

Food allergies on the rise?

Determining the prevalence of food allergies, and how quickly it is increasing, is the first step in tackling the problem

Food is an integral part of life; however, for some, it can also be deadly. Sufferers of food allergies must avoid, for example, certain cereals, nuts or fish at all costs, and scrutinize the list of ingredients of every food item to make sure that it is safe. The consequences of accidentally eating just a tiny morsel of the wrong food can be serious: breathing difficulties, swelling of the lips and throat, abdominal cramps and vomiting, and possibly death. Although food allergies are believed to be on the rise, a paucity of data on their prevalence—and just how quickly it is increasing—makes it difficult for governments and health services to react.

Assessing the incidence of food allergies is easier said than done. Societal and scientific definitions differ, and diagnosis can be problematic. Without firm figures on the number of people affected, it is difficult to track the changes in prevalence over time, and to trace the underlying causes of food allergy. More importantly, governments can be slow to implement policy changes—such as guidelines on food labelling—when the extent of the problem is not clear.

In this era of globalization, it is not only populations that migrate but also foods, as people adopt foreign diets and import exotic products

The situation is made more complex by differing perceptions of food allergy. According to Bengt Björkstén, a professor in allergy prevention at the Karolinska Institute in Stockholm, Sweden, “the term used by common people is clearly different from how it is defined by medical people,” and can be influenced by social and cultural perceptions. “There are still too many situations where people do not recognize that food allergy is a medical condition, not a food preference,” said Anna Muñoz-Furlong, founder and CEO of the Food

Allergy & Anaphylaxis Network (FAAN; Fairfax, VA, USA)—a non-profit organization dedicated to raising public awareness, providing advocacy, education and advancing research on food allergy.

Medically, an allergic reaction is defined as an IgE-mediated response to an allergen, usually a food protein. This strict definition separates food allergy from food intolerance and hypersensitivity—metabolic conditions, such as lactose intolerance and coeliac disease, which do not involve the immune system. However, “we don’t have an easy way to make the diagnosis,” said Hugh Sampson, a professor of paediatrics and immunobiology at the Mount Sinai School of Medicine (New York, NY, USA). People also tend to overestimate the extent of food allergies: the rates of perception of food allergies are often up to four times greater than the rates of true food allergies, because people confuse allergy with intolerance or even cases of mild food poisoning (Woods *et al*, 1998; Kristjansson *et al*, 1999; Pereira *et al*, 2005; Venter *et al*, 2006a,b). Skin tests can confirm an IgE-mediated reaction; a double-blind placebo-controlled food challenge then verifies the diagnosis. “At the moment, the only way you can really objectively diagnose a food allergy is by feeding the person the food, which has a certain hazard,” said Clare Mills, head of the allergy research team at the Institute of Food Research (Norwich, UK).

Despite a lack of data, many scientists believe that the number of people with food allergies is rising, as is the number of foods to which they are allergic. “In the past, more often than not, children were only allergic to one or maybe two foods [...], whereas now it’s very common to see children allergic to two or three or more foods,” Sampson said. On the basis of random phone surveys, FAAN estimate that about 4% of the US population—about 12 million people—are allergic to peanuts, tree nuts, fish or shellfish

(www.foodallergy.org). However, “we probably still are under-reporting,” said Muñoz-Furlong. Prevalence rates seem to be similar around the world but could be distorted owing to the limited size of studies and surveys. “For every case reported, there are two or three that didn’t get reported,” Sampson said. In comments on the US Food & Drug Administration’s 2005 Food Safety Survey, FAAN stated that “Accurate and reliable data on food allergy and anaphylaxis is lacking, and it is generally believed that the limited data now available represents an under-reporting of food allergy-related reactions and deaths” (FAAN, 2005).

Regional differences are clear from the varying number of allergens considered dangerous in each area

Without comprehensive data on the prevalence of food allergies in the general population, researchers often resort to counting cases of anaphylaxis—the severe systemic reaction that follows exposure to a specific antigen. In the UK, for example, hospital admissions for food allergy have increased by 500% since 1990 (Gupta *et al*, 2006). But it is not clear if this figure indicates an equivalent increase in food allergies, or reflects an increase in the awareness of food allergies and in the quality of healthcare during this period. Furthermore, such studies only count those individuals unlucky enough to have ended up in hospital, and probably represent only a small proportion of the population who live with food allergies. “They’re the tip of the iceberg,” Mills said.

To provide a more comprehensive picture, several initiatives are underway. In 2005, EuroPrevall was launched with €14 million from the European Union’s Framework Programme 6 (FP6) to fund it for four years. A multi-disciplinary project involving 54 partners



in Europe and worldwide, EuroPrevall aims to develop diagnostic tools, carry out epidemiological studies and examine the socioeconomic impact of food allergies. It follows on from InformAll, a similar project funded under FP5 that concentrated on education and communication.

The EuroPrevall birth cohort study is described as “the most comprehensive investigation of food allergies in the first years of life”, and aims to determine the incidence of food allergies and the influence of regional differences, environmental factors, infections and genetic factors (EuroPrevall, 2006). A total of 12,000 newborns from eight European countries will be investigated using questionnaires and telephone interviews with mothers. Children who show any symptoms of a possible food allergy will be subject to clinical assessment and allergy testing, alongside two age-matched controls. Similar studies are expected to establish the prevalence of food allergies and intolerance in children and adults. “The epidemiology will capture a lot of people who may never have been to a doctor but suffer from a food allergy,” said Mills, who coordinated InformAll and now coordinates EuroPrevall.

As part of its Food Allergy Research Programme, the Food Standards Agency (London, UK) funds research on various aspects of food intolerance and allergy;

since it was established in 1994, the agency has funded 45 projects, several of which are ongoing. Taraneh Dean from the University of Portsmouth (UK), in conjunction with colleagues from the David Hide Asthma and Allergy Research Centre on the Isle of Wight, recently completed a study to establish the prevalence of food allergy on the island in children between birth and 15 years of age. “The luxury of having a captured population,” as Sampson described it, meant that a whole-population birth cohort could be recruited, in addition to three whole-population school cohorts of different ages. Although a final report on the project has yet to be released, the team has determined that the prevalence of food hypersensitivity—which combines allergy and intolerance—decreases with age. As many as 5.5% of infants in the first year of life had clinically diagnosed food hypersensitivity; this dropped to 2.5% in 6-year olds, and 2.3% in 11- and 15-year olds (Pereira *et al*, 2005; Venter *et al*, 2006a,b).

Other large-scale initiatives—although not focusing specifically on food allergies—

might also prove useful. Since 1990, the European Community Respiratory Health Survey (ECRHS) has provided a treasure-trove of data on asthma and allergy in adults, both from within and outside Europe. ECRHS I and II amassed information from more than 100,000 individuals from 22 countries (Burney *et al*, 1994; Janson *et al*, 2001; ECRHS, 2002), some of which has been used to assess national and international prevalences of food allergies (Bjornsson *et al*, 1996; Woods *et al*, 2001). EuroPrevall are now analysing sera from ECRHS II for IgE against food allergens.

Plans are underway for ECRHS III—another follow-up study that might also look at diet—“but these are at an early stage” said Peter Burney, a professor of respiratory epidemiology and public health at Imperial College (London, UK), who chaired the ECRHS Steering Committee. More recently, the Global Allergy and Asthma European Network (Ghent, Belgium) announced the creation of a Europe-wide database tracking 50 factors that might have an effect on allergy in children, such as housing conditions, medications, infections, exposure to pets or tobacco smoke, the number of siblings and particular foods. This initiative includes data from 20 standardized birth cohorts, and might comprise another useful resource for investigating food allergies.

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Researchers acknowledge the importance of crossing borders when studying food allergies. In this era of globalization, it is not only populations that migrate but also foods, as people adopt foreign diets and import exotic products. "One of the classic examples [in the USA] is that we never used to see kiwi allergy, but no one ever ate kiwis. Now everybody eats kiwis and we have lots of kiwi allergies," Sampson said. "Everything is so global now. We're getting exposed to foods that we never had before." In particular, the introduction of Western food products might have the most significant impact. "All the countries that have Westernized their diet are now seeing the same problem with food allergy as we see," Sampson said. "Countries that have introduced peanut butter are now starting to see a rise in the prevalence of peanut allergies" akin to the high rates already found in the UK, Australia, Canada and some European countries.

Before the world's diets mingle even more, scientists want to study regional differences to compare eating habits and allergy prevalence. Some trends are already apparent—for example, sesame allergy is a bigger problem in Israel and the Middle East than in the rest of the world, and in Japan and China, rice allergy is more common—but scientists want to investigate these in more detail. EuroPrevall has selected eight countries that represent geographical regions throughout Europe—funding limitations prevent them from including more—and Mills hopes that the epidemiology data they collect can be joined with results from other studies around the world.

Without a clear understanding of the true extent of food allergies, the policies of governments and public health services can often be reactive rather than proactive

Regional differences are clear from the varying number of allergens considered dangerous in each area. The Codex Alimentarius—a continuously updated food reference from the United Nations' Food and Agriculture Organization (Rome, Italy) and the World Health Organization (WHO; Geneva, Switzerland)—recommends eight potential allergens that should always be declared on pre-packaged foods:

shellfish, fish, eggs, milk, peanuts, tree nuts, sulphites, and cereals containing gluten. Some countries include additional foods, such as soy and sesame seeds. In Japan, for example, only 5 items are subject to mandatory labelling, but another 19 are recommended. It is up to national governments to determine whether labelling is recommended or mandatory, and if manufacturers should also indicate that foods 'may contain' or 'may be cross-contaminated with' particular antigens.

Although the influence of a Western diet could explain some of the increases in food allergies worldwide, this cannot account for the increase in allergies within the USA itself. Peanut allergies in US children doubled from 1997 to 2002 (Sicherer *et al*, 2003), but there is no indication that the consumption of peanuts—or the awareness of food allergies—increased as significantly during the same period. Instead, changes in food manufacturing might be to blame. Dry-roasting peanuts, common in the USA, UK and Australia, increases allergenicity compared with boiling or frying peanuts, as is common in China (Beyer *et al*, 2001; Chung *et al*, 2003; Schmitt & Maleki, 2004). "The Chinese eat the same amount of peanut per capita as we do, they introduce it early in a sort of a boiled/mashed type form, as they do in many African countries, and they have very low rates of peanut allergies," said Sampson. This also suggests that allergy rates might have as much to do with how and when the food is introduced as with the food itself.

To increase its knowledge of food allergies and dietary habits around the world, the WHO has joined forces with EuroPrevall. It recently distributed a questionnaire and information note (WHO, 2006) on food allergy throughout the 148 member states of the International Food Safety Authorities Network, which was launched in 2004 to promote the exchange of information nationally and internationally. "We know that there is a lot of discussion [on food allergy] in many developed countries but our intention was to find out what is actually going on in developing countries," said Jorgen Schlundt, Director of the WHO Department of Food Safety, Zoonoses and Foodborne Diseases. "We believe that it's an important health issue. We also believe that too little effort has gone into it in the past."

Without a clear understanding of the true extent of food allergies, the policies of governments and public health services can often be reactive rather than proactive. In Australia, for example, many of the most recent initiatives have been driven by high-profile cases of children dying from peanut allergies. In New South Wales, the death of a boy in 2002 prompted the development of anaphylaxis guidelines for schools, which were initially adopted on a voluntary basis but later recommended as mandatory. However, "implementation has been painfully slow," said Robert Loblay, a senior lecturer in immunology at the University of Sydney (NSW, Australia) and director of the Allergy Unit at the Royal Prince Albert Hospital in Sydney.

Loblay, who also chairs the Australasian Society of Clinical Immunology & Allergy (Balgowlah, NSW), undertook a survey with colleagues in 2003 of more than 250 childcare centres in Sydney and the Australian Capital Territory, involving more than 15,000 children. Preliminary analysis shows that 85–90% of centres have at least one child with a documented food allergy, and almost half have witnessed a moderate or severe reaction in the past two years, with peanuts being the most common cause.

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Surprisingly, although such epidemiological data might not be sufficient to trigger policy changes, it is often enough to convince industry to take action. Loblay's survey was originally carried out in response to a food manufacturer who did not think it was economically worthwhile to change its production practices to prevent allergen cross-contamination, on the basis that it only affects 1–2% of the population. "Once we were able to tell them that nine out of ten childcare centres have at least one child with a food allergy, and that most of these centres were banning their products for all the children, they began to pay attention," he said.

The food industry might be more receptive to this ripple effect. "When someone has a food allergy, the entire family tends to follow that restricted diet, and change their

purchasing decisions," Muñoz-Furlong explained. "For industry, market share and risk situations, rather than raw epidemiological numbers, seem to have the biggest impact," Loblay said. Thus, societal pressures rather than national guidelines might force manufacturers to label their products in the most informative and accurate way.

Regardless of the outcome of these ongoing studies, some aspects of food allergy have not changed. "The issues from the patient perspective are universal," said Muñoz-Furlong. Sufferers have only one choice: avoid the food in question. Unfortunately, "there's a huge number of foods out there that cause allergies," Mills said, and there is no reason to believe that the prevalence of food allergies has peaked. In the past 15 years, "we have seen tremendous increase in awareness about food allergy," said Muñoz-Furlong. "We still believe there's a lot of work to be done."

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