Epidemiology of Food Allergy

Joan H. Dunlop, MD, Corinne A. Keet, MD, PhD*

KEYWORDS

• Food allergy • Epidemiology • Prevalence • Age • Population • Geography
• Ethnic groups

KEY POINTS

- It is difficult to measure food allergy prevalence accurately in population-wide studies.
- In the United States, the estimated rate of self-reported food allergy is between 4.8% and 8% among children, whereas in international studies it is generally lower.
- An important exception is in Australia, where a high rate of food allergy in infants suggests that there may be substantial food allergy that is transient and not recognized.
- The rate of food allergy seems to be increasing, but data about fatalities and sensitization conflict with the increase seen in self-report and in hospitalizations.
- More data are needed to understand these trends.

In recent decades, food allergy has seemed to increase at a dizzying rate, sparking a search for the environmental factors that may underlie this increase. Understanding how many people are affected by food allergy, which groups are most at risk, and how risk has changed over time, that is, the epidemiology of food allergy, can provide clues to both genetic and environmental causes of the disease. Herein we review the epidemiology of food allergy, focusing on immunoglobulin E (IgE)-mediated allergy. Our perspective is from the United States, but we review international data to understand how geography and genetics may influence the development of allergy. We discuss the challenges inherent in efforts to estimate rates of food allergy, and summarize the conflicting evidence about whether increasing reports of food allergy reflect true increases in disease.

CHALLENGES IN UNDERSTANDING THE EPIDEMIOLOGY OF FOOD ALLERGY

Study Design

Estimating the rate of food allergy in a population is challenging because measuring food allergy on a large scale is difficult. True food allergy is defined by a specific,

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Division of Pediatric Allergy and Immunology, Johns Hopkins University School of Medicine, The Johns Hopkins Hospital, CMSC 1102, 600 North Wolfe Street, Baltimore, MD 21287, USA
* Corresponding author.
E-mail address: ckeet1@jhmi.edu

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reproducible, immunologically mediated clinical response upon exposure to allergen. Only food challenge directly assesses the clinical response upon allergic exposure, but the inherent risk to patients of food challenge, combined with the fact that it is time and staff intensive, makes it untenable in general for large-scale studies of food allergy prevalence, with few exceptions.

Self-report or parental report is easiest to obtain in broad population surveys, but generally tends to overestimate prevalence, because many people mistake intolerances, such as lactose intolerance, or other conditions for food allergy. Typically, population-based surveys ask brief questions that do not distinguish between IgE-mediated allergy, non–IgE-mediated allergy and intolerance, and many positive responses are not corroborated with further investigation.[1,2]

Surveys that use more detailed questions, such as those done by Gupta and coworkers[3] or Sicherer and associates,[4] may reduce overreporting but, because these surveys typically have food allergy as the focus and are done by telephone or Internet, they may suffer more from selection bias. Selection bias arises from the tendency for those with food allergy to be more likely to participate in surveys about food allergy. Soller and colleagues[5] quantified this bias in a telephone survey in Canada, and found that those who did not complete a full survey were much less likely to report food allergy than those who did. They estimated that selective nonresponse could inflate prevalence rates by somewhere between 20% and 110%. Further complicating matters, both nonresponse and overreporting of food allergy may vary between groups and over time.[6]

Objective measures of sensitization, such as specific IgE levels or skin-prick tests, have also been used in some national surveys to estimate food allergy rates. However, like self-report, these tests suffer from poor specificity, making it difficult to extrapolate prevalence estimates from sensitization data. As an example, Liu and associates[7] attempted to apply positive predictive values for food-specific IgE cutoffs to the National Health and Nutrition Examination Survey (NHANES) 2005 to 2006, the only national survey in the United States to prospectively measure food-specific IgE. Although the estimate of food allergy prevalence that they calculated, 2.5%, was similar to or less than estimates derived from self-report, the methods they used to derive this estimate may not be robust. This finding is because the positive predictive value is a function of both the inherent qualities of the test and the prevalence of disease in the population studied. Positive predictive values generated from allergy clinics with high rates of food allergy will lead to overestimates of food allergy when used in the general population. In fact, in that same survey, most of those assigned to “high probability of food allergy” reported eating the same food, making food allergy very unlikely.[8] Combining objective measures such as skin prick test or IgE with detailed questions about food allergy history would markedly improve the accuracy of population-based estimates of food allergy, but such surveys have not been done on a population wide basis in the United States to date.

Use data, such as that on hospitalizations and outpatient visits provide another window into the prevalence. However, these data are severely limited by the historical lack of specific and commonly used codes for food allergy, the fact that much food allergy may not present for medical care, and differences in health care use related to access to care.

Finally, a few population-based studies throughout the world have used food challenge to confirm food allergy. Among those efforts is the EuroPREVALL project, which sought to establish patterns of food allergy across Europe by establishing birth cohorts in 8 European countries.[9] Suspected food allergy was evaluated clinically, including with oral food challenge. In Australia, the HealthNUTs study