. Clarke have received research support from AllerGen NCE and Health Canada. The rest of the authors declare that they have no relevant conflicts of interest.
Received for publication June 3, 2014; accepted for publication June 10, 2014.
Available online August 28, 2014.
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2213-2198

http://dx.doi.org/10.1016/j.jaip.2014.06.009

Abbreviations used
CT- Census tract
FAPQ- Food Allergy Prevalence Questionnaire
LICO- Low-income cutoff
OR- Odds ratio
SCAAALAR- Surveying Canadians to Assess the Prevalence of Food Allergies and Attitudes Towards Food Labelling and Risk
SPAACE- Surveying Prevalence of Food Allergy in All Canadian Environments

Food allergy has become an increasingly important condition in Western society due to its unpredictable nature and the need for extreme dietary vigilance, both of which can substantially compromise the quality of life of affected individuals and their families.[1] Although immune modulatory therapies appear promising, these likely will not induce long-term tolerance,[2] and food allergy will remain largely incurable. Those affected must rely on strict avoidance of the offending food and rescue therapy with epinephrine. In the United States, estimates of the prevalence of self-reported food allergy range between 8.0% and 9.1%.[3,4] However, until recently, the prevalence of food allergy in Canada was unknown.

From 2008 to 2009, our research team estimated that approximately 8% of Canadians self-reported at least 1 food allergy and that the prevalence differs across socioeconomic groups and geographic regions (Surveying Canadians to Assess the Prevalence of Food Allergy and Attitudes Towards Food Labelling and Risk [SCAAALAR] study).[5] However, given that the data were collected by using a large-scale telephone survey, it is not surprising that the resulting sample underrepresented important parts of the Canadian population, specifically those of low education and low income, new Canadians, and individuals of Aboriginal identity. These 4 population groups are hereafter referred to as vulnerable populations. Although other researchers have attempted to estimate the prevalence of food allergy in these vulnerable populations, existing studies are limited in that the majority focus only on children, do not collect data on specific food allergies, and/or do not use an appropriate targeting strategy to ensure an adequate sample of these vulnerable groups, who are particularly difficult to reach, are included.[3,4,6-12] These limitations make it difficult to form any definitive conclusions about how the prevalence of food allergy in these groups compares with that in the nonvulnerable populations.

The current study (Surveying Prevalence of Food Allergy in All Canadian Environments [SPAACE]) attempts to bridge these gaps, by specifically targeting and evaluating the prevalence of specific food allergies in vulnerable populations of children and adults in all Canadian provinces and territories, by comparing vulnerable with nonvulnerable populations, and by examining potential sociodemographic determinants of food allergy.

METHODS

Selection of study population

Canadians of low income, new Canadians, and individuals of Aboriginal identity were specifically targeted. Canadians of low education were not targeted because it was anticipated that there would be substantial overlap between low income and low education, and by targeting low income areas, those with low education would also be included.[13] Adults who completed less than a postsecondary degree, trade certificate, or diploma, were defined as being of low education. This group included individuals who were 18 years or older only. Individuals were considered to be low income if their household income was below the low-income cutoff (LICO). The LICO is defined as an income level at which families or unattached individuals spend at least 70% of before tax income on food, shelter, and clothing, and is determined according to family size and geographic location.[14] New Canadians were those who immigrated to Canada within 10 years of completion of the telephone survey. An individual was considered to be of Aboriginal identity if he or she reported "Aboriginal" as his or her cultural background, and identified with First Nations, Métis, or Inuit.

By using the 2006 Canadian census, the 100 census tracts (CT) from within the census metropolitan areas (CMA)[15] that contained either the highest proportion of households living under the LICO (range, 41.5%-91%) or the highest proportion of new Canadians (range, 31.9%-66%) were selected. Individuals of Aboriginal identity were selected in the same way by using a lower threshold, of 15% (range, 15%-94.6%), which resulted in a total of 66 CTs included. These CTs were then converted to postal codes by using the 2006 Statistics Canada postal code conversion file (available via the Computing for Humanities and Social Sciences server at the University of Toronto) and Info-Direct (a company that maintains telephone directory listings or "White Pages" in Canada; Cornerstone Info-Direct, Toronto, Ontario) selected a random sample of household telephone numbers with accompanying mailing addresses from these postal codes.

Due to this targeting strategy, CTs from the province of New Brunswick were not proportionately represented (only 2 CTs were included in the initial selection), and those from Nova Scotia and from Newfoundland and Labrador were excluded from the initial selection because they were not among the top 100 in terms of proportion of low income households or new Canadians, nor in the top 66 in terms of proportion of individuals of Aboriginal identity. Further, Prince Edward Island and the 3 Canadian territories (Northwest, Yukon, and Nunavut) were excluded because they do not contain any Census metropolitan areas, and, hence, there are no CTs.

Although our primary objective was to ensure adequate representation of the vulnerable populations, we also wanted to provide prevalence estimates that involved populations from all Canadian provinces and territories. Hence, for New Brunswick, for Nova Scotia, and for Newfoundland and Labrador, CTs with the highest proportion of households under the LICO (range, 25.8%-38.9% from 8 CTs in Saint John, New Brunswick; range, 24.1%-40.9% from 10 CTs in Halifax, Nova Scotia; range, 27.4%-41.4% from 5 CTs in St John's, Newfoundland) were selected from the main Census metropolitan areas. These areas contained too few new Canadians or individuals of Aboriginal identity to be included in the sampling for these populations. In Prince Edward Island, we targeted the largest Census subdivision in the province, Charlottetown. According to the 2006 Census, 13.2% of households in Charlottetown were below the LICO and 1.4% were new Canadians. In the Northwest and Yukon Territories, a random sample of households was selected from all areas. In Nunavut, all available records were purchased because of the large number of those of Aboriginal identity residing in this territory.

Participant recruitment

All households, with the exception of those in Nunavut, were mailed a letter that informed them that the research team would