

What is the prevalence of food allergy in New Zealand?

This is a very difficult question to answer for a number of reasons. Overall, studies in New Zealand on the prevalence of food allergy have been very limited. Internationally, while there have been many studies, because they have often been designed differently (e.g. some based on self-reported food allergy, others on clinical diagnosis which in turn may be based on different diagnostic tools) it is very difficult to draw specific conclusions. Across the studies where people were asked if they had food allergies (self-reporting), the 'yes' responses ranged up to 38%. However when asked if these were 'doctor-diagnosed', the 'yes' responses dropped to between 1% and 11%.¹

There is also confusion over the difference between food allergy and food intolerance. Some of the symptoms are similar, but it is generally the timing and dose response that differentiates these two broad conditions. In allergy, the immune system decides for some reason that a particular substance (usually harmless) is a threat and sets up IgE antibodies to counter this. In someone who is 'allergic' these antibodies will cause a reaction process (called IgE-mediated) every time the person comes into contact with the substance (the allergen) usually within minutes. The process results in mast cells, which line the surface of the body under the skin and internally around major organs, to release chemicals including histamine. These chemicals cause the symptoms of allergic reactions, such as itchy skin and swelling.

In food allergy, because the allergen is ingested the reaction can, in some patients, also include swelling of bronchial tubes causing wheeze and other respiratory symptoms, and/or gastric symptoms including vomiting and diarrhoea. Others may experience a sudden drop in blood pressure, due to the swelling of blood vessels. Respiratory symptoms or signs of collapse are indicative of anaphylaxis, a life-threatening reaction, and must be treated immediately with intramuscular injection of adrenaline.

Diagnosis of IgE-mediated food allergy is made on the basis of clinical history and symptoms and then referral for testing to confirm. The 'gold standard' test is a 'double-blind placebo-controlled food challenge' (DBPCFC) however in New Zealand this is not practical for many patients and diagnostic tests are usually skin prick or blood tests to measure (food) specific IgE. These tests will help determine the likelihood of a food allergy being the cause of symptoms, but not the potential severity of a reaction to that food. Many people assume that the higher the level of anti-bodies found, the more severe a reaction will be to that food, but this is not the case. The higher level only increases the likelihood that the person will be allergic to it.

To make things more complicated, there are also immune-related non IgE-mediated food allergies, such as Eosinophilic Oesophagitis. These are where foods, through a form of immune response, cause an inflammation in a part of the gastrointestinal system. Symptoms are often delayed (sometimes 24-48 hours) and most commonly in the form of gastric upset (vomiting, diarrhoea), pain, and difficulty swallowing food. If severe they can lead to 'failure to thrive' in infants because the gastric system is not able to digest food properly and therefore absorb nutrients. Diagnosis often involves an elimination/re-introduction diet. Some patients have both IgE and non IgE-mediated forms of food allergy. The main difference in treating IgE versus non IgE-mediated food allergies is the management of the risk of anaphylaxis in the IgE-mediated form. Both conditions require complete avoidance of the food concerned.

Coeliac disease is an abnormal immune-based reaction to gluten, a protein found in wheat, barley, oats and rye. The immune system produces antibodies which inflames and damages the lining of the small bowel. The intestinal system is then unable to absorb vitamins, minerals and other nutrients from food. Coeliac disease is life-long but treated by eliminating gluten from the diet. *(For more information refer to Coeliac New Zealand on <http://www.coeliac.org.nz/>)*

Food intolerances, including to gluten, are not caused by an immune system response. They can be caused by a range of things including toxic responses to substances such as caffeine, or metabolic problems e.g. with alcohol. The food itself may have high levels of histamine (sometimes in fish); or the digestive system may lack an enzyme needed to digest the food, such as the enzyme lactase which is needed to digest lactose, the sugar in milk. Food intolerances can cause bloating and nausea, diarrhoea, and trigger eczema or asthma, but symptoms are often dose-responsive (i.e. an occasional small amount won't cause problems) and delayed (24-48 hours). Diagnosing food intolerances is not straightforward as there are no reliable tests. An elimination/re-introduction diet is the most useful diagnostic tool, but should be done in consultation with a specialist or dietitian as it can be difficult to identify all the different foods to be eliminated. For example, salicylates (which some people can be sensitive to) are natural chemicals in many fruits, vegetables and herbs. Food intolerances, as with non IgE-mediated food allergy, do not cause anaphylactic reactions.

Back to food allergy....

Eight main foods have been identified internationally as causing 90% of food allergies. These are cows milk (dairy), eggs, peanuts, tree-nuts, soy, wheat, fish and shellfish. However almost any food can cause allergy, and patterns often reflect what is common in the local diet. In some regions there are particular foods which are significant, such as mustard in France, lupin in some parts of Europe, and sesame in some parts of Australia. There is no data to indicate there are particular foods apart from the 'top' eight which are significant food allergies in New Zealand, although kiwifruit allergy is believed to be more common than a few years ago.

It is also not known if there are differences in prevalence and patterns (in foods causing allergies) in New Zealand related to ethnicity. A pilot study based on a survey conducted in Plunket Clinics in 2009² found similar rates of adverse reactions to food in young children in all ethnic groups.

It is known that the prevalence of food allergy is higher in children than in adults; this is because most food allergy develops in early childhood and most children will outgrow their food allergies, particularly to egg and milk, usually by school-age. However, peanut, tree-nut, fish and shellfish allergies are more likely to persist for life.

Adults can also develop food allergies but these may be related to pollen allergy (known as Oral Allergy Syndrome or OAS). In this case, someone who is allergic to pollen such as from silver birch trees or different types of grass, may become allergic to some fresh fruit and vegetables. This is known as cross-reactivity, where protein in the pollen is similar in structure to protein in the fruit or vegetables, and an individual's immune system confuses the two and reacts to both. There are often geographical variations in OAS because of differences in diet, and exposure to different pollens. The proteins involved are often heat sensitive so cooked forms of the food can usually be tolerated.

Referrals to paediatric clinics around New Zealand for investigation of food allergy are known to be increasing. This could be due to an increase in prevalence, but also to greater awareness amongst health professionals. However the international consensus is that food allergy rates have

significantly increased overall in the last decade in westernised countries, so we would expect that to be the case in New Zealand.

Reasons for the increase in prevalence of food allergy are not known. There is a genetic component, with children of parents with allergies at higher risk, but it is generally acknowledged that environmental factors associated with a westernised life-style are driving this epidemic. Factors being investigated include 'the hygiene hypothesis'; lifestyle changes leading to lack of Vitamin D; dietary changes; pollutants; and the effect of stress on the immune system.

So what do we know?

The International Study on Asthma and Allergies in Childhood (ISAAC) was established in 1991, and was recognised in the 2004 Guinness Book of World Records as the largest epidemiology study among children ever conducted. ISAAC found that the prevalence of asthma and allergies overall was highest in developed countries such as New Zealand. New Zealand is rated in the 'top five countries' overall for asthma prevalence (from Phase 3 of the ISAAC study³) with levels similar to Australia, the U.K., Ireland, United States and Canada. It could be assumed therefore that food allergy rates in New Zealand will be similar to rates found in those countries.

A large population-based epidemiological study of food allergy in 12-month-old infants in Melbourne (Australia) was reported in 2011⁴. The study used food challenges to confirm the diagnosis. It found more than 10% of infants had a food allergy. It is likely rates will be similar in New Zealand.

The Melbourne study found the most common allergy was to raw egg (8.9%), peanut (3%) and sesame (0.8%). Oral challenges weren't conducted for cows' milk allergy but 5.6% were found to be sensitised. Sensitisation rates to shellfish were low and oral challenges not carried out; wheat, soy and tree-nut allergies were not included in the study.

Food allergy can cause anaphylaxis, a life-threatening allergic reaction. Anaphylaxis is a medical emergency and patients must be given an intra-muscular injection of adrenaline, an ambulance called and the patient observed in hospital for at least 4 hours in case of secondary (biphasic) reaction. Further treatment may be required. A review of hospital data on admissions between 1993 and 2005 in Australia found a 5-fold increase in hospitalisations for anaphylaxis to food in children under age 5 years⁵. This is further evidence of the increase in prevalence of food allergy.

There is no cure for food allergy although a number of treatments are being researched or trialled internationally, including immunotherapy. However it is likely these will be several years away from being available to patients in NZ. Strategies to prevent food allergy are also not known at this time.

Management of food allergy requires stringent avoidance to prevent reactions, particularly where there is a risk of anaphylaxis. In practice, this is time-consuming and costly, and stressful for all concerned. An allergy or anaphylaxis management plan should be established by the patient's doctor, setting out the steps to be taken in case of a reaction, and education of the patient and family/caregivers is vital.

In summary:

- The main foods causing IgE-mediated food allergy in New Zealand are milk (dairy), eggs, peanuts, wheat, soy, tree-nuts, fish and shellfish. Milk, eggs and peanuts are the most common causes of food allergies in NZ children.
 - There is evidence that rates of food allergy globally have risen significantly in the last decade, and some, such as to peanut, have risen dramatically⁶. Reasons for this increase are not known.
 - Food allergy affects up to 10% of infants in New Zealand, with milk, eggs and peanuts being the main foods involved. Most children will outgrow their food allergies including to soy and wheat, however allergies to peanuts, tree-nuts, fish and shellfish tend to persist for life.
 - Non IgE-mediated forms of food allergy such as Eosinophilic Oesophagitis are also known to be increasing; as well as allergies to fruit and vegetables related to pollen allergy - Oral Allergy Syndrome. However there is no data to indicate the prevalence of these in NZ.
 - Food-allergic patients often have or develop other allergies as well, such as to pollens and house dust-mites.
 - Up to 5% of the population overall are likely to have a food allergy
 - Patients with IgE-mediated food allergy will need to be assessed for their risk of anaphylaxis and an allergy or anaphylaxis action plan set up.
1. EuroPrevall project: http://www.foodallergens.info/Facts/How_Many.html
 2. Crooks et al. "Adverse reactions to food in New Zealand children aged 0-5 years." NZMJ Dec 2010
 3. Asher et al. "ISAAC Phase Three: Has the prevalence and severity of symptoms of asthma changed among children in New Zealand?" NZMJ, 17 Oct 2008.
 4. Osborne et al. "Prevalence of challenge-proven IgE-mediated food allergy using population-based sampling and predetermined challenge criteria in infants." J All Clin Immunol, 2011
 5. Poulos et al. "Trends in hospitalizations for anaphylaxis, angiodema, and urticaria in Australia, 1003-1994 to 2004 – 2005." J Allergy Clin Immunol 2007
 6. J. Grundy et al. "Rising prevalence of allergy to peanut in children: Data from 2 sequential cohorts."

Recommended reading:

St Aubyn Crump, V. *Allergies: New Zealand's growing epidemic*. David Bateman Ltd, 2009.

Prescott, S. *The Allergy Epidemic: A Mystery of Modern Life*. UWA Publishing, 2011

(Books available from Allergy New Zealand: <http://www.allergy.org.nz/shop/Shop+online.html>)