

*Original article***Prevalence of self-reported food allergy in American adults and use of food labels**

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Background: Few population-based studies in the United States have determined the prevalence of food allergy in adults and the problems these individuals might have with reading food labels.

Objective: The objectives of this study are to report the prevalence of self-reported food allergy, to identify the characteristics of food allergy reactions, and to describe the use of labels among adults with food allergy.

Methods: Questions from the US Food and Drug Administration's 2001 Food Safety Survey were analyzed to determine the prevalence of food allergy and opinions about food labels in the management of food allergy.

Results: The prevalence of self-reported food allergy is 9.1% among all survey respondents, with 5.3% of all respondents reporting a doctor-diagnosed food allergy. The prevalence of food allergy to the 8 most common allergens (peanut, tree nuts, egg, milk, wheat, soybeans, fish, and crustacean shellfish) is self-reported as 2.7% among respondents with doctors' diagnoses. Several label issues, such as words on some ingredient lists being too technical or hard to understand and food labels not always alerting persons to new ingredients, were reported as serious or very serious obstacles for managing an allergy.

Conclusion: The prevalence of self-reported doctor-diagnosed food allergy among US adults is 5.3%, and a large portion of adults with food allergy found certain label issues a serious problem for managing their food allergy.

Clinical implications: The findings provide a needed source of population-based prevalence data of food allergy among US adults. Label issues identified are useful in understanding the difficulties of managing a food allergy. (*J Allergy Clin Immunol* ■■■■;■■■;■■■-■■■.)

Key words: Food allergy, food labeling, prevalence

In the 1990s, food allergies were estimated to affect 1.5% of adults in the United States and 6% of children younger than 3 years of age.¹ In recent population-based

Abbreviation used

FDA: Food and Drug Administration

studies in the United States, 1.3% of adults self-reported peanut allergy, tree nut allergy, or both; 2.8% of adults self-reported seafood allergy; and the adult population allergic to food was estimated to be 4%.^{2,3} However, few population-based studies in the United States have determined the prevalence of allergies in adults to a number of particular foods.^{4,5}

Currently, because there is no cure for food allergy, sensitive individuals must manage their food allergy through avoidance of foods containing the allergen. For packaged foods, food labels are the only readily available product-specific information for food ingredients. The US Food and Drug Administration (FDA) is concerned with allergen-labeling issues as part of its regulatory authority. The FDA recognizes peanuts, soybeans, milk, egg, fish, crustacean shellfish, wheat, and tree nuts as the 8 most common food allergens.⁶ Additionally, the Food Allergen Labeling and Consumer Protection Act of 2004 amends the Federal Food, Drug, and Cosmetic Act to require plain-English declaration of the source of ingredients that are or are derived from these 8 foods or food groups within or adjacent to the ingredient statement of a food product.

There is little population-based information on what proportion of individuals with food allergies read food labels or what types of problems these individuals have using food labels. Evidence that consumers sometimes have trouble using current food labels to determine whether certain allergens are in a food has been reported. In a 2002 convenience sample survey, Joshi et al⁷ found that parents of children with food allergy had difficulty in identifying milk and soy ingredients on product labels, and 48% of the parents indicated that they found it necessary to contact manufacturers to assist with interpreting food ingredient labels.

The objectives of this study are to report the prevalence of self-reported food allergy in adults in the United States from the 2001 Food Safety Survey, to identify the characteristics of food allergy reactions, and to describe the use of information on food labels among adults with food allergy. This study provides baseline information on food allergy prevalence and label use before the January 1, 2006, effective date of the Food Allergen Labeling and Consumer Protection Act of 2004.

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TABLE I. The prevalence of reported food allergy by demographic group, 2001 Food Safety Survey

Demographic variable	Total sample (N)	Self-reported food allergy (N [%])*	Self-reported doctor-diagnosed food allergy (N [%])*
All	4482	471 (9.1)	279 (5.3)
Sex†			
Female	2744	340 (11.4)	224 (7.6)
Male	1733	131 (6.5)	55 (2.7)
Age (y)			
18-29	729	75 (8.1)	37 (4.1)
30-39	907	81 (8.4)	52 (5.5)
40-49	984	118 (9.6)	70 (5.5)
50-59	759	82 (10.0)	50 (5.7)
≥60	991	95 (8.1)	62 (5.3)
Race/ethnicity			
White/non-Hispanic	3510	361 (8.9)	212 (5.1)
Black	321	37 (8.8)	28 (6.5)
Hispanic	355	35 (8.7)	18 (4.3)
Other	291	38 (11.6)	21 (6.3)
Education‡			
High school education or less	1727	137 (6.6)	86 (3.8)
At least some college education	2710	329 (11.3)	192 (6.6)

*N represents actual numbers reported, but percentages are weighted (see the Methods).

†Prevalence significantly different in female compared with male subjects; $P < .001$.

‡Prevalence significantly different in respondents with at least some college education; $P < .001$.

METHODS

Instrument

The Food Safety Survey is a list-assisted random-digit-dial survey of American consumers conducted periodically by the FDA. In this survey about various food safety issues, a new series of questions in 2001 addressed participants' experience with food allergy and opinions about the role of food labels in the management of food allergy. The food allergy questions were cognitively tested with members of the Food Allergy and Anaphylaxis Network for clarity, completeness, and relevance of item content. A Spanish version of the questionnaire was also developed.

Data collection

The survey was conducted by using a nationally representative single-stage sample of telephone numbers generated by the GENESYS Sampling System (Fort Washington, Pa). Data were collected between April 30 and August 28, 2001.

The respondent had to be 18 years of age or older to be eligible to participate in the study. If more than one household member qualified on the basis of age, the member with the most recent birthday was selected for the interview. The response rate for this survey was 35.8% of potentially eligible participants.⁸ The majority of the total nonresponse was caused by initial refusals, quits, or nonavailability of respondents.

Definition of persons with a food allergy

Persons who answered yes to the question about currently having any food allergy or suspecting that they have a food allergy were defined as persons who self-reported food allergy. On the basis of additional questions, this group was further subdivided on the basis of whether they had received a doctor's diagnosis.

Persons who answered yes to the question that asked whether a medical doctor diagnosed their condition as a food allergy were defined as persons self-reporting a doctor-diagnosed food allergy.

Questions about allergenic foods and use of labels

Respondents were asked to identify what food or food ingredients to which they were allergic. Up to 6 foods were recorded and matched to a precoded list. The interviewer did not read a list of foods to the respondent or probe for additional foods. Respondents who reported a food allergy to sulfites only ($n = 5$) were excluded from this analysis. The 8 most common food allergens recognized by the FDA are noted in the analysis. These are milk, egg, wheat, soy, peanut, tree nuts, fish, and crustacean shellfish.

Several questions on using food labels to manage food allergies were included in the survey. For each question on label use, respondents were asked how serious a problem it is for managing their food allergy. Response choices were as follows: "a very serious problem," "a serious problem," "a minor problem," "not a problem at all," and "not relevant to my allergy."

Data analysis and statistics

SAS procedures were used for data analysis (SAS System for Windows version 8.2; SAS Institute, Cary, NC). The χ^2 test was used to assess statistically significant differences. The data analyses took into account sampling weights. Sampling weights were used to adjust for disparities in response rates among key demographic groups and to adjust for the probability of selection for multiple-telephone households and the number of adults within households. The following demographic variables were used in the weight adjustments: sex (2 categories), educational attainment (4 categories), and race/ethnicity (4 categories). Weighted percentages are shown in the tables. Population estimates for the weights were obtained from the Current Population Survey for March 2001 (estimates are for the 48 continental United States and the District of Columbia and adults age 18 years or older).⁹ The weighted data were calculated by multiplying each respondent by a factor that adjusted the percentage of respondents in each cell (sex by education by race/ethnicity) to the population percentage for that set of characteristics after first adjusting for probability of selection.

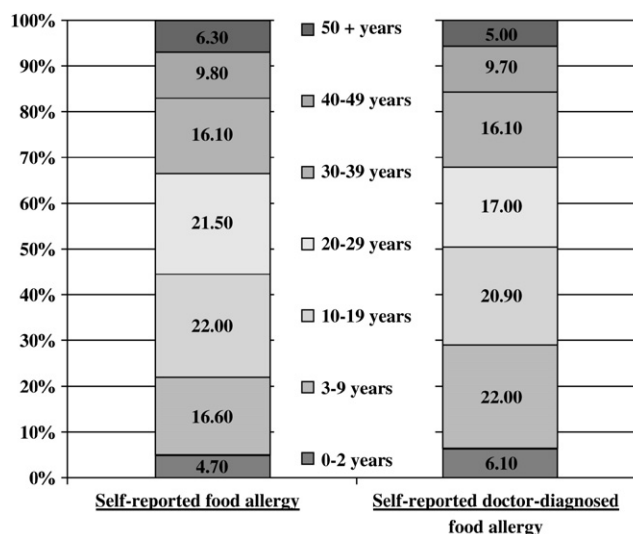


FIG 1. Age at which food allergy was first realized or suspected by category of food allergy, 2001 Food Safety Survey. Percentages are weighted percentages. Self-reported food allergy, n = 471; self-reported doctor-diagnosed food allergy, n = 279.

RESULTS

A total of 4482 persons responded to the survey. Of these respondents, 471 (9.1%) self-reported having a food allergy, and 279 (5.3%) self-reported a doctor-diagnosed food allergy (Table I). The prevalence of food allergy was higher in women and in those with an education beyond high school.

About half of the respondents with food allergy first realized or suspected that they had an allergy to food when they were 20 years of age or older: 53.7% of those with self-reported food allergy and 47.8% of those with a self-reported doctor-diagnosed food allergy (Fig 1). Allergy was most frequently diagnosed by means of skin test/pin prick/skin scratch test for respondents with self-reported doctor-diagnosed food allergy (46.4%). Other commonly reported diagnostic methods (respondents could answer more than one diagnostic method) included history (22.2%), RAST/CAP-RAST or blood test (10.2%), and food-elimination diets (5.8%). A small proportion of respondents (12.3%) did not know what diagnostic method was used. Epinephrine was prescribed to 61 (20.0%) of the respondents with self-reported doctor-diagnosed food allergy. Among these, 32 respondents had food allergies to at least 1 of the 8 most common allergenic foods.

The most frequently reported reaction for respondents in both groups was a skin reaction, such as hives, itching, or redness of the skin (Table II). Only 2 other reactions were frequent (chosen by $\geq 40\%$ of the respondents) among respondents with self-reported food allergy: stomach pain and throat tightness. In contrast, 6 reactions in addition to skin reactions were frequent among respondents with self-reported doctor-diagnosed food allergy: throat tightness, swelling of the face, stomach pain, itchy throat, lips, or mouth, trouble breathing, and nasal congestion.

TABLE II. Reported reactions to foods by category of food allergy, 2001 Food Safety Survey

Reported reactions	Self reported food allergy, N = 471 (N [%])*	Self-reported doctor-diagnosed food allergy, N = 279 (N [%])*
Skin reaction (hives, itching, redness)	233 (48.7)	173 (60.7)
Swelling of face	162 (35.6)	127 (45.6)
Itchy throat, lips, or mouth	176 (38.2)	124 (43.5)
Throat tightness	197 (40.1)	141 (48.2)
Wheezing	136 (28.3)	104 (35.0)
Trouble breathing, shortness of breath, coughing	162 (34.1)	121 (42.2)
Nasal congestion	154 (31.8)	116 (40.6)
Stomach pain	202 (42.8)	125 (44.1)
Vomiting or nausea	128 (27.7)	77 (28.3)
Diarrhea	165 (34.7)	109 (37.0)

*Weighted percentages.

Twenty respondents with self-reported food allergy and 7 respondents with self-reported doctor-diagnosed food allergy reported only gastrointestinal symptoms (stomach pain, vomiting/nausea, or diarrhea). It is possible that some of these might not be food allergy, thus resulting in an overestimate of food allergy prevalence. When these respondents are excluded from the prevalence analysis, the prevalence of self-reported food allergy is 8.7% among all survey respondents, with 5.1% of all survey respondents reporting a doctor-diagnosed food allergy.

Table III shows the percentage of persons in each food allergy group that reported an allergy to a specific food. The first 8 foods listed are those that the FDA describes as the 8 most common food allergens. About half of the

TABLE III. Number, percentage of persons with food allergy, and population prevalence of reported allergic reaction to a food* by category of food allergy, 2001 Food Safety Survey

Food allergy to:	Self-reported food allergy			Self-reported doctor-diagnosed food allergy		
	No.	Percentage† of those with allergic reactions (N = 471)	Prevalence (%‡) in total sample (N = 4477)	No.	Percentage† of those with allergic reactions (N = 279)	Prevalence (%‡) in total sample (N = 4477)
Eight common food allergens						
Milk/dairy	109	22	2.0	64	21	1.1
Fish	31	8	0.7	26	11	0.6
Eggs	33	7	0.6	22	7	0.3
Crustaceans	31	6	0.6	18	6	0.3
Tree nuts	29	6	0.5	21	7	0.4
Wheat/gluten	26	6	0.5	22	8	0.4
Peanuts	31	5	0.5	22	6	0.3
Soy	4	1	0.05	3	1	0.04
One or more of the above foods	236	50	4.5	149	51	2.7
Other food allergens‡						
Fruit/vegetable	150	32	2.8	91	31	1.6
Shellfish	75	17	1.5	50	20	1.1
Chocolate	27	6	0.5	16	6	0.3
Food additive	26	5	0.4	18	6	0.3

*Persons might be allergic to more than 1 food.

†Weighted percentages.

‡Percentage of persons with self-reported food allergy with allergic reactions to other foods: spices, legumes, pork, corn, beef, and other grains, 2% each; other foods, 5% (these represent foods <2% [eg, seeds, 1%]); other foods not specified, 5%; do not know, 3%; refused, less than 1%.

persons in each food allergy group had an allergy to 1 or more foods among the 8 most common food allergens. About one third of respondents in each food allergy group reported an allergy to a food in the category of fruit or vegetable. Prevalence of food allergy to the 8 most common food allergens was 4.5% for respondents with self-reported food allergy and 2.7% for respondents with self-reported doctor-diagnosed food allergy.

For respondents with self-reported doctor-diagnosed food allergy, allergy to wheat/gluten was reported by 14.4% of those who realized their food allergy at age 20 years or older compared with only 2.7% of those who realized their food allergy before age 20 years. In contrast, for these respondents, peanut allergy was reported by just 4.2% of those who realized their food allergy at age 20 years or older compared with 8.3% of those who realized their food allergy before age 20 years (not shown in Table III). Results were similar for those with self-reported food allergy.

Although there was no difference in overall prevalence of food allergy by race/ethnicity (Table I), 44.1% of black respondents with self-reported food allergy reported a fish, shellfish, or crustacean food allergy compared with 24.0% of white respondents with self-reported food allergy ($P < .005$, not shown in tables). Among respondents with self-reported doctor-diagnosed food allergy, 46.1% of black respondents versus 30.1% of white respondents reported a fish, shellfish, or crustacean allergy ($P < .075$).

About 80% of respondents reported having their last allergic reaction to food less than 5 years ago (78.2% with self-reported food allergy and 79.5% with self-reported doctor-diagnosed food allergy). Twenty-eight percent of respondents with self-reported food allergy and 25.1% of

respondents with self-reported doctor-diagnosed food allergy reported their last reaction as occurring less than 1 month ago.

Of the 444 (95.7%) respondents with food allergy who recalled the time of their last allergic reaction to food, the majority could recall the specific characteristics of their last reaction (Table IV). Less than half of respondents with self-reported doctor-diagnosed food allergy and about a quarter of respondents with self-reported food allergy reported being treated in a hospital or doctor's office for this last reaction (Table IV). In addition, 5 respondents (4 with self-reported doctor-diagnosed food allergy and 1 with self-reported food allergy) required an overnight stay in a hospital (not shown in tables).

The top 3 locations where the last reaction occurred were homes, restaurants, and work. Homes were most frequently reported among the respondents (Table IV). A prepared food caused the last reaction in about half of respondents in both allergy groups; reaction to a prepared food most often occurred at a restaurant. A packaged food caused the last reaction in 28.1% of respondents with self-reported food allergy and 26.6% of respondents with self-reported doctor-diagnosed food allergy. About 20% of respondents with self-reported and self-reported doctor-diagnosed food allergy (19.9% and 17.5%, respectively) reported that the food that caused their last reaction was neither packaged nor prepared (eg, a piece of fruit).

We found that 63.4% of all those with self-reported food allergy and 76.7% of those with self-reported doctor-diagnosed food allergy stated that they read labels on food packages to avoid foods to which they were allergic. Several questions were asked of the persons who said that they read the labels on food packages to avoid allergenic

TABLE IV. Characteristics of last allergic reaction to food, by category of food allergy, 2001 Food Safety Survey

Last reaction characteristics	Self-reported doctor-diagnosed food allergy, N = 250* (%†)	
	Self-reported food allergy, N = 421* (%†)	Self-reported doctor-diagnosed food allergy, N = 250* (%†)
Treatment		
Epinephrine used	6.2	10.1
Treated in hospital or doctor's office	24.5	37.1
Place of reaction		
Reaction occurred in home	67.6	65.0
Reaction occurred in restaurant	13.2	15.4
Reaction occurred at work	9.9	10.3
Type of food		
Prepared food caused reaction‡	48.0	50.7
Prepared in a restaurant	73.3	75.4
Prepared in home	18.1	14.5
Prepared in another home	8.3	9.7
Packaged food caused reaction§	28.1	26.6
Simple packaged food	52.2	36.2
Complex packaged food	44.1	59.0
Neither prepared nor packaged	19.9	17.5

*N does not include "do not recall" responses.

†Weighted percentages.

‡Percentage of those with reactions to prepared foods. *Prepared food* is defined as food cooked or made at home, a restaurant, or another place.

§Percentage of those with reactions to packaged foods. *Packaged food* is defined as food eaten without further preparation. *Simple packaged food* is defined as made from 1 main ingredient and only a few additions, such as milk or peanut butter. *Complex packaged food* is defined as made from several ingredients, such as cookies, snack food, or ice cream.

||A food that did not come in a package and was not prepared, such as a piece of fruit.

foods. In Fig 2 we show the percentage of label readers with food allergy who stated that various label issues were a serious or very serious problem for managing their food allergies. Around 40% of respondents with food allergy who read food labels found that these issues were serious or very serious problems: (1) some ingredient lists give a general name for an ingredient without specifying the source, such as spices and flavors; (2) different words for the food to which a person is allergic are used on different food products; and (3) food labels do not always alert persons that new ingredients have been added to a food, although they are stated in the ingredient list. About one third of the respondents rated as a serious or very serious label issue that the words on some ingredient lists are too technical or hard to understand. More than a quarter of the respondents rated as a serious or very serious problem that the length of the ingredient list makes it hard to find the ingredient of concern. The responses from persons with self-reported doctor-diagnosed food allergy and from persons with self-reported food allergy indicated only small differences that were not statistically significant.

Additionally, 32% of respondents with self-reported food allergy and 29% of respondents with self-reported doctor-diagnosed food allergy who read food labels said that a statement about allergenic ingredients, such as

"allergy information—contains eggs," suggested to them that the product had been screened for all foods that might cause an allergic reaction and that egg was the only allergen in the food. At the time of this survey, food label regulations did not provide for a consistent meaning of such a statement. Therefore the meaning of the statement would vary among food manufacturers. Around one fourth of respondents with self-reported and self-reported doctor-diagnosed food allergy said that they had bought or eaten a packaged food in the past year that they did not know contained the food to which they were allergic.

Among persons with food allergy who read labels, 6.0% with self-reported food allergy and 6.9% with self-reported doctor-diagnosed food allergy stated that they or another household member had called a food manufacturer within the past year to find out whether the food to which they were allergic was in a particular packaged food.

DISCUSSION

The prevalence of self-reported food allergy was 9.1%, and 5.3% of respondents self-reported a doctor-diagnosed food allergy. The prevalence of food allergy to the 8 most common food allergens was 4.5% when estimated from those with a self-reported food allergy and 2.7% when estimated from those with a self-reported doctor-diagnosed food allergy. Eighty percent of respondents reported that their last allergic reaction to food was within the past 5 years, and about a quarter reported that their last allergic reaction occurred less than 1 month ago. Last reactions occurred most often in homes and with prepared foods. Almost 77% of respondents with self-reported doctor-diagnosed food allergy reported that they read food labels to avoid allergenic foods, and a large portion of both groups consider certain label characteristics to be a serious or very serious problem for managing their food allergy.

The prevalence of both self-reported and self-reported doctor-diagnosed food allergy was higher in women and those with an education beyond high school. There was no difference in overall prevalence of food allergy among age groups or race/ethnicity groups, but more black respondents than white respondents reported a fish, shellfish, or crustacean food allergy. In a study by Sicherer et al,³ black respondents reported the highest rate of seafood allergy. The reasons for this observation are unknown; further studies on seafood consumption and seafood allergy among this demographic group are needed.

In a 1993 study by Altman and Chiaramonte,⁴ 13.9% of US households reported at least one individual in the home with a food allergy. The study indicated that more Americans perceive they are allergic to food than suggested by prevalence estimates based on double-blind placebo-controlled food challenge. To reduce the likelihood of overestimating the prevalence of food allergy in this study, the respondents with self-reported food allergy were further subdivided on the basis of self-reported doctor diagnosis.

In 2004, Sampson et al^{3,10} estimated the prevalence of food allergy of the US population to be 3.5% to 4% based

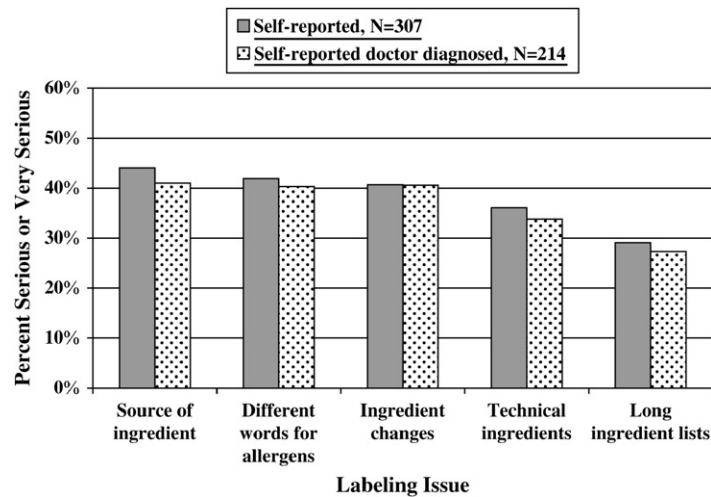


FIG 2. Among persons with food allergy who read labels, the percentage that considers a labeling issue to be serious or very serious by category of food allergy, 2001 Food Safety Survey, is shown. Percentages are weighted percentages. Some questions had 1 or 2 missing responses.

on other studies. The prevalence of food allergy among adults in other countries has also been reported.^{5,11-15} In France a 1997-1998 population study found the prevalence of self-reported food allergy to be 3.2% in 16- to 30-year-olds and about 4.0% in adults 31 to 60 years old.¹¹ Woods et al⁵ studied adults aged 20 to 44 years who participated in the European Community Respiratory Health Survey (1991-1994) in 12 European countries, Australia, New Zealand, and the United States. Self-reported food allergy/intolerance ranged from 4.6% in Spain to 19.1% in Australia and was about 12% in the United States, which is higher than the estimate found in this study.

On the basis of recent studies, Sampson¹⁰ estimated that the prevalence of food allergy among US adults to the 8 most common food allergens was 3.7%, which is slightly higher than the prevalence reported among adults with self-reported doctor-diagnosed food allergy in this study (2.7%). In a 2002 survey by Sicherer et al,² the self-reported prevalence of food allergy to peanut in the United States for adults was 0.6% and to tree nuts was 0.5% compared with prevalences of 0.3% and 0.4% for adults, respectively, in this study. Milk or dairy was most often reported as a food allergy in this study, but these reports likely include individuals with lactose intolerance. A previously published estimate for adult milk allergy is 0.3%¹⁰; the prevalence of milk or dairy allergy in this study was found to be 1.1% to 2.0%.

Although the FDA distinguishes between crustacean shellfish and molluscan shellfish allergies and includes only crustacean shellfish as one of the 8 most common food allergies, previous studies have not separated these categories of shellfish. Prevalence of "shellfish" food allergy, "crustacean" food allergy, or both in this study was found to be 1.9% among respondents with self-reported food allergy and 1.3% among respondents with self-reported doctor-diagnosed food allergy. This was slightly lower than Sampson's¹⁰ estimate of 2.0% and a 2.5% prevalence of self-reported shellfish (including

crustacean shellfish and molluscan shellfish) allergy among adults in Sicherer et al's³ population-based study.

In our estimates of the separate prevalence of "shellfish" allergy and "crustacean" allergy, it is possible that persons actually allergic to crustacean shellfish reported their food allergy as being caused by "shellfish." This question was asked open-ended, which means that respondents were not read a list of foods. If the respondent reported an allergy to shellfish, the interviewer did not probe to determine what specific type of shellfish caused the allergy or whether the person was reporting a food actually classified as a crustacean shellfish.

Food labels are a critical source of product-specific information for individuals with food allergy and caretakers of children with food allergy. Several label characteristics were rated as serious or very serious problems by about 40% of respondents with food allergy. Few studies on the use of food labels have been published, some of the studies are not about adults, and the studies are difficult to compare because different methodologies were used.^{7,16,17} Joshi et al⁷ studied the accuracy with which parents of children with food allergy were able to identify allergenic foods on food labels and found that many parents might make mistakes when reading food labels. Milk was the most difficult for parents to identify; only 7% of participants with children with milk allergy were able to correctly identify all labels declaring milk. Fifty-four percent of parents with children with peanut allergy were able to identify all labels indicating peanut, and most parents were able to correctly identify wheat or egg on labels.

Joshi et al⁷ also observed that almost 50% of the parents of children with food allergy found it necessary to contact manufacturers to find out whether an allergenic food is present in a product. In this study there is no time frame specified for when parents called manufacturers. In our study of adults, only about 7% of respondents with self-reported doctor-diagnosed food allergy stated that they had called a food manufacturer in the past year. In addition to the

differences in time frame, the design of the study by Joshi et al⁷ differed from that of our study in that participants were surveyed while attending a clinic specializing in food allergy. Some of these patients might have had severe food allergy and might have been previously counseled on food label reading. Also, it might be possible that parents of children with food allergy are more likely to call a manufacturer for information important to maintaining the health of their child than adults with food allergy will call manufacturers for information pertinent to their own health.

Food Standards Australia New Zealand collected baseline data in 2003 on knowledge and awareness of the 2002 Australia and New Zealand allergen-labeling provisions and the behaviors in food selection among individuals with food allergy and their caretakers.¹⁷ In that survey 30% of principal grocery shoppers for the household stated that they always or often contact manufacturers about what is in a food. Furthermore, respondents who were members of an allergy support group were significantly more likely to contact a food manufacturer.

The Australia and New Zealand study also found that 90% of respondents always read food labels carefully, somewhat above our finding that almost 77% of US adults with self-reported doctor-diagnosed food allergy read food labels to avoid allergenic ingredients. Also similar to our study, labeling characteristics, such as changing ingredients of a food product, different names on labels for the food that needs to be avoided, and spices and flavors not indicating allergenic components, were indicated as problems by respondents.

The major limitation to this study is that food allergy is self-reported, including a self-report of doctor diagnosis. The gold standard for determining the presence of food allergy in an individual is a double-blind, placebo-controlled oral food challenge,¹⁰ but this method is not feasible to do for a population-based study. Because food allergy in this study is self-reported, the prevalence of true allergy might be overestimated. In addition, this study includes only adults and therefore cannot estimate the prevalence of food allergy for all ages.

The survey asked respondents retrospective questions, such as the age of food allergy diagnosis and last food allergic reaction. It is possible that there was some recall error in accurately remembering the past. Respondents were also asked what foods to which they were allergic without being provided a list of foods from which to choose. Although this format allowed us to capture specific allergenic foods, respondents might not have reported all food allergies.

This study found that the population-based prevalence data of food allergy among US adults is similar to those in previous reports and provides more information about allergy to specific foods. A strength of the study is that questions on food allergy and questions on label use were asked of the same individual. Problems with label use identified in this study are useful in understanding the difficulties of managing a food allergy. For foods (except raw agricultural commodities) labeled on or after January 1, 2006, the Food Allergen Labeling and Consumer

Protection Act of 2004 requires that the name of the food source be declared for each ingredient that is or contains protein derived from one of the 8 foods or food groups identified by the law. (This requirement does not apply to highly refined oils.) Several of the label problems identified in this study will be solved or addressed by requirements of the law, including problems such as ingredient lists that give a general name for an ingredient without specifying the source (eg, spices and flavors), use of different words for the allergenic food on different food products, and the use of words on ingredient lists that are too technical or hard to understand. The findings from this study provide population-based data that can be compared with data collected after the effective date of the labeling change.

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