

# 7 Outcomes for children with wheeze or asthma

Children with asthma experience poorer health outcomes than other children. As discussed in *Chapter 5*, children with asthma are more likely to be hospitalised or visit an emergency department. However, asthma may also affect a child's quality of life. Sleeping patterns (Strunk et al. 2002), absenteeism (van Gent et al. 2007b), weight (Bender et al. 2007; van Gent et al. 2007a) and height (Falliers et al. 1963; Helms 2001) have been shown to be adversely affected by asthma.

In this chapter we have quantified the impact of parent-reported wheeze or asthma in 4–5 year old children on health outcomes over the ensuing two years.

## Methods

Two year follow-up data from the LSAC kindergarten cohort were used to examine health outcomes. At baseline, the kindergarten cohort was classified as having or not having parent-reported wheeze or asthma. Outcomes were ascertained at the 2 year follow-up. Rate ratios and PAF were estimated, as described in *Chapter 1*. The PAF represents the proportion of cases of an adverse health outcome that would be avoided if none of the cohort had the risk factor; in this case wheeze or asthma at baseline.

The estimation of PAF requires information on the proportion of the population exposed to the risk factor. In this case, that is the prevalence of wheeze or ever diagnosed asthma at baseline, and the relative risk (or rate ratio) (RR) for the association between the exposure and the health outcome.

## Results

The prevalence of wheeze or ever diagnosed asthma among 4–5 year olds was 28% (Table 7.1).

**Table 7.1: Prevalence of wheeze or ever diagnosed asthma at 4–5 years, kindergarten cohort**

	Number of children	Per cent <sup>(a)</sup> (95% CI)
No	3,243	71.8 (70.2–73.4)
Yes	1,202	27.7 (26.2–29.3)
Don't know	19	0.5 (0.3–0.7)
<b>Total</b>	<b>4,464</b>	<b>100.0</b>

(a) Weighted to the Australian population aged 4 years as at March 2004.

Table 7.2 shows the RR and PAF of wheeze or ever diagnosed asthma for each of the health outcomes. At age 6–7 years, children who had wheeze or ever diagnosed asthma at age 4–5 years were twice as likely as those without to have been hospitalised in the last 12 months; to have had 13 or more GP visits in the last 2 years; and to report fair or poor health status.

Wheeze or asthma at baseline accounted for approximately 25% of each of these outcomes at a population level.

Analysis of the linked MBS data showed that children in the kindergarten cohort visited a GP an average of 6.4 times over the 2 year follow-up period (data not shown). The average number of GP visits among children who had wheeze or ever diagnosed asthma at baseline was significantly higher (8.1 visits; 95% CI 7.7–8.6) than among those with no wheeze or ever diagnosed asthma at baseline (5.7 visits; 95% CI 5.5–6.0).

**Table 7.2: Outcomes at age 6–7 years among children with and without parent-reported wheeze or asthma at age 4–5 years, kindergarten cohort**

	Children aged 6–7 years who had wheeze or asthma at age 4–5 years		Children aged 6–7 years who did not have wheeze or asthma at age 4–5 years		Relative Risk (RR) of outcome for children aged 6–7 years who had wheeze or asthma at age 4–5 years		Impact on outcome of having wheeze or asthma at age 4–5 years
	Number of children	Per cent of those at risk <sup>(a)</sup> (1,202)	Number of children	Per cent of those at risk <sup>(a)</sup> (3,243)	RR <sup>(b)</sup>	95% CI RR	PAF% <sup>(c)</sup>
Hospitalisation for any reason in last 12 months	93	8.1	120	3.9	2.09	1.52–2.88	23.2
Emergency department visit in last 12 months	170	13.6	355	10.3	1.33	1.08–1.62	8.3
13 or more GP visits in last 2 years <sup>(d)</sup>	236	21.4	280	10.1	2.12	1.75–2.57	23.7
Fair or Poor health status	41	4.0	53	1.9	2.18	1.34–3.53	24.6
Child's sleeping pattern is a moderate or large problem for parent	89	7.9	164	5.5	1.44	1.04–1.97	10.8
Absence from school							
1 or more days in last 4 weeks	606	51.3	1,516	47.4	1.08	1.00–1.17	2.2
2 or more days (75th percentile) in last 4 weeks	335	29.2	815	25.8	1.13	1.01–1.27	3.4
4 or more days (90th percentile) in last 4 weeks	135	12.0	307	9.4	1.27	1.03–1.57	7.1
Overweight or obese	260	23.1	562	18.1	1.28	1.09–1.50	7.2
Overweight or obese at age 6–7 years among children who were not overweight or obese at age 4–5 years	67	8.5 (925 children at risk)	148	6.1 (2,620 children at risk)	1.40	1.03–1.90	9.6
Shorter than median height for age	464	39.7	1,334	41.9	0.95	0.87–1.04	..

(a) Weighted to the Australian population aged 4 years as at March 2004.

(b) Prevalence of outcome among children with wheeze or ever doctor diagnosed asthma at age 4–5 years compared to prevalence among those with no wheeze or ever doctor diagnosed asthma at age 4–5 years.

(c) Based on the 28% prevalence of wheeze or ever doctor diagnosed asthma at age 4–5 years.

(d) Based on MBS linked data.

Note

PAF=Population Attributable Fraction

RR=Relative risk

.. = not applicable.

## Discussion

Childhood asthma is common. Children with asthma or asthma symptoms are more likely to have poorer health outcomes, such as being hospitalised, being admitted to an emergency department, visiting a GP more often and reporting poorer health status, than other children. Although the association between asthma and health outcomes is only modest, the high prevalence of the condition means that it is a big contributor, at a population level, to adverse health outcomes in children.

GP visits, hospitalisation and sleep disturbances can lead to increased school absenteeism, resulting in poor grades and decreased physical activity which may affect a child's emotional state, behaviour and weight (Blackman & Gurka 2007; van Gent et al. 2007b).

Children with asthma are more likely than other children to have disturbed sleep. Within a 28-day screening period, 33.7% of children in the Childhood Asthma Management Program (CAMP) experienced one or more nocturnal awakenings due to asthma (Strunk et al. 2002). Awakenings were more common among children with mild to severe asthma. We found that moderate to severe sleep disturbance was 1.44 times more prevalent among children with wheeze or asthma at age 4–5 years, compared to those without wheeze or asthma at the same age. Furthermore, 11% of sleep disturbance was attributed to wheeze or asthma at age 4–5 years. Sleep disturbance is an important cause of poor health outcomes attributable to asthma in children (Martin 1990; Miller B D & Strunk 1989).

Nocturnal asthma is strongly associated with increased absenteeism from school (Diette et al. 2000; Silverstein et al. 2001). Our results show a linear increase in the number of days absent from school at age 6–7 years, as a function of wheeze or ever diagnosed asthma at age 4–5 years. Absenteeism from school has been shown to result in poorer school performance and increased work absenteeism among parents with caring responsibilities (Blackman & Gurka 2007; Schmier et al. 2007).

There are worldwide epidemics of obesity and asthma, especially among children. The similar aetiology of each disorder has led to speculation about a link between them (Tantisira & Weiss 2001; Weiss & Shore 2004). In addition, children with asthma are limited in their ability to participate in daily activities like sports and other physical games, suggesting that asthmatic children may have an increasingly sedentary lifestyle, to prevent exacerbations (Schmier et al. 2007). Cross-sectional studies have demonstrated an association between asthma and obesity, however they are unable to examine the direction of the relationship (Bender et al. 2007; Shaheen et al. 1999; von Mutius et al. 2001). On the other hand, longitudinal studies have been able to demonstrate that obesity may precede the development of asthma (Camargo et al. 1999; Weiss & Shore 2004). Our data lend some support to an association in the opposite direction. In LSAC, wheeze or asthma reported at age 4–5 years was associated with an increased risk of overweight or obesity at age 6–7 years (RR 1.28, 95% CI 1.09–1.50), even if they were not overweight or obese at the time of the baseline survey (RR 1.40, 95% CI 1.03 to 1.90). Hence, there is a link between asthma and obesity in children. The mechanism underlying it is unknown. It may operate in both directions.

There has been concern about the effect of inhaled or oral steroids on growth in children with asthma (Guilbert et al. 2006; Allen et al. 1994). The LSAC did not find evidence of any negative impact of asthma on height. The limitation to our results is that not all children with parent-reported wheeze or asthma at age 4–5 years will have received treatment.

Our results demonstrate that poorer health outcomes at age 6–7 years can be predicted from the experience of asthma or asthma symptoms at age 4–5 years. Although the impact for individual children is relatively small, the impact at population level is substantial, simply because asthma is such a common condition.

# 8 Conclusions

## Summary of findings

- The development of wheeze or asthma in early life is associated with factors that have been linked, directly or indirectly, to reduced airway function. These include exposure to tobacco smoke, being male, child care attendance, presence of older siblings, maternal age, gestational age and admission to NICU.
- Longer duration of breastfeeding within the first 12 months of life is associated with a reduced risk of wheeze or asthma during infancy.
- Parent-reported food or other allergies in early childhood and remoteness of residence are independent risk factors for the development of asthma between the ages of 4–5 years and 6–7 years.
- Children with wheeze at kindergarten age are more likely to have persistence of this symptom over the next two years, if they have more severe symptoms and/or if they have had eczema.
- More kindergarten-aged children than infants are taking preventer medications.
- Nearly 20% of children aged 6–7 years with frequent asthma symptoms were reported not to be taking medications for asthma and over half were not taking preventer medications.
- Having wheeze or asthma at age 4–5 years doubled the risk of hospitalisation or frequent general practice visits *for any cause* and of reporting fair to poor health status over the next 2 years. At a population level, it accounts for over 20% of each of these outcomes in children aged 6–7 years.

## Some limitations of LSAC

Growing Up in Australia is a broad, multidisciplinary study that has been developed to examine the impact of Australia's unique social, economic and cultural environment on the next generation, particularly in regard to issues of policy relevance. While every effort was taken to ensure the methodological strengths of the study data, there are some weaknesses that must be acknowledged in our presentation of the results.

The LSAC used the Medicare register as a sampling frame on the premise that it is the most comprehensive database of Australia's population. This sample design was selected as its major strength is its representativeness of the general population. In theory, every Australian child is on the Medicare register and therefore each child of relevant age would have had an equal chance of being selected for the study. In practice, the LSAC sample excluded infants and children who were living in very remote areas, due to the excessive costs associated with their inclusion (Hunter 2008). As many of the people living in these very remote areas are Aboriginal and Torres Strait Islander Australians, they are under-represented in the LSAC sample. Furthermore, Indigenous communities in remote areas were specifically excluded from the study, and the survey questions and instruments used to collect information for the LSAC may not be sensitive to the unique cultural and social life of Aboriginal and Torres