

1 Introduction

Asthma is a chronic inflammatory condition of the airways, affecting an estimated 300 million people worldwide (GINA 2004). The common features of asthma are recurrent episodes of wheezing, breathlessness and chest tightness, associated with widespread narrowing of the airways (NAEPP 1997). However, these features are difficult to identify in young children. Parents report that their infant or child has wheezing, noisy breathing and, sometimes, fast breathing (Mellis 2009). A range of entities, such as viral bronchiolitis, bronchitis, or upper respiratory tract infections, may all manifest in similar ways or with overlapping clinical features. Children with wheezing may be labelled with the diagnosis 'asthma', 'wheezing illness' or one of these other illnesses mentioned above. Sometimes the diagnosis of asthma is made in retrospect, when it is clear that the disease is more than transient episodes of wheezing. 'Asthma' is not a precisely defined entity in preschool-age children. In this report we have tended to use the term 'asthma' and 'wheezing illness' interchangeably when referring to younger children. In citing data from other reports, we have adhered to the terms used in those reports.

Prevalence of asthma in Australian children

The International Study of Asthma and Allergies in Childhood (ISAAC) has consistently identified Australia, along with the UK, New Zealand and the Republic of Ireland, as having a relatively high prevalence of asthma in children, by international standards (Lai et al. 2009; Pearce et al. 2007). The National Health Survey (NHS) 2004–05 provides the most recent nationwide data on the prevalence of asthma in Australia. This survey found that asthma is the most common long-term medical condition in children, with prevalence being higher among boys than girls (ABS 2006). It is estimated that 20.8% of children aged 0 to 15 years have ever been diagnosed with asthma, while 11.3% of children within the same age group have a current diagnosis (ACAM 2008). Comparison of results from the 2004–05 NHS with those reported in a similar survey in 2001 shows that the prevalence of childhood asthma appears to have reached a plateau since peaking during the 1980s and early 1990s. The reasons for this remain uncertain.

Risk factors for asthma and its consequences in children

There are many pathways leading to the development of asthma and wheezing illness. Interactions among a range of genetic and environmental risk factors are thought to play an important role. Researchers in this field are attempting to understand the nature of the gene–environment interaction that leads to disease in children, so that they can develop interventions aimed at reducing the prevalence and incidence of asthma. Cohort studies have been conducted to examine putative risk factors for childhood asthma, persistence of the illness and poorer outcomes, such as more frequent use of health-care services. Interventions directed at these risk factors could potentially lead to a reduction in the burden of disease attributed to childhood asthma. There is evidence that inherited attributes,

prenatal and postnatal events, and early childhood exposures may all contribute to the development of asthma and related disorders in children (see Table 1.1).

Table 1.1: Characteristics, behaviours and environmental exposures that have been linked, positively or negatively, to the presence of asthma

Inherent factors	Sex	Dik et al. 2004; Strachan 1985
	Genetics	Bottema et al. 2008; Vercelli 2003
	Family heredity	London et al. 2001; Metsala et al. 2008
	Socioeconomic status	Cesaroni et al. 2003
	Remoteness	Clement et al. 2008
	Aboriginality	Bremner et al. 1998; Valery et al. 2001; Valery et al. 2003; Veale et al. 1996
	Ethnicity and migration	Leung et al. 1994; Netuveli et al. 2005; Wilson et al. 2006
Prenatal and postnatal factors	Maternal smoking	Li et al. 2005; Stein et al. 1999
	Mode of delivery	Metsala et al. 2008; Sears 1997
	Prematurity	Jaakkola et al. 2001; Miller 2001
	Multiple births	McKeever et al. 2001; Toos et al. 2008
	Breastfeeding	Chandra 1997; Dyson et al. 2005; Oddy 2000; Oddy et al. 1999
Early childhood exposures	Bronchiolitis	Jackson et al. 2008
	Reduced physical activity	Lucas & Platts-Mills 2005
	Siblings	Doull 2001; Martinez & Holt 1999; Strachan 2000
	Child care attendance	Von Mutius 2007
	Pet ownership	Hesselmar et al. 1999
Other conditions	Eczema	Burgess et al. 2008
	Food and digestive allergies	Tariq et al. 2000
	Obesity	Sutherland 2008
	Allergic rhinitis	Dik et al. 2004

Note: Inclusion here does not imply a causal relationship has been demonstrated.

Not all children with asthma or wheezing in early childhood have persisting disease. In many children the wheezing is relatively transient. Children with more troublesome asthma in early childhood are more likely to have persistent disease (Jenkins M A et al. 1994; Oswald 1994; Reed 2006; Sears 1994). Other reported risk factors for persistent asthma include early onset of the disease, having a family history of asthma, being allergic, having airway hyperresponsiveness (twitchiness of the airways), increased frequency of respiratory infections and lack of contact with older children (Lewis et al. 1995; Martinez 2002a; Reed 2006; Sears et al. 2003; To et al. 2007). The use of health-care services for asthma may be influenced by access, education, socioeconomic status, country of birth and length of time in Australia (Christakis et al. 2001; Jones et al. 2008). Other risk factors associated with health

care use, particularly hospitalisation, include the severity of asthma, poor asthma management and improper use of asthma medications (Christakis et al. 2001; Rasmussen et al. 2002).

Rationale for this study

The Australian Centre for Asthma Monitoring (ACAM) has previously explored childhood asthma in Australia using data from the National Health Surveys. However, these are cross-sectional surveys with limited data on both risk factors and outcomes and no capacity to link these over time. Further exploration of the issues identified above requires data from a cohort study.

In 2003, the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) in partnership with the Australian Institute of Family Studies and a consortium of leading researchers initiated data collection for the Growing Up in Australia: the Longitudinal Study of Australian Children (LSAC). The study has a broad, multidisciplinary base, involving a broadly representative sample of Australian children, and examines topical issues of policy relevance. It explores family and social issues relevant to children's development, and addresses a range of research questions about family functioning, health, non-parental childcare and education. Data are being collected from two separate cohorts, aged 0–1 year and 4–5 years at recruitment, every two years. In this report ACAM has used these LSAC data to investigate childhood asthma in Australia.

Study aims

This study investigates the incidence, prevalence, risk factors, management and consequences of parent-reported wheeze or asthma among infants and kindergarten-age children in Australia. It aims to answer the following questions:

1. What risk factors are associated with the development of wheeze and asthma among infants in the first three years of life?
2. What risk factors are associated with the development of asthma among children between the fifth and seventh years of life?
3. What risk factors are associated with the persistence of wheeze between the fifth and seventh years of life?
4. What health services and medications are used in relation to childhood asthma?
5. What are the consequences or outcomes of childhood asthma or wheeze?

Definitions of the terms 'parent-reported wheeze' and 'asthma' are provided in *Chapter 2*.

Structure of this report

This chapter has introduced the background to this study, the questions posed, the data that were used and the issues taken into account in the analyses; while the second chapter includes a detailed description of the data source and the methods used to analyse the data. The subsequent chapters will address each of the five main study questions described in the study aims.

In *Chapter 3*, risk factors associated with the development of wheeze or asthma in infants are examined. In *Chapter 4*, risk factors associated with the development of asthma in kindergarten-age children are examined. *Chapter 5* presents data on the persistence of wheeze in the kindergarten cohort. Health service utilisation and medication use in relation to childhood asthma is explored in *Chapter 6*. The last study question, investigating outcomes associated with childhood asthma, is addressed in *Chapter 7*. The concluding chapter of this report summarises the main findings across all chapters and considers the limitations as well as the future possibilities for studies using these data.