

Australian asthma indicators

Five-year review of asthma monitoring in Australia

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Australian asthma indicators

Five-year review of asthma monitoring in Australia

Australian Centre for Asthma Monitoring

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Australian Institute of Health and Welfare
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Abbreviations

ABS	Australian Bureau of Statistics
ACAM	Australian Centre for Asthma Monitoring
AIHW	Australian Institute of Health and Welfare
ASMA	Australian System for Monitoring Asthma
BEACH	Bettering the Evaluation And Care of Health
CATI	Computer-Assisted Telephone Interviews
COPD	Chronic obstructive pulmonary disease
DoHA	Australian Government Department of Health and Ageing
GP	General practitioner
ICD	International Classification of Diseases
ICD-9	International Classification of Diseases version 9
ICD-10	International Classification of Diseases version 10
NCCH	National Centre for Classification in Health
NHMD	National Hospital Morbidity Database
NHS	National Health Survey
PBS	Pharmaceutical Benefits Scheme
PIP	Practice Incentive Program
SAND	Supplementary Analysis of Nominated Data

Summary

Health indicators are measures of aspects of health and the health system that can be used to monitor the effectiveness and impact of the health system and of specific interventions to improve health and provide effective, accessible and quality health care.

An initial set of indicators for asthma monitoring was developed in 2000 by the Australian Institute of Health and Welfare after asthma was made a National Health Priority Area in Australia in 1999. In 2004, the Australian Centre for Asthma Monitoring (ACAM) reviewed the proposed indicators under the auspices of the Australian System for Monitoring Asthma and published a set of recommended national asthma indicators. A detailed asthma data development plan was released in 2005, which outlined a range of projects that would address the data deficiencies that had been identified for the purposes of monitoring the recommended asthma indicators.

This report reviews the outcomes of the indicator review, the lessons learnt through experience with various data sources, progress so far with asthma data development and suggests future directions for national asthma monitoring.

What have we achieved so far?

The asthma data development plan outlined a range of projects to address data deficiencies related to monitoring the recommended asthma indicators. These included:

- developing a module of recommended survey questions;
- data linkage;
- validation of hospital and mortality data coding;
- development of general practice data;
- further investigation into dynamic health assessment to study health outcomes;
- working with multiple cause of death and multiple diagnosis hospital data; and
- input into national data development processes.

ACAM has reported on the recommended asthma indicators for which national or state-level data are available. Table 1 provides a summary of progress towards reporting and data development activities for each of the 24 recommended asthma indicators.

Where to next?

In this report, we explore future options including reviewing the list of asthma indicators. Future work will aim to provide a reduced set of indicators. This will be achieved by focusing on those indicators that provide useful information about asthma and that can guide policy and practice; and also by identifying opportunities to select one of several closely correlated indicators, hence removing redundant indicators. We expect that this list of core indicators will be the primary focus of ongoing monitoring and will be the basis for benchmarking standards in Australia and other countries.

Table 1: Reporting and development of national asthma indicators

Indicator	Reporting and whether or not recommended definition used (yes ✓ or no ✗)	Data development	
Prevalence of ever having doctor-diagnosed asthma	<i>Asthma in Australia 2003</i>	✓	Recommended survey question: 'Have you ever been diagnosed with asthma by a doctor or a nurse?'
	<i>Asthma in Australia 2005</i>	✓	
	<i>Asthma in Australia: findings from the 2004–05 National Health Survey</i>	✓	
Prevalence of current asthma (ever diagnosed plus symptoms or treatment in last 12 months)	<i>Asthma in Australia 2003</i>	✓ ^(a)	Recommended survey question: 'Have you had symptoms of asthma or taken treatment for asthma in the last 12 months?'
	<i>Asthma in Australia 2005</i>	✓ ^(a)	
	<i>Asthma in Australia: findings from the 2004–05 National Health Survey</i>	✗	
Prevalence of wheeze in the preceding 12 months	<i>Asthma in Australia 2003</i>	✓ ^(a)	Recommended survey question: 'Have you had wheezing or whistling in your chest at any time in the last 12 months?'
	<i>Asthma in Australia 2005</i>	✓ ^(a)	
Prevalence of airway hyperresponsiveness	<i>Asthma in Australia 2003</i>	✗ ^(b)	Further work is required to select the appropriate measure of airway hyperresponsiveness for surveillance purposes and to identify appropriate data sources.
	<i>Asthma in Australia 2005</i>	✗ ^(b)	
Impact of asthma on quality of life	Reporting on several elements of this indicator in: <i>Asthma in Australia 2003</i> <i>Asthma in Australia 2005</i> <i>Asthma in Australia: findings from the 2004–05 National Health Survey</i>		A number of questionnaires and individual questions have been recommended to report on this indicator.
Index of asthma control	Reporting on elements of this indicator in: <i>Asthma in Australia 2005</i>		Survey questions to monitor this indicator have been developed.
Death rate for asthma, ages 5 to 34 years	<i>Asthma in Australia 2003</i>	✓	The NCCCH proposed further study to improve the codes for asthma after a review of the ICD-10 and ICD-10-AM codes used for asthma found that there were limitations in the ability of these codes to provide information about the types of asthma that may have clinical relevance.
	<i>Asthma in Australia 2005</i>	✓	
Death rate for asthma, all ages	<i>Asthma in Australia 2003</i>	✓	
	<i>Asthma in Australia 2005</i>	✓	
Prevalence of smoking in people with asthma	<i>Asthma in Australia 2003</i>	✗ ^(c)	Recommended survey question: 'Do you smoke at least once a week?'
	<i>Asthma in Australia 2005</i>	✗ ^(c)	
	<i>Asthma in Australia: findings from the 2004–05 National Health Survey</i>	✗ ^(c)	
Prevalence of smoking in the household where children with asthma reside	<i>Asthma in Australia 2003</i>	✗ ^(c)	Recommended survey question: 'Which of the following best describes your home situation?' – My home is smoke free – People occasionally smoke in the house – People frequently smoke in the house'
	<i>Asthma in Australia 2005</i>	✗ ^(c)	
	<i>Asthma in Australia: findings from the 2004–05 National Health Survey</i>	✗ ^(c)	
Proportion of schools using the Asthma Friendly Schools Program	None reported		The proportion of pre-schools, child care centres and hospitals using nationally accredited asthma education programs is recommended for data development and monitoring in the future, when accredited programs have been implemented at a national level.
Prevalence of occupational asthma	None reported		Further work is required. A workshop to bring together experts in this area is planned in 2008 to consider options for data development.

(continued)

Table 1 (continued): Reporting and development of national asthma indicators

Indicator	Reporting and whether or not recommended definition used (yes ✓ or no ✗)	Data development	
Rate of hospital separations for asthma	<i>Asthma in Australia 2003</i>	✓	ACAM developed age-group-specific comparability factors using a dual coded data set which should be incorporated into the analysis of time series extending prior to 1998.
	<i>Asthma in Australia 2005</i>	✓	
	<i>Asthma and COPD among older people in Australia: deaths and hospitalisations</i>	✓	
Patient days for asthma	<i>Asthma in Australia 2003</i>	✓	
	<i>Asthma in Australia 2005</i>	✓	
Hospital re-admissions for asthma	<i>Asthma in Australia 2005</i>	✓ ^(a)	Complexities in linking hospitalisation records for the same person to enable the observation of individuals, rather than overall hospital episodes, need to be overcome before this indicator can be monitored with a national data source.
Number of individuals with separations for asthma	None reported		Further work is required to establish data linkage models enabling this indicator to be measured.
Rate of emergency department attendance for asthma	<i>Asthma in Australia 2003</i>	✓ ^(a)	Further development is required to establish a national database of emergency department attendances.
	<i>Asthma in Australia 2005</i>	✓ ^(a)	
Rate of asthma-related general practice encounters	<i>Asthma in Australia 2003</i>	✓	Options for new means of developing primary care data are being investigated.
	<i>Asthma in Australia 2005</i>	✓	
Rate of Asthma 3+ Visit Plan payments	<i>Asthma in Australia 2003</i>	✓	It is envisaged that this 'program-specific indicator' will be monitored for the duration of the Plan and its replacement, the Asthma Cycle of Care.
	<i>Asthma in Australia 2005</i>	✓	
Health-care visits for acute asthma	None reported		Data sources require development. ACAM have recommended a series of survey questions: 'At any time in the last 12 months, was your asthma worse or out of control?' If yes, 'In the last 12 months, how many times have you gone to a hospital or ED because your asthma was worse or out of control?' 'In the last 12 months, how many times have you consulted a GP or local doctor because your asthma was worse or out of control?'
Proportion of people with asthma who have a written asthma action plan	<i>Asthma in Australia 2003</i>	✗ ^(c)	Recommended survey question: 'Do you have a written asthma action plan; that is, written instructions of what to do if your asthma is worse or out of control?'
	<i>Asthma in Australia 2005</i>	✗ ^(c)	
Proportion of people with asthma who use preventers regularly	<i>Asthma in Australia 2003</i>	✗	Recommended survey question: 'What are the names or brands of all the asthma medications you have used in the last 4 weeks?'
	<i>Asthma in Australia 2005</i>	✗	
	<i>Patterns of Asthma Medication Use in Australia</i>	✗	If any medications identified: 'How often did you use {name of medication} in the last 4 weeks?' (loop for each type of medication)
	<i>Asthma in Australia: findings from the 2004–05 National Health Survey</i>	✗	

(continued)

Table 1 (continued): Reporting and development of national asthma indicators

Indicator	Reporting and whether or not recommended definition used (yes ✓ or no ✗)	Data development	
Proportion of people with asthma who have had recent spirometry	<i>Asthma in Australia 2003</i>	✗	Development of a data source that is able to identify when spirometry is performed for the assessment of asthma, as opposed to other respiratory conditions, is needed if this indicator is to be monitored accurately.
	<i>Asthma in Australia 2005</i>	✗	
Expenditure on asthma	Reporting on elements of this indicator in the following: <i>Health Care Expenditure and the Burden of Disease Due to Asthma in Australia</i> <i>Asthma in Australia 2005</i>	The ability to do a formal economic analysis of the expenditure on asthma is currently beyond the role of monitoring using routinely available data sources. Further development of this indicator is required.	

- (a) State-level data reported using recommended definition.
- (b) Reported in association with prevalence of recent wheeze, not AHR alone.
- (c) Questions used to define current asthma not in line with the recommended definition.

1 Introduction

Health indicators are measures of aspects of health and the health system that can be used to monitor the effectiveness and impact of the health system and of specific interventions to improve health and provide effective, accessible and quality health care. Indicators may be disease-specific or focus on particular aspects of the health system. They summarise data that allow the regular reporting of disease levels, burden and trends and can be used to monitor changes over time. They are used to examine social, geographical and environmental differentials in the medical condition of interest. Indicators can identify problems that need action, but are usually unable to identify the reasons for the problem. Health indicators can monitor and help in the development of potential prevention and management strategies as well as tracking the impact of such strategies. In addition, indicators allow the evaluation of the impact of health policy and monitoring of progress towards targets.

Asthma was made a National Health Priority Area in Australia in 1999. As a part of this action, there was recognition of the need for data to support an informed response to this disease. Therefore, a workshop conducted in August 2000 by the Australian Institute of Health and Welfare (AIHW 2000) developed a proposal for an initial set of indicators that could be useful for asthma monitoring. These were to be developed under the auspices of the Australian System for Monitoring Asthma (ASMA).

The Australian Centre for Asthma Monitoring (ACAM) was established in 2002 as a collaborating unit of the Australian Institute of Health and Welfare (AIHW) to develop a system for population-based monitoring of asthma. Since its inception, ACAM has been overseen by the ASMA Steering Committee, which comprises members from the Australian Government Department of Health and Ageing (DoHA), the AIHW, the National Asthma Council Australia and the Asthma Foundations of Australia, as well as content area experts.

In 2004, ACAM published a review of the proposed indicators (Baker et al. 2004), which assessed their feasibility and value and, where possible, provided data definitions and identified suitable data sources. In addition, the report proposed a number of new indicators for monitoring asthma and highlighted issues that needed to be resolved before appropriate indicators could be incorporated into an asthma-monitoring system.

In parallel with this process, ACAM has also published several reports including *Asthma in Australia 2003* and *2005* that used a wide range of administrative and research data collections from federal and state agencies and other sources, including industry, to publish a comprehensive record of asthma statistics (ACAM 2003; 2005a). A further key component of ACAM's activities has been to undertake a program of data development to follow on from the indicator review and to develop the data sources for monitoring the recommended indicators. This was guided by ACAM's data development plan, published in 2005 (ACAM 2005b).

This report reviews the outcomes of the indicator review, the lessons learnt through experience with various data sources, progress so far with asthma data development and suggests future directions for national asthma monitoring.

2 Status of current recommended asthma indicators

This section will examine each of the asthma indicators that were recommended by ACAM in the technical review (Baker et al. 2004) and provide an update of how each is being monitored.

2.1 Prevalence of ever having doctor-diagnosed asthma

Four indicators were recommended for monitoring asthma prevalence. The first of these is the prevalence of ever having doctor-diagnosed asthma. This indicator is considered a 'supplementary' indicator because it is necessary to measure this in order to measure the core prevalence indicator; 'Prevalence of current doctor-diagnosed asthma' (see 2.2).

Operational definition

Numerator: The number of people who report having ever been diagnosed with asthma by a doctor or nurse.

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

This indicator can be monitored using data from the National Health Survey (NHS) and other state and local health surveys.

Summary of monitoring activities

The main source of data for this indicator has been the NHS, which is conducted every three years by the Australian Bureau of Statistics (ABS). Data have also been analysed from state Computer-Assisted Telephone Interview (CATI) surveys.

ACAM have presented data for this indicator from the 2001 NHS, state CATI surveys and a number of other local area studies in both the *Asthma in Australia 2003* (ACAM 2003) and *Asthma in Australia 2005* (ACAM 2005a) reports. More recently, ACAM updated this information using the 2004–05 NHS in the report: *Asthma in Australia: findings from the 2004–05 National Health Survey* (ACAM 2007a).

While, as indicated in the technical review, it is possible to present these data by age and sex, state, rural and remote areas of residence, socioeconomic status (using residential postcodes), English-speaking background status (using country of birth) and Indigenous status, only breakdowns by age and sex have been recently published for this indicator (ACAM 2007a). This is because it is supplementary to the indicator 'Prevalence of current asthma'. The latter indicator (see 2.2) is considered to have more relevance for informing policy and practice.

Summary of findings

From the 2004–05 NHS, it was estimated that 3,979,486 Australians (20%) had ever been diagnosed with asthma by a doctor (ACAM 2007a). In addition, a number of state, territory and locally based surveys have estimated that, among adults, the prevalence of reporting ever having been diagnosed with asthma ranges from 17% to 25%, with most estimates between 19% and 21%. In four surveys conducted among children, estimates of the number who had ever been diagnosed with asthma ranged from 20% to 26% (ACAM 2005a).

Data development issues

As the indicator has an established national data source, there has been no further data development required. For monitoring this indicator, ACAM have recommended (ACAM 2007c) that surveys use the following question:

'Have you ever been diagnosed with asthma by a doctor or a nurse?'

2.2 Prevalence of current asthma

Operational definition

Numerator: The number of people who report having ever been diagnosed with asthma by a doctor or nurse and who have experienced symptoms (wheeze, shortness of breath or chest tightness) of asthma or taken treatment for asthma in the last 12 months.

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

Data relating to this indicator are available in the NHS and other state and local health surveys.

Summary of monitoring activities

At the time ACAM recommended this indicator, state CATI surveys were the most feasible source of data for this indicator. The NHS was limited in being able to monitor this indicator because the questions asked did not clearly identify those people who met the above operational definition.

Within the NHS, the prevalence of current asthma was assessed by asking the following question among respondents who had indicated they had ever been diagnosed with asthma:

'Do you still get asthma?'

People who answered 'yes' to this question have been analysed (with qualification) as those with current asthma in ACAM reports (ACAM 2003; 2005a; 2007a). However, this is not completely consistent with the operational definition because this question does not establish that current asthma was based on self-reporting of asthma symptoms or treatment in the last 12 months.

Data from state CATI and other smaller surveys were also available, and some have been consistent with the ACAM operational definition. The results from these surveys have also been reported by ACAM (ACAM 2003; 2005a). However, there was variation in the survey methods used, the age ranges surveyed, the sample sizes and, most importantly, the way in which current asthma was measured. Therefore, it is necessary to examine the range of values obtained in these surveys to get an idea of the likely true prevalence of current asthma in the population.

Both NHS and CATI survey data have been analysed by age, sex, state, remoteness and socioeconomic status. It should be noted that CATI surveys have sampled insufficient numbers of Aboriginal and Torres Strait Islander Australians to yield reliable estimates of prevalence in this population – more reliable information has generally been obtained from the ABS National Aboriginal and Torres Strait Islander Health Survey. However, as with the NHS, this survey has also not applied the recommended ACAM operational definition.

Summary of findings

In the 2004–05 NHS, 2,010,212, or 10.3% of the population, stated that they ‘still get asthma’ (ACAM 2007a). Among other state and locally based surveys, the prevalence of current asthma among adults has ranged from 9% to 15%, with most estimates falling between 10% and 12%. The proportion of children with current asthma ranged between 14% and 16% (ACAM 2005a). These estimates are high by international standards.

Several findings have been consistent across the range of data. Among children, boys have a higher rate of asthma than girls. However, after the teenage years, asthma is more common in women than in men. The prevalence of asthma is higher among Aboriginal and Torres Strait Islander people than among other Australians, particularly women aged 35 years and over. It is also lower among those from non-English-speaking backgrounds.

Data development issues

The major data development issue for this indicator is to establish national data that are based on a consistent and meaningful definition of current asthma. This has been an important area of survey question development and a question to monitor current asthma that had been recommended in ACAM’s review of indicators, has been field-tested and recommended for use among people who indicated they had ever been diagnosed with asthma (ACAM 2007c):

‘Have you had symptoms of asthma or taken treatment for asthma in the last 12 months?’

Through its NHS consultation process, the ABS have indicated that they will include the recommended question in the 2007–08 NHS to monitor current asthma. The previous question used by the NHS will also be asked, so that the difference in estimates of current asthma obtained by each question can be evaluated.

Application of this recommended definition for identifying people with current asthma is also important for many of the other indicators which are monitored among the subset of Australians with current asthma.

2.3 Prevalence of recent wheeze

Operational definition

It is proposed that this indicator be monitored separately in children and adults.

Numerator: The number of children/adults (age 18–44 years) who report wheeze or whistling in the chest in the previous 12 months.

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

This indicator can be monitored using data from state and local health surveys; however, there is no single, national data source.

Summary of monitoring activities

Data relating to this indicator from a range of surveys and studies were reported in *Asthma in Australia 2003* (ACAM 2003).

While some data can be analysed by age and sex, state, remoteness, socioeconomic status (using postcode of residence) and English-speaking status, these disaggregations have not been included in ACAM reports to date as, similarly to the 'Prevalence of ever asthma' (2.1), it is not considered to have key importance for policy and practice compared to the 'Prevalence of current asthma' indicator (2.2).

Summary of findings

The prevalence of recent wheeze is substantially higher than the prevalence of asthma, particularly among children. Between 1992 and 2002, estimates of current wheeze in studies of children ranged from 16% to nearly 34%. Among adults during the 1990s these estimates ranged from 22 to 26%. The age ranges sampled in these surveys varied widely and the extent to which this higher prevalence of wheeze represents undiagnosed asthma, as opposed to non-asthma, viral-associated wheeze, cannot be ascertained from the available data (ACAM 2003).

Data development issues

There has been no further data development required for this indicator. For monitoring this indicator, ACAM have recommended that surveys use the following question:

'Have you had wheezing or whistling in your chest at any time in the last 12 months?' (ACAM 2007c).

2.4 Prevalence of airway hyperresponsiveness

Operational definition

This indicator was recommended by ACAM because it provides an objective measure of asthma prevalence in contrast with the three previous measures, which are all based on self-reporting. An operational definition for this indicator has not been established.

Data sources

No national data source has been identified, although some local and regional data collections have been recognised.

Summary of monitoring activities

ACAM have cited data from the Belmont (Toelle et al. 2004) and Wagga Wagga (Downs et al. 2001) studies, which used airway hyperresponsiveness to indicate the prevalence of current asthma in children. In *Asthma in Australia 2003*, data from these studies on the presence of both airway hyperresponsiveness and self-reported wheeze in the last 12 months were used to define current asthma.

Summary of findings

As previously stated, the availability of data for this indicator is extremely limited. The prevalence of both wheeze in the last 12 months and airway hyperresponsiveness among children in the Belmont area of coastal New South Wales was 11.3% in 2002 (Toelle et al. 2003 cited in *Asthma in Australia 2003*).

Data development issues

Further work is required to select the appropriate measure of airway hyperresponsiveness for surveillance purposes and to identify appropriate data sources. For further information see Section 3.4.

2.5 Impact of asthma on quality of life

Operational definition

The proportion of people with current asthma who report having poor health-related quality of life.

It is proposed that this indicator be monitored separately in adults and children and with consideration for the domains of health-related quality of life. This is discussed in the report: *Measuring the impact of asthma on quality of life in the Australian population* (ACAM 2004).

Data sources

Data relating to this indicator are available in the NHS and other state/territory and local health surveys.

Summary of monitoring activities

Some measures relevant to quality of life were reported by ACAM in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a) and from the 2004–05 NHS (ACAM 2007a). These include self-assessed health status, levels of psychological distress, days off work or study and sick days due to asthma.

Summary of findings

Findings from survey data consistently find that people with asthma rate their health worse than people without asthma. In the 2004–05 NHS, fewer people with current asthma (42%) rated their health as ‘excellent’ or ‘very good’ than people without current asthma (52%) (ACAM 2007a), and more rated their health as ‘poor’ (28%) than people without current asthma (14%). However, based on data from the 2004–05 NHS, people with current asthma were more likely to rate their health better than their counterparts in the 2001 NHS.

Data from the 2004–05 NHS also identified that a greater proportion of people with asthma have days away from work or study (16.6%) than people without asthma (10.7%) or other days of reduced activity (19% and 10%, respectively). Again, these proportions had decreased for people with current asthma compared with those reported in the 2001 NHS, suggesting some improvement in these impacts over time.

People with asthma also generally scored higher on the psychological distress scale and, in the 2004–05 NHS, people with current asthma were 1.9 times more likely to have high or very high psychological distress than people without current asthma (ACAM 2007a).

Data development issues

In 2004, ACAM published its report *Measuring the impact of asthma on quality of life in the Australian population* (ACAM 2004). The purpose of this report was to further develop an approach to monitoring the effects of asthma on quality of life. This report reviewed and identified a range of questionnaire-based measures that could be used to assess the impact of asthma on quality of life. Further development occurred in the process undertaken by ASMA to develop survey questions for monitoring asthma indicators (Section 3.1). ACAM have recommended a number of questionnaires and individual questions to report on this indicator (ACAM 2007c).

2.6 Index of asthma control

Operational definition

This is a composite indicator comprising measures of asthma severity and control among people with current asthma.

Data sources

There is currently no identified national data source. However, some data relating to this indicator are available in state/territory and local health surveys and the situation will improve if there is implementation of the ACAM recommendations for a module of survey questions to monitor asthma indicators (ACAM 2007c).

Summary of monitoring activities

Some data were reported from state/territory and local surveys in *Asthma in Australia 2005* for the proportion of adults with current asthma whose sleep was disturbed by asthma. Evaluation of sleep disturbance has been recommended as a component of this index (see below).

Summary of findings

Approximately 40% of adults with current asthma report disturbed sleep due to their asthma in the last month. Among children with current asthma the interruption is more prevalent, with almost half reporting one or more nights of disturbed sleep in the last month (ACAM 2005a).

Data development issues

Survey questions to monitor this indicator have been developed as a part of the ASMA data development activities (see Section 3.1). Recommended measures include:

- proportion of people who experience severe enough wheezing to limit speech
- frequency of asthma symptoms in the last 4 weeks
- proportion of people with asthma who have been woken from sleep due to asthma symptoms in the preceding week.
- rate of use of short-acting bronchodilator medication

These have been recommended in the module of survey questions to monitor asthma indicators (provided in Appendix A). It is expected that the implementation of the recommended asthma question module (ACAM 2007c) would provide data for this indicator.

2.7 Death rate for asthma, all ages

Operational definition

Numerator: Total number of death occurrences in Australia assigned to ICD-9 code 493 or ICD-10 code J45 or J46 as underlying cause of death for a particular calendar year.

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

National data for this indicator are available in the National Mortality Database.

Summary of monitoring activities

This indicator was included in the *Asthma in Australia 2003* and *2005* reports. Time trends since 1979, using 3-year moving averages, and seasonal variations were reported. Data where deaths occurred in people aged five years and over from the most recent five years were disaggregated by sex, age, state or territory, English-speaking background status, socioeconomic status and remoteness of residence.

Summary of findings

The death rate due to asthma in Australia is moderately high by international standards. However, trends in asthma deaths have declined since the most recent peak in 1989. There were 318 deaths in which asthma was the underlying cause in 2004 – representing 0.2% of all deaths in that year (ABS 2006).

Death rates are higher among people aged 35 to 64 years who live in outer regional and remote areas, people of lower socioeconomic status and older people (ACAM 2005a). From 1992, mortality rates have been higher in females than males.

Data development issues

The accuracy of coding will impact on the accuracy of mortality data. This is discussed further in Section 3.3. Validation of coding in all ages, particularly in older age groups, is needed.

Analysis has not been carried out using the Aboriginal and Torres Strait Islander status variable as it is not sufficiently reliable in most states. At this stage, data for South Australia, Western Australia and the Northern Territory can be considered sufficiently reliable from 1990 and Queensland from 1998. Trend analysis of Aboriginal and Torres Strait Islander status data is not considered reliable.

2.8 Death rate for asthma, persons aged 5–34 years

Operational definition

Numerator: Total number of death occurrences in Australia (among people aged 5 to 34 years) assigned to ICD-9 code 493 or ICD-10 code J45 or J46 as underlying cause of death for a particular calendar year.

Denominator: Australian population (aged 5 to 34 years) as at 30 June for same calendar year as numerator.

Data sources

National data for this indicator are available in the National Mortality Database.

Summary of monitoring activities

This indicator was included in *Asthma in Australia 2003* and *2005* (ACAM 2003; ACAM 2005a). Time trends since 1979, using 3-year moving averages, and seasonal variation were reported. Data from the most recent five years were disaggregated by sex, English-speaking background status, socioeconomic status and remoteness of residence.

Summary of findings

Deaths due to asthma among people aged 5 to 34 years have declined since the most recent peak in 1986, although the decline is less marked than that observed among all ages. In 2004 there were 31 deaths due to asthma in people aged 5 to 34 years (0.37 per 100,000 population, 95% confidence interval (CI): 0.26–0.51) (ABS 2006).

Data development issues

These are the same as those described under the previous section (2.7). This indicator, which includes only the subset of people aged 5 to 34 years, is considered more specific for monitoring asthma than using all ages because there may be diagnostic confusion and misclassification with chronic obstructive pulmonary disease (COPD) in older age groups. No additional data development issues have been identified.

2.9 Prevalence of smoking in people with asthma

Operational definition

Numerator: The number of people aged 18 years and over who have current asthma and who smoke any tobacco product weekly or more frequently.

Denominator: The estimated number of Australians aged 18 years and over with current asthma.

Data sources

Data relating to this indicator are available in the NHS and other state and local health surveys.

Summary of monitoring activities

The NHS was limited in being able to monitor this indicator because the questions asked did not clearly identify those people who met the above operational definition. However, the NHS includes the question:

'Do you currently smoke?'

ACAM has used this question in conjunction with those used to identify current asthma to report on people with current asthma who smoke from the 2001 and 2004–05 NHS. Despite not being completely consistent with the recommended operational definition, these data were used to present information relevant to this indicator in *Asthma in Australia 2003 and 2005* and the report *Asthma in Australia: findings from the 2004–05 National Health Survey*. Data were disaggregated by age, sex and socioeconomic status, with additional comparisons drawn between those with and without current asthma and those who were current and ex-smokers. Further data disaggregations, such as remoteness, English-speaking background status and Indigenous status have not been undertaken because of small numbers.

Summary of findings

In the 2004–05 NHS, it was reported that 24.5% (95% CI 23.5–28.2%) of people with current asthma were current smokers. This rate was not significantly different from that observed among people without asthma. Among people with asthma, those who are younger and live in localities that are relatively socioeconomically disadvantaged are most likely to smoke.

Data development issues

It is noteworthy that the NHS question used by ACAM to identify current smoking does not define people who smoke weekly or more frequently. In addition, this indicator requires the identification of people with current asthma and, as noted in Section 2.2, the questions used from the NHS do not clearly identify current asthma consistently with the operational definition for that indicator.

In the 2004–05 NHS, people who answered ‘Yes’ when asked if they currently smoke were asked an additional question:

‘Do you smoke at least once a week?’

This question was endorsed in the ASMA survey question development process and can be used in the future to identify individuals who meet the operational definition criteria for a current smoker (ACAM 2007c). Furthermore, as already noted, the ABS indicated that they will modify their questions to identify current asthma to be consistent with the ASMA operational definition in the 2007–08 NHS. With these changes, the NHS will be a feasible source of national data for monitoring this indicator in accordance with its recommended operational definition.

2.10 Prevalence of smoking in the household where children with asthma reside

Operational definition

Numerator: The number of people aged less than 15 years with (a) current asthma or (b) wheeze in the previous 12 months and who live in a household where one or more regular smokers resides.

Denominator: The number of people aged less than 15 years with (a) current asthma or (b) wheeze in the previous 12 months.

Data sources

Data relating to this indicator are available in the NHS and other state and local health surveys.

Summary of monitoring activities

National data relating to this indicator have been examined from the NHS by analysing data for children aged 0 to 14 years with current asthma who live with a current smoker (current smokers were identified in the NHS, see 2.9). These data have been presented in *Asthma in Australia 2003 and 2005* and the report *Asthma in Australia: findings from the 2004–05 National Health Survey*. Data were disaggregated by age, sex and socioeconomic status, with comparisons of the proportion of children with and without asthma. Further disaggregations were not undertaken due to small numbers.

Information was also published from two state CATI surveys (New South Wales and Western Australia) that related to this indicator but which focussed on whether the child lived in a household in which smoking occurred. This issue is explored further below.

Summary of findings

Similar proportions of children with and without asthma live with one or more regular smokers (39.1% and 36.2%, respectively). Of these, 11% and 9.4%, respectively, resided in

homes in which smoking occurred indoors (ACAM 2007a). The higher rate of household exposure to smokers is most evident in more socioeconomically disadvantaged areas.

Data development issues

While operational definitions provided in the review of asthma indicators (Baker et al. 2004) defines passive smoke exposure as living with a smoker, more recent recommendations are that information should focus on whether a child lives in a household in which smoking occurs (ACAM 2007c). Some CATI surveys currently collect data using the question:

'Which of the following best describes your home situation?

-My home is smoke free

-People occasionally smoke in the house

-People frequently smoke in the house'

This question has been recommended for this indicator (ACAM 2007c). Currently it has been included in South Australia and New South Wales health surveys. Revisions to the operational definition may also be appropriate. For example, it may be more meaningful to monitor the number of children with current asthma who live in houses in which smoking occurs as opposed to those who reside with adults who currently smoke. Also, it may be relevant to quantify the extent of exposure to passive smoke.

2.11 Prevalence of occupational asthma

Operational definition

Numerator: The total number of asthma cases attributed to exposure at work at a given time within the survey population.

Denominator: Denominator populations for the two surveys.

Data sources

No national or reliable state/local data sources have been identified.

Summary of monitoring activities

There is no ongoing data source for reporting on this indicator. Various *ad hoc* collections provide some data to report on the prevalence of occupational asthma at the present time.

Summary of findings

There has been no information reported for this indicator to date. A review of the literature on this topic has been carried out under the auspices of the Australian System for Monitoring Asthma in 2006, but this is yet to be published.

Data development issues

This is an important area for asthma monitoring because it concerns cases of potentially preventable asthma. However, it is also very difficult to ascertain these cases in data that can be used for monitoring purposes.

The review of asthma indicators (Baker et al. 2004) provided an evaluation of available data that included two *ad hoc* surveys carried out in Victoria and New South Wales and a voluntary reporting scheme: Surveillance of Australian workplace Based Respiratory Events (SABRE) that operates in New South Wales, Victoria and Tasmania. All of these data sources are prone to selection bias arising from low response rates in surveys and low reporting rates to SABRE. The method of attribution of asthma to an occupational exposure is also indirect.

Data development is required to enhance the currently available data on the incidence of occupational asthma. Currently, a workshop to bring together experts in this area is planned in 2008 to consider options for further data development. It seems likely that the definition will need to be revised.

2.12 Proportion of schools using the Asthma Friendly Schools program

Operational definitions

Numerator: Number of schools recognised as using the Asthma Friendly Schools program.

Denominator: Total number of schools in Australia.

Numerator: Number of students in schools recognised as using the Asthma Friendly Schools program.

Denominator: Total number of students in Australian schools.

Data sources

Data are recorded at state level by the individual Asthma Foundations after a follow-up to check that the essential criteria for Asthma Friendly Schools have been met. However, there are differences in the way compliance with the criteria for accreditation is assessed. While Asthma Foundations in some states require evidence to support the claim that the accreditation criteria have been met, in other states accreditation is awarded on the basis of the signed statement of compliance from the school principal.

Summary of monitoring activities

This indicator has not been reported on as further data development is required before this can be reported using a national data source.

The proportion of schools and students can be disaggregated into primary and secondary, as well as the type of school (government, Catholic or independent).

Individual schools will be disaggregated by remoteness classification.

Schools and students will also be analysed by state, as there have been slight variances in the rollout of the Asthma Friendly Schools program in each state due to differences in the time frames and methods of approaching the schools.

Summary of findings

No information on this indicator has been reported in any ACAM reports.

Data development issues

The proportion of pre-schools, child care centres and hospitals using nationally accredited asthma education programs is recommended for data development and monitoring in the future, once accredited programs have been implemented at a national level. The relevance of this indicator as a core asthma indicator will be reviewed in future work.

2.13 Hospital separation rate for asthma

Operational definition

Numerator: Total number of hospital separations from Australian private and public hospitals assigned to a principal diagnosis of ICD-9-CM code 493 or ICD-10-AM code J45 or J46 for a particular calendar year.

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

State/territory hospital separations data are compiled from all public general and psychiatric hospitals, private hospitals and private day surgery facilities. These data are considered to be close to complete and are, therefore, largely representative of the population who use hospital services. Each state/territory contributes an agreed subset of variables from their hospital data collections for inclusion on the National Hospital Morbidity Database (NHMD). Therefore, the NHMD held at the AIHW provides a national source of data to monitor this indicator.

Summary of monitoring activities

This indicator has been reported in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a). Time trends since 1993 and seasonal variation were reported. Data from the most recent year were disaggregated in these reports by age, sex, English-speaking background status, socioeconomic status, remoteness and Indigenous status. Information on the number of separations for asthma among people aged 55 years and over was also reported in *Asthma*

and chronic obstructive pulmonary disease among older people in Australia: deaths and hospitalisations (ACAM 2006).

Summary of findings

There are approximately 40,000 hospital separations each year in which the principal diagnosis is asthma. The highest hospitalisation rates have occurred among children, particularly those aged less than 5 years, and these rates decreased by 43% between 1993–94 and 2003–04. Among adults, hospitalisation rates have also decreased by 17% over this time.

Among people aged 65 years and over, rates of hospitalisation for asthma are highest in the winter months, whereas among children, the peaks occur in February and May.

Among children, boys have higher rates of hospitalisation for asthma than girls, which reflects the higher prevalence of asthma in boys. However, this trend is reversed after the age of 15 years when more females than males are admitted to hospital for asthma. Rates of hospitalisation are higher among people living in more remote areas, Indigenous Australians and people living in more socioeconomically disadvantaged areas (ACAM 2005a).

Data development issues

Changes to coding practice will affect the quality of this indicator. Validation studies have demonstrated that diagnostic accuracy is higher in younger age groups. The impact of changes to ICD coding has been less well studied. A dual coded data set has been used to quantify age-group-specific comparability factors. These need to be incorporated into the analysis of time series extending prior to 1998. This is also discussed in Section 3.3.

2.14 Hospital patient days for asthma

Operational definition

Numerator: Total number of patient days from Australian private and public hospitals assigned to ICD-9-CM code 493 or ICD-10-AM code J45 or J46 for a particular calendar year.

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

As for the previous indicator (2.13), the NHMD held at the AIHW is the best data source for monitoring hospital patient days for asthma.

Summary of monitoring activities

Included in the NHMD are both admission date, separation date and the total number of days hospitalised. This indicator has been monitored using these variables in both *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a). Time trends in the total number of hospital

days were provided since 1993, and data were disaggregated by age, sex, English-speaking backgrounds status, socioeconomic status, remoteness, and Indigenous status.

Summary of findings

The overall number of hospital bed-days occupied by patients with asthma has declined by 49% between 1993–94 and 2003–04. The reduction in hospital bed-days, combined with the decrease in hospital separations for asthma, has resulted in a fall in the average length of stay for all age groups from 2.9 days to 2.2 days (ACAM 2005a).

Data development issues

These are the same as those described under Section 2.13.

2.15 Hospital re-admissions for asthma within 28 days

Operational definition

Numerator: Number of people discharged from hospital with a principal diagnosis of asthma (ICD-10-AM code J45 or J46) who are re-admitted within 28 days to the same hospital with a diagnosis of asthma.

Denominator: (1) number of hospital separations for asthma in the year.
(2) Australian population as at 30 June for same calendar year as numerator.

Data sources

Currently, state hospital data collections, particularly in New South Wales, Victoria and Western Australia, are the most feasible data sources for this indicator. In future, the NHMD may be used as a data source.

Summary of monitoring activities

Data relating to this indicator were reported for the first time in *Asthma in Australia 2005* (ACAM 2005a). However, reporting was limited to two states: namely New South Wales and Victoria. These data were disaggregated by age and sex, and represent 60% of the Australian population.

An extension to this indicator was foreshadowed in the indicator review (Baker et al. 2004). This was to include both hospital emergency department visits and admissions to hospital to ascertain overall 're-attendances' at hospital for asthma. This was also reported in *Asthma in Australia 2005* (ACAM 2005a) for Victoria and New South Wales by age and sex.

Summary of findings

Analysis of data for New South Wales and Victoria has shown that, following a hospitalisation for asthma, 5% of people are re-admitted to hospital for asthma within 28 days. The highest rate of re-admissions is among people aged 15 to 64 years and re-admission rates are higher in females than males.

Data development issues

Currently, this indicator has only been monitored in two states using state-based data sources. There are a number of complexities that have to be overcome before it is possible to report on this indicator with a national data source. In Australia, hospitalisation data are based on hospital admissions, rather than the individuals hospitalised. Therefore, hospitalisation records for the same person need to be linked to be able to track individuals rather than overall hospital episodes.

For national monitoring purposes, it is desirable to identify a single national source of data. The most likely source is the NHMD because it contains data routinely forwarded from all states and territories. However, the data forwarded are very limited, and data development is required in order to determine the feasibility of linkage within this data set. This is discussed further in Section 3.2.

2.16 Number of individuals with separations for asthma

Operational definition

Numerator: Total number of individuals who had hospital separations from Australian private and public hospitals assigned to a principal diagnosis of ICD-9-CM code 493 or ICD-10-AM code J45 or J46 for a particular calendar year.

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

Currently, state hospital data collections, particularly in New South Wales, Victoria and Western Australia, are the only feasible data sources for this indicator. In future, it is envisaged that the NHMD may be used as a data source.

Summary of monitoring activities

This indicator has not been monitored as further data development is required before a national data source becomes available.

Summary of findings

This indicator has not been reported in any ACAM publications to date.

Data development issues

Data development will be required to establish data linkage models to enable this indicator to be measured. It is most likely that this linkage will be developed once it is possible to also measure hospital re-admissions for asthma (see Section 2.15).

2.17 Rate of emergency department attendance for asthma

Operational definition

Numerator: Number of hospital emergency department attendances with a principal diagnosis of asthma (ICD-9 code 493 or ICD-10 codes J45 or J46) for a particular calendar year

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

Currently, state data collections, particularly in New South Wales, Victoria and partial data from Western Australia, are the only feasible data sources for this indicator.

Summary of monitoring activities

Data relating to this indicator were reported in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a). However, reporting was limited to two states: New South Wales (both reports) and Victoria (2005 report only). Time trends and seasonal variation over the period 1999 to 2004 were reported and data were disaggregated by age, sex, attendance outcome (for example, hospital admission), triage category and socioeconomic status.

Summary of findings

The highest rate of emergency department visits for asthma occurs among children aged 0 to 4 years. Children in this age group, along with the elderly, are most likely to be admitted to hospital as a result of going to the emergency department (ACAM 2005a). Visits to emergency departments peak among children in mid February, while, among adults, the peaks occur during the winter months.

Data development issues

Ideally, a national database of emergency department attendances would be developed. Further development is needed to determine the feasibility of such an undertaking. However, at the time of this review, there were no plans for such development to occur.

2.18 Rate of asthma-related general practice encounters

Operational definition

Numerator: Estimated proportion of general practice encounters where asthma was managed (for designated year) multiplied by the number of claims for Medicare reimbursement for Professional Attendances group A1 and A2 (for that year).

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

This indicator has been predominantly monitored by ACAM using the survey known as BEACH (Bettering the Evaluation And Care of Health). This survey invites a sample of 20 general practitioners (GPs) per week to complete the survey for 100 consecutive patient encounters. The findings can then be applied to total Medicare Benefits Scheme claims for GPs to extrapolate on the national patterns of general practice encounters.

Summary of monitoring activities

BEACH data were used to monitor this indicator in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a). Time trends in BEACH data have been reported from 1998 and data have been disaggregated by age, sex, socioeconomic status, and remoteness. In addition to rates being reported as a rate of the estimated resident population, rates were also reported as a rate of total general practice encounters.

Summary of findings

During the period 1998–99 to 2003–04, the rate of general practice encounters for asthma decreased from 3.1% to 2.5% of all general practice encounters. Boys aged 0 to 4 years have the highest rate of asthma-related general practice encounters.

Data development issues

There are limitations to this data source because of the low participation rates by GPs (28.1% in 2004–05) in the BEACH program. Although post-stratification weighting is used to adjust for differences between the sample and the GP population, the sample may not be representative of general practice and, therefore, data on morbidity may not be an accurate reflection on the current situation in general practice. However, BEACH still remains the most reliable and representative source for these data.

The future of the BEACH data collection is currently being reviewed and options for new means of developing primary care data are being investigated.

2.19 Rate of Asthma 3+ Visit Plan payments

Operational definition

Numerator: Number of claims for completed Asthma 3+ Visit Plan Practice Incentive Program Payments.

Denominator: Australian population as at 30 June for same calendar year as numerator.

Data sources

The Asthma 3+ Visit Plan Practice Incentive Program (PIP) was replaced by the Asthma Cycle of Care in November 2006. The Program is funded by the Australian Government and aims to improve general practice care for patients with moderate or severe asthma. It entails the development and ongoing review of an asthma management plan over at least two general practice visits (DoHA 2002; 2003). Data from the Asthma Cycle of Care Program are reported through Medicare Australia, based on claims for remuneration for structured asthma review visits made by GPs.

Summary of monitoring activities

ACAM have summarised data reported through Medicare Australia by age and sex, and by state/territory of residence in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a). In these reports, ACAM also presented the rate of claims using 'people with current asthma' as the denominator.

Summary of findings

Since being introduced in 2001, it is estimated that 3.9% of people with current asthma, or 12.9% of people with moderate or severe asthma, have used the Asthma 3+ Visit Plan. Children and older adults were the most likely to access it, and young adults aged 15 to 34 years were least likely (ACAM 2005a).

Data development issues

This indicator was proposed as a temporary, 'program-focused' indicator to report on the uptake of the Asthma 3+ Visit Plan PIP. With the recent changes, the number of claims for – the replacement program – the Asthma Cycle of Care PIP, will be measured for the duration of the Program, using total counts, cumulative counts and rates.

2.20 Health-care visits for acute episodes of asthma

Operational definition

This is a composite indicator that would include rates of general practice visits for acute episodes of asthma as well as emergency department visits and hospitalisations for asthma.

Numerator: Number of acute asthma-related general practice visits, number of emergency department visits with a principal diagnosis of asthma (ICD-9 code 493 and ICD-10 codes J45 and J46) and hospital separations with a principal diagnosis of asthma (ICD-9-CM code 493 and ICD-10-AM codes J45 and J46).

Denominator: Australian population as at 30 June for same year as numerator.

Data sources

Data relating to this indicator are available in the NHS and other state and local health surveys. There may also be other sources of data that could inform this indicator, particularly hospitalisation, emergency department and general practice data.

Summary of monitoring activities

Data are only complete for the hospital separation component of this indicator and further development is required before it can be monitored.

Summary of findings

No information has been reported on this indicator in any ACAM reports to date.

Data development issues

While existing administrative data may be useful for informing this indicator, it is more likely that it will be monitored using self-reported data from health surveys. The data sources for this indicator require development. ACAM have recommended questions to monitor this indicator in its module of survey questions to monitor national asthma indicators (ACAM 2007c) which are summarised in Appendix A of this report.

2.21 Proportion of people with asthma who have a written asthma action plan

Operational definition

Numerator: Number of people with current asthma who have an individualised, written asthma action plan incorporating information on how to recognise the onset of an exacerbation of asthma and information on what action to take in response to that exacerbation, developed in consultation with a health professional.

Denominator: Total population of people with asthma.

Data sources

Data relating to this indicator are available in the NHS and other state and local health surveys. However, these data often fail to adequately define the criteria defining a written asthma action plan as stated in the above operational definition.

There may also be other sources of data that could inform this indicator, particularly from general practices.

Summary of monitoring activities

Among people with current asthma, the NHS collected information about possession of a written asthma action plan in the 2001 and 2004–05 surveys. These data have been analysed and presented in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a) and the report *Asthma in Australia: findings from the 2004–05 National Health Survey* (ACAM 2007a). Data were disaggregated by age, sex, state, remoteness, socioeconomic status and Indigenous status. Data have not been disaggregated by English-speaking background status due to small numbers.

Data on rates of possession of action plans were also compiled from state surveys (New South Wales, South Australia and 'Eastern' Australia) in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a).

Summary of findings

Less than a quarter (23%) of people with current asthma have a written asthma action plan (ACAM 2007a). The possession of asthma action plans increased in the early 1990s and then decreased until 2002 (ACAM 2005a). However, the latest figures from the 2004–05 National Health Survey indicate a small increase in the rate of possession. Adults, particularly men, and the elderly, and persons living in less well-off areas are least likely to have a written asthma action plan.

Data development issues

The questions used to accurately define individuals who possess a written asthma action plan as described in the above operational definition have been the subject of survey question development. Reliable questions to monitor this indicator have been suggested in the recommended module of survey questions to monitor national asthma indicators (ACAM 2007c). Further data development for this indicator may occur using general practice data (see Section 3.4).

2.22 Proportion of people with asthma who use 'preventers' regularly

Operational definition

Numerator: Number of people with current asthma for whom preventers are indicated and who report using a 'preventer' medication daily.

Denominator: Number of people with current asthma for whom preventers are indicated (that is, who meet the National Asthma Council Australia criteria for preventer medication or similar).

Data sources

Data relating to this indicator are available in the NHS and in state/territory CATI health surveys. Data are also available from the Pharmaceutical Benefits Scheme (PBS) and IMS Health pharmaceutical supply data. However, these data do not show whether the medications were used for asthma or for other obstructive respiratory diseases.

Summary of monitoring activities

Information relating to this indicator using data from the 2001 NHS, the PBS and IMS Health was published in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a). More recently, ACAM have used newly available PBS data that links the prescription history of individuals and includes their basic demographic characteristics. This has been published in the report: *Patterns of asthma medication use in Australia* (ACAM 2007b). These data were able to assess the use of the main 'preventer' medication, inhaled corticosteroids, and disaggregate data by age group, sex, socioeconomic status and remoteness of residence. However, they were not able to identify those individuals who were prescribed the treatment specifically for asthma.

More recent NHS data have been reported in ACAM's report: *Asthma in Australia: findings from the 2004–05 National Health Survey* (ACAM 2007a).

Summary of findings

The data consistently suggest that many people with asthma who would benefit from using inhaled corticosteroids do not use them regularly. Analysis of individuals in PBS data identified that most people who purchased inhaled corticosteroids only filled one to three

prescriptions over a two-year period. Also, the majority of inhaled corticosteroids were taken in the most potent formulation. It is likely that, for many people, their asthma could be well controlled with less potent inhaled corticosteroids that carry fewer risks of side effects. The majority of inhaled corticosteroids are now administered in a combined formulation with long-acting beta agonists. This should also allow the use of lower potency of inhaled corticosteroids, with equivalent efficacy.

Inhaled corticosteroids were used more than twice as much among people who obtained them at a concessional rate, which suggests that the price of these medications impedes their regular use by many individuals (ACAM 2007b).

Data development issues

The data sources for this indicator require development so that use of medications for asthma can be more accurately ascertained. Questions have been proposed in the recommended module of survey questions to monitor national asthma indicators that would obtain self-reported measures of medication use for acute asthma (ACAM 2007c).

2.23 The proportion of people with asthma who have had recent spirometry

Operational definition

Numerator: Number of claims for spirometry in a given year for people with asthma.

Denominator: Total number of people with current asthma.

Data sources

Limited information relating to this indicator has been reported in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a) using claims data from the Medicare Benefits Scheme. A major limitation of these data is that there is no clinical information that enables the identification of spirometry that was performed for asthma as opposed to other respiratory conditions. This is particularly a problem among older people who may have spirometry to assess COPD. Therefore data were separately presented in these reports for people aged 5 to 34 years, for whom it was highly probable that spirometry was used in the management of asthma.

Summary of monitoring activities

Available data relating to this indicator were reported in *Asthma in Australia 2003* and *2005* (ACAM 2003; 2005a). These analyses presented information about the overall use of spirometry based on claims for these services in Australia. Time trends since 1994 were provided and differentiated between lab-based and office-based claims. The most recent three years of data were disaggregated by age, sex, state, and socioeconomic status. As it was not possible to differentiate claims made for asthma, data were presented as a rate per 100,000 population rather than as a proportion of people with asthma. In addition,

subsidiary analyses were carried out to estimate the rate of spirometry among people aged 5 to 34 years because this subgroup would have been most likely to have had the procedure for asthma rather than some other chronic respiratory condition.

Summary of findings

Most claims for spirometry occur in the winter months. Between 1994 and 2004, spirometry claims decreased slightly, particularly among people aged 5 to 34 years. This decrease was mainly observed among office-based spirometry, while laboratory-based spirometry (which comprise a minority of all claims) increased.

The highest rate of spirometry was among elderly people aged 65 to 84 years among whom it was more common among males than females. Spirometry was also more common among boys than girls; however, among people aged 15 to 64 years, spirometry was more common among women.

There was substantial variation between states and territories in spirometry rates.

Data development issues

At present the indicator is not measurable in the recommended form. Data on Medicare Benefits Schedule (MBS) claims for the performing spirometry are available, but it is not possible to separately identify the occasions of service for the performance of spirometry in people with asthma.

Development of a data source that is able to determine when spirometry is performed for the assessment of asthma, rather than for other respiratory conditions, is needed if this indicator is to be monitored accurately. At the time of this review, plans for enhancing the currently available data source were not under development.

2.24 Costs of asthma

Operational definition

This is a composite indicator that uses data from a range of sources.

Data sources

Two data sources have been used for this indicator; the AIHW National Health Expenditure Database, and data from the Australian Burden of Disease Study.

Summary of monitoring activities

ACAM have produced a report: *Health care expenditure and burden of disease due to asthma in Australia* (ACAM 2005c) which covers the above data sources. Expenditure data were also included in *Asthma in Australia 2005* (ACAM 2005a). These data were examined by age, sex and health-care sector.

Summary of findings

In the 2000–01 financial year, health expenditure on asthma was \$693 million. This was 1.4% of total health expenditure in that year. Over half (54%) of expenditure allocated to asthma in 2000–01 was attributed to pharmaceuticals. The proportion of health expenditure attributed to asthma care was highest (over 25%) among children; particularly boys aged 5 to 14 years.

Overall, health expenditure on asthma increased by 21% between 1993–94 and 2000–01 (adjusted to 2000–01 dollar values). However, expenditure for asthma due to GPs and specialists decreased.

The Australian Burden of Disease Study estimated that asthma was the leading contributor to burden of disease among children aged 0 to 14 years – accounting for an estimated 18% of disability adjusted life years in this age group in 1996. The estimated financial equivalent of the burden of disease in Australia due to asthma in 1996 was \$4.3 billion (2000–01 dollars).

Data development issues

The ability to carry out a formal economic analysis of the costs of asthma is currently beyond the role of monitoring using routinely available data sources and further development of this indicator is needed to ensure its intent is clear.

3 Review of data development activities

In 2005, a detailed asthma data development plan was released (ACAM 2005b), which outlined a range of projects that would address the data deficiencies for monitoring the recommended asthma indicators. These projects were grouped into a number of areas that would engage specific collaborations including:

- development of survey questions
- data linkage
- validation of coding (hospital and mortality data)
- development of general practice data
- further investigation into dynamic health assessment to study health outcomes
- working with multiple cause of death and with multiple diagnosis hospital data
- input into national data development processes.

Here, these project areas are reviewed to evaluate the extent to which the data development plan has been implemented.

3.1 Survey questions

In 2004, ASMA implemented a process of survey question development to identify reliable and valid questions that can be used in health surveys to monitor the recommended asthma indicators. This process involved key groups including the ABS and CATI Health survey experts. The following indicators were considered in this process:

- prevalence of ever having diagnosed asthma
- prevalence of recent wheeze
- rate of exacerbations of asthma
- number of people with current asthma who have an asthma action plan
- impact of asthma on quality of life
- asthma control in people with current asthma
- prevalence of smoking in the household where children with asthma reside
- prevalence of smoking in people with current asthma
- proportion of people with current asthma who use 'preventers' regularly.

The process involved a detailed review of available survey questions, development of new questions where existing questions were not available, and testing of questions for which reliability was uncertain. The outcome was a recommended module of questions for monitoring Australian asthma indicators (ACAM 2007c).

It is expected that the implementation of the asthma question module in a range of surveys will facilitate improved data for asthma monitoring as well as strengthen comparisons between surveys. Already a number of key surveys have agreed to adopt these recommendations. The ABS have indicated that they will include the recommended question for the 'Prevalence of current asthma' in the 2007-08 NHS to monitor current asthma. The previous question used by the NHS will also be asked, so that the difference in estimates of

current asthma obtained by each question can be evaluated. The New South Wales Health Survey program has also indicated that they will implement most of the recommended questions in their asthma modules in future health surveys.

The module of recommended questions has been included in Appendix A of this report.

3.2 Data linkage

While survey data are a key source of information for monitoring several national asthma indicators, there are important limitations in the use of surveys including:

- 1) most measurements are based on self-report.
- 2) an increasing problem with low response rates in community-based surveys leading to possibly biased results.
- 3) surveys are expensive to implement.

Alternative data sources are required to complement the data obtained from surveys. One approach has been to use routinely collected administrative health data, such as hospitalisation and mortality statistics. In addition to their administrative purposes, these data may provide valuable epidemiological information. They have the advantage of being readily available and are usually complete, or nearly complete. The main disadvantage is that, because these data have been collected for administrative purposes, they are often not ideal for use as a source of epidemiological information. Furthermore, they represent a limited range of information about the burden and management of asthma in the community.

One way of enhancing the value of routinely collected administrative data has been to link information from related data sets and also to link data for individuals within data sets (Hall et al. 2005). Data linkage is a potentially powerful and cost effective means of achieving health research goals, provided consideration is given to ensuring that individual privacy is not compromised. To contend with this, anonymous linkage methods have been developed that might increase the feasibility of this approach to research (Kelman et al. 2002).

There are two recommended asthma indicators for which data linkage would be relevant. Both relate to hospital admissions:

- 2.15 Hospital re-admissions for asthma
- 2.16 Number of individuals with separations for asthma.

In Australia, hospitalisation records are based on hospital separations, rather than on the individuals hospitalised. In order to monitor indicators 2.15 and 2.16, hospitalisation records for the same person need to be linked to observe 'people' rather than hospital separations. This requires that the data contain suitable information to be able to group records that pertain to the same individual, such as a unique number for each person, or personally identifying information such as name, address and date of birth. State-level hospital data include personally identifying information that can be used to 'link' records of the same person with a high level of accuracy. Several states already undertake hospital record linkage on either a routine or *ad hoc* basis (for example, New South Wales, Victoria and Western Australia).

However, for national monitoring purposes, it is desirable to identify a single national source of data. The most obvious is the NHMD because it contains hospital data forwarded from all states and territories. However, the information in this data set is more limited than

that held by the states and does not include variables such as names and addresses that would typically be used in data linkage.

A major undertaking in this area by ACAM has been to investigate whether, with the more limited range of variables, it is still possible to link hospital separations that pertain to the same person in the NHMD. To do this, ACAM carried out a study in New South Wales using state hospitalisation data. This study compared linkage that used all available personally identifying information (that is names, addresses, dates of birth and other variables) with a 'restricted' linkage method that used only those variables that are forwarded to the NHMD (that is date of birth, postcode and sex) (Ringland et al. 2006). This study was applied only to records in which the principal diagnosis code was asthma, and found that over 95% of records identified by the first method were also identified in the restricted linkage method.

The results of ACAM's study suggest that hospital re-admissions for asthma can be reliably monitored using the NHMD. The next stage will be to implement this method in the NHMD, and approval has been given by all states and territories except Queensland to do this. If this is successfully implemented, it will provide a national data source for monitoring the relevant asthma indicators.

Linkage has also been used in analysing the data from the PBS database to investigate the patterns of use of asthma medications in Australia. Since early 2002, PBS prescriptions have included the patients' Medicare numbers. Use of the Medicare number, which is encrypted to protect patient confidentiality, has created the ability to anonymously identify prescriptions for the same individuals within the PBS data and also to link information on age, sex and home postcode. ACAM obtained these data from the DoHA for people who were prescribed asthma medications during the period July 2002 to July 2004 and the results of the analysis were presented in the report *Patterns of asthma medication use in Australia*, published in May 2007 (ACAM 2007b).

3.3 Validation of coding

As already stated, administrative health data are a valuable source of data for monitoring a range of the agreed national asthma indicators, particularly hospital and mortality data. The variables within these data sets use codes from the International Classification of Diseases (ICD). These are essential for selecting records that pertain to people with asthma.

As such, the quality of coding across the range of data sets is critical for ensuring accuracy of the information obtained from these sources. Coding of hospital and mortality data is carried out by individuals trained in coding. The standards for coding hospital and mortality data are managed in Australia by the National Centre for Classification in Health (NCCH). With each revision of ICD, an associated set of 'coding rules' is provided to direct professional coders in the application of the codes. The NCCH also releases additional guidelines to ensure that coders interpret the coding rules consistently in all jurisdictions.

The ICD is reviewed regularly and updated. Currently in Australia, mortality data are coded using the 10th revision of ICD (ICD-10) and hospital data are coded using the Australian Modification of the 10th revision of ICD, (ICD-10-AM).

Comparability factors

ICD-10 replaced ICD-9 in Australia in the late 1990s at different times in various jurisdictions. During the transition period, dual coding projects were undertaken so that the impact of the revised ICD could be assessed. A change in ICD-10 rules, from the previous ICD-9, was that death certificates and hospital records that included both asthma and COPD were more likely to be coded to COPD, rather than asthma. ACAM obtained dual coded hospital and mortality data for asthma diagnoses to assess the impact of this change. This study found that the change from ICD-9 to ICD-10 had a substantial impact on asthma mortality and hospital separations data for persons aged over 35 years, but not for younger people (Baker et al. 2003). ACAM were able to use these data to calculate comparability factors for three broad age groups: 5 to 34 years: 1.0; 35 to 64 years: 0.84; and 65 years or over: 0.68. Time trends that span the period when ICD-9 changed to ICD-10 can be adjusted by multiplying data coded in ICD-9 by these comparability factors. It is now recommended that these be applied to time series analyses of hospital and mortality data that span across both ICD revisions so that trends are represented consistently over time (Baker et al. 2004).

Review of asthma codes

In 2005, a review by the NCCH of the ICD-10 and ICD-10AM codes used for asthma found that there were limitations in the ability of these codes to provide information about the types of asthma that may have clinical relevance. The NCCH proposed further study to investigate how medical practitioners record patient information relating to asthma with a view to making recommendations to improve the codes for asthma. This would inform submissions into future revisions of ICD. ACAM have been invited to provide consultation and advice on this activity.

3.4 Other data development

General practice data

GPs play a central role in managing asthma in the community. This role includes assessment, prescription of regular medications, education and review, as well as managing acute exacerbations.

Currently the BEACH survey has provided the most detailed source of data about general practice activity in Australia. A sub-component of this survey are the SAND (Supplementary Analysis of Nominated Data) modules. While the data items collected in the BEACH survey are stable over time, SAND modules can be commissioned by organisations to survey issues of interest.

It may be possible for ACAM to develop a SAND module to collect further information about a number of indicators, including inhaled corticosteroid use, asthma severity and asthma action plans. However, some caution is needed in the use of SAND modules particularly in relation to the prescription of inhaled corticosteroids and the use of written asthma action plans. As noted in the review of asthma indicators, these may incur bias due to the Hawthorne effect (that is, the reporting GPs may be influenced by the survey itself to provide asthma action plans or prescribe inhaled corticosteroids) (Baker et al. 2004). This might be addressed by collecting information retrospectively, such as 'before this visit, did

the patient have a written asthma action plan/was the patient prescribed regular inhaled corticosteroids?’

The major limitation of BEACH and SAND data is that this survey has low response rates and limited coverage. It is also not possible to distinguish general practice visits for routine asthma maintenance from those for acute asthma episodes. ACAM carried out a study to see if a combination of the variables available in BEACH among asthma-related records could identify a subgroup of those with evidence of acute asthma (Belousova et al. 2005). This study was not able to identify such a combination of variables.

Given the importance of GPs in managing asthma and the limitations of existing data on primary care, developing new mechanisms for systematic collection of such data is crucial for monitoring asthma indicators relevant to policy and practice. Virtually all GP consultations are claimed on the Medicare Benefits Scheme. However, there is minimal data reported through this scheme. The data set does not include any information about the reason for the consultation or the actions undertaken. In the future, it may be possible to include additional information or link Medicare Benefits Scheme data with other data sources such as the PBS data set, hospital morbidity data and mortality data. This will require collaboration among the jurisdictions responsible for these data.

Dynamic health assessment

In the report: *Measuring the impact of asthma on quality of life in the Australian population* (ACAM 2004) dynamic health assessment was discussed as an option for improving the precision of questionnaire measures, particularly those used to measure complex health outcomes such as quality of life and asthma control.

This approach contrasts with standard questionnaire approaches in which the same questions are administered to every person every time the instrument is used. Practical considerations in this approach dictate that relatively few questions are used in many health applications. This limits the precision that the questions can achieve, and may have problems with ceiling and floor effects whereby respondents are over-represented at the extreme ends of the scale (such as when most individuals respond ‘none’ or ‘always’ to a question).

Dynamic health assessment seeks to address these limitations and implement questionnaires more efficiently by using only those questions that are relevant to the individual. A way to achieve this is by basing subsequent questions on the responses to earlier questions (Hays et al. 2000). To do this, technology is used to select individually tailored questions from a large pool of potential questions. This enables increased sensitivity and precision with far fewer questions being asked.

As this is a developing area, the strengths and limitations of dynamic health assessment are probably not yet fully realised or understood, ACAM have recommended further investigation of this approach as a population monitoring tool (Baker et al. 2004). However, whether or not this will be a feasible approach to use in population health surveys in Australia is yet to be determined and currently this activity has not progressed.

Multiple diagnosis data

As well as the principal diagnosis in hospitalisation data, additional diagnoses are included in routinely collected data that relate to the hospital admission. In a similar vein, mortality data include both the underlying cause of death and also other associated causes of death. These data may be of use either for population monitoring in asthma, particularly where there is overlap in diagnosis such as between asthma and COPD in older people. ACAM investigated the potential of these data in its report: *Asthma and chronic obstructive pulmonary disease among older people in Australia* (ACAM 2006). It found that while there was limited overlap between asthma and COPD, this may be a result of the requirements of ICD-10 coding rules rather than an inherent lack of overlap. Unfortunately, there were no dual coded data for multiple diagnoses and causes of death. The study did, however, identify a number of other interesting disease associations with both asthma and COPD, such as increased rates of musculoskeletal disease associated with asthma. Further work in this area is warranted.

Airway hyperresponsiveness data

The prevalence of airway hyperresponsiveness was recommended for inclusion in the set of national asthma indicators as the only measure of the prevalence of asthma that is completely objective and uninfluenced by labelling or diagnostic fashion (Baker et al. 2004). Measurement of airway hyperresponsiveness requires the performance of a bronchial challenge test. A range of challenge protocols are in current use (American Thoracic Society 2000). Substantial development is required to agree on a specific challenge protocol and a methodology for its use in population monitoring and surveillance. As this indicator was not likely to be able to be monitored in the foreseeable future, it was not included in ACAM's data development plan.

However, ACAM have since developed a detailed proposal for an Australian asthma survey that would include a number of objective measurements including bronchial challenge testing. Including this measure adds considerably to the complexity of the study design because it requires that participants attend a local testing centre and consequently increases the requirement for a clustered sample design. It also adds substantially to the cost of the survey. Nonetheless data on airway hyperresponsiveness would be very advantageous for monitoring asthma. At the time of this review, options for funding the proposed asthma survey are being considered.

Input into national data development

National Data Dictionary

A number of the operational definitions from the review of indicators (Baker et al. 2004) were recommended for inclusion in the National Data Dictionary. The submission of these definitions for formal inclusion in the National Data Dictionary is scheduled into the upcoming ASMA workplan, which runs from July 2007 to June 2009.

National emergency department minimum data set

Currently emergency department data are only available in some jurisdictions and coverage within those jurisdictions is incomplete. The emergency department is an important point of health-care use for asthma. Usually it reflects cases of acute asthma, although often these do not progress to a hospital admission. Therefore, the absence of national emergency department data may leave a substantial gap in our ability to monitor health service use for acute asthma. Further work is needed in collaboration with health jurisdictions and the AIHW to develop a national emergency department minimum data set.

4 Future directions

4.1 Ongoing monitoring

The major undertaking for monitoring asthma indicators to date has been the production of the key reports: *Asthma in Australia 2003* (ACAM 2003) and *Asthma in Australia 2005* (ACAM 2005a). These reports have brought together data from a wide range of sources to describe the current status of asthma in Australia. These documents mainly focused on reporting information for national asthma indicators and included information on the prevalence of asthma, medication use for asthma, possession of written asthma action plans, health service use and deaths due to asthma.

The 2005 report also included information about health care expenditure for asthma and a focus chapter on asthma in Australian children. Both of these reports drew on data from the 2001 NHS for a substantial proportion of the information presented. Therefore, a supplementary report: *Asthma in Australia: findings from the 2004–05 National Health Survey* was produced to provide updated information once data from the more recent NHS was available. The next report planned will be *Asthma in Australia 2008*.

ACAM will continue to produce these reports that deliver information on national asthma indicators in an accessible format. In 2006, ACAM made available a more readily accessible version of *Asthma in Australia 2005* with the inclusion of the html version on the ACAM web site. This online version allows quick and easy movement between chapters with links to the figures and tables. Some additional features of the online report are that all data tables have been included with the figures and there is updated trend data.

A number of specific priorities identified by ASMA in the coming period may be addressed through individual projects. One of these is to collate additional information about asthma in children. Given the high level of disease burden attributed to asthma among children in Australia, this is an important area for policy and intervention. Therefore, a project is planned that will use a range of data sources that pertain to children to provide information about the impact of asthma in this population.

Another area is the appropriate use of pharmaceuticals to manage asthma. ACAM have already undertaken substantial work using PBS data. The next phase of ASMA work will extend this by using PBS data that range over a longer time period to investigate time trends and patterns of incident use of asthma medications.

It is important to note here that the list of asthma indicators needs to be periodically revised to ensure that they remain relevant for national monitoring. Some indicators may become obsolete with the evolution of knowledge and with changes in asthma-related public health and clinical practice. With the nature of the ageing population, it will also be important to consider the relevance of other conditions or comorbidities, which may influence outcomes, and hence indicators, in people with asthma.

4.2 Refining asthma indicators

Health indicators are measures of selected aspects of health and the health system that can be used to monitor the effectiveness and impact of the health system and of specific interventions to improve health and provide effective, accessible and quality health care.

Disease-specific indicators, such as those for asthma, summarise data that allow the regular reporting of disease levels, burden and trends and can be used to monitor changes over time. They are used to examine social, geographical and environmental differentials that may influence the development and burden of asthma.

As already stated, an important function of indicators is to track the impact of health policy, and prevention and management strategies and to monitor progress towards targets.

In its report: *Review of proposed national health priority area asthma indicators and data sources* (Baker et al. 2004); ACAM recommended 24 asthma indicators for inclusion in the Australian System for Monitoring Asthma. Experience with the use of these indicators has led us to the conclusion that there is a need to review them. Some are no longer relevant to policy needs. Others are redundant: providing information that is closely correlated with other indicators. Finally, some indicators will not be feasible to measure in the foreseeable future. The complexity of monitoring and reporting on many indicators makes it desirable to simplify the monitoring system where possible. This is likely to have the benefits of making information easier for target audiences to interpret.

It is therefore worthwhile to refine the current set of asthma indicators and identify those that provide the most information or which are most effective at signalling change. ACAM propose to adopt a systematic approach with two components to revise the existing set of indicators:

- *Factor Analysis* to identify domains of factors (that is, clusters of indicators) from data collected on the current indicators
- A modified *Delphi Survey* of experts to solicit consensus opinions by ranking and reducing the existing list to a shorter, higher priority list of indicators.

The factor analysis will yield a recommended set of independent indicators with *robust statistical properties* and the expert consensus opinions will ensure *clinical relevance* of the indicators. The key asthma indicators identified as a result of this process will provide high quality information on asthma in the population.

These indicators will help ensure greater consistency in the provision of health services to individuals with asthma; to provide important support and justification for future human resource planning; and to inform and assist policy and decision-makers in addressing future asthma health resource planning and allocation requirements.

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Appendix A

Table A1: Recommended questions to monitor selected national asthma indicators

Indicator	Recommended questions	Response categories
Prevalence of recent wheeze	1: Have you had wheezing or whistling in your chest at any time in the last 12 months?	Yes No
Prevalence of ever having diagnosed asthma	2: Have you ever been told by a doctor or a nurse that you have asthma? If yes,	Yes No
Prevalence of current asthma	2a: Have you had symptoms of asthma or taken treatment for asthma in the last 12 months?	Yes No
Rate of exacerbations of asthma	3: At any time in the last 12 months, was your asthma worse or out of control? If yes,	Yes No
	3a: In the last 12 months, how many times have you gone to a hospital or emergency department because your asthma was worse or out of control?	Number of times None / No times
	3b: In the last 12 months, how many times have you consulted a GP or local doctor because your asthma was worse or out of control?	Number of times None / No times
Number of people with current asthma who have an action asthma plan	4: Do you have a written asthma action plan, that is, written instructions of what to do if your asthma is worse or out of control?	Yes No
Impact of asthma on quality of life ^(a)	5.1: During the last 4 weeks how often did your asthma interfere with your daily activities?	All of the time Most of the time Some of the time None of the time
	5.2: Sydney Asthma Quality of Life Questionnaire (20 items)	Full questionnaire reproduced in Appendix A of ACAM 2007c
	5.3: Paediatric Asthma Quality of Life Questionnaire (23 items)	Permission required for use from Elizabeth Juniper <www.qoltech.co.uk>
Asthma control in people with current asthma	6.1: In the last 12 months, has wheezing ever been severe enough to limit your speech to only one or two words at a time between breaths?	Yes No
	6.2: In the last 4 weeks, how often did you have symptoms of asthma; that is wheezing, chest tightness, coughing or shortness of breath?	Every day 3 or more times a week 1 to 2 times a week Less than once a week
	6.3: In the last 4 weeks, have you been woken by asthma or wheezing? If yes,	Yes No
	6.3a: In the last 4 weeks, how many nights have you been woken by asthma or wheezing?	Number of times None / No times
	6.4: See also questions 9 and 9a. These questions will be used to assess the use of reliever medications as an indicator of asthma control.	

(continued)

Table A1 (continued): Recommended questions to monitor selected national asthma indicators

Indicator	Recommended questions	Response categories
Prevalence of smoking in the household where children with asthma reside ^(b)	7: Which of the following best describes your home situation?	My home is smoke free People occasionally smoke in the house People frequently smoke in the house
Prevalence of smoking in people with current asthma ^(b)	8: Do you currently smoke? If yes,	Yes No
	8a: Do you smoke at least once a week?	Yes No
Proportion of people with current asthma who use preventers regularly	9: What are the names or brands of all the asthma medications you have used in the last 4 weeks? If any medications identified:	Interviewers will have an updated list of currently available asthma medications. All responses in the list to be checked. Medications stated but not in the list to be recorded under 'other'
	9a: How often did you use {name of medication} in the last 4 weeks? (loop for each type of medication)	Every day 3 or more times a week 1 to 2 times a week
	For this indicator, these questions will be used to assess the frequency of use of preventer medications.	Less than once a week Not at all

(a) Only asthma-specific health-related quality of life measures have been included in this asthma module. However, generic quality of life measures may also be used in many surveys that, when used in conjunction with the questions identifying people with current asthma, can be useful for making comparisons between people with and without asthma.

(b) These questions are not asthma-specific and, for asthma monitoring purposes, would need to be used in conjunction with the questions identifying people with current asthma. However, the selected questions were included in the asthma module because they are able to measure the established asthma indicator consistently with its operational definition.