

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

Strait Islander children (Hunter 2008). These factors mean that LSAC is not a reliable source of health, social and cultural information about remote Indigenous populations. To respond appropriately to the diverse circumstances faced by Aboriginal and Torres Strait Islander children, FaHCSIA has funded a parallel study, *Footprints in Time – The Longitudinal Study of Indigenous Children (LSIC)*. Similar to the LSAC, the LSIC is collecting important information on health, culture, education, housing and family relationships from a truly representative Indigenous sample.

The initial sample from the Medicare enrolments database included 9,259 children aged 0–1 years (infant cohort) and 10,275 children aged 4–5 years (kindergarten cohort). The initial response rates for the infant and kindergarten cohort were 57% and 50%, respectively. The main reasons for non-participation in the baseline surveys were refusal and non-contact because a PO Box address had been supplied or families had changed address. Mothers who had not completed year 12 at school or who spoke a language other than English were more likely to refuse to participate in LSAC (Soloff et al. 2006). Other differences have also been reported (FaHCSIA: Wake et al. 2008). To some extent the resultant selection bias was addressed by weighting to the sociodemographic distribution of the Australian population. However, the effect of other, unmeasured differences between respondents and non-respondents cannot be adjusted for, and the overall low participation rate does increase the risk of uncorrected selection bias.

There is often a large disparity between parents' and general practitioners' interpretation of wheeze and other symptoms related to asthma (Mellis 2009). A major weakness of the LSAC is the dependence on parents as the primary study informants. In particular, the LSAC depends on parent-reported wheeze and parent-reported doctor diagnoses of asthma. Although studies have shown that self-reported wheeze in adults is a valid measure, parent-reported wheeze has serious limitations. Findings from a hospital-based observational study of children aged between 4 months and 15 years showed less than 50% agreement between clinician diagnosed wheeze and parent-report of wheeze (Cane et al. 2000). There are also substantial problems associated with parents reporting on doctor diagnosed asthma. Zuidgeest et al. (2008) surmised that parent-reported doctor diagnosed asthma, taken from questionnaire data, over-estimated asthma compared with GP records. On the other hand, another study indicated that parents under-reported asthma status (Yoo et al. 2007). In the LSAC's kindergarten cohort, we found that 20% of parents, who had indicated that their child had 'ever' been diagnosed with asthma at baseline, did not report 'ever asthma' at 2 year follow-up, indicating poor recall. This has been noted in previous studies (Peat et al. 1992) and may reflect a change in the child's health and the level of parental concern.

A family history of asthma is one of the strongest risk factors for the development of childhood asthma (Kurukulaaratchy et al. 2003; Wahn 2000). Unfortunately, the LSAC did not collect data on parental history of asthma or atopic disease. We were, therefore, unable to analyse the direct impact of family history on the development of wheeze or asthma in offspring and the differential effect of paternal and maternal asthma. In our analysis, we used the maternal use of asthma medication variable as a marker of maternal asthma. However, there are limitations associated with using this variable from which to infer maternal asthma. It is uncertain whether the use of asthma medication during pregnancy was due to a pre-existing long-term condition or whether symptoms were related to the pregnancy. It is also possible that mothers who indicated asthma medication use during pregnancy may have bought over-the-counter medications and have never had a physician diagnose them with asthma.

A further limitation, inherent in all questionnaire-based studies such as LSAC, is the absence of any objective data; in particular, on atopy and lung function. Both of these are central to the diagnosis of asthma and the assessment of severity. In this report, we have cited data from studies that have measured these attributes objectively, in order to supplement the LSAC data where this was appropriate.

Finally, information on medication use derived from the PBS data is not comprehensive. This is because over-the-counter items and items that cost less than the general patient copayment, such as short-acting beta agonists (Ventolin™) and oral steroids (prednisone) are not routinely recorded in the PBS dataset.

Further study

The analysis of baseline and 2 year follow-up data presented in this report has provided insight into many aspects of asthma and the development of asthma in infants and young children. Data collection for Growing up in Australia: the LSAC will continue until 2010 and possibly beyond this time. It will be important to analyse future waves of LSAC data to investigate the rates of remission and persistence for infants who were reported as having developed wheeze or asthma at the 2 year follow-up. This will enable us to differentiate the risk factors associated with transient wheeze from those that indicate a predisposition to chronic asthma. In addition, future waves of data from the kindergarten cohort will help to identify the risk factors associated with asthma that persists into late childhood.

Conclusion

LSAC provides valuable insights into the incidence, natural history, and outcomes of asthma in children. The concurrent follow-up of the two cohorts starting at different ages, will, over time, allow valuable information to be acquired over the full span of childhood. This initial analysis has demonstrated the important differences between wheezing illness in infancy and wheezing illness in kindergarten-aged children, both in the nature of the disease and in the risk factors for the disease. It has also highlighted the importance of wheezing illness, a very common disorder, as a contributor to a range of important adverse health outcomes in the kindergarten-age cohort. Further study of this cohort will expand our knowledge about asthma and related problems in children.