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Costly Reactions: The economic and social cost of allergic disease in Australia

Australasian Society of Clinical Immunology and Allergy (ASCIA) and the National Allergy Council

August 2025

Deloitte Access Economics

Contributions to this report

Deloitte Access Economics, the Australasian Society of Clinical Immunology and Allergy (ASCIA) and the National Allergy Council are committed to an evidence-based approach in all our work and have collaborated with representatives from the National Allergy Centre of Excellence (NACE), Australia's peak allergy research body, to develop this report.

A Project Advisory Group was convened to have oversight of the research and development of the report, each member of which has generously provided their experience, expertise and time. We acknowledge the valuable contribution of many people to this report and extend particular thanks to the following members:

- Dr Raymond Mullins, Clinical immunology/allergy specialist
- Professor Dianne Campbell, Paediatric clinical immunology/allergy specialist, NACE Executive - Lead Training and Innovation Pillar, and Centre for Food Allergy Research (CFAR) Chief Investigator
- Dr Katie Frith, Paediatric clinical immunology/allergy specialist
- Dr Melanie Wong, Paediatric clinical immunology/allergy specialist
- Professor Kirsten Perrett, Paediatric clinical vaccinology/allergy specialist; NACE Director and Lead Transforming Allergy Care Pillar; CFAR Director; and Head, Population Allergy, Murdoch Children's Research Institute.
- Associate Professor Rachel Peters, Principle research fellow at the Murdoch Children's Research Institute and University of Melbourne, NACE Population Health Program lead and CFAR Associate Investigator
- Maria Said AM, CEO, Allergy & Anaphylaxis Australia
- Dr Andrew Fong, paediatric clinical immunology/allergy fellow and health economics researcher, NACE Consumer Advisory Group member and CFAR PhD scholar.

Dr Sandra Vale, CEO of the National Allergy Council and Jill Smith, CEO of ASCIA contributed to the Project Advisory Group and provided support to the Deloitte Access Economics team in the development of this report.

This report has been developed to help inform the National Allergy Council Shared Care for Allergy Program, funded by the Australian Government Department of Health, Disability and Ageing.

The National Allergy Council is a partnership between the Australasian Society of Clinical Immunology and Allergy (ASCIA) and Allergy & Anaphylaxis Australia.

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Acknowledgement of Country

Deloitte Access Economics, the Australasian Society of Clinical Immunology and Allergy (ASCIA) and the National Allergy Council acknowledge the Traditional Owners of Country throughout Australia and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past and present.

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Acronyms

Acronym	Full name
ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ASCIA	Australasian Society of Clinical Immunology and Allergy
AWE	Average Weekly Earnings
BEACH	Bettering the Evaluation and Care of Health
BoD	Burden of Disease
CFAR	Centre for Food Allergy Research
CRS	Chronic rhinosinusitis
CSU	Chronic spontaneous urticaria
COVID-19	Coronavirus-19
DALY	Disability Adjusted Life Year
DWL	Deadweight loss
EoE	Eosinophilic oesophagitis
FTE	Full time equivalent
FY	Financial year
GP	General practitioner
ICD-10	International Classification of Disease, Tenth Edition
i.e.	That is
IHACPA	Independent Health and Aged Care Pricing Authority
MBS	Medicare Benefits Schedule
NACE	National Allergy Centre of Excellence
NHS	National Health Survey
NOS	Not Otherwise Specified
NWAU	National Weighted Activity Unit
OTC	Over-the-counter
PBS	Pharmaceutical Benefits Scheme
QALY	Quality Adjusted Life Year
SCIT	Subcutaneous immunotherapy
SLIT	Sublingual immunotherapy
TGA	Therapeutic Goods Administration
VSL	Value of Statistical Life
YLD	Years of healthy life Lost due to Disability
YLL	Years of Life Lost due to premature mortality
VSLY	Value of Statistical Life Year

Key insights

Impacts of allergic disease are far reaching

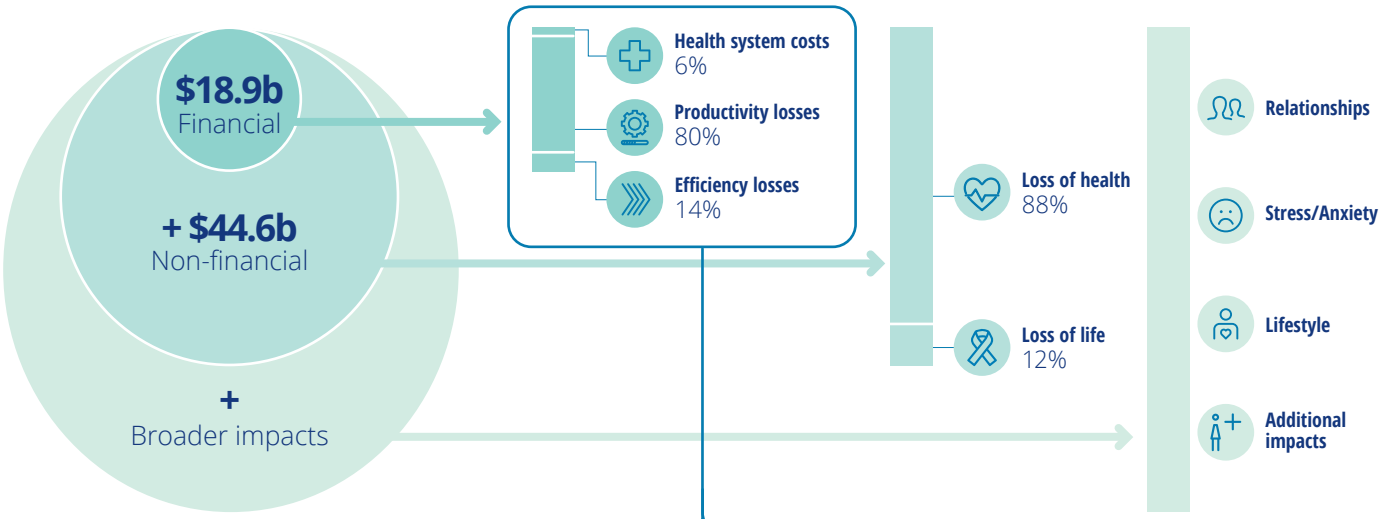
Around **8.2 million Australians** were affected by allergic disease in 2024

...comprising a total of **16.4 million allergic conditions**

30%
of Australians

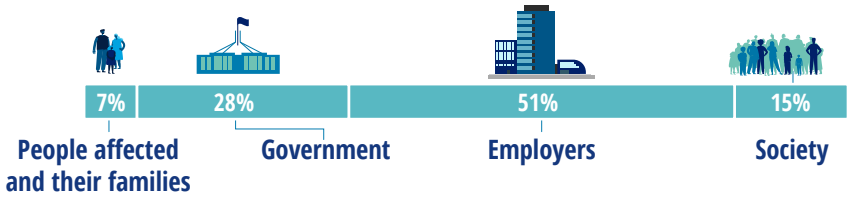
Many people – and households – manage at least two allergic conditions at the same time

Allergic disease has a large burden



Total financial cost of allergic disease of **$18.9 billion** in 2024 is equivalent to **$2,318 per person** affected by allergic disease

The financial cost burden falls on:



Opportunities

Continued support for the National Allergy Council and National Allergy Centre of Excellence (NACE) programs is essential to delivering meaningful improvements to the millions of Australians living with allergic disease. There is an opportunity to support better outcomes for people living with allergic disease through:

- Clinical care and public health programs
- Supporting and upskilling health professionals
- Quality and availability of data related to allergic disease
- Further allergic disease prevention and management research
- Recognition of allergic disease as a chronic health condition

Executive summary

In 2024, it is estimated that allergic disease impacts approximately 8.2 million Australians (30%), with an estimated total financial cost of $18.9 billion, with a further $44.6 billion non-financial costs through loss of wellbeing. This is equivalent to an average financial cost of $2,318 and a further $5,470 of non-financial costs per person living with allergic disease.[i]

Deloitte Access Economics was engaged by the National Allergy Council and the Australasian Society of Clinical Immunology and Allergy (ASCIA) to produce a report on the social and economic costs of allergic disease in Australia in 2024. In this report, 'allergic disease' is a term that includes a number of distinct allergic conditions, such as food allergy, drug allergy, insect allergy, allergic rhinitis (hay fever) and/or asthma, that may occur alone or in parallel in the same person (see Box 1). Genetic and environmental influences result in clustering of affected people within families. Allergic disease is increasing in prevalence and complexity in Australia and is among one of the fastest growing chronic medical conditions.

What is allergic disease?

Allergic disease results from an abnormal immune response to environmental triggers ('allergens') that do not normally affect other people. Symptoms may affect one or many body organs at the same or different times. Severity ranges from mild through to severe and potentially fatal reactions, known as anaphylaxis. A spectrum of symptoms can occur in people with medication, food and insect/tick allergies, with symptoms which range from mild to severe. As the severity of these allergic reactions are unpredictable, many people with these allergies are considered to be at risk of anaphylaxis.

[i] Based on the assumption that, on average, people affected by allergic disease have around two allergic conditions. This may be higher or lower across different allergic conditions and for different age groups, genders and other factors.

Box 1: Definitions

Allergic disease

The occurrence of an immune-mediated condition mediated by the allergic pathway of the immune system.

Allergic condition

A distinct allergic disease. This report considers the following allergic conditions:

Allergic case

An instance of an allergic condition in a person. The total number of cases may be more than the number of people affected by allergic disease. For instance, a person with both food allergy and allergic rhinitis would be counted as two separate cases of allergic conditions.

Allergic rhinitis (hay fever)

Inflammation of the lining of the nose caused by inhaling an allergen (e.g., dust mites, pollens, mould spores or animal dander), leading to a runny or blocked nose, sneezing and/or itchy eyes.

Anaphylaxis not otherwise specified (NOS)

A severe allergic reaction to an unidentifiable allergic trigger. Anaphylaxis is an allergic reaction that involves many organs of the body.

Eosinophilic oesophagitis

Chronic inflammation of the oesophagus ('food tube') whereby eosinophils (white blood cells) build up due to an allergic reaction to food or other environmental allergens.

Allergic chronic rhinosinusitis

Persistent inflammation of the lining of the nose and sinuses caused by airborne allergens, lasting 12 weeks or longer.

Drug (medication) allergy

An immune-mediated reaction to a substance in a medication such as penicillin which is generally well tolerated by non allergic people.

Atopic dermatitis (eczema)

Inflammation of the skin which becomes red, swollen, itchy and often weeping due to a combination of genetic and environmental triggers, including allergens.

Asthma

Allergic inflammation of the airways that produces swelling, narrowing and the build-up of mucus within the airway, leading to difficulty breathing.

Food allergy

An allergic reaction to specific proteins in foods such as peanuts, tree nuts, fish, shellfish, egg, soy, wheat, sesame, and cow's milk that involves the immune system.

Chronic spontaneous urticaria

Hives that are chronic, lasting six weeks or more, three to four times per week and have no known cause (spontaneous).

Insect and tick allergy

An immune-mediated response to the saliva from tick bites or the venom from stinging insects such as honeybees, wasps, or Jack Jumper Ants.

Impacts of allergic disease

Allergic disease has a substantial financial and non-financial impact on people, affecting physical health, sleep quality, concentration, emotional wellbeing, social life, work productivity and employment.

The costs associated with allergic disease include both economic and social impacts:

Economic impacts

Economic impacts include costs to the person with allergic disease and their family (given the frequent clustering of disease within families), as well as costs imposed on the broader healthcare system. These include hospital services, out-of-hospital medical expenses, prescription pharmaceuticals and other costs related to ongoing management), productivity losses (through reduced workforce participation, absenteeism, presenteeism, premature mortality and informal care requirements) and broader efficiency losses (through lost tax revenue, increased government expenditure on healthcare and other support programs, and deadweight losses from public transfers).

Social impacts

Social impacts (referred to in this report as wellbeing costs) result through the burden of allergic disease which negatively impacts quality of life for affected people with allergic disease and their carers and can often cause severe and life-threatening symptoms. These challenges contribute to the broader loss of wellbeing due to allergic disease, captured in measures such as disability-adjusted life years (DALYs) and years of lost life (YLLs).

This report quantifies the annual cost in terms of the economic and wellbeing impact of allergic disease on the person with allergic disease, the broader health system, the economy and the community. This was estimated using Deloitte Access Economics' cost of illness methodology based on analysis of prevalence and associated costs of each allergic condition.

Approach

In this report, the approach to estimating the economic and social cost of allergic disease is based on the prevalence of allergic disease groups in Australia. It is tailored based on data availability to capture a range of cost categories as outlined below.

Methodological approach in this report

The aim of this report was to estimate the economic and social cost of allergic disease to Australia in the calendar year 2024. This was estimated using a cost-of-illness methodology based on a prevalence approach, whereby the costs of an allergic disease in 2024 were multiplied by the total estimated number of cases of allergic disease in that year.

This study refers to two separate estimates:

- **Number of allergic conditions** refers to the total number of allergic conditions, where a person may have one or more *allergic conditions*. Presented this way, a person with both food allergy and allergic rhinitis would be counted as *two separate conditions*.
- **Prevalence of allergic disease** refers to the sum of all people with at least one allergic condition divided by the total population at a single point in time. Under this context a person with both asthma and allergic rhinitis is only counted as *one person*.

The approach to analysis costs was tailored based on data available at the time of analysis. As such, three categories of cost have been assessed:

- **Core costs** – where there is sufficient data available, costs can be quantified using costs specific to each allergic condition in Australia.
- **Indicative costs** – where Australian-derived data is not readily available or of lower quality, costs have been quantified using a proxy to estimate the distribution of costs for another allergic condition, or using evidence from literature from other jurisdictions.
- **Qualitative costs** – where cost data is not available for any allergic condition and the indicative approach is not viable, costs have been qualitatively discussed.

In this study, there are also two types of costs that are assessed:

- **Financial costs** – include costs to the health system, productivity losses and efficiency losses. These costs may be borne by the person with allergic disease, the Australian Government, employers and by broader society.
- **Non-financial costs (or wellbeing losses)** – refer to the intangible losses in wellbeing incurred due to an illness. It encompasses factors such as pain, suffering, reduced quality of life and the impact on daily activities.

Further information related to the methodological approach in this report is available in Chapter 2.

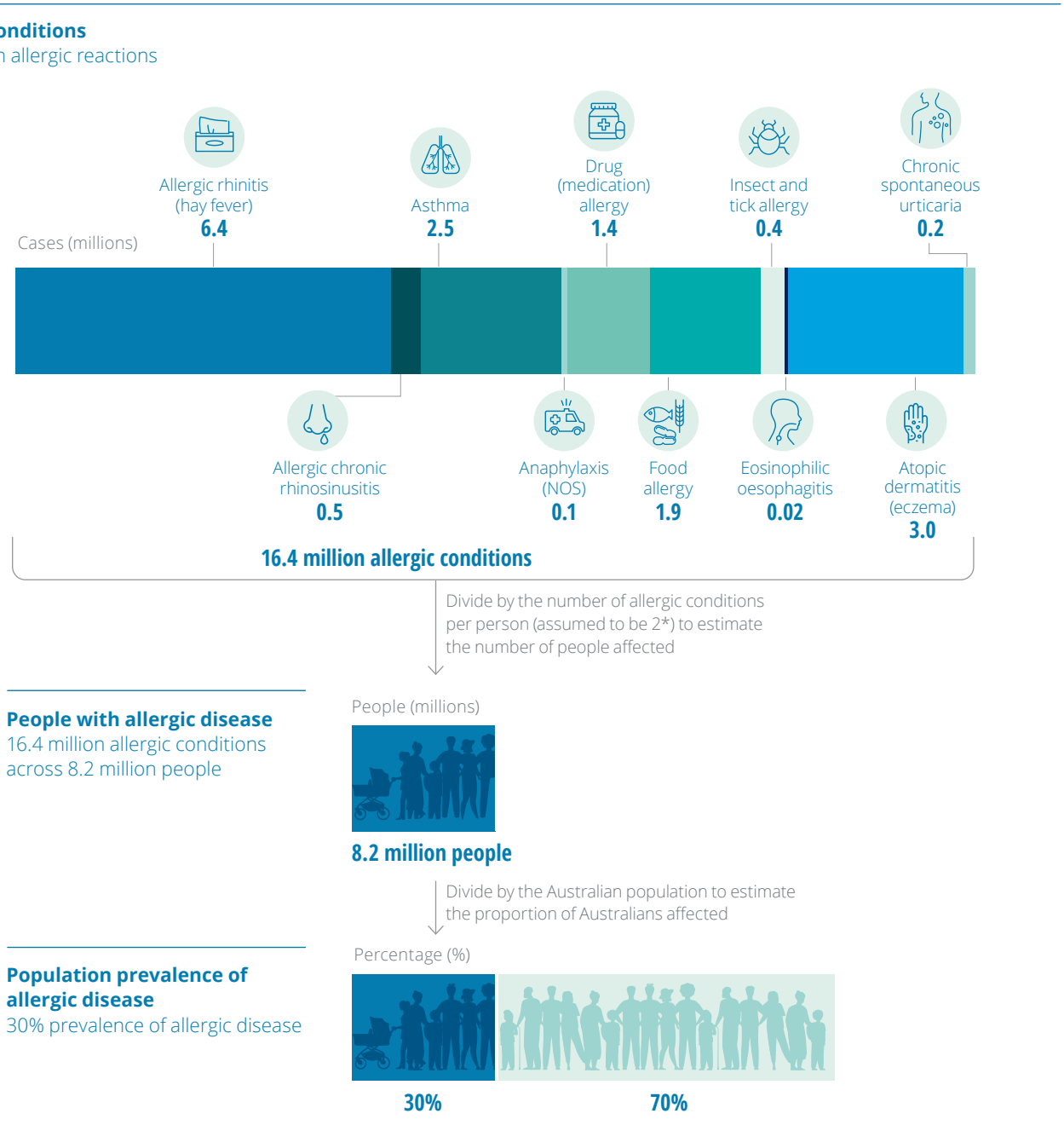
Results

Frequency of allergic disease

In 2024, there were an estimated 16.4 million cases of allergic conditions. The prevalence of allergic disease was calculated by the number of people who have at least one allergic condition and an estimated prevalence of self-reported allergic disease of 30%. The most common allergic conditions include allergic rhinitis, atopic dermatitis, asthma, food allergy and drug allergy.

Collectively, these allergic conditions account for 92.9% of all allergic disease. The prevalence of allergic disease is known to vary by allergic condition, gender, age and geographical location. For example, food allergy and eczema tend to be more common in young children whereas allergic rhinitis and drug allergy are more common in adults.[1,2,3,4]

Figure i: Relationship between cases of allergic conditions, people with allergic disease and population prevalence in Australia in 2024

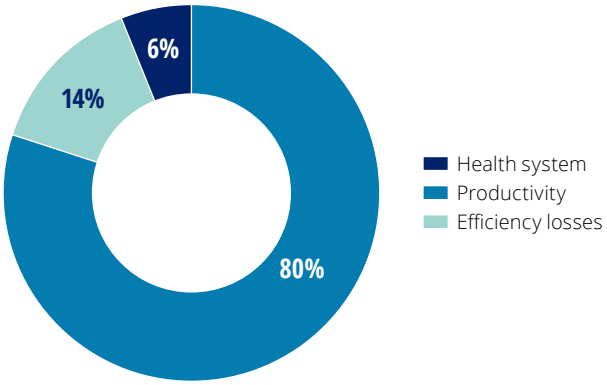


Source: Deloitte Access Economics. *The average number of allergic conditions per person may vary across different allergic conditions and different age groups and genders, for instance. Evidence indicates a range of approximately 1.5 to 2.6 allergic conditions per person.

Costs

The cost of allergic disease has a substantial impact not only on people living with allergic disease but also on their families and carers, government and society as a whole. In 2024, the total financial cost of allergic disease in Australia was estimated to be $18.9 billion. As illustrated in Chart i, loss of productivity (such as increased absences from work and reduced efficiency while working) accounted for $15.1 billion or 80% of these losses. This reflects the demographics of those experiencing allergic disease, with 68.9% of affected people being of working-age (15 to 64 years). Efficiency losses accounted for $2.6 billion (14%), followed by health system costs ($1.2 billion, 6%).

Chart i: Total financial costs of allergic disease by cost component, 2024



Source: Deloitte Access Economics

Beyond the financial impact, allergic disease also creates a substantial loss in wellbeing. In 2024, this non-financial cost was estimated to account for an additional $44.6 billion. This estimate reflects the burden borne directly by the person with allergic disease and its impact on their daily quality of life.

While not quantified in this report, there are also important considerations for different cohorts:

- In children, allergic disease can often limit participation in activities such as sports, camps and social events. For example, a child with food allergy may be excluded from social activities, school camps and excursions, certain snacks and food at school or parties, leading to feelings of isolation.
- Psychological impacts include anxiety, especially concerning accidental exposure. Parents may face stress managing allergic disease, influencing family dynamics and routines.
- Adults and children experiencing some allergic conditions such as atopic dermatitis, asthma or allergic rhinitis (hay fever) may have performance issues at work or school due to symptoms of fatigue or cognitive impairment related to sleep deprivation/disturbance.
- Adult-onset allergic disease can also alter lifestyle choices (e.g. avoiding outdoor activities during peak pollen seasons) or employment choices (e.g. food service industry and the armed forces, where some forms of allergic disease may preclude employment).
- The financial burden due to costs for healthcare visits, medications and the need to purchase more expensive food substitutes (for food allergy) can also impact broader economic stability in the family. This is exacerbated when clustering of allergic disease and genetic influences result in multiple affected people within the same family.

Future opportunities

Allergic disease is a significant public health burden disease affecting around one-in-three Australians. This report outlines the economic and societal costs of allergic disease.

The findings presented in this report aim to improve the understanding of the impact of allergic disease among key interest holders, to raise awareness and inform priorities for future public health and research programs.

This report also highlights the importance of:

- **Clinical care and public health programs** that reduce the economic and societal cost of allergic disease
- **Supporting and upskilling health professionals** to enable earlier intervention and improved access to care for allergic disease
- **Improving the quality and availability of data** related to allergic disease
- **Further allergic disease prevention and management research**
- **Recognition of allergic disease as a chronic health condition.**

Each of these points represents an opportunity for future work to expand upon current understanding of allergic disease, that will lead to better outcomes for people living with allergic disease.

This report has built upon the existing evidence base related to allergic disease in Australia. With ongoing investment into prevention, management and research related to allergic disease, Australia can remain a leader in the evidence-based management of allergic disease. Continued support towards implementation of the National Allergy Strategy through the National Allergy Council and National Allergy Centre of Excellence (NACE) programs is essential to delivering meaningful improvements to the millions of Australians living with allergic disease.[5]

01

Introduction

1.1 Context

Allergic disease is a chronic immune system disorder. It occurs when a person's immune system mounts an abnormal response to otherwise harmless substances, known as allergens. Allergens include a wide range of substances such as food, pollen, mould, dust mites, animal dander or saliva, insect stings or bites, drug (medications) and latex.[6]

When exposed to an allergen an allergic reaction may occur. This may present as inflammation of the:

- nose and eyes – leading to allergic rhinitis
- skin – leading to eczema or urticaria
- lungs – leading to asthma
- gastrointestinal system – leading to eosinophilic oesophagitis
- whole body response – leading to anaphylaxis.[7]

Allergic disease has substantial social and economic impacts across multiple domains. Direct healthcare system costs associated with allergic disease include hospital services, out-of-hospital medical expenses, prescription pharmaceuticals and other costs related to ongoing management. Productivity losses due to allergic disease are also substantial, with impacts from reduced workforce participation, absenteeism, presenteeism, premature mortality and informal care requirements. Broader efficiency losses due to allergic disease can include lost tax revenue, increased government expenditure on healthcare and other support programs, and deadweight losses from public transfers.

The social burden of allergic disease negatively impacts quality of life for affected people and their carers. For example, for children with severe food allergy, community management is complex and can create substantial stress for families and carers, particularly in relation to childcare, schooling and emergency preparedness. These challenges contribute to the broader loss of wellbeing due to allergic disease, captured in measures such as Disability-Adjusted Life Years (DALYs).

1.1.1 Factors driving prevalence of allergic disease

Global trends indicate that allergic disease affects 10% to 30% of all adults worldwide.[8,9,10,11,12,13,14] The reasons for the increase in prevalence of allergic disease over time is largely unknown. It is hypothesised that these increases may be due to a combination of factors including:

- westernised lifestyles and feeding patterns in early life[15]
- genetics, family history, migration[16]
- changing exposures to indoor and outdoor pollutants/toxins[17]
- changing exposure to macro and micro-nutrients such as Vitamin D
- climate change impacting upon the length of pollen seasons
- the impact of urban living and/or pollution due to growing urbanisation
- microbiome disturbance caused by lack of exposure or increased household hygiene through infancy.[18]

Previous Deloitte Access Economics and Access Economics reports have quantified the extensive social and economic costs associated with allergic disease in Australia including: *The Hidden Cost of Asthma (2015), Global Health Care Outlook (2025), The Economic Impact of Allergic Disease: Not to be Sneezed At (2007).*[19,20,21]

Allergic disease is increasing in prevalence and complexity in Australia and is among the fastest growing chronic conditions in Australia. This indicates that the cost profile of allergic disease will continue to change over time.

Delayed access to medical care for the diagnosis and management of allergic disease is a major problem due to growing demand for these services, a low number of appropriately trained healthcare professionals, an ageing workforce, and insufficient specialist training pathways.[22] As prevalence and severity grow, delayed or inappropriate treatment can lead to more people experiencing permanent complications such as chronic damage to lungs and other body organs, chronic sleep disturbance/sleep apnoea or premature death.[23] A continued lack of recognition of allergic disease as a chronic disease affects resourcing in relation to prevention programs, research and data collection that is afforded to diseases recognised as chronic.[24]

1.1.2 Australia is a leader in evidence-based management of allergic disease

In 2019, a Parliamentary Inquiry into Allergies and Anaphylaxis was referred to the Standing Committee on Health, Aged Care and Sport which resulted in 24 recommendations across prevention, management and research.[25] This included the establishment of the National Allergy Council and the National Allergy Centre of Excellence (NACE) in 2022 through funding from the Australian Government, Department of Health, Disability and Ageing.

The National Allergy Council programs currently being implemented aim to reduce the burden of allergic disease within Australia. These include:

- Nip allergies in the Bub food allergy prevention program
- Food Allergy Aware food allergen management in food service program
- Allergy 250K youth program
- Allergy aware school and children's education and care program
- Shared Care for Allergy program
- Drug (medication) allergy program
- Developing and implementing a national anaphylaxis reporting system.[26]

The NACE has built a national research infrastructure and collaboration to help transform consumer-centred allergy care. The NACE has established a network of almost 500 experts in drug, food, insect and respiratory allergic disease and is supporting the next generation of allergy researchers.

The National Allergy Council is a partnership between ASCIA and Allergy & Anaphylaxis Australia and, working together with the NACE, the organisations promote evidence-based, best-practice information to underpin guidelines, education, training public health programs and consumer support.

This report is intended to help identify where there are future opportunities to build on existing work and help to address any gaps in information and data.

1.2 Definitions

1.2.1 Allergic disease

Allergic disease is an umbrella term that describes the occurrence of an immune-mediated condition mediated by the allergic pathway of the immune system. There are different types of allergic disease (i.e., allergic conditions), each involving an inappropriate immune response to otherwise harmless environmental substances. While these types of allergic disease differ in presentation and severity, they share a commonly underlying mechanism of allergic sensitisation and inflammation. Multiple allergic conditions make up the broader overarching category of allergic disease, meaning a person with food allergy and allergic rhinitis would count as *one person* living with allergic disease.

1.2.2 Allergic conditions

Allergic conditions are distinct types of allergic disease. A person may have multiple allergic conditions. The following definitions outline the key allergic conditions considered in this report:

1.2.2.1 Allergic rhinitis (hay fever)

Allergic rhinitis, commonly known as hay fever, is an inflammation of lining of the nose, often chronic and typically triggered by an allergic response to allergens such as pollen, dust mites, or animal dander and by eating certain foods.[27] Both seasonal and perennial forms of allergic rhinitis result in symptoms like itching, sneezing, blocked and/or runny nose and itchy/watery eyes. This definition excludes non-allergic (vasomotor) rhinitis triggered by irritants, certain smells and exercise. The burden of allergic rhinitis includes fatigue, decrease in energy, general health perception and social aspects of patients' lives.[28]

1.2.2.2 Allergic chronic rhinosinusitis

Allergic chronic rhinosinusitis (CRS) is defined as persistent inflammation of the lining of the nose and sinuses caused by airborne allergens, lasting 12 weeks or longer.[29] It is characterised by symptoms such as nasal congestion, postnasal drip, facial pain and swelling around the eyes and nose and a reduced sense of smell and taste.[30] In some people, nasal polyps, which are growths in the sinuses may also develop. This definition includes CRS associated with fungal allergy, where affected people develop an allergic response to airborne fungal spores.[31] Allergic CRS is distinct from acute and subacute rhinosinusitis, which are short term sinus infections that typically follow virtual illnesses such as the common cold and are excluded from this analysis. Symptoms of chronic rhinosinusitis can make it difficult to concentrate, affecting academic performance in children and work productivity in adults.[32]

1.2.2.3 Asthma

Asthma is characterised by an allergic inflammation of the airways producing swelling, narrowing and the build-up of mucus within the airway. This can lead to difficulty breathing, wheezing, persistent coughing and chest tightness.[33] The major allergenic triggers of asthma include pollen, dust mites or pet dander. People living with under-treated asthma often suffer sleep disturbance, consequential tiredness and poor concentration.[34] The majority of people with allergic asthma also have allergic rhinitis.[35] Non-allergic asthma, which may be triggered by factors such as exercise, respiratory infections, stress, weather changes or long-term tobacco exposure is not included in the quantified impacts in this report.

1.2.2.4 Anaphylaxis not otherwise specified (NOS)

Anaphylaxis is the most severe type of allergic reaction, can involve many organs of the body and should always be treated as a medical emergency. Anaphylaxis NOS, is defined as a severe allergic reaction where the specific trigger is unknown or does not fall under common categories such as food, drugs, insect or tick bites.[36] This definition includes exercise induced anaphylaxis and idiopathic anaphylaxis (no identifiable cause). Compared to population norms, people experiencing anaphylaxis NOS have significantly higher levels of depression, anxiety and stress due to fear of future reactions and need for constant vigilance.[37]

1.2.2.5 Drug (medication) allergy

Drug allergy is an immune-mediated reaction with the production of allergy antibodies to a substance in a medication, which is generally well tolerated by non allergic people.[38] Substances most commonly include antibiotics (e.g., penicillin) or pain killers (e.g., anti-inflammatory medication such as aspirin or ibuprofen). This reaction includes responses mediated by drug specific IgE antibodies (allergy antibodies produced against the drug) or T cells (a type of white blood cell). This definition excludes non-immune adverse drug reactions, such as side effects to medicines listed on their labels or intolerances which do not involve the immune system. The diagnosis of drug allergy is complex, and over and underdiagnosis can have negative impacts such as the use of less effective or more expensive treatments that may have more side effects.[39]

1.2.2.6 Food allergy

Food allergy is an adverse reaction to foods such as peanut, tree nuts, fish, shellfish, egg, soy, wheat, sesame, and cow's milk that involves the immune system. The reaction is characterised by the production of allergy antibodies to specific proteins in a food that is harmless and well-tolerated by non allergic people. It can result in a spectrum of symptoms from mild localised symptoms to severe anaphylaxis.[40] Immune reactions affecting the gastrointestinal tract ('gut'), may also occur, predominantly affecting young children. This definition excludes non-allergic food intolerances, such as lactose or gluten intolerance, enzyme deficiencies and irritation from skin contact with food. The psychological burden of living with food allergies can lead to anxiety, stress and social isolation, particularly for children with food allergies and their caregivers.[41]

1.2.2.7 Insect and tick allergy

Insect and tick allergy is an immune-mediated response to stinging insect venoms from bees, wasps, Jack Jumper Ants or saliva from tick bites.[42] This includes localised allergic reactions as well as generalised systemic reactions that affect other parts of the body beyond the site of the sting and include anaphylaxis. Excluded from this definition are non-allergic skin irritation or minor localised responses, such as mild redness or itching, that do not involve an immune mechanism. In outer urban and rural areas, people with insect and tick allergy are more likely to present in emergency departments and experience life threatening anaphylaxis, with an average of three deaths each year resulting from severe reactions to bites or stings.[43,44]

1.2.2.8 Eosinophilic oesophagitis

Eosinophilic oesophagitis (EoE) is a chronic inflammation of the oesophagus ('food tube') where white blood cells called eosinophils build up in the lining of the oesophagus due to an allergic reaction to food or other environmental causes. This can cause difficulty swallowing, abdominal pain, weight loss, narrowing of the oesophagus (strictures) and food impaction, which often requires hospitalisation and sometimes endoscopic removal of the obstructing food.[45]

1.2.2.9 Atopic dermatitis (eczema)

Atopic dermatitis is an inflammation of the skin which can be red, swollen, itchy and often weeping. Commonly known as eczema, it is a form of allergic dermatitis caused by a combination of genetic and environmental triggers, including allergens. Symptoms of atopic dermatitis include dry, red, scaly and itchy skin that may flare in response to irritants such as soaps, pollen, dust mites, pet dander, certain foods, or changes in temperature and stress.[46] In some people, susceptibility to eczema is caused by a gene variation that weakens the skin's natural barrier. In early childhood, severe eczema is often accompanied by food allergy, even when food is not the underlying cause. Once established, atopic dermatitis is often contributed to an overgrowth of the bacterium staphylococcus aureus, which further disrupts the skin's barrier and microbiome, enhancing the cycle of inflammation.[47] Eczema commonly affects concentration, education, work, social life, increasing the risk of depression and anxiety.[48]

1.2.2.10 Chronic spontaneous urticaria

Chronic spontaneous urticaria (CSU) is the name for hives that are chronic, lasting six weeks or more, three to four times per week and have no known cause (spontaneous).[49] Symptoms of CSU typically present as raised, itchy and potentially burning skin wheals with surrounding redness, that usually lasts less than 24 hours, but then reappear soon after on a different part of the body.[50] The visible nature of the allergic disease, the unproductivity of flare-ups and the associated discomfort can lead to anxiety and depression in people experiencing chronic spontaneous urticaria.[51]

1.2.3 Allergic case

Allergic cases are defined as an instance of an allergic condition in a person for the purposes of this report. The total number of cases may be more than the number of unique people affected by allergic disease, meaning a person with both food allergy and allergic rhinitis would be counted as *two separate cases* of allergic conditions.

1.3 This report

Deloitte Access Economics was engaged by ASCIA and the National Allergy Council to produce a report on the social and economic costs of allergic disease in Australia in 2024. The report incorporates the most recent data, evidence, and methodologies available.

This report was informed by multiple data sources. Data was primarily collected through a review of publicly available information and a literature review, which included data from the Australian Institute of Health and Welfare (AIHW) and the Australian Bureau of Statistics (ABS). Secondary data and preliminary findings were tested with the Project Advisory Group, who provided additional advice, data, and insights based on current research.

The rest of this report is structured as follows:

- **Chapter 2** outlines the methodology to quantify the social and economic costs of allergic disease in an Australian context using both qualitative and quantitative data
- **Chapter 3** exhibits the prevalence and mortality figures for allergic disease in Australia
- **Chapter 4** presents financial costs of allergic disease in Australia
- **Chapter 5** discusses the non-financial costs of allergic disease in Australia
- **Chapter 6** provides a summary of the analysis and recommended next steps.

02

Methodological approach

This chapter provides an overview of the approach used to quantify the social and economic costs of allergic disease in Australia.

The aim of this study was to estimate the economic and social cost of allergic disease to Australia in the calendar year 2024 (henceforth referred to as 2024). This was estimated using a cost-of-illness methodology based on a prevalence approach, whereby the costs within 2024 are assigned to cases of allergic conditions or unique people with an allergic disease within the same year, depending on whether costs are financial or non-financial in nature.

2.1 Overview of cost of illness methodology

The costs associated with allergic disease were considered using a cost-of-illness methodology applying a prevalence approach. This approach involves estimating the number of allergic conditions in Australia in 2024 and estimating the costs attributable to each case of allergic condition in that year. Figure 2.1 provides an overview of the cost-of-illness framework. The main components of this framework include:

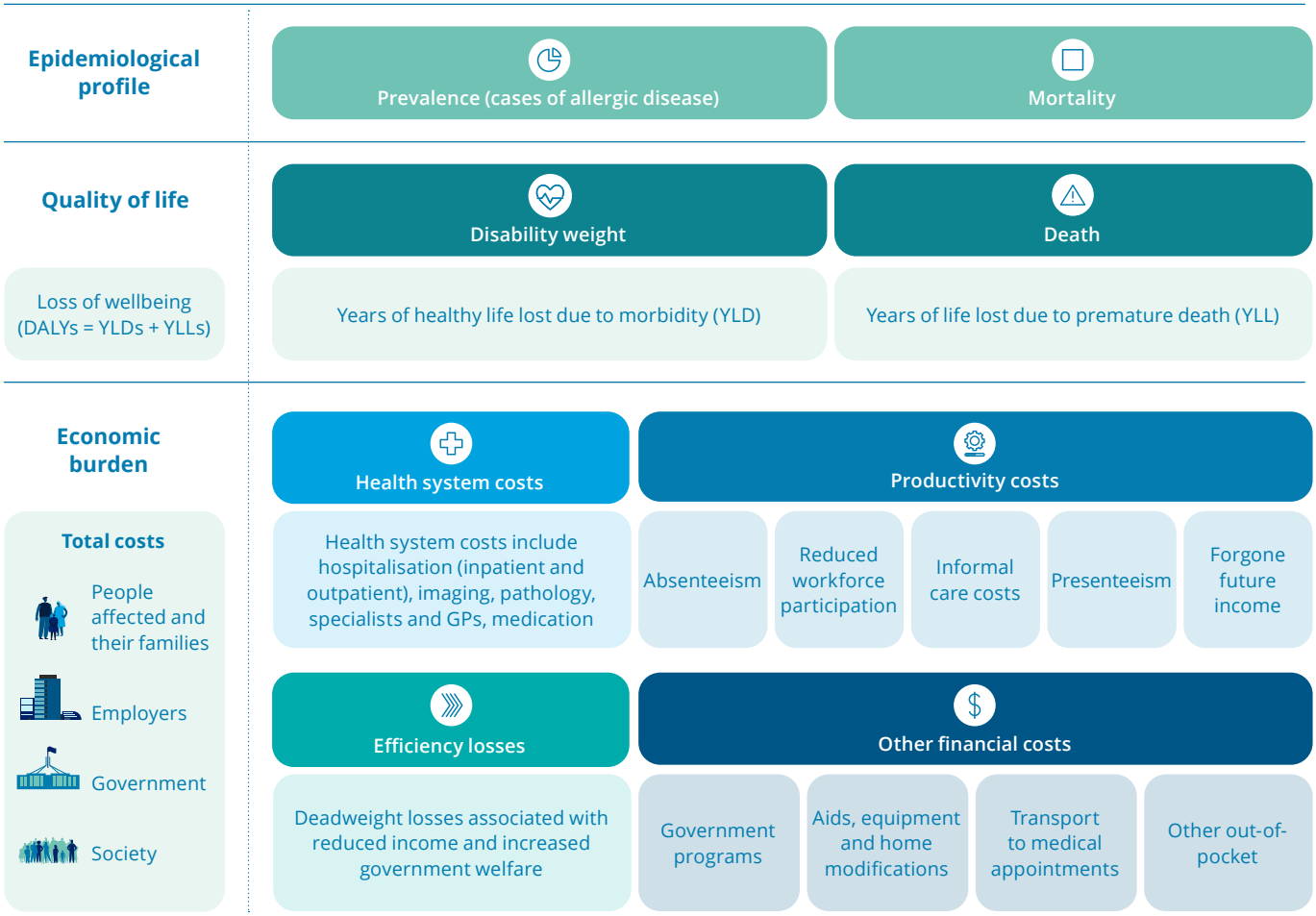
- prevalence and mortality (discussed in section 2.2)
- health system costs (section 2.4.1)
- productivity costs (section 2.4.2)
- efficiency losses (section 2.4.3)
- wellbeing losses (section 2.5.1).

Cases of allergic conditions versus people with allergic disease

For the purposes of this study, the total number of people affected by allergic disease has been captured in terms of:

- **Number of allergic conditions (cases):** The total number of allergic conditions, where a person may have one or more allergic conditions. Presented this way, a person with both food allergy and allergic rhinitis would be counted as two separate conditions. The number of cases of allergic condition inform the financial cost modelling for this study as costs are calculated per-case of an allergic condition.
- **Prevalence of allergic disease:** The sum of all people with at least one allergic condition divided by the total population at a single point in time. Under this context a person with both asthma and allergic rhinitis is only counted as *one person.* The number of unique people informs the non-financial cost modelling for this study as costs are calculated on a per-person basis.

Figure 2.1: Cost-of-illness model framework overview



Source: Deloitte Access Economics

2.2 Prevalence and mortality methodology

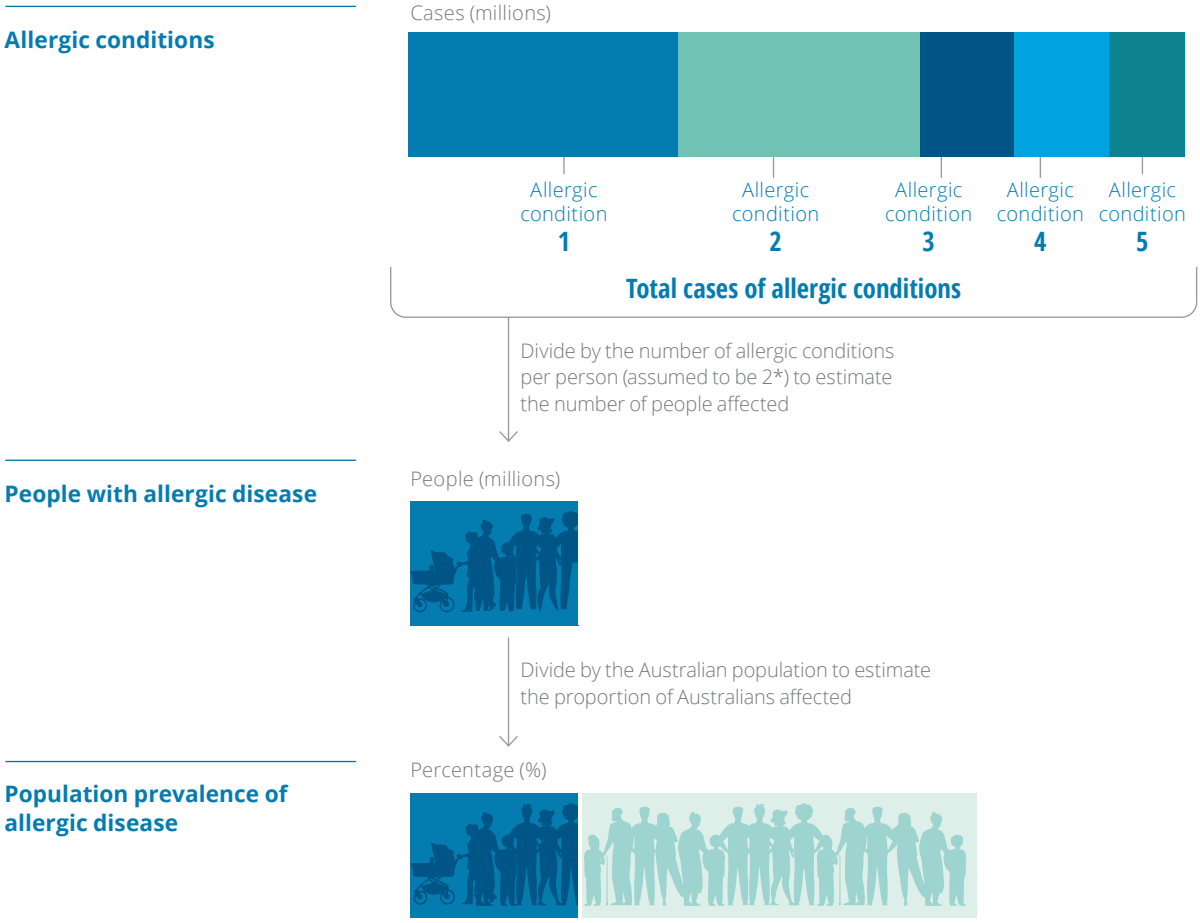
2.2.1 Prevalence methodology

Given this report estimates the cost of allergic disease to Australia in a specific year, the type of prevalence used is one-year prevalence of allergic disease in 2024, that is, the number people in Australia's population with an allergic disease at any time during 2024. The one-year prevalence for each allergic condition was estimated using the *National Health Survey (NHS) 2022*, supplementary literature and assumptions from the Project Advisory Group. Further information on the method and data sources used to inform estimates of the prevalence estimates for each allergic condition is provided in Appendix A.1.

These prevalence estimates for each allergic condition yielded the total number of cases in Australia in 2024. This number of allergic conditions (i.e., cases) were used as inputs into the financial cost modelling in this study.

In estimating the collective prevalence of allergic disease in Australia, it cannot be assumed that each person experiences only one allergic condition. People with one allergic condition are likely to also have a second allergic condition due to the clustering of allergic disease.[52] Some may have three, four or more allergic conditions. As such, to sum the cases of each allergic condition would double count people and overestimate the true number of people living with allergic disease in Australia. To account for this, the number of people living with allergic disease in Australia was estimated by applying an assumption of the average number of allergic conditions per person to the sum of cases across all allergic conditions. The number of people living with allergic disease in Australia was converted to a population prevalence rate by dividing the number of people living with allergic disease by the population of Australia. The logic of this approach is shown in Figure 2.2.

Figure 2.2: Approach to estimating the collective prevalence of allergic disease in Australia using the number of allergic conditions



[ii] An assumed population prevalence of 30% implies an estimated 2.01 cases of allergic disease per person. This prevalence assumption has been informed by information available at the time of analysis (evidence from previous work, the latest data and literature and input from the Project Advisory Group).

An average of two allergic conditions per person was used to inform the non-financial costs in this study. This was based on a bottom up analysis of the prevalence of each allergic condition, evidence from literature of prevalence (see section 1.1.1), and input from the Project Advisory Group.[ii] However, it is noted that there is limited recent evidence available on the comorbidity of allergic conditions. In the previous 2007 Access Economics report on the impact of allergic disease, a rate of 1.74 allergic conditions per person was used.[53] However some studies indicate for some age groups the average may be as low as 1.55 allergic conditions per person.[54] It is noted that the upper bound value for this assumption would be approximately 2.56 allergic conditions per person (calculated noting that the minimum prevalence of allergic disease must exceed the prevalence of the most common allergic condition). Further, the number of conditions per person and prevalence rate is likely to vary by age group and sex.

2.2.2 Mortality methodology

People with certain allergic conditions are at an increased risk of mortality, primarily through fatal asthma and anaphylaxis, a life-threatening systemic allergic reaction. Accordingly, the mortality approach used in this study involved available AIHW data and supplementary literature on the number of fatalities due to anaphylaxis and asthma, refined with inputs provided by the Project Advisory Group. Further information on the approach to estimating mortality is provided in Appendix A.2.

2.2.3 Prevalence limitations

The limitations of estimating the prevalence of allergic disease are detailed below:

- **self-reported datasets** – Australia has no regular dataset tracking the prevalence of allergic disease over time. For some allergic conditions, self-reported NHS data is available to inform prevalence estimates. While this provides some indication, self-reporting is not a true estimate of prevalence. For some health conditions such as allergic disease, there is a wide spectrum of severity experienced and people have varied understanding of allergic disease definitions. People may be less likely to seek a professional medical opinion where symptoms are mild, leading to a propensity to overestimate their health condition and incorrectly self-diagnose. Research indicates that a person's perception of allergic disease may lead to overreporting of allergic disease when compared to clinical diagnoses by medical professionals.[55] However, the extent to which allergic disease is overstated by self-reporting is unknown. No assumptions for this self-reporting overestimation have been made for the purposes of this study since the true level of overestimation is unknown.
- **challenges in diagnosis** – there are also challenges experienced by medical professionals in diagnosing allergic disease. For many allergic conditions, the symptoms that present may be induced by other non-allergic causes. Rarer allergic disease types such as EoE are not well known amongst community health professionals and wait times for allergic disease specialists can be prolonged. This can lead to misdiagnosis or lack of diagnosis for multiple years. The Project Advisory Group indicated that for some rarer forms of allergic disease, it can take people 10 to 15 years to obtain a correct diagnosis. This impacts the accuracy of prevalence estimates. It is also noted that emergency department and admissions coding for allergic disease and anaphylaxis is often incorrectly coded,[56] leading to underestimates of emergency department presentations and admissions in AIHW data.
- **attribution of mortality to allergic disease** – with respect to mortality, there are also challenges in attributing death to allergic disease. A coronial inquest is not a mandatory requirement for suspected anaphylaxis fatalities or necessarily required for deaths where it is possible that allergic disease may have contributed. As such, there are likely to be instances of death due to allergic disease that remain unreported, underestimating the true mortality rate of allergic disease. There are also instances where allergic disease can contribute to suicide, particularly where the disease has been chronic.[57] However there is no regular reporting or dataset tracking where allergic disease may have contributed to a person's death.
- **available data and literature in the Australian context** – literature on the prevalence and mortality due to allergic disease in the Australian population is inconsistent. In the case of accurate mortality reporting, this is due to the lack of requirements for mandatory reporting and/or referral to the coroner. While some Australian longitudinal studies exist and there are some anaphylaxis registers, these do not measure whole population prevalence or report on all allergic disease that is prevalent in certain age groups (e.g., asthma or food allergy in children). The prevalence of rarer forms of allergic disease is also less well documented in the literature. Literature estimating the point in time prevalence of allergic disease is often limited to specific allergic conditions, single centres or specific regions. This literature often has a small sample size or is not available for the Australian population. Further there is limited literature available on the comorbidity of allergic disease, the relationship between different allergic conditions or the presence any form of allergic disease in a single person. In the absence of granular data, averages were applied based on available data. However, it is noted that there are differences across age groups and allergic conditions that are not captured in this analysis. It is also acknowledged that this approach may not reflect recent changes in the epidemiology of allergic disease in Australia.

[ii] An assumed population prevalence of 30% implies an estimated 2.01 cases of allergic disease per person. This prevalence assumption has been informed by information available at the time of analysis (evidence from previous work, the latest data and literature and input from the Project Advisory Group).

2.3 Overview of costing methodology

The following sections detail the availability of data for the analysis and the subsequent approach to modelling certain cost categories.

2.3.1 Type of cost analysis

The approach to analysing costs has been tailored based on data available at the time of analysis. As such, three categories of cost have been assessed: core costs, indicative costs and qualitative costs. These categories align with the quality of data available to estimate the cost to Australia associated with allergic disease in 2024, and include:

- **core costs** – where there is good data available, and the total cost can be quantified using costs specific to each allergic condition in Australia.
- **indicative costs** – where some data may be available but is limited or of lower quality, the total cost has been quantified using a proxy to estimate the distribution of costs for another allergic condition, or using piecemeal literature sourced from different jurisdictions.
- **qualitative costs** – where cost data is not available for any allergic condition and the indicative approach is not viable, costs have been qualitatively discussed.

For indicative costs where proxies were used to estimate the distribution for other allergic conditions, the cost per person, or another key element required to calculate cost was known for one allergic condition and used as a reference. A relative weighting was calculated using the proportionate ratio of the reference allergic condition to other allergic conditions. This relative weighting was applied to other cost categories where the cost for some allergic conditions were unknown.

A summary of the type of analysis used for each cost category is illustrated in Figure 2.3. Where both core and indicative analysis has been undertaken for a single cost category, some allergic conditions leverage the core method while others leverage the indicative method. This is dependent on the data available for each allergic condition.

Cost results have been reported on a per case of allergic condition basis. Where per person costs are reported, these rely on the assumed number of allergic conditions per person (a conversion discussed in section 2.2.1). A person may incur a higher cost than simply a per case cost because they suffer from multiple allergic conditions.

2.3.2 Data quality

For each cost category, there is variability in the quality and availability of data. This has informed the type of analysis able to be undertaken for each cost category. The quality and availability of allergy data include:

- **complete data** – cost and service usage data for a specific cost category are available for majority of allergic conditions from the same credible Australian source.
- **adequate data** – cost and service usage data are only available for some allergic conditions (e.g., those with more established data capture such as asthma), data available is no longer routinely collected, is outdated and must be adjusted to 2024 levels, or literature is generally available in the Australian or similar jurisdiction context but may vary in credibility.
- **limited or unavailable data** – cost and service usage data are not available for any allergic condition in the Australian or similar jurisdiction context.

A summary of the quality of data available for each cost category is illustrated in Figure 2.3. This figure also illustrates the nature of each type of cost (financial or non-financial).

Figure 2.3: Type of analysis used in this cost-of-illness study and quality of data available for different costs

Category	Cost type	Core	Indicative	Qualitative
Financial costs				
Health	Public hospital admissions	✓		
	Public hospital emergency department presentations	✓		
	General practitioner contacts	✓		
	Pathology	✓		
	PBS prescriptions	✓		
	Medical imaging		✓	
	Specialist services		✓	
	Public hospital outpatient contacts		✓	
	Private hospital services		✓	
	Allied health and other services		✓	
	Non-PBS pharmaceuticals	✓		
	Immunotherapy	✓		
Productivity	Reduced employment			✓
	Presenteeism	✓	✓	
	Absenteeism	✓	✓	
	Informal care			✓
	Premature mortality	✓		
Efficiency losses	Consumer taxes	✓		
	Company taxes	✓		
	Government health expenditure	✓		
Non-financial costs				
Loss of wellbeing	Years of healthy life lost due to living with a disability	✓	✓	
	Years of life lost due to premature death	✓		

Complete
Adequate
Limited or unavailable

Source: Deloitte Access Economics

2.4 Financial cost types

2.4.1 Health system costs

People with allergic disease incur considerable health system costs. Allergic disease often impacts a person's quality of life for prolonged periods, with many becoming lifelong disease to be managed by multiple treatments.[58] Costs to treat allergic disease vary by treatment type, treatment setting and allergic condition.

2.4.1.1 Methodological approach

While some estimates of health costs are available from the AIHW, these are only available for some allergic conditions considered in this study. As such a bottom-up approach was used to estimate the health costs associated with allergic disease. This approach allows for payments from all source funds, including Australian and state and territory governments, private health insurance and out-of-pocket payments, and for hospital services (including public and private services), out-of-hospital expenses (consisting of primary healthcare and referred medical services) and pharmaceuticals to be measured.

The following health cost categories used a bottom-up approach under the core analysis:

- public hospital admissions
- public hospital emergency department presentations
- general practitioner (GP) contacts
- pathology
- pharmaceutical benefits scheme (PBS) prescriptions
- non-PBS pharmaceuticals (including other prescriptions and over-the-counter (OTC) medications)
- immunotherapy.

For each of these core costs, the quantity of service uses (e.g. public hospital admissions or presentations, GP encounters or tests) was estimated and multiplied by the estimated cost of a single service. This was estimated at a per allergic condition level. Quantity estimates were derived from the AIHW, the Bettering the Evaluation and Care of Health (BEACH) survey or Services Australia. For some categories, these quantity estimates were split by allergic condition according to available literature. Cost estimates were derived from the Independent Health and Aged Care Pricing Authority (IHACPA), the AIHW, Services Australia or pricing advertised online by the pharmaceutical industry.

The following health cost categories applied relative weightings under the indicative approach with data on public hospital admissions available from the AIHW:

- medical imaging
- specialist services
- public hospital outpatient contacts
- private hospital services
- allied health and other services.

A relative weighting between the public hospital admission costs per person for asthma compared to other allergic conditions was calculated. The AIHW health system costs for asthma include the above categories, unlike other allergic conditions. The health system cost of asthma in each category was applied to other allergic conditions according to the relative weighting to yield an indicative total cost for each type of health system service provided.

It was advised by the Project Advisory Group that dental service expenditure is unlikely to be attributable to allergic disease. As such, it has been excluded from this analysis.

Total costs for each category across allergic conditions were converted to a per case cost based on the estimated number of cases (instances) of each allergic condition. Where applicable, all costs were inflated to 2024 dollars using ABS Consumer Price Index figures.

For further detail on health system costs, see Appendix B.1.2.

2.4.1.2 Health system cost limitations

The estimated health system costs included in this study capture a conservative estimate of total healthcare spending on allergic disease due to gaps in data available. These limitations include:

- **limited data on some tests and treatments** – no data is collected on the cost of avoiding allergic reactions to drugs/medications by opting for alternative medications. Some tests for allergic disease are also undertaken privately and not always recorded as healthcare expenditure by publicly available data sources used. This includes the jumper ant tests and alpha galactose tests for tick allergy. While these can impose a cost burden on people with allergic disease and are associated with longer hospital stays and a greater risk of adverse drug reactions, these impacts have not been accounted for in health system cost estimates for this study.
- **unallocated healthcare expenditure data availability** – data is not available for unallocated healthcare expenditure such as administrative health system costs for any allergic condition other than asthma. Due to likely differences in these costs between allergic conditions, these expenditure types are not included in this study.
- **assumptions on the pattern of service use over time** – some service usage assumptions such as utilisation of GP services rely on data and historical growth rates from years prior the COVID-19 pandemic. In the case of BEACH data, the latest available data is from 2016. However, patterns of usage across the health system (and therefore expenditure) may have shifted over time, particularly since COVID-19.
- **assumptions on the pattern of service use by allergic disease** – the indicative approach assumes a consistent pattern of health system usage for all allergic conditions.

However, patterns of usage and costs per case for health services may vary between allergic conditions.

- **variance in costs per service or product** – the bottom-up approach for some cost categories is also limited by the representative costs per unit or service used. Given limited data availability, a representative cost has been formulated using the average cost of some common products available on the market. However, this does not consider the difference in product cost across locations or regions in Australia, age (e.g., junior or child products compared to adult products), or by allergic condition.

2.4.2 Productivity costs

Due to the life-limiting and life-threatening impacts of allergic disease and the need for treatment, the participation and performance of people with allergic disease in both paid and unpaid work may be negatively affected compared to people without allergic disease.[59] Specifically, people with allergic disease may experience disruptions to their work productivity or attendance and participation in the workforce.[60] This impact on productivity varies between allergic conditions. For example, a less severe allergic condition such as allergic rhinitis is more likely to affect productivity while at work, whereas a more severe allergic condition such as asthma or anaphylaxis may result in more absences from work due to sickness and attendance at medical appointments or hospital.[61,62] Allergic disease can also adversely affect performance of students at schools, universities and other institutions.[63] The specific costs quantified in this study are absenteeism, presenteeism and premature mortality. The Project Advisory Group informed this study that allergic disease does not have a notable impact on employment, that is where a worker would exit the workforce or reduce their hours due to the impacts associated with their allergic disease. As such, impacts of reduced employment have not been quantified in this study. Informal care is considered qualitatively due to data limitations.

2.4.2.1 Methodological approach

A human capital approach was adopted to estimate productivity losses. This involved calculating the attributable difference in employment of people with allergic disease compared to that of the general population, multiplied by average weekly earnings (AWE).

The human capital approach assumes that workers have a value equal to their earnings. However, it is noted that a human life is more valuable than employment and financial contribution, and these calculations are not intended to reduce human worth to productivity and capital. The need for these calculations reflects the wider goal of estimating the financial impact of allergic disease on those affected by them, and the need for appropriate treatment, management and greater resource allocation to allergic disease education and services.

There are three types of productivity losses relating to allergic disease that were quantified in this study:

- **absenteeism** – where a worker may be unwell more often and take time off work due to the impacts of their allergic disease, while remaining in the workforce. This cost captures the value of the work time missed due to their allergic disease by multiplying days missed by average daily earnings. Work time missed may include that due to the allergic disease itself, or consequent use of healthcare services such as specialist and medical appointments and hospital visits.
- **presenteeism** – where the impact of allergic disease on a person's physical, psychological, and emotional wellbeing may disrupt their productivity while at work. This cost captures the loss in productivity due to allergic disease by multiplying the estimated loss of productive time by average yearly earnings (excluding earnings during sick leave and annual leave).
- **premature mortality** – when a person's expected lifetime earnings are forgone after a loss of life due to their allergic disease. It is estimated by multiplying the number of premature deaths due to allergic disease with lifetime expected earnings. It is noted that the intention of this calculation is not to reduce the meaning, gravity, and value of the human lives it represents.

For absenteeism and presenteeism, the approach (core or indicative) depended on the allergic condition and the available literature to inform absenteeism or presenteeism rates per person per year. Estimates of absenteeism and presenteeism from literature were only available for asthma, allergic rhinitis, atopic dermatitis and EoE. All other allergic conditions leveraged an indicative approach using asthma as the reference weight.

Given the large share of children with allergic disease, a meaningful impact on productivity is informal care, where a person (generally a family member or friend) partially or completely foregoes participation in the paid labour force to provide care to someone experiencing an allergic disease. For example, parents may take time off work to take their children to medical appointments for their allergic disease, prepare alternative foods for their children to eat or to homeschool their children to avoid the risk of contact with allergens. However, insufficient data was available to quantify the opportunity cost of providing this informal care (e.g., what the carer could have earned had they been in the workforce).

For more information on estimating productivity costs, including the calculations and inputs used, see Appendix B.1.3.

2.4.2.2 Productivity cost limitations

The limitations pertaining to the estimation of productivity costs include:

- **literature unavailable in the Australian context** – inputs for absenteeism and presenteeism were derived from international literature pertaining to specific allergic conditions due to a lack of Australian data or literature. There may be societal, economic, and demographic differences between Australia and other countries that could lead to variation in a person's likelihood of absenteeism or presenteeism.
- **recency of data sources** – further, while premature mortality rates for asthma and insect and tick allergy were taken from recent AIHW sources, other rates of premature mortality were drawn from a source leveraging data in Australia between 2000 and 2013. While this data was recorded by the ABS and is relatively robust, it is possible that the number of deaths caused by allergic disease may have increased over time, therefore underestimating the impact of premature mortality.
- **distribution by age and sex** – it was assumed that the distribution of mortality for allergic disease follows the prevalence distribution of each allergic condition. That is, the mortality rate per person was assumed to be constant regardless of age or sex. This is a simplifying assumption reflecting the lack of robust data to inform a different distribution.

2.4.3 Efficiency losses

Allergic disease generates health care costs and reduces income tax revenues (through lower productivity). As such, taxation rates must be higher to achieve a neutral budget position. This additional tax and subsidy revenue is not an economic cost but a transfer of payments from one person to another. However, increasing tax revenue reduces the efficiency with which the economy's resources are used. For example:

- an increase in income tax rates will increase the relative price of work compared to leisure and therefore create a disincentive to work
- an increase in the sales tax increases the price of goods and services, resulting in a loss of sales.

Consequently, there is an associated reduction in consumer and producer surplus. Efficiency losses capture the reduced economic efficiency (i.e., this reduction in consumer and producer surplus) associated with the need to levy taxes to fund the provision of government services and replace lost employment taxes.

2.4.3.1 Methodological approach

There are three types of efficiency losses relating to allergic disease:

- **consumer taxes** – where workers limit their employment or take unpaid sick leave due to the impacts of their allergic disease, reducing the personal income tax received by government and incurring an associated efficiency loss.
- **company taxes** – where businesses lose revenue due to their worker taking sick leave for allergic disease or becoming less productive at work due to the impacts of their allergic disease, reducing the company tax received by government and incurring an associated efficiency loss.
- **government health expenditure** – where governments increase taxation revenue to fund health system costs associated with allergic disease, incurring an efficiency loss.

For information on the calculations and inputs used to estimate the efficiency losses associated with allergic disease, see Appendix B.1.4.

2.5 Non-financial cost types

2.5.1 Loss of wellbeing

As outlined in Chapter 1 and section 2.2, people with allergic disease experience serious symptomology and high rates of mortality, resulting in a loss in wellbeing.[64]

2.5.1.1 Methodological approach

The burden of disease methodology is a non-financial approach to quantifying the loss of wellbeing, where life and health are measured in terms of disability-adjusted life years (DALYs). While the use of DALYs is current best practice for estimating the wellbeing impacts of health conditions, it is a crude calculation of disability and health status. Use of these calculations is not intended to imply that there is a hierarchy of health status, or that diversity or changes in health status (i.e., chronic illness, disability) indicate a loss of human value. Further, it is noted that DALYs do not capture important factors such as stigma, minority stress and marginalisation that may affect the health of disabled and chronically ill people in multiple complex ways.

DALYs combine the years of healthy life lost due to living with a disability (YLD) and the years of life lost due to premature death (YLL). One DALY (the summation of YLD and YLL) is equivalent to one year of healthy life lost. DALYs can be converted into a dollar figure using an estimate of the value of a statistical life year (VSLY), an estimate of the dollar value society places on an anonymous life. The Department of Prime Minister and Cabinet (2024) estimated the net VSLY (that is, subtracting financial costs borne by individuals) to be $245,000 in 2024 Australian dollars.[65]

In the burden of disease methodology, various health states are assigned a disability weight score, where zero represents no health loss and one is equivalent to total health loss (i.e., death). Other health states are given a calculated weight between zero and one to reflect the loss of wellbeing from a particular health condition relative to no health loss. For example, a disability weight of 0.2 is interpreted as a 20% loss in wellbeing relative to no health loss for the duration of the health condition.

The loss of wellbeing that occurs due to allergic disease can be calculated using the following formulas:

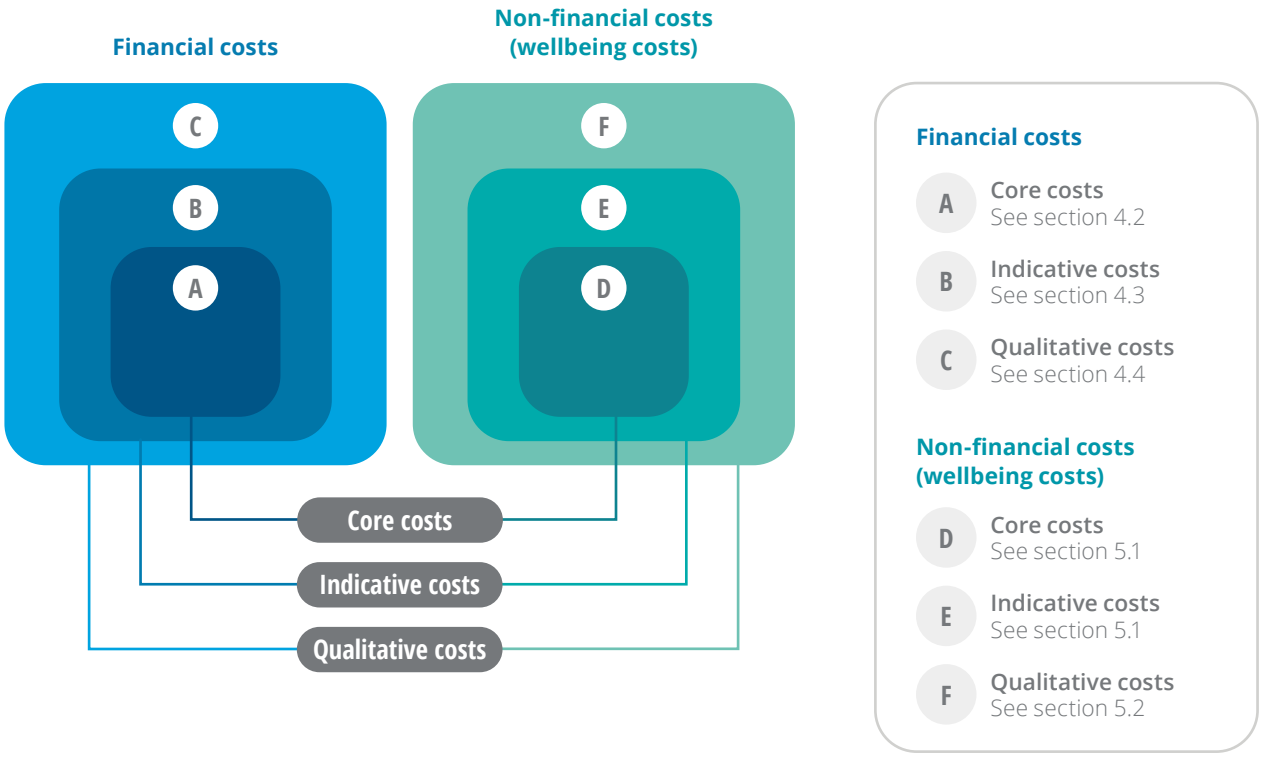
- DALYs = [YLDs (disability weight x prevalence) + YLLs (deaths due to allergic disease x discounted standard life expectancy at the average age of death)]
- loss of wellbeing = DALYs x VSLY.

Disability weights vary by allergic condition given differences in severity. A weighted average disability weight was calculated based on individual disability weights for allergic conditions, adjusting for the relative prevalence of each allergic condition. However, it is noted that these disability weights rely on literature from 2018 or earlier, and not always in the Australian context. The limited availability of literature means that the estimated loss of wellbeing may be underestimated in the severity of allergic disease and impact on quality of life has increased over time.

2.6 Analysis components in this report

As outlined in section 2.3.1, the analysis has been tailored based on data available at the time of analysis. Three categories of cost have been assessed: core costs, indicative costs and qualitative costs. The approach to assessing core, indicative and qualitative costs has been applied to the cost types which, at the highest level, are financial, non-financial and qualitative. These components are illustrated collectively in Figure 2.4 with results presented in Chapters 4 and 5.

Figure 2.4: Conceptual representation of the analysis components in this report



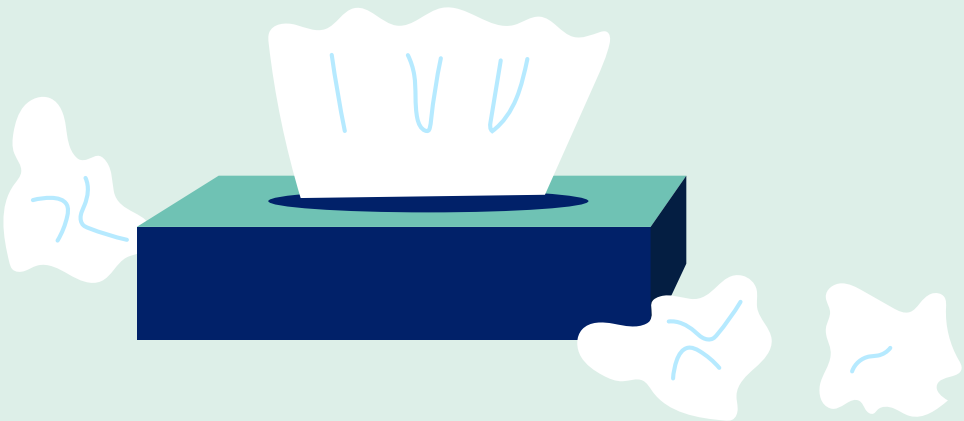
Source: Deloitte Access Economics

2.7 Further limitations of this study

It is acknowledged that costs quantitatively estimated in this study do not fully represent the complete cost of allergic disease. Where data is limited or unreliable, estimates have been made using conservative assumptions. There may be other additional costs associated with allergic disease such as informal care costs to family and friends who care for people with allergic disease, or the cost of alternatives to avoid allergic reactions. While data limits the quantification of these costs, they place additional social and economic burden on Australians. Where possible, these have been discussed qualitatively.

Further, this study only quantifies the cost impact of allergic disease in Australia for one year (2024). However, allergic disease occurs across the lifecycle, and many are diagnosed early and are chronic in nature.[66] The costs of allergic disease therefore exceed one year, and as such, this study provides only a snapshot of the economic and social cost of allergic disease to Australia.

As discussed in the above sections, there are also data limitations in the data available on allergic disease in Australia. In some instances, there is uncertainty regarding the relevance of international literature to the Australian context in the absence of Australian data sources, while in other instances, there is simply no data available on the cost category. The quality of data on prevalence and costs also varies across allergic condition, with higher quality data for some well-known conditions such as asthma, while data is limited for other more recently emerging allergic conditions such as EoE.



03

Epidemiology of allergic disease

There were approximately 16.4 million cases of allergic conditions in 2024. This translates to approximately 30% of all Australians (or 8.2 million people) living with allergic disease.

This section presents the estimated prevalence and mortality of allergic disease in Australia in 2024. Prevalence and mortality are presented by allergic condition, sex and age to highlight how allergic disease typically presents and which cohorts are most affected.

3.1 Annual prevalence

3.1.1 Prevalence by allergic condition

Prevalence by allergic condition reflects the number of cases of each allergic condition in 2024. It was estimated that there were approximately 16.4 million cases of allergic conditions in 2024 (i.e., isolated instances of allergic conditions). Notably this does not equate to unique people with allergic disease – reflecting the fact that many people with allergic disease will have comorbid allergic conditions. The population prevalence of each allergic condition is presented in Table 3.1 with the corresponding total number of cases. The most common allergic conditions include allergic rhinitis, atopic dermatitis, asthma, food allergy and drug allergy. Collectively, these allergic conditions account for 92.9% of all allergic disease.

Table 3.1: Prevalence of allergic conditions in Australia in 2024

Allergic condition	Total cases	Population prevalence
Allergic rhinitis (hay fever)	6,388,052	23.5%
Allergic chronic rhinosinusitis	453,123	1.7%
Asthma	2,530,581	9.3%
Anaphylaxis NOS	75,486	0.3%
Drug (medication) allergy	1,427,676	5.2%
Food allergy	1,902,823	7.0%
Insect and tick allergy	427,154	1.6%
Eosinophilic oesophagitis	20,454	0.1%
Atopic dermatitis (eczema)	2,962,472	10.9%
Chronic spontaneous urticaria	190,791	0.7%
Total cases of allergic conditions	**16,378,612**	**30%***

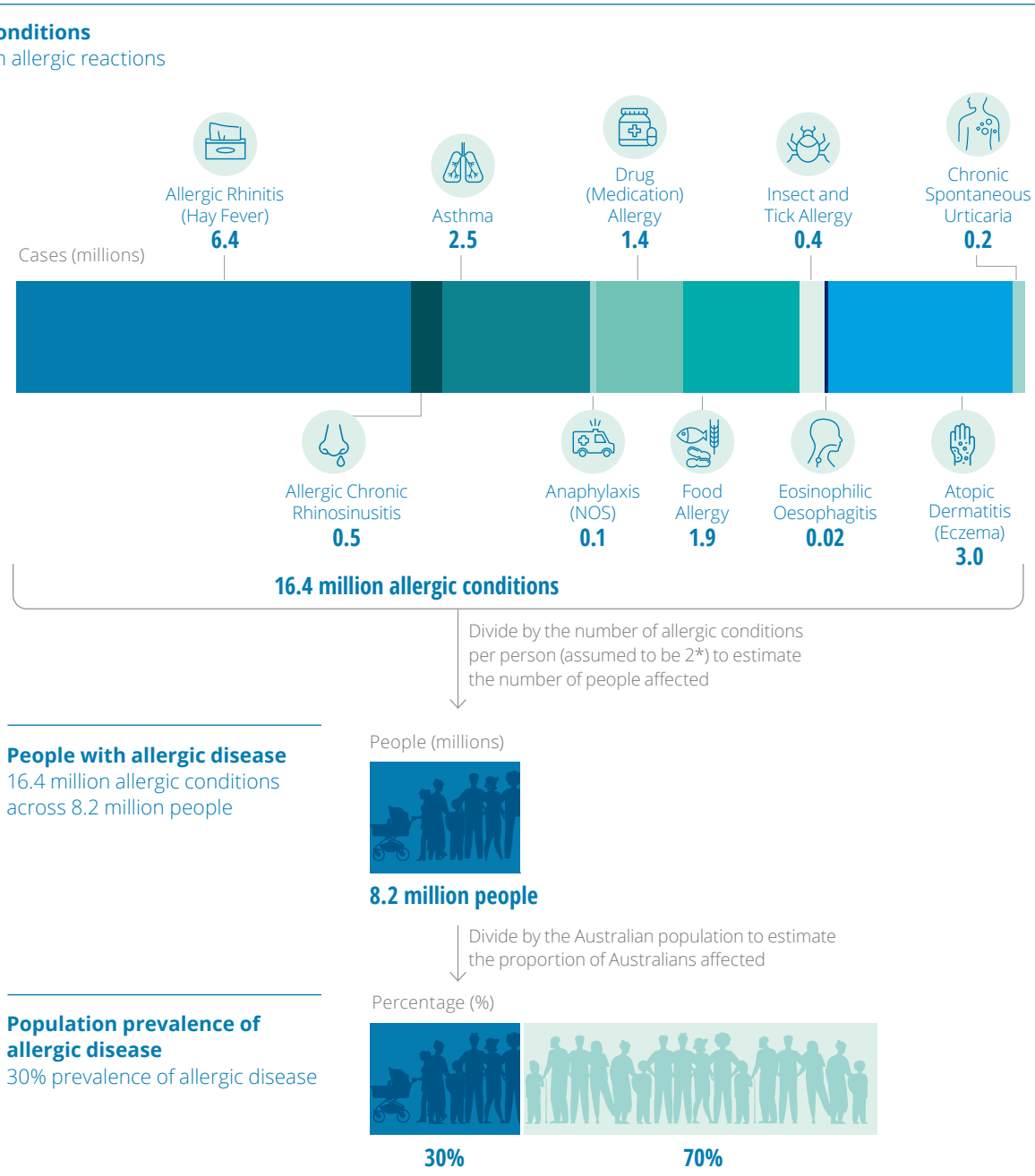
Source: Deloitte Access Economics. *It is noted that the population prevalence of all allergic disease is contingent on the number of comorbid allergic conditions per person and there are more cases of allergic conditions than people living with allergic disease. The number of comorbid allergic conditions was estimated to be 2 allergic conditions per person.

3.1.2 Overall prevalence of allergic disease (unique people)

As previously noted, the modelling relies on estimates of the number of cases of allergic conditions in 2024. An adjustment for comorbidity of allergic disease is required in order to estimate the number of unique people with at least one allergic condition. This adjustment process is discussed in detail in section 2.2 and Appendix A. It was estimated that the likely number of comorbid allergic conditions is 2 cases per person. This yields an estimated population prevalence of 8.2 million people, or 30% of all people living in Australia.

A schematic of this relationship between allergic conditions, people with allergic disease and population prevalence is shown in Figure 3.1.

Figure 3.1: Relationship between cases of allergic conditions, people with allergic disease and population prevalence in Australia in 2024



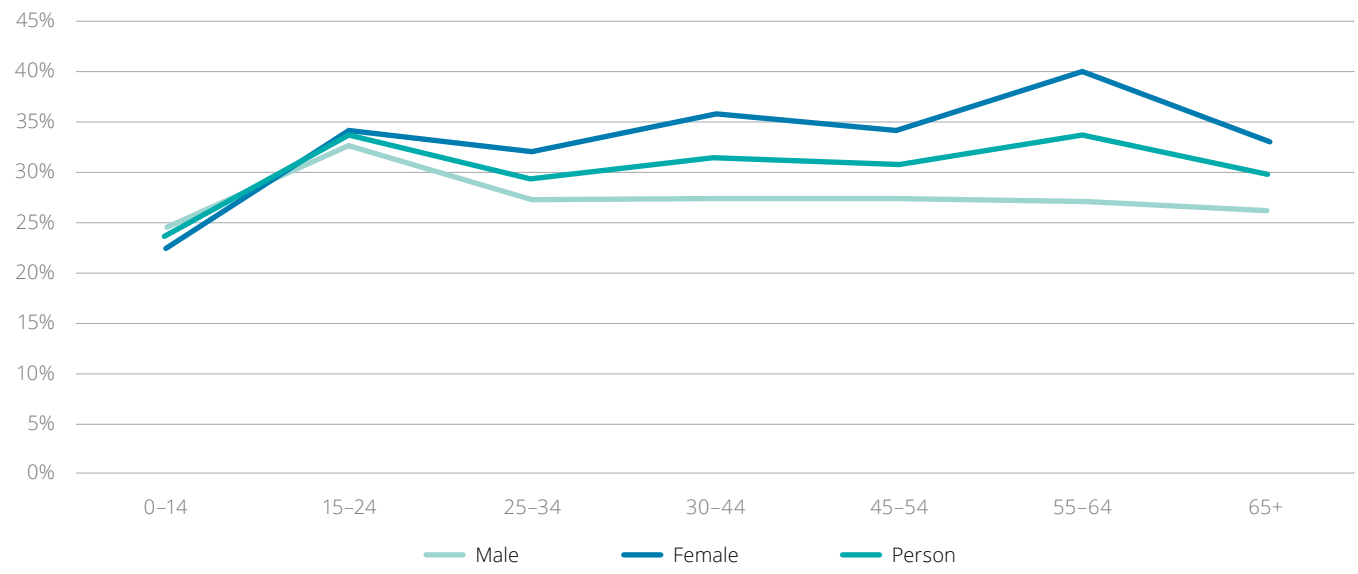
Source: Deloitte Access Economics. *The average number of allergic conditions per person may vary across different allergic conditions and different age groups and genders, for instance. Evidence indicates a range of approximately 1.5 to 2.6 allergic conditions per person.

3.1.3 Prevalence by age and sex

This report estimates that there were approximately 9.0 million cases of allergic conditions in females and 7.4 million cases of allergic conditions in males. When adjusted to account for unique people with allergic disease, this equates to approximately 32.6% of females and 27.4% of males. In childhood, allergic disease is more common in males than females, but the pattern reverses during adolescence and persists throughout adulthood (Chart 3.1). Specifically, in the 55–64 age group, around 39.9% of women are estimated to have at least one allergic condition, compared to about 25% of men.

It was estimated that the prevalence of allergic disease was highest amongst the 55-64 age group (33.7%), closely followed by the 15-24 age group (33.4%).

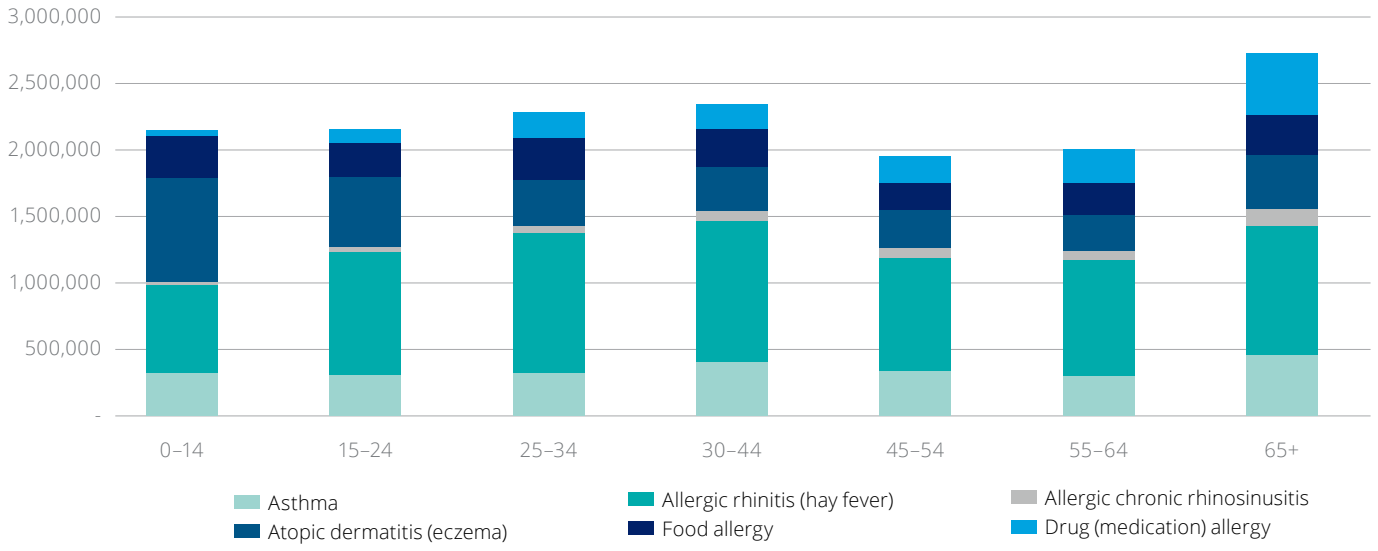
Chart 3.1: Prevalence of allergic disease by age and sex (unique people)



Source: Deloitte Access Economics, modelled using inputs from sources outlined in Appendix A.

There are some noticeable trends in the allergic conditions experienced by different age groups. For example, atopic dermatitis is most common in early childhood and affects 16.6% of people aged under 14 years but decreases during adulthood to less than 9% of people on average. Similar patterns are observed for food allergy.[67, 68] Comparatively, allergic rhinitis is uncommon in early childhood, only affecting 13.8% of children under 14 years, but increases with age and is most common in those aged 15-64 years, with up to 28.2% of adults are affected (see Chart 3.2).

Chart 3.2: Prevalence of allergic conditions by age group (cases)



Source: Deloitte Access Economics

3.2 Growth in prevalence

Overall, the current prevalence of allergic disease in Australia is estimated to be 30%, up from 21% in 2007, making it one of the fastest growing chronic diseases in Australia. Among the allergic conditions, allergic rhinitis (hay fever) remains the most common. In 2007, Access Economics estimated prevalence of allergic rhinitis was approximately 3.3 million cases. This has increased to almost 6.4 million cases in 2024.

Australian children have some of the highest rates of food allergy worldwide.[69,70,71] The evidence base relating to risk factors which contribute to food allergy is still developing, however there is some recognition in literature that anaphylaxis hospital admission rates for food allergy have risen.[72] Some risk factors which have been studied extensively include genetic factors, environmental exposures (such as air pollution and pollen exposure) and other modifiable exposures (such as diet and other food allergens in the home environment).

Additionally, other allergic conditions such as eosinophilic oesophagitis have seen increased recognition in diagnoses by medical professionals over time.[73]

The prevalence of self-reported drug (medication) allergy is higher in adults and increases with age, since older age is a known risk factor for anaphylaxis and immediate and delayed hypersensitivity reactions to medications.[74] This is largely due to higher rates of comorbidities and polypharmacy among older adults.[75] With Australia's ageing population, it is expected that prevalence of drug allergy will increase over time.

Conversely, over the last decade, the prevalence of allergic respiratory diseases such as asthma, although high, has remained relatively stable.[76] This is partly because datasets ask participants to specifically report asthma that has been formally diagnosed by a doctor and because there is longstanding familiarity with respiratory disease among health professionals.

3.3 Mortality

Allergic disease represents a group of chronic conditions in which morbidity rather than mortality is predominant. However, where mortality occurs, the major sources of mortality are asthma, and less commonly anaphylaxis, drug allergy and complications arising from surgical care of sinusitis. Some deaths from anaphylaxis may also be erroneously classified as asthma or respiratory fatalities (Mullins et al, 2016 and Gupta et al, 2007) and anaphylaxis deaths may not be recognised as such on the death certificate (and thus are susceptible to underreporting).[77, 78] There is no central database where allergic disease-related deaths are systematically recorded, and because anaphylaxis is often considered a natural cause of death, coronial inquests are not always mandated. Some deaths from anaphylaxis may also go unrecognised in the community due to the absence of characteristic features on autopsy. However, with data available, in total it was estimated that there were 497 deaths dues to allergic disease in 2024 (see Table 3.2).

Table 3.2: Mortality by allergic condition

Allergic condition	Total cases
Allergic rhinitis (hay fever)	0
Allergic chronic rhinosinusitis	0
Asthma	474
Anaphylaxis NOS	15
Drug (medication) allergy[iii]	4
Food allergy[iv]	2
Insect and tick allergy	3
Eosinophilic oesophagitis	0
Atopic dermatitis (eczema)	0
Chronic spontaneous urticaria	0
Total allergic disease	**497***

Source: Deloitte Access Economics. *Components may not sum to total due to rounding

[iii] Mortality due to drug (medication) allergy is an anaphylaxis mechanism.
[iv] Mortality due to food allergy is an anaphylaxis mechanism.

04

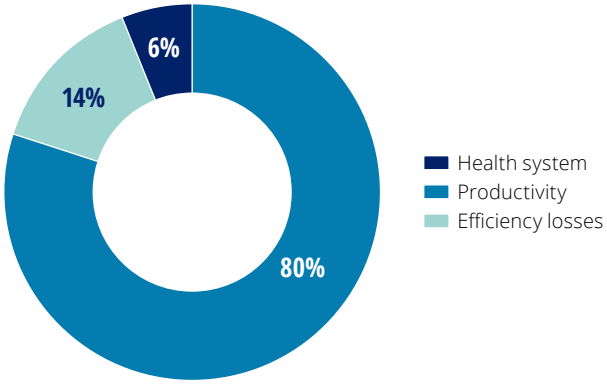
Financial costs

The total financial costs attributable to allergic disease in Australia were estimated to exceed $18.9 billion in 2024.

Allergic disease has a wide-ranging impact on the financial position of people with allergic disease, their families and carers, governments, and society. In 2024, the financial cost of allergic disease in Australia was $18.9 billion, or $1,155 per case of allergic condition (or approximately $2,318 per person).

Productivity costs (such as increased absences from work or reduced efficiency while working for people with allergic disease) made up most of this figure, totalling $15.1 billion, or 80% of the core financial cost (see Chart 4.1). This large impact on productivity reflects the substantive impact allergic disease has on working productivity and that an estimated 68.9% of people with allergic disease are in the working age population (i.e., between 15 and 64 years old). Efficiency losses accounted for $2.6 billion (14%), followed by health system costs ($1.2 billion, 6%).

Chart 4.1: Share of the core financial costs of allergic disease in Australia, 2024



Source: Deloitte Access Economics

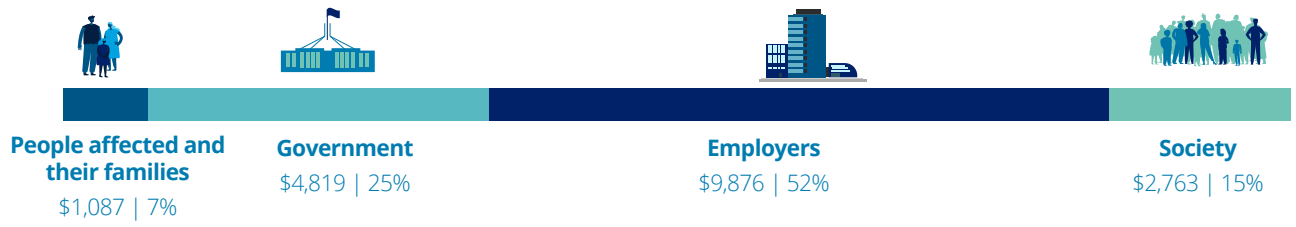
Table 4.2: Financial costs due to allergic disease by cost component, 2024

Cost component	Total ($ millions)	Cost per case ($)
Core analysis		
Health system	1,212.5	74.1
Productivity	15,107.9	922.4
Efficiency losses	2,595.4	158.5
Total core financial cost	**18,915.8**	**1,154.9**

Source: Deloitte Access Economics

The Deloitte Access Economics Cost-of-Illness model helps to determine where the financial burden falls. Employers bore the greatest proportion ($9.9 billion, 52%) of the $18.9 billion in total financial costs, followed by the Federal Government ($4.8 billion, 25%) and Society[v] ($2.8 billion, 15%). The remaining costs were borne by people living with allergic disease ($1.1 billion, 6%) and State and Territory Governments ($371 million, 2%).

Chart 4.2: Who bears the cost of allergic disease in 2024, ($ millions)



Source: Deloitte Access Economics

[v] Society refers to a range of actors including insurers, consumers, and producers.

4.1 Core financial costs

The core financial costs associated with allergic disease were quantified using costs specific to each allergic condition in Australia, as per section 2.3.1. Core financial costs were categorised into health costs, productivity losses, and efficiency losses.

4.1.1 Health costs

The total health system costs attributable to allergic disease were estimated to be $1.2 billion in Australia in 2024.

Health system costs estimated within the core methodology include hospital emergency department presentations, hospital admitted patient services, out-of-hospital medical expenses (e.g., allied health services and GP visits), prescription pharmaceuticals, OTC medication, medical imaging and immunotherapy costs.

In total, health system costs were estimated to be $1.2 billion in Australia in 2024, equivalent to $74 per case of allergic condition (see Table 4.3).

PBS prescriptions made up the largest proportion of health system costs, an estimated $501.6 million (41% of the core health costs). General practitioner contacts accounted for $384.6 million (32%), and public hospital emergency department presentations for $145.0 million (12%), and public hospital admissions for $98.3 million (8%).

Table 4.3: Health system costs of allergic disease in 2024, by type of health cost

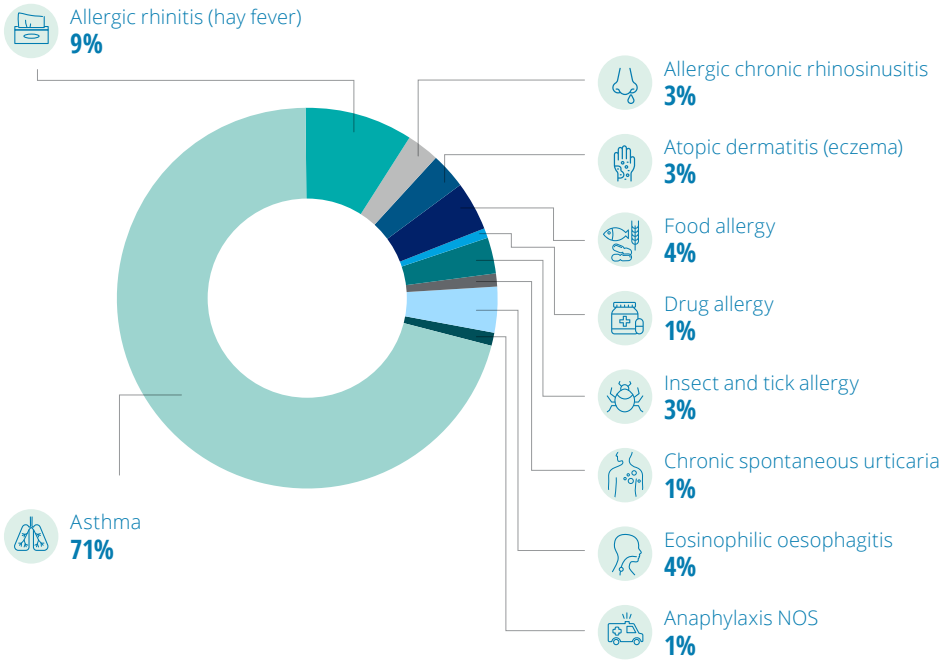
Component	Total ($ millions)	Cost per case ($)
Core analysis		
Public hospital admissions	98.3	6.0
Public hospital emergency department presentations	145.0	8.9
General practitioner contacts	384.6	23.5
Pathology	8.5	0.5
PBS prescriptions	501.6	30.6
Over-the-counter medications	62.3	3.8
Immunotherapy[vi]	12.1	0.7
Core analysis total	**1,212.5**	**74.0**

Source: Deloitte Access Economics

With respect to the burden of cost by allergic condition, shown in Chart 4.2, asthma accounts for a majority of health system costs – an estimated $858.3 million or 71% of the core health cost (Chart 4.3). This primarily reflects a combination of high service utilisation and prevalence of people with asthma. Allergic rhinitis makes up the next largest portion ($112.7 million, 9.0% of core health costs), followed by EoE ($46.5 million, 4%), food allergy ($42.5 million, 4%), atopic dermatitis ($37.3), insect and tick allergy ($40.7) and allergic chronic rhinosinusitis ($34.9 million).

[vi] While the cost of immunotherapy is averaged across all cases in Australia, in reality the cost is borne by a smaller proportion of people, whose actual expenses can range from approximately $600 to $1,200 per year per person undergoing immunotherapy.

Chart 4.3: Share of the core health costs by allergic condition in Australia, 2024



Source: Deloitte Access Economics

Table 4.4: Health cost due to allergic disease in Australia by allergic condition, 2024 ($ millions)

Allergic condition	Core analysis
Allergic rhinitis (hay fever)	112.7
Allergic chronic rhinosinusitis	34.9
Asthma	858.3
Anaphylaxis NOS	11.8
Drug (medication) allergy	17.2
Food allergy	42.5
Insect and tick allergy	40.7
Eosinophilic oesophagitis	46.5
Atopic dermatitis (eczema)	37.3
Chronic spontaneous urticaria	10.6
Total health cost	**1,212.5**

Source: Deloitte Access Economics

The data used to quantify the health system costs in this report is an incomplete portrayal of the reality of living with allergic disease in Australia. In particular, it does not capture all of the out-of-pocket expenses incurred by people with allergic disease while accessing healthcare.

The financial burdens faced by those with allergic disease to access the necessary healthcare can be costly.

"Often allergy treatment is expensive and poorly understood. I had to be really assertive when looking for help."

"There is a limitation in the number of people who can provide specialised allergy and anaphylaxis care. GP services are also very limited. Not having allergies covered by Medicare is another challenge."

"Waitlists for both public and private are very long. Private immunology is very expensive and I found when I saw a private consultant, she was difficult to contact when not in her office."

"It costs me over $50 a week on creams and medications and I'm a student who has a casual job and often at times I just cannot afford it. I would also like some more support in place. I was bullied a lot in school for having weird skin and anaphylaxis, to the point where people would bring food and try to cause me to have an attack. It has left me with so much anxiety and panic about leaving my house."

4.1.2 Productivity losses

Allergic disease can have a negative impact on a person's participation in employment and disrupt their engagement and productivity, amounting to costs of $15.1 billion in 2024.

Productivity losses for people with an allergic disease were estimated to be $15.1 billion, equating to a cost per case of allergic condition of $922 (see Table 4.5). Of the productivity losses, presenteeism accounted for $12.1 billion (78%), absenteeism for $2.3 billion (16%) and lost earnings from premature mortality cost $694.6 million (6%).

The magnitude of these costs is large, reflecting the impact allergic disease has on the productivity of workers who experience them. Given 68.9% of people with an allergic disease are of working age (i.e. aged 15-64), this large impact on productivity reflects the distribution of allergic disease by age.

Table 4.5: Productivity costs of allergic disease in 2024, by cost category

Productivity	Total cost ($ millions)	Cost per case ($)
Presenteeism	12,093.5	738.4
Absenteeism	2,319.8	141.6
Premature mortality	694.6	42.4
Core cost total	**15,107.9**	**922.4**

4.1.3 Efficiency losses

In 2024, efficiency losses associated with allergic disease cost $2.6 billion, equivalent to $159 per case of allergic condition.

Efficiency losses associated with allergic disease were estimated to equal $2.6 billion, equating to a cost per case of $159 (see Table 4.6). Company taxes made up most of this cost ($2.2 billion, 86.0%), followed by government health expenditure ($343.2 million, 13.2%) and consumer taxes ($20.5 million, less than 1%). These estimates reflect the impact allergic disease can have on employment status and productivity. All efficiency losses were categorised as core costs.

Table 4.6: Efficiency losses due to allergic disease by cost category, 2024

Cost component	Total cost ($ millions)	Cost per case ($)
Consumer taxes	20.5	1.3
Company taxes	2,231.7	136.3
Government health expenditure	343.2	21.0
Core cost total	**2,595.4**	**158.5**

Source: Deloitte Access Economics

4.2 Indicative financial costs

An indicative analytical approach has been undertaken (as per the methodology) where data is not readily available or of lower quality. In these instances, costs were quantified using a proxy to estimate the distribution of costs for other allergic conditions or using evidence from literature from other jurisdictions. This further analysis suggests that there could be an additional $1.3 billion in financial cost impacts, the majority of which comes from productivity cost ($1.0 billion). The indicative financial costs are discussed in sections 4.3.1 and 4.3.2.

4.2.1 Health costs

Further estimates indicate that there could be an additional $274.4 million cost impact on the health system when using the indicative approach for cost categories where data is limited. Medical imaging made up $22.5 million, $77.7 million for specialist services, $147.5 million for public hospital outpatient contacts, $19.3 million for private hospital services and $7.4 million for allied health and other services (see indicative analysis results in Table 4.7).

Table 4.7: Indicative health costs of allergic disease by cost category, 2024

Indicative analysis	Total cost ($ millions)	Cost per case ($)
Medical imaging	22.5	1.4
Specialist services	77.7	4.8
Public hospital outpatient contacts	147.5	9.0
Private hospital services	19.3	1.2
Allied health and other services	7.4	0.5
Total indicative health costs	**274.4**	**16.8**

Source: Deloitte Access Economics

4.2.2 Productivity costs

An indicative analysis reveals that additional productivity costs associated with allergic disease is equivalent to $1.0 billion (as shown in Table 4.8). Presenteeism made up $636.1 million and absenteeism accounted for $393.4 million. It is assumed that allergic disease does not result in reduced employment, as advised by the Project Advisory Group. The approach for generating the costs associated with absenteeism and presenteeism varied by allergic condition. The core analysis included costs for asthma, allergic rhinitis, atopic dermatitis and EoE. Other allergic conditions were part of the indicative analysis. This is because data limitations mean there is insufficient confidence to include presenteeism and absenteeism in the core analysis for all allergic conditions. No absenteeism costs were calculated for allergic rhinitis (hay fever) as advised by the Project Advisory Group.

Table 4.8: Indicative productivity costs of allergic disease by cost category, 2024

Indicative analysis	Total cost ($ millions)	Cost per case ($)
Presenteeism	636.1	38.8
Absenteeism	393.4	24.0
Total indicative productivity costs	**1,029.6**	**62.9**

Source: Deloitte Access Economics

4.3 Qualitative financial costs

There are additional qualitative costs associated with allergic disease that could not be quantified due to limited data.

This report does not estimate additional costs incurred due to the use of informal carers, for instance. This does not mean that there are no costs related to informal care. For example, parents may spend time undertaking allergen avoidance measures, taking their child to medical appointments or spending additional time to shop and prepare special meals for a child with food allergy.

Allergic disease generates additional costs for carers.

"Our son had multiple food allergies as a young child and we just did not feel confident that childcare could look after him, so we made the decision that I would not go back to work."

"There needs to be more recognition of the care needed beyond diagnosis/medically. Allergies have an impact socially and emotionally too. There needs to be greater recognition of this and care targeted towards this."

05

Non-financial costs

Beyond the financial impact, allergic disease also creates a substantial loss in wellbeing. In 2024, this non-financial cost was estimated to be $44.6 billion.

The impact of allergic disease is widespread, affecting at least 30% of the Australian population. While the impact of allergic disease upon quality of life is minor in most individual instances, the cumulative impact across all Australians is substantial. This reduction in quality of life is not a financial cost, but can be quantified and valued using a burden of disease approach.

5.1 Quantified wellbeing costs

The total YLDs attributable to allergic disease was estimated to be 160.9 billion in Australia in 2024. This was equivalent to $39.4 billion in lost wellbeing (88% of the total loss in wellbeing). The total YLLs attributable to allergic disease was estimated to be 21.2 billion, which was valued at $5.2 billion (12%). The total loss in wellbeing was estimated to be $44.6 billion in 2024 (see Table 5.1).

In addition, there were an estimated $6.9 billion in indicative costs where data is limited, suggesting that the total loss of wellbeing could be $51.4 billion when considering both the core and indicative cost approaches.

Table 5.1: Cost of loss of wellbeing due to allergic disease, 2024

Component	Total cost ($ millions)
Core analysis	
YLDs (#)	160,908.3
Cost of YLDs	39,422.5
YLLs (#)	21,221
Cost of YLLs	5,199.1
Core analysis loss of wellbeing total	**44,621.7**
Indicative analysis	
YLDs (#)	27,679
Cost of YLDs	6,781.4
YLLs (#)	0.0
Cost of YLLs	0.0
Indicative analysis loss of wellbeing total	**6,781.4**
Total loss of wellbeing (core + indicative analysis)	**51,403.0**

Source: Deloitte Access Economics

The wellbeing costs presented here reflect only those borne directly by the person with allergic disease. The total cost presented in Table 5.1 corresponds to a cost of $2,724 per case of allergic condition (or approximately $5,470 per person). A complete list of disability weights used within the analysis for each allergic condition is available in Table B.6.

There were an estimated 497 deaths due to allergic disease in 2024. Most of these were attributed to asthma (474 deaths) and anaphylaxis (21 deaths total, including 4 from drug (medication) allergy, 2 from food allergy and 15 NOS). It is highlighted that the exact distribution of these deaths by age and sex is not known. Previous analysis has indicated that mortality rates for asthma increase substantially among people aged over 75.[79]

5.2 Qualitative wellbeing costs

While the direct impact of deaths due to allergic disease is quantified within this report, it is highlighted that there is an unquantified cost of the additional burden for family and friends. This toll may be particularly high in the case of food allergy deaths among young adults – deaths which are preventable with appropriate education and training (e.g. within schools and workplaces) as well as timely use of epinephrine.

In children, allergic disease often can limit participation in activities such as sports or social events. For instance, a child with food allergy might be excluded from social activities, school camps and excursions, certain snacks and food at school or parties, leading to feelings of isolation. Psychological impacts include anxiety, especially concerning accidental exposure. Parents may face stress managing allergic disease, influencing family dynamics and routines. Adults and children experiencing some forms of allergic disease such as atopic dermatitis, asthma or hay fever may have performance issues at work or school due to symptoms of fatigue or cognitive impairment related to sleep deprivation/disturbance. Adult-onset allergic disease can also alter employment and lifestyle choices, e.g., avoiding outdoor activities during peak pollen seasons, food services industry and the armed forces, where some forms of allergic disease such as food or drug allergy may preclude recruitment. The financial burden due to costs for healthcare visits, medications and ailments can also impact broader economic stability in the family. This is exacerbated when clustering of allergic disease and genetic influences result in multiple affected people within the same family. This would further increase the burden of allergic disease.

Allergic disease has broader impacts on wellbeing of people living with the disease and their family and friends.

"The wait for the diagnosis (via proper testing) was perhaps one of the most stressful periods of my life. We lived every day for 5 months knowing she was at risk of anaphylaxis from something, but had no confirmation of what it might be. Such an awful, dark time."

"There seemed to be little empathy expressed when we would report if our daughter had suffered an anaphylactic episode that year or acknowledgement or understanding of the emotional toll on me as a parent and our daughter of these episodes."

"My daughter and I (mother) have been traumatised by her previous anaphylaxis episodes."

06

Conclusion

An estimated 8.2 million Australians had one or more allergic conditions in 2024. In total it was estimated that there were 16.4 million individual cases of allergic conditions, or approximately 2 cases per person with allergic disease.

This report estimates the total financial costs of allergic disease in Australia in 2024 to be $18.9 billion, equivalent to $1,155 per case of allergic condition (or approximately $2,318 per person). Additional non-financial costs equated to 44.6 billion, or a further $2,724.4 per case of allergic condition (approximately $5,470 per person) (Table 6.1).

Table 6.1: Total core cost of allergic disease in Australia in 2024

Cost component	Total cost ($ millions)
Financial costs	
Health system	1,212.5
Productivity	15,107.9
Efficiency losses	2,595.4
Total financial costs	**18,915.8**
Non-financial costs	
Loss of wellbeing	44,621.7
Total non-financial costs	**44,621.7**

Source: Deloitte Access Economics

This report estimates that the prevalence of allergic disease has increased substantially over time. In 2007, an estimated 4.1 million Australians had at least one allergic disease, or approximately 21.3% of the population at the time.[80] Current estimates suggest that the number of people living with allergic disease has doubled since 2007 – with now approximately one-in-three Australians living with allergic disease.

6.2 Future opportunities

This report demonstrates the considerable economic and social cost of allergic disease in Australia. Allergic disease is widespread, affecting around one-in-three Australians. The findings presented in this report aim to improve the understanding of the impact of allergic disease among key interest holders to raise awareness and inform priorities for future research.

Understanding the factors driving prevalence of allergic disease and the appropriate responses to help mitigate future growth is key to managing the future burden of allergic disease. Better data on allergic disease can help to inform researchers, clinicians, people with allergic disease and broader society of the substantial impact of allergic disease. It can also help to inform decision making related to prevention and treatment of allergic disease in the future.

This report presents an understanding of the current costs of allergic disease in 2024 based on the latest available information. It has identified several gaps in the quality and availability of data related to allergic disease. For example, there are opportunities to:

- **enhance health cost data for all allergic disease.** A range of health costs could not be robustly modelled for allergic conditions other than asthma. These included medical imaging, specialist services, outpatient appointments, private hospital services, allied health and other services.
- **strengthen understanding of true prevalence of allergic disease in Australia.** A range of assumptions were used to estimate the prevalence of allergic disease for this study due to limitations in the completeness and availability of data and literature. Further understanding of the comorbidity of multiple allergic conditions and the difference between self-reported prevalence and clinically diagnosed prevalence would enhance measurement of the prevalence of allergic disease over time. This would support a greater understanding of the extent to which Australians are affected by allergic disease.
- **capture broader impacts on people and society.** The Project Advisory Group advised that certain productivity impacts such as informal care could not be readily quantified with the level of available data – despite there likely being substantial costs associated with the component. Further to this, a range of other impacts including anxiety or stress related to both people with allergic disease and their family/friends currently sit outside the scope of this report. These remain areas for future research to understand the additional impact these may have on people living with an allergic disease.

This report also highlights the importance of:

Clinical care and public health programs that reduce the economic and societal cost of allergic disease

Supporting and upskilling health professionals to enable earlier intervention and improved access to care for allergic disease

Identifying opportunities to address gaps in the quality and availability of data related to allergic disease

Further allergic disease prevention and management research.

Recognition of allergic disease as a chronic health condition.

Each of these points represents an opportunity for future work to expand upon current understanding of allergic disease, that will lead to better outcomes for people living with allergic disease.

This report has built upon the existing evidence base related to allergic disease in Australia. With ongoing investment into prevention, management and research related to allergic disease, Australia can remain a leader in the evidence-based management of allergic disease. Continued investment towards implementation of the National Allergy Strategy through National Allergy Council and National Allergy Centre of Excellence programs is essential to delivering meaningful improvements to the millions of Australians living with allergic disease.[81]

A

Appendix A
Prevalence approach

A.1. Prevalence of allergic disease

A.1.1. Cases of allergic conditions

The following two approaches were used to inform the prevalence estimates across allergic conditions:

- direct prevalence estimates by age and sex were sourced from the *National Health Survey (NHS) 2022*, where available
- supplementary literature and assumptions from the Project Advisory Group were used to refine estimates for allergic disease where NHS provides data for a broader category (e.g., including both allergic and non-allergic forms), or where only overall prevalence is available without age or sex breakdowns.

These prevalence estimates are the number of cases of each allergic condition in Australia in 2024.

Of the ten allergic conditions that have been assessed in this report, the following allergic conditions were informed directly by NHS 2022 data, with age- and sex-specific prevalence available:

- asthma
- food allergy
- drug (medication) allergy
- allergic rhinitis (hay fever).

NHS data is self-reported, however as discussed in section 2.2, it is acknowledged that a person's perception of allergic disease may lead to overreporting when compared to clinical diagnoses by medical professionals.[82] No assumptions for this self-reporting overestimation were made for the purposes of this study since the true level of overestimation is unknown.

Further, not all cases of asthma are allergic. For example, some may be induced by medication, and cold air, or exercise.[83] This study only considers cases that are allergic. The share of asthma cases that are allergic was informed by the Project Advisory Group, at 85%.

Age and sex prevalence was sourced from the NHS. Based on advice from the Project Advisory Group, the standard 0–14 age group was further split into 0–4, 5–9, and 10–14 years, as allergic rhinitis prevalence is minimal in children under five years.

For allergic conditions not covered by the NHS, prevalence estimates were obtained from the literature. These studies provided total population prevalence and, in some cases, sex distributions.

- **Anaphylaxis (otherwise unspecified)** – Wood et al. (2014) estimate the overall population prevalence of anaphylaxis to be 1.6%.[84] Kim et al. (2018) further report that 2.5% of anaphylaxis cases are exercise-induced and 1.5% have no known cause, accounting for 4.0% of anaphylaxis cases considered otherwise unspecified.[85] To estimate age and sex distributions, prevalence data for undefined allergic disease from the NHS 2022 was used as a proxy. Final estimates were calculated by applying the proportion of "otherwise unspecified" anaphylaxis to the overall prevalence and distributing this by age and sex according to the undefined allergy data.
- **Insect and tick allergy** – Population prevalence estimates for insect and tick allergy were informed by Brown et al. (2011), who report the overall population prevalence of allergic disease to specific to insect and tick reactions, averaging to 1.6% across the population.[86] The AIHW reports that 56% of hospitalisations due to contact with living things (including venomous and non-venomous insects) are for males. Although not specifically for insect and tick allergic reactions, this can be used as a proxy to disaggregate prevalence by sex. The 2022 NHS includes the prevalence of undefined allergies by age. This provides a general distribution of allergic disease in the population in line with feedback from the Project Advisory Group that insect and tick allergy is higher amongst young adult/middle aged populations. The prevalence of insect and tick allergy by age and sex is calculated by multiplying the population prevalence of insect and tick allergy by the relative prevalence of hospitalisations due to contact with living things by sex by the distribution of undefined allergies by age.
- **Eosinophilic oesophagitis** – Dellon and Hirano (2019) report that the overall population prevalence of eosinophilic oesophagitis is 0.075%.[87] To disaggregate prevalence estimates by sex, Sperry et al (2015) report that 76.0% of eosinophilic oesophagitis cases are in males.[88] The 2022 NHS prevalence of undefined allergies by age were used to disaggregate by age. Therefore, the prevalence of eosinophilic oesophagitis by age and sex can be calculated by multiplying the population prevalence of eosinophilic oesophagitis by the relative prevalence of eosinophilic oesophagitis by sex by the distribution of undefined allergies by age.
- **Atopic dermatitis (eczema)** – Age-specific prevalence estimates for atopic dermatitis (eczema) were sourced from the literature. Zeleke et al. (2022) is the most recent meta-analysis study that incorporates results from several Australian cohort studies, including HealthNuts, the Melbourne Atopic Cohort Study, the Tasmanian Longitudinal Health Study, and the Australian arm of the European Community Respiratory Health Survey.[89] Zeleke et al. (2022) reports prevalence by broad age categories. To map these estimates to the relevant age groups, the value for 0-14 is calculated as the average of the ranges for <6 and 6-12, the value for 15-24 is based on value for 18-year-olds, and all other values are based on value for 'adults'. The sex distribution for food allergy was applied, based on advice from the Project Advisory Group that the distribution of atopic dermatitis by age and sex is very similar to that of food allergy.

- **Chronic spontaneous urticaria** – Fricke et al. (2020) report an overall population prevalence of 0.70% for chronic spontaneous urticaria.[90] To disaggregate prevalence estimates by sex, Zuberbier et al (2010) report that 70.3% of chronic spontaneous urticaria cases are in females.[91] As with insect and tick allergy, the age prevalence spilt was calculated using the prevalence of undefined allergies by age. Therefore, the prevalence of chronic spontaneous urticaria by age and sex is calculated by multiplying the population prevalence of chronic spontaneous urticaria by the relative prevalence of chronic spontaneous urticaria by sex by the distribution of undefined allergies by age.

Finally, the NHS was used to derive the prevalence of some allergic conditions but also supplemented with advice from the Project Advisory Group for the following allergic condition:

- **Allergic Chronic Rhinosinusitis** – Prevalence by age and sex was taken from NHS data on total chronic rhinosinusitis. Of all the subtypes of allergic chronic rhinosinusitis, it was assumed that only allergic fungal rhinosinusitis and isolated central compartment atopic disease would primarily be driven by allergic disease. The corresponding share of allergic chronic rhinosinusitis cases that are allergic is estimated to be at least 6.3%.[92,93,94] However some studies recognise that evidence of the relationship between chronic rhinosinusitis and allergic disease is inconclusive and that this estimate may not be comprehensive.[95] As such, the Project Advisory Group advised that the population rate of atopy, 20%, should be assumed as the share of chronic rhinosinusitis cases that are allergic.

A.1.2. Unique people affected by allergic disease

In order to convert cases of isolated allergic conditions into an estimate of the total number of people affected by allergic disease, an adjustment for comorbidity of allergic conditions was applied. Many people with allergic disease have comorbid allergic conditions because the immune system's response to allergens have shared pathogenic features. This means that people often experience multiple allergic conditions that coexist simultaneously or at different times. The treatment of one allergic condition may help alleviate the symptoms of others, while developing one allergic condition can lead to or precede the development of others. Therefore, an assumption was used that are 2 cases per person living with allergic disease. This yields a total prevalence of 8.2 million people with allergic disease in 2024, which is substantially smaller than the total number of cases of various allergic conditions, at 16.4 million. Given there is limited recent evidence available on the comorbidity of allergic disease (as discussed in section 2.2.3), it was advised by the Project Advisory Group that 2 allergic conditions per person be applied, however it is recognised there is uncertainty around this assumption,[96] and that it could vary between 1.55[97] and 2.56.[vii]

A.2. Mortality of allergic disease by type

The mortality of allergic disease per year was estimated using a selection of data sources reporting cause of death in Australia. Where literature reported number of deaths over multiple years, this was divided by the number of years to determine the per-year number of deaths. For some allergic conditions, the Project Advisory Group informed this study that there is no increased risk of mortality associated with the condition. The data sources for each allergic condition are outlined in Table A.1.

[vii] Calculated noting that the minimum prevalence of allergic disease must exceed the prevalence of the most common allergic condition

Table A.1: Calculation of mortality of allergic disease

Allergic condition	Calculation and data sources
Allergic rhinitis (hay fever)	The Project Advisory Group informed this study that no deaths are attributable to this allergic condition.
Allergic chronic rhinosinusitis	The Project Advisory Group informed this study that no deaths are attributable to this allergic condition.
Asthma	The AIHW reports the number of deaths attributable to asthma each year.[98]
Anaphylaxis NOS	Number of anaphylaxis deaths caused by drug allergy was recorded by the ABS from 2000 to 2013.[99] A per year mortality figure was derived by dividing the number of anaphylaxis deaths by 13 years.
Drug (medication) allergy	Number of anaphylaxis deaths caused by food allergy was recorded by the Australian Bureau of Statistics (ABS) from 2000 to 2013.[100] A per year mortality figure was derived by dividing the number of anaphylaxis deaths by 13 years.
Food allergy	Number of anaphylaxis deaths caused by insect and tick allergy was recorded by the ABS from 2000 to 2013.[101] A per year mortality figure was derived by dividing the number of anaphylaxis deaths by 13 years.
Insect and tick allergy	Number of anaphylaxis deaths caused by insect and tick allergy was recorded by the ABS from 2000 to 2013.[102] A per year mortality figure was derived by dividing the number of anaphylaxis deaths by 13 years.
Atopic dermatitis (eczema)	The Project Advisory Group informed this study that no deaths are attributable to this allergic condition.
Other allergic disease	Number of anaphylaxis deaths without a specified cause were recorded by the ABS from 2000 to 2013.[103] A per year mortality figure was derived by dividing the number of anaphylaxis deaths by 13 years.

Source: Deloitte Access Economics

B

Appendix B
Costing methodology

B.1. Financial costs

Financial costs include health system costs and productivity costs.[viii] These costs were categorised as either core analysis, indicative analysis or qualitative analysis based on the details provided in Table B.1 below. The approach for each financial cost is discussed in sections B.1.2 and B.1.3 respectively.

Table B.1: Calculation method for financial costs in 2024

Calculation	Details
Core analysis	Cost categories for which data is available for the majority of allergic conditions.
Indicative analysis	For a cost category in which data for all allergic conditionsis available (e.g., public hospital admissions), the ratio across all allergic conditions is taken usiwng the value for asthma as a baseline. These ratios are then applied to other cost categories where data is not available.
Qualitative discussion	Qualitatively assessed in the narrative to demonstrate the importance but noting there is insufficient data/information to estimate or inform any assumptions. Limited data analysis could be used to indicate the impact.

Source: Deloitte Access Economics

B.1.2. Health system costs

A summary of the approach used to estimate the health costs associated with allergic condition (excluding informal care) can be found in Table B.2.

Table B.2: Calculation of health system costs

Type of health cost	Approach	Calculation	Details
Public hospital admissions	Core analysis	No. of acute public hospital admissions from IHACPA X Cost of acute public hospital admissions from IHACPA.	Total cost of public hospital admissions for **asthma** is reported by the AIHW.[104] Total cost of acute public hospital admissions for the **remaining allergic conditions** are reported by the IHACPA (ICD-10 codes provided).[105] Cost estimation is based on: 1. Cost per national weighted activity unit (NWAU) – the average cost to a healthcare provider for delivering one NWAU to treat this health condition. 2. Total presentations – the total number of times a patient presents to healthcare services for this health condition 3. NWAU per presentation – the average numbers of NWAUs assigned per patient presentation for this health condition.

viii Efficiency losses are also a financial cost which, the methodology for which will be included in the draft report.

Type of health cost	Approach	Calculation	Details
Public hospital emergency department presentations	Core analysis	No. of 'allergic reactions' presentations from AIHW. Spilt by allergy from literature. X Cost of acute public hospital admissions from IHACPA	The total cost of emergency department admissions per year for asthma and 'allergic reactions' are available from AIHW. The total cost of 'allergic reactions' are distributed across the remaining allergic conditions according to a study by Shifti et al. (2025) based on data from Central Queensland.[106]
General practitioner services	Core analysis	No. of GP contacts X Cost of contacts from the AIHW.	Data on the utilisation of GP services by health condition was collected by the BEACH survey until 2016. The number of GP contacts related to each allergic condition per year can therefore be estimated using this data by forecasting forward to 2024 using the average year-on-year growth rate of GP contacts for all allergic disease between 2011 and 2016. Out-of-pocket and government costs of GP appointments are provided by the Australian Institute of Health and Welfare.[107]
Pathology	Core analysis	No. of tests from Services Australia X Costs of tests from Medicare Cost Finder	Data is available on the number of pathology tests and total government cost of pathology tests by Medicare Benefits Schedule (MBS) item number from the Department of Human Services.[108] This data was pulled for MBS item numbers corresponding to the relevant allergic conditions. Item numbers corresponding to general allergy testing have been distributed across allergic conditions by taking the relative prevalence weightings of food allergy, drug allergy, insect allergy and chronic spontaneous urticaria, which were the allergic conditions identified by the Project Advisory Group as requiring pathology testing.
Prescription pharmaceuticals	Core analysis	No. of prescriptions from Services Australia. X Cost of prescriptions from Services Australia.	Data is available on the number of prescriptions and total government cost of prescriptions by restriction code from the Department of Human Services.[109] This data was pulled for the restriction codes corresponding to the relevant allergic conditions.
Dental expenditure	Core analysis	Dental expenditure assumed to be zero, as informed by project advisory group.	N/A

Type of health cost	Approach	Calculation	Details
Non-PBS pharmaceuticals	Core analysis	No. of OTC purchases X Average cost of OTC medications per person per year + No. of prescribed medications by GPs not on the PBS X Average cost of prescribed medications	BEACH survey data from 2011-2026 provides the share of GP encounters that result in an advised OTC medication purchase at a pharmacy, or a GP supplied medication purchase for an allergic condition. These shares are applied to the estimated number of GP contacts to yield the number of non-prescription OTC medications purchased for allergic disease. It is assumed that each advised medication purchase provided by a GP is acted on by the patient. The number of OTC purchases as advised by GPs can be extrapolated based on the share people purchasing OTC medications who do or do not have a doctor's diagnosis,[110] and the share of people that purchase OTC medications at a pharmacy or a supermarket.[111] The cost of common OTC medications for allergic disease is available from pharmacy and supermarket websites. This is converted to a per person per year cost according to the recommended dosage and average number of days OTC medications are used for allergic disease and sinus issues.[112] The BEACH data can also be used to estimate the number of prescription medications purchased after a GP appointment. The dataset also provides the most common medications prescribed. The average cost of the top 10 medications not covered by the PBS is calculated using common brands available at pharmacies. Together with PBS medications this covers majority (77%) of all medications prescribed by GPs.
Immunotherapy	Core analysis	Average cost of immunotherapy per patient X No. of patients using immunotherapy per year in Australia	Industry data was provided by ASCIA on the estimated number of patients using subcutaneous immunotherapy (SCIT) and sublingual immunotherapy (SLIT) in Australia per year. The cost of single immunotherapy kits for grass and dust mite allergy that are approved by the Therapeutic Goods Administration (TGA) is readily available from pharmaceutical websites. An average cost of these kits was multiplied by the number of immunotherapy kits required per patient to maintain the recommended dosage to yield the immunotherapy cost per patient per year. It was assumed that these immunotherapy kits would only be used for asthma and allergic rhinitis (hay fever) in people aged five years and older as per the manufacturer recommended use guidelines.

Type of health cost	Approach	Calculation	Details
Medical imaging	Indicative analysis	Relative weighting of public hospital admission costs per person (asthma as the reference category) X Medical imaging costs per person for asthma	Indicative cost modelling approach involving: • Calculating the cost of public hospital admissions for each allergic condition per person with that allergic condition • Calculating the relative weighting of the costs per person using asthma as the reference category • Multiplying the resulting weighting for the relevant allergic condition by the medical imaging costs for asthma.
Specialist services	Indicative analysis	Relative weighting of public hospital admission costs per person (asthma as the reference category) X Specialist services costs per person for asthma	Indicative cost modelling approach – estimated using ratio of asthma costs.
Public hospital outpatient services	Indicative analysis	Relative weighting of public hospital admission costs per person (asthma as the reference category) X Public hospital outpatient costs per person for asthma	Indicative cost modelling approach – estimated using ratio of asthma costs.
Allied health and other services	Indicative analysis	Relative weighting of public hospital admission costs per person (asthma as the reference category) X Allied health services costs per person for asthma	Indicative cost modelling approach – estimated using ratio of asthma costs.

Source: As noted and AIHW (2021) [113]

B.1.3. Productivity costs

The calculations, data sources and assumptions used to estimate the productivity costs associated with allergic disease are set out below in Table B.3.

Table B.3: Calculation method and data sources for productivity losses in 2025

Type of health cost	Approach	Calculation	Details
Reduced employment	N/A	N/A	All allergic conditions are assumed to have no notable impact on employment, as informed by the Project Advisory Group. As such, this has been excluded from the analysis.
Absenteeism	Approach varies by allergic condition. Core analysis includes asthma, allergic rhinitis, atopic dermatitis and EoE. Other allergic conditions are part of indicative analysis. No absenteeism calculated for allergic rhinitis (hay fever) as advised by the Project Advisory Group.	Number of people with allergic disease X Absenteeism days in a year X Daily wage	Data on absenteeism is sourced from the literature for asthma, allergic rhinitis, atopic dermatitis and EoE.[114,115,116,117] For the remaining allergic conditions, an indicative cost modelling approach was undertaken, involving: • Calculating the cost of public hospital admissions for each allergic condition per person with that allergic condition, • Calculating the relative weighting of the costs per person using asthma as the reference category, • Multiplying the resulting weighting for the relevant allergic condition by the absenteeism for asthma. **Daily wage:** Average weekly earnings of all employees split by age and sex, divided by 5 days and inflated to 2024 figures (ABS, 2024).[118] This assumes a work week of 5 days.
Presenteeism	Approach varies by allergic condition. Core analysis includes asthma, allergic rhinitis and atopic dermatitis. Other allergic conditions are part of indicative analysis.	Number of people with allergic disease X Productivity impact X AWE X 46 weeks (52 weeks – 4 weeks annual leave – 2 weeks sick leave)	Data on presenteeism was available for asthma, allergic rhinitis and atopic dermatitis from the literature.[119,120,121] For the remaining allergic conditions, an indicative cost modelling approach was undertaken, involving: • Calculating the cost of public hospital admissions for each allergic condition per person with that allergic condition, • Calculating the relative weighting of the costs per person using asthma as the reference category, • Multiplying the resulting weighting for the relevant allergic condition by the absenteeism for asthma. **AWE:** Average weekly earnings of all employees split by age and sex and inflated to 2024 values (ABS, 2024).[122]

Type of health cost	Approach	Calculation	Details
Premature mortality	Core analysis	Number of deaths X Expected lifetime earnings	**Number of deaths** were sourced from the following sources: Premature deaths from **asthma** was taken from the AIHW.[123] Premature deaths from **anaphylaxis** (by anaphylaxis trigger) was taken from Mullins et al. (2016).[124] Anaphylaxis deaths were split across food, drug, insect and NOS using data on the distribution of anaphylaxis triggers from Drewett et al (2022).[125] All other allergic conditions were assumed to have no impact on mortality as informed by the Project Advisory Group. The distribution of deaths by age and sex were assumed to follow the prevalence distribution for each allergic condition. **Expected lifetime earnings:** Estimated by multiplying years left in working age population (i.e., 15-64) by the average employment rate for people with allergic disease and wage in each year, split by age and sex (ABS, 2023; ABS, 2024).[126,127]

Source: Deloitte Access Economics

B.1.4. Efficiency losses

The methodological approach to estimating the efficiency losses associated with allergic disease in 2024 is summarised in Table B.4.

Table B.4: Key inputs for estimating efficiency losses

Type of health cost	Calculation	Details
Consumer taxes	(Absenteeism costs borne by employees) X Average personal income tax rate X Efficiency loss of income tax	• **Absenteeism costs borne by employees:** Estimated by Deloitte • **Average personal income tax rate:** 22.3% (Australian Taxation Office, 2013-14)[128] • **Efficiency loss of income tax:** 25.0% (Cao et al. 2015).[129]
Company taxes	(Absenteeism costs borne by employers + Presenteeism costs) X Company tax rate X Efficiency loss of company tax	• **Absenteeism costs borne by employers:** Estimated by Deloitte • **Presenteeism costs:** Estimated by Deloitte • **Company tax rate:** 29.2% (Australian Taxation Office, 2013-14)[130] • **Efficiency loss of company tax:** 50.7% (Cao et al. 2015).[131]
Government health expenditure	Health system costs X Proportion of health systems costs paid by the government X Efficiency loss of welfare payments	• Health system costs: Estimated by Deloitte • Proportion of health systems costs paid by the government: 41.6% for Federal Government and 26.7% for State Government (AIHW, 2016)[132] • Efficiency loss of welfare payments: 42.6% (Cao et al. 2015).[133]

Source: Deloitte Access Economics

B.2. Non-financial costs

The loss of wellbeing that occurs due to allergic disease can be calculated using the following formula:

- DALYs = [YLDs (**Disability weights x Prevalence of allergic disease by age and sex**) + YLLs (**Number of deaths due to allergic disease x Discounted standard life expectancy at the average age of death**)]
- Loss of wellbeing = DALYs x VSLY

Each of the components for loss of wellbeing is detailed below in Table B.5.

Table B.5: Key inputs for estimating loss of wellbeing

Component	Details
Disability weights	Disability weights varied by each allergic condition. The estimates are outlined in detail below in Table B.6. A weighted average disability weight of 0.024 was calculated (based on the individual disability weights in Table B.6 and adjusting for the relative prevalence of each allergic condition).
Number of deaths due to allergic disease	Premature deaths from asthma were taken from the AIHW. Premature deaths from anaphylaxis (by anaphylaxis trigger) were taken from Mullins et al. (2016). Anaphylaxis deaths were split across food, drug, insect and NOS using data on the distribution of anaphylaxis triggers from the literature. All other allergic conditions were assumed to have no impact on mortality.
Discounted standard life expectancy at the average age of death	Estimated by Deloitte by discounting the expected number of years left at each age from the ABS Life Tables (2019-2021).[134]
VSLY	The value of a statistical life in 2022 was $245,000.[135]

Source: Deloitte Access Economics

Table B.6: Disability weights for allergic conditions

Allergic condition	Disability weight	Estimation approach
Allergic rhinitis (hay fever)	0.006	Disability weights for allergic rhinitis were estimated based on Haagsma et al. (2015).[136]
Allergic chronic rhinosinusitis	0.037	No available literature identified. Disability weight of 0.037 applied consistent with Access Economics (2007).[137]
Asthma	0.042	Estimated based on weighted average disability weights for controlled, partially controlled and uncontrolled asthma available from the AIHW burden of disease report.[138]
Anaphylaxis NOS	0.037	No available literature identified. Disability weight of 0.037 applied consistent with Access Economics (2007).[139]
Drug (medication) allergy	0.037	No available literature identified. Disability weight of 0.037 applied consistent with Access Economics (2007).[140]
Food allergy	0.012	Disability weight for food allergy was estimated based on Gibb et al. (2010).[141]
Insect and tick allergy	0.037	No available literature identified. Disability weight of 0.037 applied consistent with Access Economics (2007).[142]
Eosinophilic oesophagitis	0.037	No available literature identified. Disability weight of 0.037 applied consistent with Access Economics (2007).[143]
Atopic dermatitis (eczema)	0.037	No available literature identified. Disability weight of 0.037 applied consistent with Access Economics (2007).[144]
Chronic spontaneous urticaria	0.062	Disability weight for Chronic spontaneous urticaria was based on Pu et al. (2024)[145]

Source: As noted

Limitation of our work

General use restriction

This report is prepared solely for the use of ASCIA and the National Allergy Council. This report is not intended to and should not be used or relied upon by anyone else and we accept no duty of care to any other person or entity. The report has been prepared for the purpose of assisting ASCIA and the National Allergy Council to estimate the economic cost of allergic disease in Australia. You should not refer to or use our name or the advice for any other purpose.

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