

ORIGINAL ARTICLE

WILEY

Milk allergy most burdensome in multi-food allergic children

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Funding information

Funding for this project was provided
by J Protudjer's Start Up funds from the
University of Manitoba, and the Children's
Hospital Research Institute of Manitoba.
These funding bodies had no influence on
the study design; data collection, analysis,
and interpretation; or manuscript writing.

Editor: Hugh Sampson

Abstract

Background: Food allergy is a substantial health burden, which disproportionately affects children. Among children with food allergy, as many as 70% have multiple food allergies. Whereas the overall burden of food allergy on quality of life has been described, little is known about the burden of individual allergens. We aimed to examine the perception of burden among families with multiple food-allergic children.

Methods: Parents of children with 1 + children with multiple food allergies including milk responded to online questions, including both open-ended and closed-ended questions on food allergy-related burdens of time, financial costs, social restrictions, and emotional demands.

Results: Overall, 64 children (69.8% boys) of whom (73.0%) most were aged 10 and younger were included. Most had been diagnosed with food allergy in infancy and by a (pediatric) allergist. Other common allergies included peanut (65.6%), tree nuts (57.8%), egg (76.6%), and sesame (31.3%). Quantitatively, milk allergy was reported as carrying the most burden, including most socially limiting (81.5%), requiring the most planning (75.9%), causing the most anxiety (68.5%), most challenging to find "safe" or allergy-friendly foods (72.2%), and costly (81.5%). Qualitatively, we identified five themes that captured burdens associated with costs, marketing of milk products to children, risk of cross-contamination, ubiquity of milk/dairy and public confusion with lactose intolerance, and an unwillingness of others to accommodate the allergy.

Conclusion: Parents whose children have multiple food allergies, including milk, report milk as the allergy associated with the greatest time, financial, social, and emotional burdens.

KEYWORDS

burden, food allergy, milk allergy, pediatrics

Abbreviations: EAI, Epinephrine auto-injector; EcoQ, Food Allergy Socio-Economic Questionnaire; FAQLQ, Food Allergy Quality of Life Questionnaire; QoL, Quality of life.

The peer review history for this article is available at <https://publons.com/publon/10.1111/pai.13274>

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1 | INTRODUCTION

Food allergy affects about 7% of children in Canada¹ and as many as 10% of children globally,² with temporal trends supporting an increased prevalence over time.² In Canada, whereas the overall reported prevalence of food allergy increased significantly, the greatest increase was noted for cow's milk allergy.³ In contrast, self-reports of the other most common food allergies in childhood—peanut and tree nut—did not quantitatively increase in prevalence over this time frame.^{1,3}

The prevalence of multiple food allergies within the pediatric population varies by study. A randomized cross-sectional survey of American households (N = 40 104 children) estimated that approximately 30.4% of children with food allergy (corresponding to 2.4% of the overall pediatric population) have multiple food allergies.⁴ Within subspecialty practices, the numbers can be even higher, as a study within a pediatric referral practice noted that more than 70% of food-allergic children were multiple food-allergic.⁵

The adverse impacts of food allergy on quality of life (QoL) have been well-described, including health-related QoL,^{6–8} emotional QoL, social QoL, and overall QoL.⁹ In fact, in some studies the impact of food allergy on QoL is more significant than the impact of other chronic diseases such as autoimmune disease.¹⁰ In studies to date, multiple food allergies are a variable that significantly impacts QoL among food-allergic children and their families.¹¹

Previously, multiple food allergies were associated with poorer quality of life, compared to those with single food allergy.¹² Likewise, milk or egg allergy was shown to be more negatively associated with quality of life compared with peanut or tree nut allergy.¹¹ However, among food-allergic children and their families, to date there has not been a study examining which unrestricted types of food allergy is perceived as the allergen that carries the most burdens relating to time, financial costs, social restrictions, and emotional demands. This information is crucial in informing policy decisions, behavioral interventions, and research priorities moving forward. As a result, our study was the first mixed-methods study of its kind to examine the perception of burden among families with multiple food-allergic children in Canada.

2 | METHODS

2.1 | Study design, participant recruitment, and data collection

The overarching anonymous study was open to parents of children with at least one child with multiple food allergies, living in Canada, and who were able to confidently respond to questions in English. Families with a mono-food-allergic child and in which there are no other children with multiple food allergies were ineligible, as were families in which the child has not been diagnosed by a physician (ie, the parents have “diagnosed” the child as having a food allergy). Families in which the child with multiple food allergies also had

Key Message

In this mixed-methods study, families whose children have multiple food allergies, including milk, describe milk allergy to carry the greatest burdens of time, financial costs, social restrictions, and emotional demands.

co-morbidities which impact diet (ie, metabolic diseases including but not limited to diabetes; psychological/psychiatric disorders such as autism or eating disorders) were likewise ineligible.

Potential participants were recruited via email contact that was distributed via Canadian patient and professional organizations through established mailing lists (eg, Canadian Society of Allergy and Clinical Immunology; Food Allergy Canada) and through social media (eg, Twitter). Potential participants were directed to an information page about the study, at the end of which they were invited to continue to the survey. Continuation to the survey was taken as implied consent.

The survey included basic demographic questions, and closed- and open-ended questions centered around the burden of food allergy. Herein, we define burden to include burdens based on time, financial costs, social restrictions, and emotional demands.

The questions were based on two previously validated questionnaires: the Food Allergy Quality of Life Questionnaire (FAQLQ^{7,8}) and the Food Allergy Socio-Economic Questionnaire (EcoQ¹³) as well as the study team's a priori knowledge of the field. The study was created in Survey Monkey®, with results aggregated and sent to the senior author. First, families were asked a series of 37 closed-ended questions on the burden of food allergy. This was followed by a purposive sample¹⁴ of families with a child with multiple food allergies, of which one was milk, who responded to a single open-ended question in which families were asked why a particular food allergy causes the most burden.

2.2 | Study population

The study population in the present analysis was restricted to those with a reported milk allergy, based on an a priori interest and because it is a prevalent allergy in the overarching cohort. In keeping with the inclusion criteria, all participants thus had milk allergy plus at least one other food allergy.

2.3 | Analysis

This study which involved both closed- and open-ended questions permitted a mixed-methods analysis, using a triangulation design in which qualitative and quantitative data are collected and interpreted concurrently, but independently.¹⁵ This allows for a heightened understanding of each type of data.

Quantitative data were analyzed using descriptive statistics (n/N, %). First, data for the entire study population were analyzed. Subsequently, we performed a sensitivity analysis among our study population, but who also reported concomitant peanut and/or tree nut allergy.

Qualitative data were analyzed using content analysis.¹⁴ First, participant free-text statements were read for surface descriptive content, at which time we organized like-with-like ideas. Second, the statements were reread, at which time we looked for latent meaning, to more fully understand what is being described. Through this two-stage analysis, we developed a coding guide, which we applied across the data, and refined to ultimately generate the themes presented herein. This study was approved by the University of Manitoba Health Research Ethics Board (HS23109 (H2019:317)).

3 | RESULTS

Our quantitative survey included 64 participants, representing 50.8% (64/126) of the overarching study (Table 1). Most children in our study population were boys (44/63; 69.8% [gender not reported for one child]), and the majority were aged 10 and younger (46/63; 73.0% [age not reported for one child]). Nearly all children had been diagnosed with food allergy in infancy (62/64; 96.7%) and by a (pediatric) allergist (59/61; 96.7%). All children in our study population were allergic to milk, but also commonly had allergies to peanut (65.6%), tree nuts (57.8%), egg (76.6%), and sesame (31.3%). Most children had an epinephrine auto-injector (EAI) (95.0%), which their parents reported that was carried most/all of the time (87.7%). About half of children had had a severe reaction that was treated with epinephrine (32/63; 50.8%) or for which they went to the emergency department (39/53; 77.8%). This study population paralleled the population of the overarching study (Table S1).

Quantitatively, milk allergy was reported as carrying the most burden (Figure 1). This allergy was reported as being the most socially limiting (81.5%), required the most planning (75.9%), and caused the most anxiety (68.5%). Similarly, milk allergy was reported to be the most challenging to find "safe" or allergy-friendly foods (72.2%) and costly (81.5%; Figure 2).

In a sensitivity analysis of children with milk allergy, and concomitant peanut and/or tree nut allergy, participant characteristics were comparable to those of the study population (Table S2). Milk remained the allergy that parents reported as carrying the most burden (Figures S1 and S2). Interestingly, in this analysis, the burden attributable to milk was slightly higher than reported by the study population in which children had milk allergy, plus at least one other allergy, not restricted to concomitant peanut and/or tree nut.

A total of 54 participants (84.4% of those who participated in the quantitative survey) responded to the open-ended question. Qualitatively, five themes were identified, which provide greater insight into the burdens reported above (Table 2). The first theme,

alternative high-calcium, high-energy sources are difficult and costly to find, captures how families with a child with milk allergy struggled to find nutritious and tasty alternatives that would fit into a family's financial and time constraints. Alternatives to dairy, such as "vegan cheeses are super expensive and are often not tasty" and are perceived to not "have the same nutritional profile." More nutritious alternatives were described as "expensive" compared with cheaper alternatives, as well as to dairy.

The burden of milk allergy was also captured in the second theme, milk products are heavily marketed toward children. As dairy is a staple in the diets of many young children, families noted that a milk allergy created an invisible divide between them and non-milk-allergic families. As one family stated, "milk is hailed as some kind of super hero for growing kids... and is [the allergy] that has alienated us the most." As another family described:

All social events have to be preplanned, we have to take her food where ever we go, we rarely eat out due to the risk of cross contamination... Milk is literally in everything. It's depressing watching your child miss out on movie nights at school where pizza is served to missing out on breakfast with Santa... it's never ending. Every occasion, every event, every invite, every holiday is hard due to this milk allergy... it's a heavy load to carry every single day.

The third theme, risk of cross-contamination, was common. Families of young children were constantly concerned about "liquid milk and yogurt [which were] prone to spilling... [thus] increasing the risk of cross-contamination." In contrast, families with older children struggled to find restaurants that disclosed all ingredients, as "[d]airy is in everything. This is a hard ingredient to ask others to watch for in their own cooking. And at restaurants, butter or dairy is not always listed as an ingredient in menus and can be accidentally added."

Fourth, families described challenges due to public confusion, wherein milk allergy was often confused with lactose intolerance, or not perceived as serious as peanut or tree nut allergies. These families spoke of how others commonly misunderstood the potentially severe consequences of a milk allergy, as they believed milk allergy and lactose intolerance were synonymous in definition and in consequences. By extension, these families also struggled with the ubiquity of milk and dairy products, and changes they made subsequent to a diagnosis of milk allergy.

Most people can't believe you can have a severe food allergy that is life threatening and requires an [EAI], and/or they think it's a minor problem like lactose intolerance. Our family manages egg, peanut, milk, tree nut, fish, and shellfish allergies among three family members and milk is by far the most difficult to avoid. Milk is so pervasive in so many unexpected foods that it is hard to avoid. When my son was diagnosed with his severe milk allergy I had to remove half the food from my house.

TABLE 1 Participant characteristics of the children with milk allergy (N = 64)

	n	%
Age group (years; N = 63)		
0-2	17	27.0
3-5	15	23.8
6-10	14	22.2
11-14	9	14.3
15-18	8	12.7
Gender (N = 63)		
Boy	44	69.8
Girl	19	30.1
Age at diagnosis (years)		
0-2	62	96.9
3-5	2	3.1
6-10	0	0.0
11-14	0	0.0
15-18	0	0.0
Food allergies in addition to milk		
Peanut	42	65.6
Tree nuts	37	57.8
Sesame	20	31.3
Egg	49	76.6
Fish	14	21.9
Crustaceans	14	21.9
Soy	9	14.1
Wheat or triticale	7	10.9
Mustard	6	9.4
Other ^a	20	31.3
Number of food allergies, including milk		
2	12	19.0
3	13	20.6
4	10	16.0
5	13	20.6
6+	15	23.8
Diagnosed by a (pediatric) allergist (N = 61)		
No	2	3.3
Yes	59	96.7
Clinical testing (skin or blood)		
No	4	6.3
Yes	60	93.8
Child has EAI (N = 60)		
No	3	5.0
Yes	57	95.0
Child carries EAI (N = 57)		
Never/rarely	6	10.5
About half the time	1	1.8

(Continues)

TABLE 1 (Continued)

	n	%
Most/all of the time	50	87.7
Severe reaction for which child received epinephrine (N = 63)		
No	31	49.2
Yes	32	50.8
Severe reaction for which child went to emergency (N = 53)		
No	13	20.6
Yes	39	77.8
Don't remember	1	1.6
Province/territory of residence (N = 62)		
All territories	1	1.6
Atlantic Canada ^b	2	3.2
Western Canada ^c	28	43.8
Ontario	30	46.8
Quebec	1	1.6

Abbreviation: EAI, epinephrine auto-injector

^aIncludes seeds, legumes, coconut, banana, avocado, chicken, turkey, red meat, strawberry, kiwi, coriander, fruits, sulfites, and turmeric.^bNova Scotia, Prince Edward Island, New Brunswick, Newfoundland, and Labrador^cManitoba, Saskatchewan, Alberta, and British Columbia

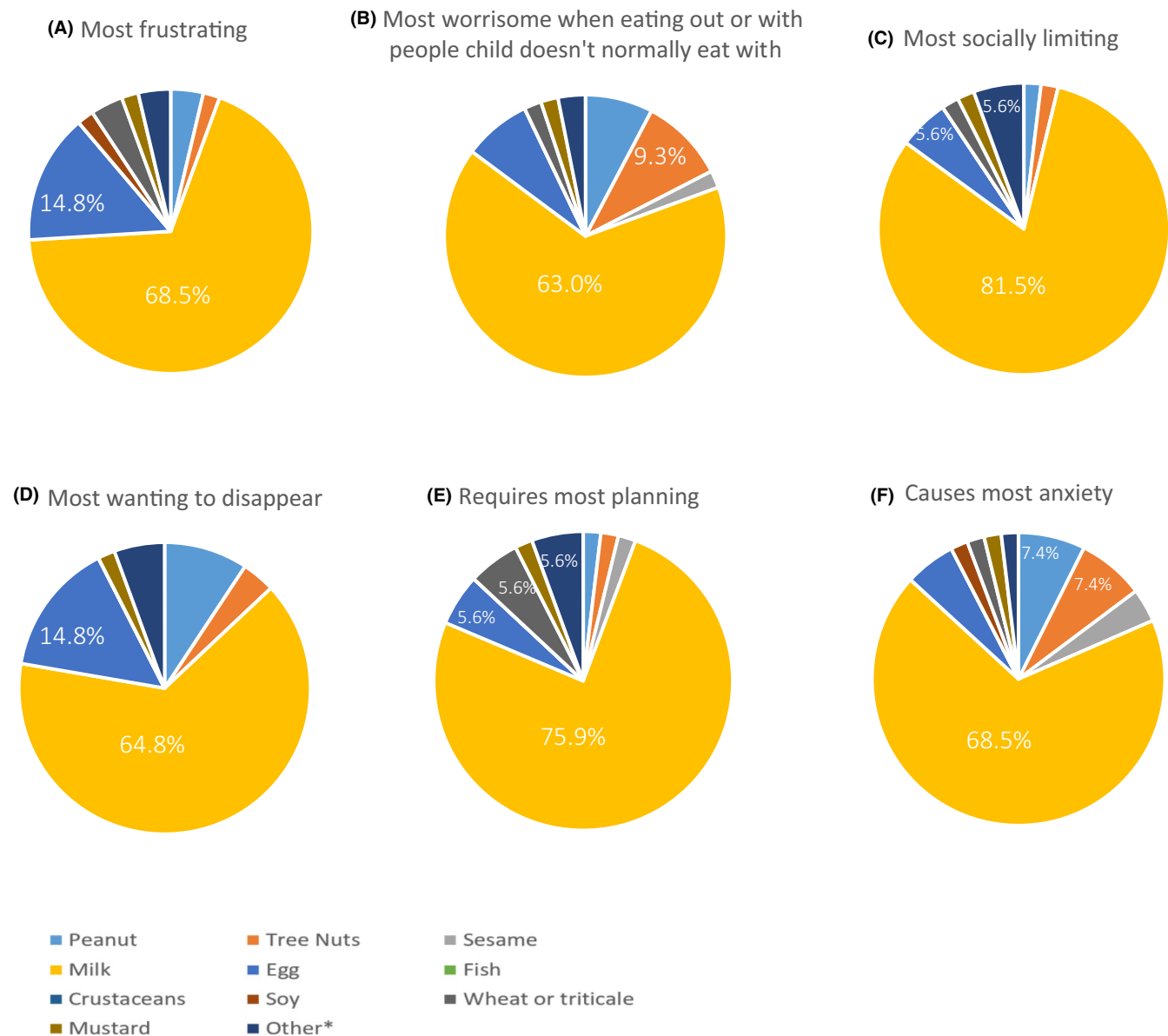
Families described how it has become acceptable, and even fashionable, to have coffee (commonly with milk) at all times. This behavior was greatly concerning to families with a milk-allergic child, as the threat of exposure limited their ability to go to public places.

Dairy is in so many foods. Most people are walking around with a coffee with cream in their hands everywhere they go. This makes doctors' offices, playgrounds, etc very challenging.

Finally, the fifth theme captures families' frustration about how people—including family members—are “unwilling to give up dairy” even if it meant that the child would be excluded. As one parent described, “Milk also is involved in so many holiday treats my son has trouble finding safe alternatives. And people honestly just give up rather than trying to accommodate or include him.”

4 | DISCUSSION

To our knowledge, this is the first study to examine the perception of burden among families of children with multiple food allergies. Qualitative and quantitative analysis identifies that cow's milk allergy is universally perceived by our study population as carrying a significantly greater burden vs other food allergies across multiple dimensions, even among those with concomitant peanut and/or tree nut allergy.



* Includes seeds, legumes, coconut, banana, avocado, chicken, turkey, red meat, strawberry, kiwi, coriander, fruits, sulfites, turmeric

Note: Percentages reported only for the top 2 foods reported in each measure of burden

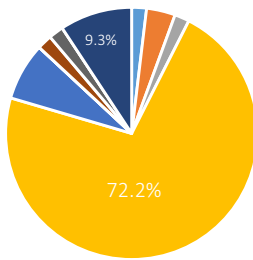
FIGURE 1 Among those with a milk-allergic child, type of food allergy reported to be

There have been a few previous studies to look at whether allergy to certain foods causes greater impairment in QoL than others. A study of 876 food-allergic families noted that food allergy-related QoL was significantly lower among cow's milk (and egg)-allergic children compared with other food allergies including peanut and tree nut.¹⁶ A study of 648 food-allergic adults in Europe noted QoL impairment to be higher with peanut or soy allergy compared with other food allergies.¹⁷ A Canadian study noted that while children with peanut allergy reported worse QoL than children with shellfish allergy, this difference was not

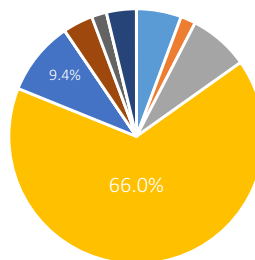
significant in multivariable analysis.¹⁸ However, our study is unique in focusing specifically on families with multiple food allergies, of which one is milk.

A common qualitative theme identified in our study population was concern about nutritional sources for calcium and for high-energy foods. Although we did not query children's nutritional status or anthropometry, these findings provide some context to reports in the literature in which children with challenge-proven cow's milk allergy had significantly lower protein¹⁹ and calcium intake^{20,21} and height^{19,20} than non-food-allergic children.¹⁹

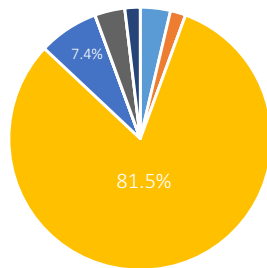
(A) Challenging to find "safe" or allergy-friendly foods



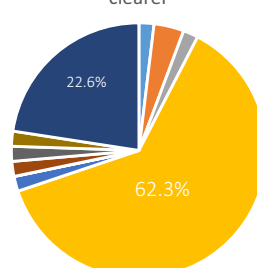
(B) Challenging to find foods without a "may contain" label



(C) Which are most costly



(D) For which ingredient labels should be clearer



■ Peanut ■ Tree Nuts ■ Sesame
 ■ Milk ■ Egg ■ Fish
 ■ Crustaceans ■ Soy ■ Wheat or triticale
 ■ Mustard ■ Other*

* Includes seeds, legumes, coconut, banana, avocado, chicken, turkey, red meat, strawberry, kiwi, coriander, fruits, sulfites, turmeric

FIGURE 2 Among those with milk allergy, type of food allergy reported to cause most financial and time burden. Note: Percentages reported only for the top 2 foods reported in each measure of burden

TABLE 2 Qualitative themes of milk as a most burdensome allergies

Theme	Supporting Quotation
1. Alternative high-calcium, high-energy sources difficult, costly to find	It is difficult to find a source of high calcium that also provides the sense of fullness that milk products provide It's very time consuming and expensive trying recipe after recipe and it can become very challenging. Working all day while having to experiment most nights can take a toll. There isn't enough time in the day! We cannot take breaks and eat at restaurants as very few can't accommodate or guarantee no cross contamination.
2. Milk products heavily marketed toward children	Dairy is a large staple for young children, so it is often used in different baby meals or for is consumed in close proximity at daycare. Milk is hailed as some type of super hero for growing kids... its given out in schools and it is the one that keeps us alienated the most.
3. Risk of cross-contamination due to liquid/spills	Liquid milk and yogurt are also prone to spilling, particular for younger age children, increasing the risk of cross-contamination
4. Milk is ubiquitous, but often confused with lactose intolerance or not perceived as severe as allergies to peanuts or tree nuts	Many people think my son's dairy allergy is the same as lactose intolerance, which is definitely not as serious and can then lead to relaxed attitudes towards the allergy. Most people can't believe you can have a severe food allergy that is life threatening and requires an [EAI], and/or they think it's a minor problem like lactose intolerance. Peanut allergies are more understood but most people have trouble grasping just how many foods have dairy in them. It really limits what we can attend as a family
5. Others unwilling to accommodate	People honestly just give up rather than trying to accommodate or include him. Family gatherings are difficult, as people are unwilling to give up dairy at those events.

Abbreviation: EAI, epinephrine auto-injector

Another theme explored was public confusion of cow's milk allergy vs lactose intolerance, a theme that has not received much attention in the scientific literature to date. Some symptoms of lactose intolerance (such as gastrointestinal symptoms) could be mislabeled as cow's milk allergy which has the potential to minimize the risks of cow's milk allergy, in particular anaphylaxis. This is a particularly poignant point as cow's milk allergy is among the most common causes of food-induced anaphylaxis, and (while rare) one of the most common causes of fatal anaphylaxis in the literature to date.²² It has been noted in a recent review of lactose intolerance that "a better knowledge of... differences could limit misunderstandings in the diagnostic approach and in the management of these conditions".²³

Other messages focused on the social impact of this condition including the marketing of milk products for children, and the sense that children could be excluded due to an unwillingness to give up dairy products. Certainly, dairy products are pervasive in many cultures and are a common source of nutrition for young children. Milk programs are common in schools, including a Canadian involvement in "world school milk day".²⁴ It has been shown in studies that childhood food allergy can lead to a social exclusion²⁵ and bullying²⁶ at schools which could theoretically be worsened with the pervasive presence of the allergen in the environment, as suggested by our study.

Finally, concern about cross-contamination was noted as a common theme within our study, which has been well-substantiated in the literature to date (although much of the focus has been on peanut allergy). It has been documented that casual contact with allergen (through cutaneous or inhalational exposure) is very unlikely to cause a systemic reaction, and this often is misaligned with public perception and can create "an uncomfortable clash between accommodations that lack any medical evidence of necessity and a desire to provide measures that comfort our patients".²⁷ Nonetheless, it warrants mention that a fatal case of anaphylaxis subsequent to cutaneous exposure was recently reported.²⁸

Limitations of our study include the inherently higher-risk population that filled out the survey, which may limit external validity. As with all Internet surveys, we were unable to assess non-responders, including those who began, but did not complete the survey. Few responses were from Quebec or Atlantic Canada, which may impact the generalizability of these results across the country. Our study looked at those families who self-identified as having a multi-food-allergic child, and did not require allergist confirmation of this diagnosis. It has been noted that the diagnosis of a multi-food-allergic child can be complicated by issues such as avoidance of foods once an initial diagnosis of food allergy is made, pre-emptive testing without a history of a reaction, or familial concern about "common allergens" in the absence of a reaction.²⁹ However, within our sample nearly all reported being diagnosed by a pediatric allergist and 94.4% reported a history of allergy testing (and more than 50% reported a prior oral challenge). We also lacked anthropometric and nutritional data on these children. Finally, our study population had very high rates of EAI carriage (96.7%), which are considerably higher than the rates commonly reported in the literature.³⁰ In addition, 52.0% had a history of previous systemic reactions. This may speak to an

inherently higher risk population, although the impact of this finding on our results is unclear. Further research is required to confirm our findings in larger populations.

Despite these limitations, this study is unique in providing insight into the perceived burden of food allergy among families of children with multiple food allergies. The unique mixed-methods study design identifies research priorities and highlights policy implications moving forward. The collective interpretation of the findings points toward a need for allergy education at daycares and schools, increased public awareness about the distinction between milk allergy and lactose intolerance, and improved labeling and changes to marketing and dietary recommendations.

5 | CONCLUSION

Families whose children have multiple food allergies, including milk, quantitatively and qualitatively describe milk allergy to carry the greatest burdens of time, financial costs, social restrictions, and emotional demands. These findings persist even in the presence of concomitant peanut and/or tree nut allergy.

CONFLICTS OF INTEREST

EMA is a member of the healthcare advisory board for Food Allergy Canada and is a member of the steering committee of Canada's National Food Allergy Action Plan. HK is president of Canadian Society of Allergy and Clinical Immunology, and co-leads Canada's National Food Allergy Action Plan. JG is an executive director, Food Allergy Canada, and co-leads Canada's National Food Allergy Action Plan. JP is a member of the steering committee of Canada's National Food Allergy Action Plan.

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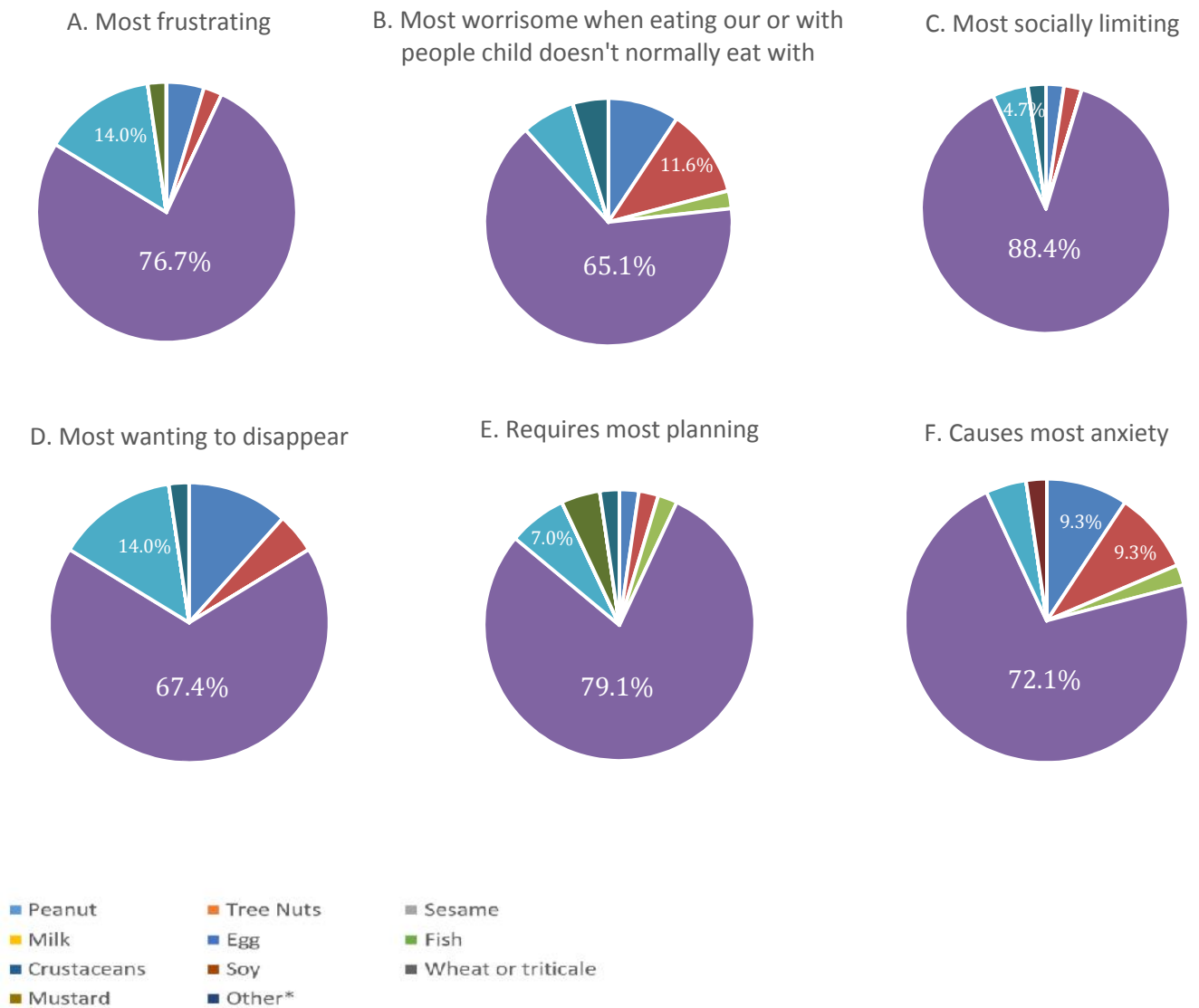
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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

How to cite this article: Abrams EM, Kim H, Gerdts J, Protudjer JLP. Milk allergy most burdensome in multi-food allergic children. *Pediatr Allergy Immunol*. 2020;00:1-8. <https://doi.org/10.1111/pai.13274>

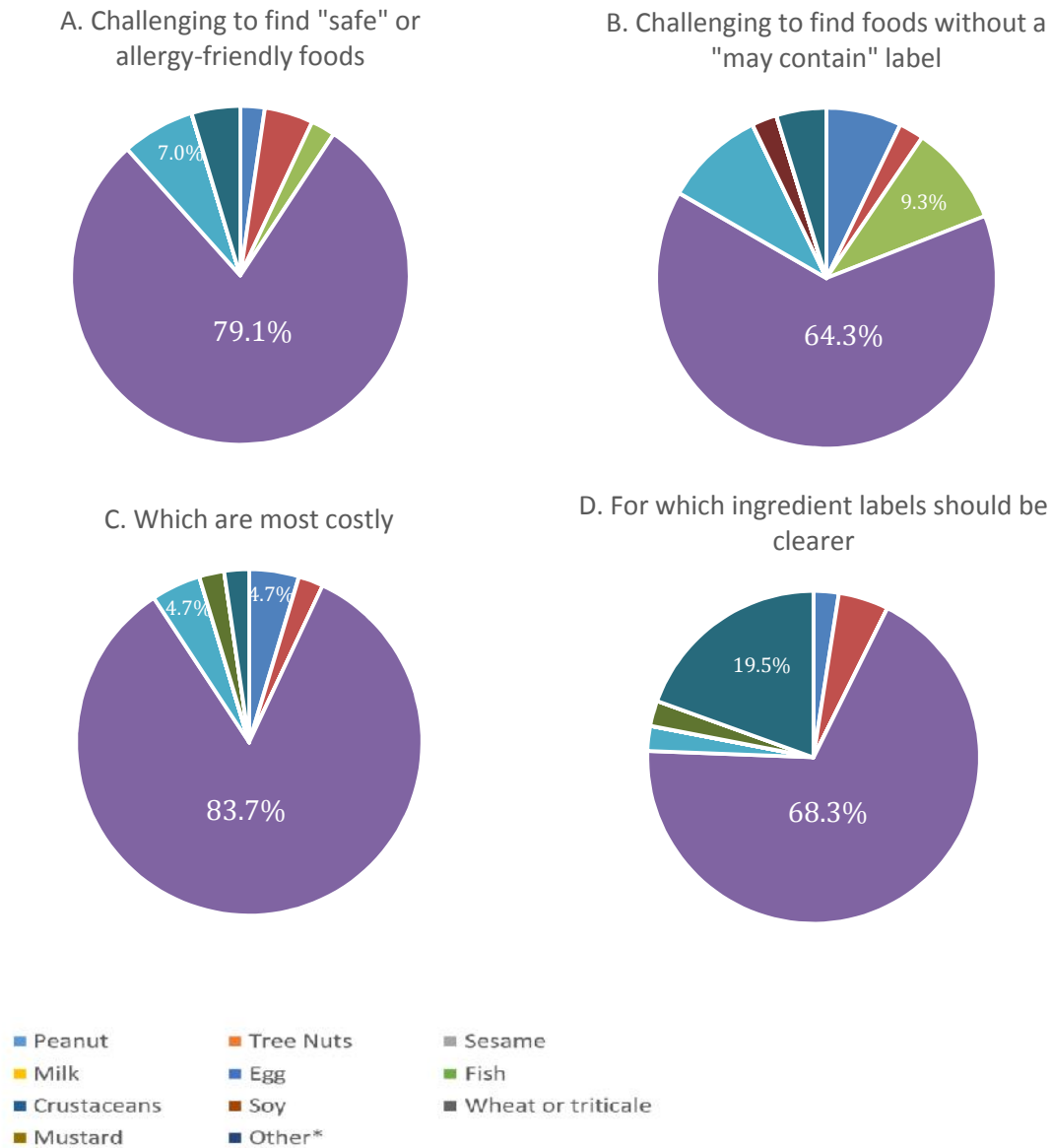
Figure E1. Amongst those with a milk allergic child and concomitant peanut and/or tree nut allergy, type of food allergy reported to be...



* Includes seeds, legumes, coconut, banana, avocado, chicken, turkey, red meat, strawberry, kiwi, coriander, fruits, sulfites, turmeric

Note: Percentages reported only for the top 2 foods reported in each measure of burden

Figure E2. Amongst those with milk allergy and concomitant peanut and/or tree nut allergy, type of food allergy reported to cause most financial and time burden



* Includes seeds, legumes, coconut, banana, avocado, chicken, turkey, red meat, strawberry, kiwi, coriander, fruits, sulfites, turmeric

Note: Percentages reported only for the top 2 foods reported in each measure of burden

TABLE E1. Participant characteristics of the entire study population (N=126)

	n	%
Age (years; N=123)		
0-2	24	19.5
3-5	22	17.9
6-10	35	28.5
11-14	26	21.1
15-18	16	13.0
Gender (N=123)		
Boy	83	67.5
Girl	40	32.5
Age at diagnosis (years)		
0-2	112	88.9
3-5	12	9.5
6-10	0	0.0
11-14	1	0.8
15-18	1	0.8
Types of food allergies (N=126)		
Peanut	95	75.4
Tree Nuts	90	71.4
Sesame	42	33.3
Milk	64	50.8
Egg	73	57.9
Fish	25	19.8
Crustaceans	27	21.4
Soy	18	14.3
Wheat or triticale	10	7.9
Mustard	11	8.7
Other*	45	35.7
Number of food allergies, including milk		
2	31	24.6
3	30	23.8
4	24	19.0
5	19	15.1
6+	22	17.5
Diagnosed by a (Pediatric) Allergist (N=121)		
No	3	2.5
Yes	118	97.5
Clinical testing (skin or blood test)		
No	7	5.6
Yes	119	94.4
Oral Food Challenge (N=125)		
No	54	43.2

	Yes	71	56.8
Child has EAI (N=120)	No	4	3.3
	Yes	116	96.7
Child carries EAI (N=116)			
	Never/rarely	9	7.8
	About half the time	2	1.7
	Most/all of the time	105	90.5
Severe reaction for which child received epinephrine (N=125)			
	No	60	48.0
	Yes	65	52.0
Severe reaction for which child went to emergency (N=124)			
	No	34	27.4
	Yes	89	89.0
	Don't remember	1	0.8
Province/Territory of Residence			
	All Territories	1	0.8
	Atlantic Canada‡	7	5.6
	Western Canada§	51	40.5
	Ontario	58	46.0
	Quebec	9	7.1

* Includes seeds, legumes, coconut, banana, avocado, chicken, turkey, red meat, strawberry, kiwi, coriander, fruits, sulfites, turmeric

‡Nova Scotia, Prince Edward Island, New Brunswick, Newfoundland and Labrador

§Manitoba, Saskatchewan, Alberta, British Columbia

Abbreviation: EAI Epinephrine auto-injector

Table E2. Participant characteristics of the children with milk allergy, and peanut and/or tree nut allergy (N=50)

	n	%
Age group (years; N=49)		
0-2	9	18.5
3-5	14	28.0
6-10	11	22.0
11-14	9	18.5
15-18	6	12.0
Gender		
Boy	35	70.0
Girl	15	30.0
Age at diagnosis (years)		
0-2	50	100.0
3-5	0	0.0
6-10	0	0.0
11-14	0	0.0
15-18	0	0.0
Food allergies in addition to milk		
Peanut	41	82.0
Tree Nuts	37	74.0
Sesame	17	34.0
Egg	37	74.0
Fish	11	22.0
Crustaceans	13	26.0
Soy	3	6.0
Wheat or triticales	4	8.0
Mustard	4	8.0
Other*	13	26.0
Number of food allergies, including milk		
2	7	14.0
3	10	20.0
4	9	18.0
5	11	22.0
6+	13	26.0
Diagnosed by a (Pediatric) Allergist		
No	2	2.0
Yes	48	96.0
Clinical testing (Skin or blood)		
No	1	2.0
Yes	49	98.0
Child has EAI (N=60)		

No	3	6.0
Yes	47	94.0
Child carries EAI (N=57)		
Never/rarely	3	6.0
About half the time	1	2.0
Most/all of the time	46	92.0
Severe reaction for which child received epinephrine (N=48)		
No	20	41.7
Yes	28	58.3
Severe reaction for which child went to emergency (N=48)		
No	5	10.4
Yes	42	87.5
Don't remember	1	2.1
Province/Territory of Residence (N=49)		
All Territories	0	0.0
Atlantic Canada†	2	4.1
Western Canada‡	19	38.8
Ontario	28	58.3
Quebec	0	0.0

* Includes seeds, legumes, coconut, banana, avocado, chicken, turkey, red meat, strawberry, kiwi, coriander, fruits, sulfites, turmeric

†Nova Scotia, Prince Edward Island, New Brunswick, Newfoundland and Labrador

‡Manitoba, Saskatchewan, Alberta, British Columbia

Abbreviation: *EAI* Epinephrine auto-injector