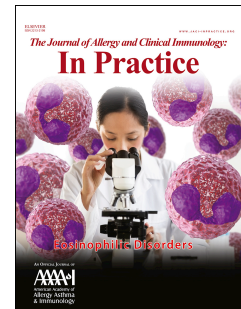


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PII: S2213-2198(19)30912-2

DOI: <https://doi.org/10.1016/j.jaip.2019.10.021>

Reference: JAIP 2516

To appear in: *The Journal of Allergy and Clinical Immunology: In Practice*

Received Date: 22 May 2019

Revised Date: 24 September 2019

Accepted Date: 18 October 2019

Please cite this article as: Clarke AE, Elliott S, Pierre YS, Soller L, La Vieille S, Ben-Shoshan M, Temporal Trends in Prevalence of Food Allergy in Canada, *The Journal of Allergy and Clinical Immunology: In Practice* (2019), doi: <https://doi.org/10.1016/j.jaip.2019.10.021>.

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Temporal Trends in Prevalence of Food Allergy in Canada

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33 Conflict of Interest:

34 L. Soller participates in research sponsored by DBV Technologies and S. La Vieille is an

35 employee of Health Canada. The rest of the authors declare that they have no relevant conflicts

36 of interest.

37

38 Funding:

39 The research was funded by the Canadian Allergy, Genes, and Environment Network of Centres

40 of Excellence (AllerGen NCE) and Health Canada.

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42 Dr. Ann E. Clarke holds The Arthritis Society Chair in Rheumatic Diseases at the University of

43 Calgary.

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45 Word count for text: 1000

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48 **Clinical Implications:**

49 The prevalence of self-reported food allergy increased from 7.1% to 9.3% between 2010 and
50 2016, while food allergy based on history or physician diagnosis remained stable (5.9% versus
51 6.1%). This increase in self-reported allergy is likely attributable to increasing awareness.

To the Editor

Although food allergy (FA) prevalence is thought to be increasing (1), no studies have assessed temporal trends in overall FA prevalence in Canada. We conducted a random cross-Canada telephone survey on FA prevalence between February 2016 and January 2017 (S2S: SPAACE (Surveying Prevalence of Food Allergy in All Canadian Environments) to SPAACE), replicating the methodology of our 2010/2011 study (SPAACE) (2). Vulnerable populations (New, Indigenous, and lower-income Canadians) were targeted using 2006 Canadian Census data (Repository).

The eligible (Repository) household respondent completed the Food Allergy Prevalence Questionnaire (FAPQ) (1), providing the following information for each household member (full participants): allergy to peanut, tree nut, fish, shellfish, sesame, milk, egg, wheat, soy, or other foods, details on the most severe reaction for the nine allergens (symptoms, interval between exposure and symptoms, mode of contact, and if the allergy was physician-diagnosed), age, sex, years in Canada (for non-Canadian-born), cultural/ethnic background, education (if ≥ 18 years) and household income.

Those refusing to complete the FAPQ were administered a Refusal Questionnaire (RQ) (partial participants) that queried on number in household with and without a FA, highest level of household education, and if any member was non-Canadian-born or Indigenous.

The Research Ethics Boards of the Universities of Calgary and Waterloo approved the study.

Food allergy was defined as (Figure E1):

1) *Perceived*: self-reported FA or

2) *Probable*: self-report of symptoms/signs compatible with a convincing history (3) and/or a physician diagnosis of the FAs listed above.

Weighted point estimates and 95% confidence interval (CIs) were calculated for *perceived* and *probable* FA prevalence, stratified by children and adults. Prevalence estimates were weighted using Census data to account for targeted sampling (Repository) and the weighted S2S and SPAACE estimates were compared. The overall weighted *perceived* FA prevalence was also calculated by incorporating RQ data (Table E3).

In S2S, of the 19,286 households targeted, (Figure E2A), 11,592 were eligible and 5874 households, representing 15,322 individuals, completed the FAPQ, yielding a 50.7% household response rate. An additional 602 households completed the RQ, increasing the response rate to 55.9%.

In SPAACE, 5734 of 12,762 eligible households participated (Figure E2B), representing 15,022 individuals (response rate 44.9%). An additional 524 households completed the RQ (overall response rate 49.0%).

In both surveys, the percentage of New Canadians, Indigenous, and members of lower-income households exceeded the Canadian population (Table E1).

In S2S versus SPAACE, among full participants, the overall weighted *perceived* FA prevalence was 9.3% versus 7.1%, yielding a difference of 2.3% (95% CI 1.3%, 3.2%), for a relative increase of 32.4% (Table I). Among children, the prevalence was 8.7% versus 7.1% [difference: 1.6% (95% CI -0.6%, 3.8%)] and among adults, the prevalence was 9.5% versus 7.2% [difference: 2.3% (95% CI 1.2%, 3.4%)]. Among children, only the prevalence of milk increased and among adults, the prevalence of milk, wheat, and soy increased.

As the prevalence of milk allergy increased the most, we re-calculated the overall FA prevalence excluding milk and the difference persisted [8.1% versus 6.7%, difference: 1.4% (95% CI 0.5%, 2.3%)] (Table E2).

Among full participants, the overall weighted *probable* FA prevalence was 6.1% versus 5.9% [difference: 0.2% (95% CI -0.8%, 1.2%)] (Table II), with no temporal difference in prevalence observed in children [6.7% versus 6.1%, difference: 0.6% (95% CI -1.7%, 2.9%)] or adults [5.9% versus 5.9%, difference: 0.0% (95% CI -1.1%, 1.1%)]. Among children, the prevalence of milk increased and among adults, the prevalence of shellfish allergy decreased, while milk and wheat increased.

Incorporating partial and non-participants, the overall weighted *perceived* FA prevalence was 8.2% (95% CI 7.6%, 8.7%) versus 4.6% (95% CI 4.1%, 5.2%) (Table E3), suggesting that the temporal increase in *perceived* prevalence is possibly underestimated when only full participants are considered.

While we observed a 2.3% absolute and 32.4% relative increase in overall *perceived* FA prevalence, the overall *probable* FA prevalence did not increase. The increase in *perceived* FA is likely due to increasing awareness, leading to an increase in self-reported FA, some of which is likely not IgE-mediated. Rather, some self-reported FA may reflect mislabeling of other conditions such as lactose intolerance, celiac disease, or irritable bowel syndrome (4). Among the individual *perceived* FAs, milk and wheat allergy had the largest increases, supporting this hypothesis. Although we excluded those self-reporting lactose intolerance or gluten sensitivity from our estimates for *probable* allergy, we were not able to do so for *perceived*. The increase in *perceived* prevalence was observed among adults, but not children. However, our study was not powered to examine temporal changes in subgroups.

Although we did not observe an increase in overall *probable* FA prevalence, we did observe an increase in *probable* milk allergy in children and adults and in *probable* wheat allergy in adults. This likely reflects an increase in IgE-mediated milk and wheat allergy as those self-reporting symptoms suggestive of lactose intolerance or gluten sensitivity were excluded from *probable* estimates. This increase in *probable* milk and wheat allergy may relate to trends for elimination of milk-based formula and gluten (5,6).

Our observed 32.4% relative increase in overall *perceived* FA prevalence is consistent with an increase in food-induced anaphylaxis (7) and self-reported FA (1). In contrast, we (8) and Venter *et al* (9) reported no increase in confirmed peanut allergy prevalence.

Our study has some limitations. Our participants may have differed from the broader population without landlines. Further, our definition of *probable* FA was not based on food challenge, but as our sample was nationwide with many participants residing in areas with limited healthcare access, it would have been impossible to generate population-based prevalence estimates based on food challenges.

Our primary purpose was to assess temporal trends in self-reported FA prevalence and given that we used identical sampling methodologies and definitions in S2S and SPAACE and our response rate increased over time, minimizing the influence of non-response bias, we believe our estimates of temporal changes are extremely robust. Assessing temporal trends in FA prevalence is crucial to understanding etiology and planning health resource allocation.

ACKNOWLEDGMENTS

We are grateful to the Survey Research Centre, University of Waterloo, Waterloo, Ontario, Canada for expert administration of the SPAACE 2 SPAACE telephone survey.

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Table I. Weighted *Perceived* Prevalence Estimates of Individual Food Allergies for Full Participants: All Ages (panel A), Children (panel B), and Adults (panel C)

	Panel A All			Panel B Children (< 18 years)			Panel C Adults		
	S2S, %	SPAACE, %	Difference*,	S2S, %	SPAACE, %	Difference, %	S2S, %	SPAACE, %	Difference, %
	(95% CI)	(95% CI)	%	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	n=15,322	n=15,022**	(95% CI)	n=3012	n=3271		n=12,310	n=11,339	
Peanut	1.4 (1.2, 1.7)	1.0 (0.8, 1.3)	0.4(-0.001, 0.7)	3.5 (2.6, 4.6)	2.7 (1.9, 3.9)	0.7 (-0.6, 2.1)	1.0 (0.8, 1.3)	0.7 (0.5, 1.0)	0.3 (-0.04, 0.7)
Tree nut	1.8 (1.5, 2.2)	1.3 (1.1, 1.7)	0.5 (0.1, 1.0)	2.6 (1.9, 3.6)	1.8 (1.2, 2.8)	0.8 (-0.4, 2.0)	1.7 (1.3, 2.1)	1.2 (0.9, 1.6)	0.4 (-0.03, 0.9)
Fish	0.8 (0.6, 1.0)	0.7 (0.5, 1.0)	0.1 (-0.2, 0.4)	1.2 (0.7, 2.0)	1.2 (0.6, 2.5)	0.0 (-1.0, 1.1)	0.7 (0.5, 0.9)	0.6 (0.4, 0.8)	0.1 (-0.2, 0.4)
Shellfish	1.9 (1.6, 2.2)	1.8 (1.5, 2.1)	0.1 (-0.4, 0.5)	1.3 (0.8, 2.1)	1.4 (0.8, 2.6)	-0.1 (-1.2, 1.0)	2.0 (1.6, 2.4)	1.9 (1.6, 2.3)	0.1 (-0.4, 0.6)
Sesame	0.3 (0.2, 0.5)	0.2 (0.1, 0.3)	0.1 (-0.1, 0.3)	0.4 (0.2, 0.9)	0.2 (0.1, 0.6)	0.3 (-0.1, 0.6)	0.3 (0.2, 0.5)	0.2 (0.1, 0.4)	0.1 (-0.1, 0.3)
Milk	2.6 (2.3, 3.0)	0.7 (0.5, 0.9)	1.9 (1.5, 2.4)	2.0 (1.4, 2.9)	0.8 (0.4, 1.4)	1.2 (0.3, 2.1)	2.7 (2.3, 3.2)	0.7 (0.5, 1.0)	2.1 (1.6, 2.6)
Egg	0.9 (0.7, 1.2)	0.6 (0.4, 0.8)	0.3 (0.02, 0.6)	2.1 (1.4, 3.0)	1.2 (0.8, 1.9)	0.8 (-0.1, 1.8)	0.7 (0.5, 0.9)	0.5 (0.3, 0.7)	0.2 (-0.1, 0.5)
Wheat	0.9 (0.7, 1.1)	0.4 (0.3, 0.6)	0.5 (0.2, 0.8)	0.7 (0.4, 1.3)	0.3 (0.1, 0.8)	0.4 (-0.1, 1.0)	0.9 (0.7, 1.2)	0.4 (0.3, 0.6)	0.5 (0.2, 0.8)
Soy	0.5 (0.4, 0.7)	0.1 (0.1, 0.3)	0.4 (0.2, 0.6)	0.3 (0.1, 0.8)	0.1 (0.0, 0.6)	0.2 (-0.2, 0.5)	0.5 (0.4, 0.8)	0.1 (0.1, 0.3)	0.4 (0.2, 0.6)
Other	3.5 (3.1, 4.0)	3.3 (2.9, 3.8)	0.2 (-0.4, 0.8)	1.8 (1.3, 2.6)	2.4 (1.7, 3.4)	-0.6 (-1.7, 0.5)	3.9 (3.4, 4.4)	3.6 (3.1, 4.1)	0.3 (-0.4, 1.0)

Any	9.3 (8.7, 10.1)	7.1 (6.4, 7.8)	2.3 (1.3, 3.2)	8.7 (7.3, 10.3)	7.1 (5.6, 8.8)	1.6 (-0.6, 3.8)	9.5 (8.7, 10.3)	7.2 (6.5, 8.0)	2.3 (1.2, 3.4)
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* The study was powered to estimate a difference in overall *perceived* prevalence among all participants to an accuracy of $\pm 1.0\%$ with a 95% CI if there was an increase in prevalence of 2% from 7.1% to 9.1%.

** The sum of the children and adults in SPAACE does not equal the total n as there were some respondents in SPAACE for whom the age was not available.

Abbreviations:

SPAACE: Surveying Prevalence of food Allergy in All Canadian Environments

S2S: SPAACE to SPAACE

Table II. Weighted *Probable Prevalence Estimates of Individual Food Allergies for Full Participants: All Ages (panel A), Children (panel B), and Adults (panel C)**

	Panel A All			Panel B Children (< 18 years)			Panel C Adult		
	S2S, %	SPAACE, %	Difference, %	S2S, %	SPAACE, %	Difference, %	S2S, %	SPAACE, %	Difference, %
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	n=15,322	n=15,022**		n=3012	n=3271		n=12,310	n=11,339	
Peanut	1.2 (0.9, 1.5)	0.9 (0.7, 1.2)	0.3 (-0.1, 0.6)	3.2 (2.4, 4.3)	2.5 (1.7, 3.6)	0.7 (-0.6, 2.0)	0.8 (0.6, 1.0)	0.6 (0.4, 0.9)	0.2 (-0.2, 0.5)
Tree nut	1.4 (1.1, 1.7)	1.2 (0.9, 1.5)	0.2 (-0.2, 0.6)	2.1 (1.4, 3.0)	1.7 (1.1, 2.6)	0.4 (-0.7, 1.5)	1.3 (1.0, 1.6)	1.1 (0.8, 1.4)	0.2 (-0.2, 0.6)
Fish	0.6 (0.4, 0.8)	0.6 (0.4, 0.9)	0.0 (-0.3, 0.3)	1.1 (0.7, 1.8)	1.1 (0.5, 2.3)	0.0 (-1.0, 1.0)	0.5 (0.3, 0.7)	0.5 (0.4, 0.8)	0.0 (-0.3, 0.2)
Shellfish	1.1 (0.9, 1.4)	1.5 (1.2, 1.8)	-0.4 (-0.8, -0.02)	0.9 (0.5, 1.5)	0.9 (0.5, 1.5)	0.0 (-0.7, 0.7)	1.1 (0.9, 1.4)	1.7 (1.4, 2.1)	-0.5 (-1.0, -0.1)
Sesame	0.2 (0.1, 0.3)	0.2 (0.1, 0.3)	0.0 (-0.1, 0.1)	0.3 (0.1, 0.7)	0.2 (0.1, 0.6)	0.1 (-0.2, 0.4)	0.2 (0.1, 0.3)	0.2 (0.1, 0.4)	0.0 (-0.2, 0.1)
Milk	1.1 (0.9, 1.4)	0.3 (0.2, 0.5)	0.8 (0.5, 1.1)	1.2 (0.7, 1.9)	0.4 (0.2, 0.9)	0.8 (0.1, 1.4)	1.1 (0.9, 1.5)	0.3 (0.2, 0.5)	0.8 (0.5, 1.1)
Egg	0.8 (0.6, 1.0)	0.6 (0.4, 0.8)	0.2 (-0.1, 0.5)	1.8 (1.2, 2.7)	1.2 (0.7, 1.9)	0.7 (-0.3, 1.6)	0.6 (0.4, 0.8)	0.5 (0.3, 0.7)	0.1 (-0.2, 0.4)
Wheat	0.4 (0.3, 0.6)	0.2 (0.1, 0.4)	0.2 (0.02, 0.4)	0.2 (0.1, 0.6)	0.2 (0.0, 0.7)	0.0 (-0.3, 0.3)	0.5 (0.3, 0.7)	0.2 (0.1, 0.4)	0.3 (0.04, 0.5)
Soy	0.3 (0.2, 0.5)	0.1 (0.1, 0.2)	0.2 (0.01, 0.3)	0.3 (0.1, 0.8)	0.1 (0.0, 0.6)	0.2 (-0.2, 0.5)	0.3 (0.2, 0.5)	0.1 (0.1, 0.3)	0.2 (-0.01, 0.3)
Any	6.1 (5.4, 6.8)	5.9 (5.2, 6.7)	0.2 (-0.8, 1.2)	6.7 (5.4, 8.3)	6.1 (4.6, 8.1)	0.6 (-1.7, 2.9)	5.9 (5.2, 6.7)	5.9 (5.2, 6.8)	0.0 (-1.1, 1.1)

*For *probable* food allergy, the prevalence estimates for “other food allergy” and “any food allergy” could not be directly calculated as *probable* estimates require a detailed reaction history. Given this information was only collected for the nine allergens listed above, an estimate for any *probable* food allergy was derived by assuming that the ratio of any food allergy to any of the nine allergens was the same for *probable* as for *perceived*.

** The sum of the children and adults in SPAACE does not equal the total n as there were some respondents in SPAACE for whom the age was not available.

Abbreviations:

SPAACE: Surveying Prevalence of food Allergy in All Canadian Environments

S2S: SPAACE to SPAACE

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Table EI. Composition of S2S and SPAACE Samples versus Canadian Population

	S2S	2016 Canadian	SPAACE	2010 Canadian
	n=15,322	Population*	n=15,022	Population**
% New Canadians	10.4 (n=15,029)	6.6	11.8 (n=14,904)	6.4
% Indigenous	12.0 (n=15,303)	4.9	15.1 (n=14,997)	4.2
% Low-income	26.1 (n=13,305)	12.8	22.8 (n=10,629)	14.3
% Without post-secondary education	51.8 (n=12,062)	44.8	50.2 (n=10,944)	47.5
% Female	49.6 (n=15,235)	50.9	51.5 (n=15,007)	51.0
% < 18 years old	19.7 (n=15,322)	20.0	22.4 (n=14,610)	21.0

* Based on 2016 Canadian Census.

** Based on an interpolation of 2006 and 2016 Canadian Censuses.

Abbreviations:

SPAACE: Surveying Prevalence of Food Allergy in All Canadian Environments

S2S: SPAACE to SPAACE

Table EII. Weighted *Perceived* Prevalence Estimates of any Food Allergy, Excluding Milk, for Full Participants, Stratified by Age

	S2S, % (95% CI)	SPAACE, % (95% CI)	Difference, % (95% CI)
All participants	8.1 (7.5, 8.8)	6.7 (6.1, 7.4)	1.4 (0.5, 2.3)
S2S: n=15,322			
SPAACE: n=15,022*			
Children (< 18 years)	7.7 (6.4, 9.3)	6.6 (5.2, 8.3)	1.1 (-1.0, 3.2)
S2S: n=3012			
SPAACE: n=3271			
Adults	8.2 (7.5, 9.0)	6.8 (6.2, 7.6)	1.4 (0.4, 2.4)
S2S: n=12,310			
SPAACE: n=11,339			

* The sum of the children and adults in SPAACE does not equal the total n as there were some respondents in SPAACE for whom the age was not available.

Abbreviations:

SPAACE: Surveying Prevalence of Food Allergy in All Canadian Environments

S2S: SPAACE to SPAACE

39 **Table EIII. Sensitivity Analysis of Overall Weighted *Perceived* Prevalence Estimates**
 40 **Incorporating Data from Refusal Questionnaires**

All participants	S2S, % (95% CI)	SPAACE, % (95% CI)
Full	9.3% (8.7%, 10.1%)	7.1% (6.4%, 7.8%)
S2S: n=15,322		
SPAACE: n=15,022		
Partial	6.5% (4.9%, 8.5%)	2.5% (1.7%, 3.4%)
S2S: n=1,582		
SPAACE: n=1,393		
Non-participants (H1)*	6.5% (4.9%, 8.5%)	2.5% (1.7%, 3.4%)
S2S: n=13,353		
SPAACE: n=17,059		
Full, partial, and non-participants (H1)	8.2% (7.6%, 8.7%)	4.6% (4.1%, 5.2%)
S2S: n=30,257		
SPAACE: n=33,474		
Non-participants (H2**)	13.0% (9.8%, 17.0%)	5.0% (3.4%, 6.8%)
S2S: n=13,353		
SPAACE: n=17,059		
Full, partial, and non-participants (H2)	10.5% (9.8%, 11.3%)	5.8% (5.2%, 6.5%)
S2S: n=30,257		
SPAACE: n=33,474		

Non-participants (H3***)	3.3% (2.5%, 4.3%)	1.3% (0.9%, 1.7%)
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S2S: n=13,353

SPAACE: n=17,059

Full, partial, and non-participants (H3)	7.0% (6.5%, 7.5%)	3.9% (3.5%, 4.4%)
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S2S: n=30,257

SPAACE: n=33,474

* Under hypothesis #1, it was assumed that both partial participants (i.e., those who completed the Refusal Questionnaire (RQ)) and non-participants (i.e., those who were reached but refused to complete either the Food Allergy Prevalence Questionnaire (FAPQ) or RQ) were allergic in the same proportion. Non-participant households were assumed to have the same average size as participant households. In S2S, sufficient data about membership in Census subgroups was collected in the RQ for a weighted estimate to be calculated. However, in SPAACE, sufficient demographic information was not collected in the RQ to allow a weighted estimate to be generated directly. Hence, for SPAACE, an estimate of *perceived* prevalence incorporating full, partial, and non-participants was derived by adjusting the unweighted estimate in the same proportion as that between weighted and unweighted estimates for full participants. However, inference about possible change in *perceived* prevalence over time with incorporation of RQ data must be made with caution, given the differences in the RQ between the surveys. Hence, we have not provided a CI for the difference.

, * We have also provided alternative estimates of prevalence by assuming under hypothesis #2 that non-participants would have twice the prevalence of partial participants and under hypothesis #3 that non-participants would have half the prevalence of partial participants.

59

60 Abbreviations:

61 SPAACE: Surveying Prevalence of Food Allergy in All Canadian Environments

62 S2S: SPAACE to SPAACE

63 H: Hypothesis

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Food allergy was defined as:

- 1) *Perceived*: any individual who was reported, by the household respondent, to have any food allergy or
- 2) *Probable*: any individual who was reported, by the household respondent, to have symptoms/signs compatible with a **convincing history** and/or a physician diagnosis of a peanut, tree nut, fish, shellfish, sesame, milk, egg, wheat, and/or soy allergy.

Convincing history

A history was considered convincing (E8–E10) if the individual had experienced at least two **mild** symptoms or one **moderate** or one **severe** symptom after ingestion or contact (or inhalation for fish, shellfish, egg, or soy) within two hours after exposure to the food.

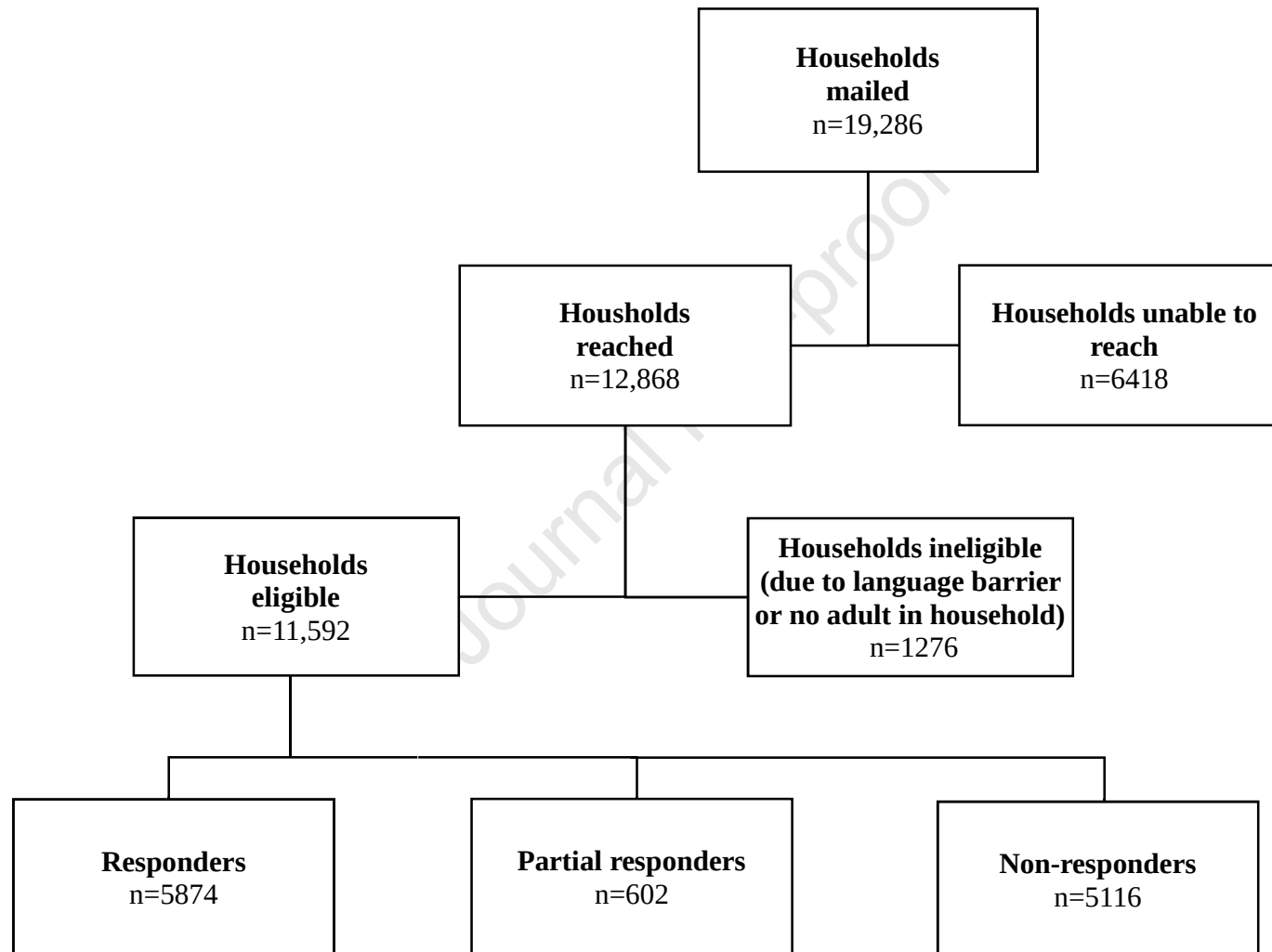
Mild symptoms included: pruritis, urticaria, flushing or rhinoconjunctivitis.

Moderate symptoms included: angioedema, throat tightness, gastrointestinal symptoms, or breathing difficulties (other than wheeze).

Severe symptoms included: wheeze, cyanosis, or circulatory collapse.

Excluding those with lactose intolerance or celiac disease from *probable* milk and wheat estimates:

To ensure that those who had lactose intolerance or celiac disease were not erroneously considered to have milk or wheat allergy, those who reported either of these conditions or symptoms limited to the gastrointestinal tract or intermittent ability to tolerate dairy or wheat products were excluded from our estimates of *probable* milk or wheat allergy.



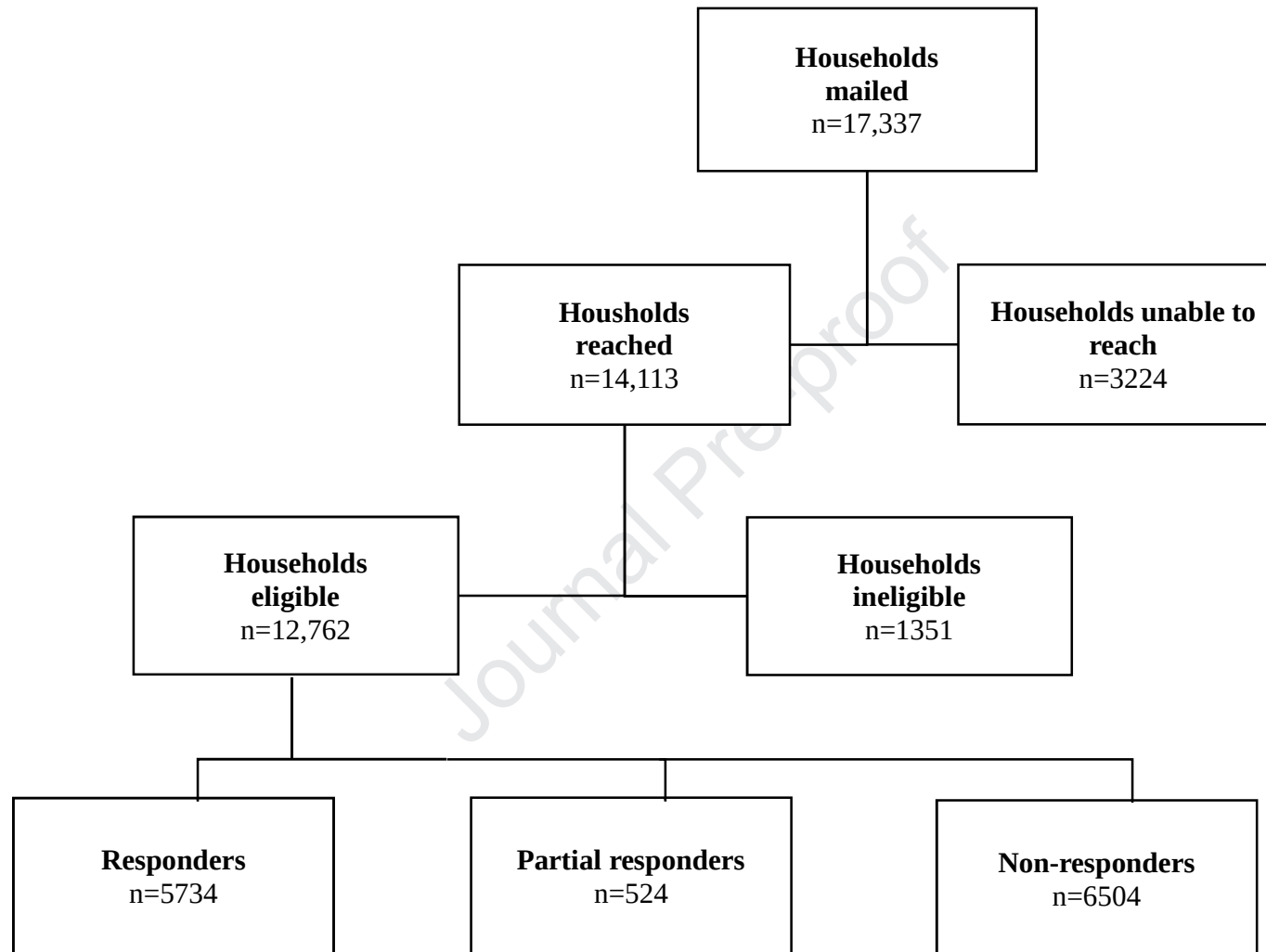


Figure E1. Definitions of Food Allergy

Figure E2A. Disposition of Households Contacted in S2S

Figure E2B. Disposition of Households Contacted in SPAACE

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METHODS

S2S: Surveying Prevalence of Food Allergy in All Canadian Environments (SPAACE) to

SPAACE

Selection of study population

New Canadians were those who reported immigrating to Canada within 10 years of completion of the telephone survey. Indigenous Canadians self-identified with First Nations, Metis, or Inuit. Lower-income Canadians were those whose household income was below the low-income cutoff (LICO), which is an income level at which families or unattached individuals spend at least 70% of before tax income on food, shelter, and clothing (E1).

Through the use of 2006 Canadian Census data, the census tracts (CT) from within the census metropolitan areas (E2) that contained the highest proportion of households with new, Indigenous, and lower-income Canadian. These CTs were then converted into postal codes using 2006 Statistics Canada data. A random sample of household telephone numbers with accompanying mailing addresses was then selected from these postal codes by Info-Direct (a company maintaining household telephone directory listings in Canada: Cornerstone Info-Direct, Toronto, Ontario, Canada) and ASDE Survey Sampler (Gatineau, Quebec, Canada).

Due to the methodology for targeted sampling of the vulnerable populations, the smaller Canadian provinces (Newfoundland and Labrador, Prince Edward Island, Nova Scotia, and New Brunswick) as well as the Canadian territories (Northwest, Yukon, and Nunavut) were either excluded or not proportionately represented. Although our primary research objective was to ensure adequate representation of the vulnerable populations, we also wanted to provide

nationwide prevalence estimates. Hence, we sampled households from additional regions from the four smaller provinces that contained the highest proportion of the vulnerable populations in these provinces although the percentage was lower than in the larger provinces. In the territories, a sample of households was obtained from the entire region.

Participant recruitment

The S2S survey was conducted by the Survey Research Centre at the University of Waterloo, Ontario, Canada. All households, with the exception of Nunavut and some in the Northwest Territories where household addresses were unavailable, were mailed an information letter regarding the survey. As an unconditional incentive, a \$5 coupon for a major Canadian restaurant chain was enclosed with the letter. When household addresses were unavailable, the study was advertised through a public service announcement and a \$5 compensation was mailed to these households after completion of the survey and provision of their address.

Telephone survey

Approximately two weeks after mailing the information letter, households were contacted and invited to complete the Food Allergy Prevalence Questionnaire (FAPQ) (E3–E7). A maximum of 15 attempts to contact the household was made during both weekdays and weekends. Respondents were eligible if they were 18 years or older, were living in the household, appeared to have no cognitive or hearing difficulties, could respond in either of Canada's official languages (English or French), and were capable of answering questions about the FA of all household members.

STATISTICAL ANALYSIS

Developing weighted prevalence estimates

As detailed Census data were only available for 2006 and 2016, weights for S2S were obtained from the 2016 Census, while for SPAACE, the 2010 population counts were interpolated between the 2006 and 2016 Census by assuming that there was a linear increase. To create the weighted estimates, non-overlapping subgroups, characterized by Canadian-born, Indigenous status, low-income, as well as those without post-secondary education were created for the study population and the Census-based data. The weight for each vulnerable group was then calculated by dividing the proportion of individuals in the Canadian population who were in this group by the proportion of individuals in the study who were in this subgroup. The overall weighted prevalence was then the sum of the subgroup specific prevalence multiplied by the subgroup specific weight for all subgroups.

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