Developed for the Global Initiative for Asthma
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It is now estimated that as many as 300 million people of all ages, and all ethnic backgrounds, suffer from asthma and the burden of this disease to governments, health care systems, families, and patients is increasing worldwide.

In 1989 the Global Initiative for Asthma (GINA) program was initiated with the U.S. National Heart, Lung, and Blood Institute, NIH and the World Health Organization (WHO) in an effort to raise awareness among public health and government officials, health care workers, and the general public that asthma was on the increase. The GINA program recommends a management program based on the best available scientific evidence to allow doctors to provide effective medical care for asthma tailored to local health care systems and resources.

Working in continued collaboration with leaders in asthma care from many countries, and with GINA Sponsors, World Asthma Day (first Tuesday in May) has been extremely successful, increasing in numbers of participants each year. We are indebted to the vast number of people in many countries of the world who have made a commitment to bring awareness about the burden of asthma to their local health care officials, and to implement programs of effective asthma care.

In 2003, and again in 2004, the theme of World Asthma Day is the "Global Burden of Asthma." GINA commissioned Professor Richard Beasley, Wellington, New Zealand (and a member of the GINA Dissemination Committee) to provide available data on the burden of asthma. In this report, Professor Beasley and his colleagues obtained data on the burden of asthma in 20 different regions worldwide from literature primarily published through the International Study of Asthma and Allergies in Childhood (ISAAC) and the European Community Respiratory Health Survey (ECHRS). Methodologies differ in these studies, and epidemiological data on asthma are very difficult to collect, as Professor Beasley carefully describes in his segment on Methodological Issues. Nonetheless, this document provides a wealth of information, along with a large number of scientific references. The study regions have been grouped according to geographical, political, historical, and racial considerations based on official data from WHO, the United Nations (UN), and other sources, and to some extent, the availability of asthma epidemiological data within the study region. Using the United Nations World Population Prospect Population Database (http://esa.un.org/unpp) as a source within each region, all countries were included, and in some cases territories and dependencies if specific asthma epidemiological data were available. For simplicity some data from small territories have been omitted or lumped in a larger sub-regional unit. The report will be updated as new information becomes available and following feedback from individual countries and regions. (Additional references, data, and feedback may be submitted at www.ginasthma.com.)

The GINA Executive Committee is indebted to Professor Beasley and his colleagues for providing this report that will be an invaluable source of information for those who wish to explore available data on the burden of asthma by region. It will be extremely useful to develop background materials for World Asthma Day activities in 2004 and well into the future.

Tim Clark, MD
Chair, GINA Executive Committee

(Information about GINA can be found at www.ginasthma.com)
Global Burden of Asthma - Summary

1. Asthma is one of the most common chronic diseases in the world. It is estimated that around 300 million people in the world currently have asthma. Considerably higher estimates can be obtained with less conservative criteria for the diagnosis of clinical asthma.

2. The international patterns of asthma prevalence are not explained by the current knowledge of the causation of asthma. Research into the causation of asthma, and the efficacy of primary and secondary intervention strategies, represent key priority areas in the field of asthma research.

3. Asthma has become more common in both children and adults around the world in recent decades. The increase in the prevalence of asthma has been associated with an increase in atopic sensitisation, and is paralleled by similar increases in other allergic disorders such as eczema and rhinitis.

4. The rate of asthma increases as communities adopt western lifestyles and become urbanised. With the projected increase in the proportion of the world's population that is urban from 45% to 59% in 2025, there is likely to be a marked increase in the number of asthmatics worldwide over the next two decades. It is estimated that there may be an additional 100 million persons with asthma by 2025.

5. In many areas of the world persons with asthma do not have access to basic asthma medications or medical care. Increasing the economic wealth and improving the distribution of resources between and within countries represent important priorities to enable better health care to be provided.

(continued)
Global Burden of Asthma - Summary (continued)

6. The number of disability-adjusted life years (DALYs) lost due to asthma worldwide has been estimated to be currently about 15 million per year. Worldwide, asthma accounts for around 1% of all DALYs lost, which reflects the high prevalence and severity of asthma. The number of DALYs lost due to asthma is similar to that for diabetes, cirrhosis of the liver, or schizophrenia.

7. The burden of asthma in many countries is of sufficient magnitude to warrant its recognition as a priority disorder in government health strategies. Particular resources need to be provided to improve the care of disadvantaged groups with high morbidity, including certain racial groups and those who are poorly educated, live in large cities, or are poor. Resources also need to be provided to address preventable factors, such as air pollution, that trigger exacerbations of asthma.

8. It is estimated that asthma accounts for about 1 in every 250 deaths worldwide. Many of the deaths are preventable, being due to suboptimal long-term medical care and delay in obtaining help during the final attack.

9. The economic cost of asthma is considerable both in terms of direct medical costs (such as hospital admissions and cost of pharmaceuticals) and indirect medical costs (such as time lost from work and premature death).

10. Until there is a greater understanding of the factors that cause asthma and novel public health and pharmacological measures become available to reduce the prevalence of asthma, the priority is to ensure that cost-effective management approaches which have been proven to reduce morbidity and mortality are available to as many persons as possible with asthma worldwide.
Barriers to Reducing the Burden of Asthma

1. Generic barriers including poverty, poor education, and poor infrastructure.

2. Environmental barriers including indoor and outdoor air pollution, tobacco smoking, and occupational exposures.

3. Low public health priority due to the importance of other respiratory illnesses such as tuberculosis and pneumonia and the lack of data on morbidity and mortality from asthma.

4. The lack of symptom-based rather than disease-based approaches to the management of respiratory diseases including asthma.

5. Unsustainable generalisations across cultures and health care systems which may make management guidelines developed in high-income countries difficult to implement in low and middle-income countries.

6. Inherent barriers in the organisation of health care services in terms of
   a. geography
   b. type of professional responding
   c. education and training systems
   d. public and private care
   e. tendency of care to be "acute" rather than "routine."

7. The limited availability and use of medications including
   a. omission of basic medications from WHO or national essential drug lists
   b. poor supply and distribution infrastructure
   c. cost
   d. cultural attitudes towards drug delivery systems, e.g. inhalers

(continued)
8. Patient barriers including
   a. cultural factors
   b. lack of information
   c. underuse of self-management
   d. over-reliance on acute care
   e. use of alternative unproven therapies.

9. Inadequate government resources provided for health care including asthma.

10. The requirement of respiratory specialists and related organisations required to care for a wide variety of diseases, which has in some regions resulted in a failure to adequately promote awareness of asthma.
Actions Required to Reduce the Burden of Asthma

1. Recognise asthma as an important cause of morbidity, economic cost, and mortality worldwide.

2. Measure and monitor the prevalence of asthma, and the morbidity and mortality due to asthma throughout the world.

3. Identify and address the economic and political factors which limit the availability of health care.

4. Improve accessibility to essential drugs for the management of asthma in low- and middle-income countries.

5. Identify and address the environmental factors including indoor and outdoor pollution which affect respiratory morbidity including that due to asthma.

6. Promote and implement anti-tobacco public health policies to reduce tobacco consumption.

7. Adapt international asthma guidelines for developing countries to ensure they are practical and realistic in terms of different health care systems. This includes dissemination strategies for their implementation.

8. Integrate the GINA guidelines with other global respiratory guidelines for children and adults. In this respect, there is a requirement to merge the key elements of the different respiratory guidelines into an algorithm for use at the first point of entry of a respiratory patient's contact with health services.

9. Promote cost-effective management approaches which have been proven to reduce morbidity and mortality, thereby ensuring optimal treatment is available to as many persons as possible with asthma worldwide.

10. Research the causation of asthma, primary and secondary intervention strategies, and management programmes including those for use in developing countries.
### Ranking of the Prevalence of Current Asthma Symptoms in Childhood by Country (I)

(Written Questionnaire: Self-reported wheezing in the previous 12 month period, in 13- to 14-year-old children*)

<table>
<thead>
<tr>
<th>Country</th>
<th>Prevalence of asthma symptoms (%)</th>
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<td>Nepal</td>
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<td>Indonesia</td>
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<td>Macau</td>
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*See Methodological Issues*
Ranking of the Prevalence of Current Asthma Symptoms in Childhood by Country (II)

(Video Questionnaire: Positive response to clinical asthma scene, in 13- to 14-year-old children*)

*See Methodological Issues
Ranking of the Prevalence of Current Asthma Symptoms in Adults by Country

(Written Questionnaire: Self-reported wheezing in the previous 12 month period, in 20- to 44-year-old adults*)
Proportion of population (%)*

Scotland 18.4
Jersey 17.6
Guernsey 17.5
Wales 16.8
Isle of Man 16.7
New Zealand 15.1
Australia 14.7
Peru 13.0
Trinidad & Tobago 12.6
Costa Rica 11.9
Brazil 11.4
United States of America 10.9
Fiji 10.5
Paraguay 9.7
Uruguay 9.5
Israel 9.0
Barbados 8.9
Panama 8.8
Kuwait 8.5
Ukraine 8.3
Ecuador 8.2
South Africa 8.1
Czech Republic 8.0
Finland 8.0
Malta 8.0

Ivory Coast 7.8
Colombia 7.4
Turkey 7.4
Lebanon 7.2
Kenya 7.0
Germany 6.9
France 6.8
Norway 6.8
Japan 6.7
Sweden 6.5
Thailand 6.5
Hong Kong 6.2
Philippines 6.2
United Arab Emirates 6.2
Belgium 6.0
Austria 5.8
Spain 5.7
Saudi Arabia 5.6
Argentina 5.5
Iran 5.5
Estonia 5.4
Nigeria 5.4
Chile 5.1
Singapore 4.9
Malaysia 4.8
Portugal 4.8
Uzbekistan 4.6
FYR Macedonia 4.5
Italy 4.5

Oman 4.5
Pakistan 4.3
Tunisia 4.3
Cape Verde 4.2
Latvia 4.2
Poland 4.1
Algeria 3.9
South Korea 3.9
Bangladesh 3.8
Morocco 3.8
Occupied Territory of Palestine 3.6
Mexico 3.3
Ethiopia 3.1
Denmark 3.0
India 3.0
Taiwan 2.6
Cyprus 2.4
Switzerland 2.3
Russia 2.2
China 2.1
Greece 1.9
Georgia 1.8
Nepal 1.5
Romania 1.5
Albania 1.3
Indonesia 1.1
Macau 0.7

*See Methodological Issues
World Map of Asthma Case Fatality Rates
(Asthma deaths per 100,000 asthmatics)

Countries shaded according to case fatality rate (per 100,000 asthmatics)*

- **>10.0**
- **5.1-10.0**
- **0-5.0**
- **No standardised data available**

- China: 36.7
- Russia: 28.6
- Uzbekistan: 27.2
- Albania: 20.8
- South Africa: 18.5
- Singapore: 16.1
- Romania: 14.7
- Mexico: 14.5
- Malta: 11.6
- Colombia: 10.1
- Denmark: 9.3
- Ukraine: 8.7
- Japan: 8.7
- FYR Macedonia: 8.2
- Belgium: 7.7
- Latvia: 7.1
- Norway: 7.1
- Switzerland: 7.0
- Portugal: 6.9
- Poland: 6.6
- France: 6.5
- Thailand: 6.2
- Argentina: 5.8
- Hong Kong: 5.6
- United States of America: 5.2
- Germany: 5.1
- Spain: 4.9
- South Korea: 4.9
- Czech Republic: 4.8
- Israel: 4.7
- New Zealand: 4.6
- Costa Rica: 3.9
- Australia: 3.8
- Republic of Ireland: 3.6
- Italy: 3.6
- Chile: 3.5
- England: 3.2
- Scotland: 3.0
- Estonia: 3.0
- Wales: 2.9
- Austria: 2.6
- Ecuador: 2.3
- Greece: 2.1
- Uruguay: 2.1
- Sweden: 2.0
- Brazil: 1.8
- Canada: 1.6
- Finland: 1.6
- Cape Verde: 0.0

*See Methodological Issues
Disability-Adjusted Life Years Lost Due to Asthma Worldwide – Ranking with Other Common Disorders

Asthma was the 25th leading cause of disability-adjusted life years (DALYs) lost worldwide in 2001.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Disorder</th>
<th>Number of DALYs (x10^6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Perinatal conditions</td>
<td>98.4</td>
</tr>
<tr>
<td>2</td>
<td>Lower respiratory tract infections</td>
<td>90.7</td>
</tr>
<tr>
<td>3</td>
<td>HIV/AIDS</td>
<td>88.4</td>
</tr>
<tr>
<td>4</td>
<td>Unipolar depressive disorders</td>
<td>65.9</td>
</tr>
<tr>
<td>5</td>
<td>Diarrhoeal disease</td>
<td>62.5</td>
</tr>
<tr>
<td>6</td>
<td>Ischaemic heart disease</td>
<td>58.7</td>
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<tr>
<td>7</td>
<td>Cerebrovascular disease</td>
<td>45.9</td>
</tr>
<tr>
<td>8</td>
<td>Malaria</td>
<td>42.3</td>
</tr>
<tr>
<td>9</td>
<td>Road traffic accidents</td>
<td>37.7</td>
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<tr>
<td>10</td>
<td>Tuberculosis</td>
<td>36.0</td>
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<tr>
<td>11</td>
<td>Maternal conditions</td>
<td>30.9</td>
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<tr>
<td>12</td>
<td>Chronic obstructive pulmonary disease</td>
<td>29.9</td>
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<td>13</td>
<td>Congenital abnormalities</td>
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<td>14</td>
<td>Measles</td>
<td>26.5</td>
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<td>15</td>
<td>Hearing loss - adult onset</td>
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<tr>
<td>16</td>
<td>Violence</td>
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<td>17</td>
<td>Self-inflicted injuries</td>
<td>19.9</td>
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<td>18</td>
<td>Alcohol use disorders</td>
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<td>19</td>
<td>Protein-energy malnutrition</td>
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<td>20</td>
<td>Osteoarthritis</td>
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<td>21</td>
<td>Schizophrenia</td>
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<td>22</td>
<td>Falls</td>
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<td>Diabetes mellitus</td>
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<td>Cirrhosis of the liver</td>
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<td><strong>ASTHMA</strong></td>
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<td>26</td>
<td>Bipolar affective disorder</td>
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<td>27</td>
<td>Pertussis</td>
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<td>28</td>
<td>Alzheimers and other dementias</td>
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<td>29</td>
<td>Sexually transmitted diseases excluding HIV</td>
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<td>30</td>
<td>Iron deficiency anaemia</td>
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<td>Country</td>
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<td>USA</td>
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**World Map of the Proportion of the Population with Access to Essential Drugs**

- **<50%**
  - Brunei
  - Malaysia
  - Singapore
  - Indonesia
  - Vietnam
  - Senegal
  - Zimbabwe
  - Nepal

- **50-80%**
  - Brunei
  - Malaysia
  - Singapore
  - Indonesia
  - Vietnam
  - Senegal
  - Zimbabwe
  - Nepal

- **81-95%**
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  - Senegal
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- **>95%**
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- **No standardised data available**
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  - Senegal
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- **No data**
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KEY REFERENCES


Methodological Issues

A. Prevalence of Current Asthma Symptoms

The large standardised international and national studies of the prevalence of asthma in both children and adults have utilised written questionnaires of asthma symptoms. These questionnaires have been based on the symptom of wheezing, which has been shown to be the most important symptom for the identification of individuals with asthma. Due to the intermittent nature of asthma symptoms, wheezing occurring at any time within the previous 12 months has been used to define current asthma symptoms. Responses to questions about self-reported wheezing in the previous 12-month period have been shown to have good specificity and sensitivity for both bronchial hyperresponsiveness and a diagnosis of asthma in both children and adults. This was the core question used in both the International Study of Asthma and Allergies in Childhood (ISAAC) and the European Community Respiratory Health Survey (ECRHS), the large standardised international studies which compared the prevalence of asthma symptoms in countries worldwide. For these reasons, "wheezing in the last 12 months" has been used in this report as the response to determine the prevalence of current asthma symptoms in each country.

In this report, data on this question have been preferentially obtained from ISAAC and ECRHS as data were collected in a standardised manner between centres in different countries in these studies. The ISAAC study obtained symptom prevalence data from children in the 13- to 14-year age group, whereas in the ECRHS the 20- to 44-year age group was studied. In countries where more than one centre participated in ISAAC or ECRHS, the mean symptom prevalence value for the country was used. For countries which did not participate in ISAAC or ECRHS, comparable data from published studies were used if self-reported wheezing in the previous 12-month period was obtained from written questionnaires in defined populations in children or adults.

Despite the general acceptance of this approach, a number of limitations need to be recognised in the interpretation of such standardised data. The first is that self-reported current wheezing is not diagnostic of asthma in an individual. Wheezing is not a symptom specific to the diagnosis of asthma and there is no agreed
way of grading the severity or frequency of wheezing symptoms to identify the presence of asthma. For example, the occasional transient episode of mild wheezing in an individual requiring no treatment would not necessarily be considered to be diagnostic of clinical asthma. From a clinical standpoint, a diagnosis of asthma is made on the basis of combined information from history, physical examination, and physiological tests, often over a period of time. There is no single test or clinical feature which defines the presence or absence of asthma, particularly from epidemiological studies of large populations. As a result, the prevalence of current asthma symptoms is not equivalent to the prevalence of clinical asthma.

Another issue is that in both children and adults, wide variations in the prevalence of current asthma symptoms are often observed between centres within the same country. This indicates that the asthma symptom prevalence rate reported for each country is dependent to some extent on the number of centres studied. The population sample chosen, on the basis of a defined geographical area, also influences the reported asthma symptom prevalence rates. In both ECRHS and ISAAC predominantly urban populations were studied, but it is recognised that the prevalence of asthma symptoms is generally higher in urban than in rural areas.

Despite the use of standardised simple written questionnaires, validated study protocols (including those for translation of questionnaires), and stringent quality control measures in both ISAAC and ECRHS, biases in the comparability of information were unavoidable. This is evident from the simple observation that in the studies data have been presented from standardised written questionnaires which have been translated into over 50 languages, some of which have no colloquial term for wheezing. In an attempt to reduce the biases inherent in international comparisons of asthma symptom prevalence data based on written questionnaires, a video questionnaire has been developed which shows rather than describes the symptoms and signs of asthma, thereby allowing comparisons between populations with different cultures and languages. While the video questionnaire probably provides the most accurate comparable estimates of asthma prevalence between populations worldwide, its use has been confined to the ISAAC programme and insufficient validation has been undertaken to date for it to be used as the primary outcome variable in this report.
B. Prevalence of "Clinical Asthma"

The true prevalence of asthma is difficult to determine due to the lack of a single objective diagnostic test, different methods of classification of the condition, differing interpretation of symptoms in different countries, as well as the uncertain influence of increasing public and professional awareness of asthma. In this report an arbitrary figure of 50% of the prevalence of "current wheezing" in children (self-reported wheezing in the previous 12-month period in 13- to 14-year-old children) has been used as the prevalence of "clinical asthma." In support of this approach, in different populations from high- and low-income countries:

1. The prevalence of "clinically important" (severe) asthma symptoms shows a similar degree of variation to mild wheezing, with a strong correlation at the national level. This indicates that the wide variation in prevalence of current wheezing is not explained by a relative over-reporting of mild symptoms in high-prevalence countries, and that current wheezing can be used as the basis for detecting the prevalence of "clinical asthma".

2. The proportion of individuals with bronchial hyperresponsiveness (BHR) plus current wheeze is around 40% to 60% of that reporting current wheeze. This criteria of BHR plus current wheeze has been proposed as the "gold standard" for identifying clinical asthma in population-based studies, having been shown to identify a group with greater severity of clinical and physiological measures and treatment requirements for asthma than alternative criteria.

3. In children the prevalence rate determined by a positive response to the video sequence of wheezing is about 50% of that of current wheezing from the written questionnaire.

4. In adults the prevalence rate of breathlessness with wheeze (indicative of clinically significant asthma) is about 50% of the prevalence rate of current wheezing.

5. There is a strong correlation observed between ISAAC and ECRHS asthma symptom prevalence data, with 74% of the variation in the prevalence of current wheezing in adults at the centre level explained by the variation in the childhood data. The mean
prevalence rate of current wheezing in children was 88% of that recorded in adults, in the countries which participated in both studies.

6. There is a close correlation between the ISAAC asthma prevalence data for teenagers (13- to 14-year age group) and young children (6- to 7-year age group). In the countries which studied both age groups in the ISAAC programme, the mean prevalence rate of current wheezing in the 6- to 7-year age group was 105% of that recorded in the 13- to 14-year age group.

The prevalence of doctor-diagnosed asthma, of asthma attacks, or of asthma medication use was avoided due to the marked variation in the recognition and presentation to a doctor by an individual with recurrent wheezing episodes, and the considerable differences in diagnostic labelling and treatment by doctors between populations.

As a result the prevalence rates for "clinical asthma" reported in this report represent a conservative estimate.

To determine the number of persons with asthma in each country, the mean prevalence of asthma calculated for each country was multiplied by the population of the country, which was derived from the WHO population statistics for 2001. For countries in which data on asthma symptom prevalence were not available, the mean prevalence of clinical asthma in the specific region was used. While the major limitations of this approach are evident, it does provide a crude estimate for the prevalence of clinical asthma in these countries. This approach enabled the total number of asthmatics in each region to be estimated and thereby the total number of persons with asthma worldwide.

C. Asthma Mortality

The asthma mortality comparison between countries has been made using the asthma mortality rates in the 5- to 34-year age group because the diagnosis of asthma mortality is firmly established in this group. It has been shown that in this age group false-positive reporting (i.e., deaths from other causes being falsely attributed to asthma) and false-negative reporting (i.e., asthma deaths being falsely assigned to other categories) are extremely low. However, the accuracy of this approach declines with increasing age, with false-positive reporting rates of >30% in those aged 65 years or more.
In this report, WHO country-specific mortality data for ICD codes 490 to 493 have been used. These codes incorporate mortality data from asthma, emphysema, chronic bronchitis, and bronchitis not specified as acute or chronic. In the 5- to 34-year age group, these mortality figures are similar to the asthma mortality rates, due to the rarity of mortality from chronic bronchitis or emphysema in this age group. This approach was supported by a validation study based on data from 14 countries in 7 regions, in which the asthma mortality rates in the 5- to 34-year age group as published by the national statistics were compared with the WHO mortality rates for ICD codes 490 to 493. This validation showed that the asthma mortality rates in the 5- to 34-year age group were on average 89% of the WHO-derived figures.

For each country, the mean mortality rate from the two most recent years in which it was available was presented. The mean period in which mortality data were available was 1996 to 1997; mortality data were not reported if they were only available prior to 1992.

When making international comparisons of asthma mortality it is necessary to also consider the asthma prevalence rates in the countries being compared. In this way a more accurate determination of the case fatality rate can be achieved and with this type of analysis a different perspective of the international differences in asthma mortality rates is obtained. In this report, case fatality rates have been derived for each country, in which the asthma mortality rate in the 5 to 34 year age group has been determined as a proportion of the prevalence of clinical asthma, where data were available. It is recognised that the case fatality rates represent a crude estimate, dependent on many factors including the accuracy of the mortality and prevalence statistics available in the different age groups, diagnostic coding, and the recognition and management of the condition. It has not been possible to document overall asthma mortality rates or the number of deaths due to asthma in each country as these data were not available from the WHO in a standardised format.

D. Disability-Adjusted Life Years

In considering the impact of a disease in terms of mortality, it is informative to extend the concept of life expectancy to that of health expectancy. In this way an attempt is made to generalise the concept
of years of life lost to that of years of healthy life lost, representing a health gap measure which incorporates both loss of life and the loss of quality of life. This allows a composite measure of the burden of both fatal and non-fatal disease. As a result, the years lost to disability (YLD) is added to the years of life lost to premature mortality (YLL) to yield an integrated unit of health - the "disability-adjusted life-year" (DALY), with one DALY representing the loss of one year of healthy life. The DALYs lost due to asthma worldwide in 2001 are presented, together with the 30 leading causes of DALYs. These data were obtained from the recently published WHO World Health Report 2002.

E. Populations with Regular Access to Essential Drugs

The world map documenting the percentage of the population in each country with regular access to essential drugs was reproduced from the WHO World Health Report 1998.
Burden of Asthma in Different Study Regions

The burden of asthma has been assessed in twenty different regions worldwide. These study regions have been grouped according to geographical, political, historical, and racial considerations, and to some extent according to the availability of asthma epidemiological data within the study region. A broad overview of some, but by no means all, of the relevant issues and interesting features of the burden of asthma within each region has been provided. Likewise, for many regions the lists for further reading provide some, but not all, of the key references relevant to the burden of asthma in countries within the region.

- Scandinavia/Baltic States
- United Kingdom/Republic of Ireland
- Western Europe
- Balkans/Turkey/Caucasus/Mediterranean Islands
- Russia and former Socialist Republics of Eastern Europe
- Middle East
- Central Asia and Pakistan
- Southern Asia
- China/Taiwan/Mongolia
- Northeast Asia
- Southeast Asia
- Oceania
- North America
- Central America
- Caribbean
- South America
- North Africa
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Scandinavia/Baltic States

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<th>Denmark</th>
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Number of persons with asthma: 3.4 m
Total population: 70.2 m
Mean prevalence of clinical asthma: 4.9%

Key Points:

1. The prevalence of asthma symptoms is similar throughout the region, with generally higher rates in Scandinavian countries, and somewhat lower rates in the former socialist countries in the Baltic region.

2. The prevalence of asthma has increased throughout the region over recent decades. The data reporting the increased prevalence of asthma in young army recruits in a number of countries within the Scandinavian region provide some of the most convincing data worldwide of the increase in asthma prevalence that has occurred over recent decades. The increase in asthma prevalence began in the 1960s/70s and has increased steadily since this time.

3. The prevalence of asthma is greater in urban communities compared with rural communities throughout the region. The reasons for these differences are uncertain.

4. The trend of increasing asthma prevalence has been associated with an increase in other allergic disorders such as rhinitis and eczema.

5. It is expected that during the next decade the increase in the prevalence of asthma is likely to be particularly marked in the former socialist countries of the Baltics as these communities increasingly adopt the Western lifestyle.

6. There is considerable underdiagnosis of asthma within the former socialist countries in the Baltic region compared with Scandinavia. This is illustrated by the considerably lower percentage of individuals with asthma symptoms who receive a diagnosis of asthma in these countries.

7. The cost of asthma medications is a major barrier to the delivery of health care to asthmatics within the former socialist countries in the Baltic region. In these countries a considerably lower percentage of individuals with asthma symptoms receives asthma medication.
8. Asthma mortality rates have declined markedly over the last 10 years in Scandinavian countries, a trend which has been attributed to improvements in asthma management, including the increased use of inhaled corticosteroid therapy. These countries have amongst the lowest case fatality rates worldwide and indicate the potential that exists to reduce asthma mortality in other countries.

9. The national asthma public health programmes developed in a number of Scandinavian countries can be used by other countries as models of programmes which have been shown to markedly reduce morbidity and mortality from asthma. The national programme developed in Finland represents a particularly successful multidisciplinary programme in which the strategic planning, principles, implementation, and evaluation have been clearly outlined.

10. Work is an important cause for the development of asthma in both men and women within the region. The risk is particularly high for agricultural, forestry, fishing, and manufacturing workers. The potential for prevention is considerably greater and more widely spread than generally assumed.

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United Kingdom/Republic of Ireland

Number of persons with asthma: 10.1 m
Total population: 63.3 m
Mean prevalence of clinical asthma: 16.1%

Key Points:
1. This region has amongst the highest prevalence rates of asthma in the world.
2. There has been a marked increase in the incidence of asthma attacks diagnosed by general practitioners over the last few decades, such that it is now about five times higher than it was 25 years ago. About 20,000 first or new episodes of asthma present each week to general practitioners in the region.
3. Asthma disproportionately affects certain ethnic minority groups and low socioeconomic groups, which represent a priority for management initiatives.
4. Asthma is one of the leading causes of hospital admission in children. There are over 75,000 emergency hospital admissions due to asthma each year, a quarter of which are in children below 4 years of age. The number of hospital admissions has gradually declined over the last decade.
5. Asthma places a high burden on the primary health care system, with over 4 million consultations for asthma each year. An average primary care organisation in the United Kingdom of 330,000 people can expect to treat 25,000 people with asthma, with over 400 patients with asthma admitted to hospital and 8 asthma deaths each year.
6. It has been estimated that one in four people have severe or moderately severe asthma that might be relieved if treatment were reviewed and made more appropriate. However, one in 10 people living with asthma has severe or moderately severe asthma that is inadequately controlled despite the best clinical and preventive management.
7. Currently over 1,500 people die from asthma each year within the region. Confidential inquiries have shown that suboptimal routine care, delay in obtaining help during the final attack, and poor adherence to medication contribute to many of the deaths.

8. Mortality from asthma has declined steadily in the last 10 years. This reduction is considered to be due to improvements in the management of asthma, particularly the increased use of inhaled corticosteroid therapy.

9. The total cost of asthma in the region has been estimated to be about £2.5 billion. This includes the cost of about £900 million to the public health service. It is estimated that 50% of all annual healthcare costs for asthma come from the most severe 20% of the asthmatic population. About 20 million working days are lost due to asthma each year.

10. The United Kingdom National Asthma Campaign is a successful model of a national education, management, and research-based programme which has contributed to reducing the burden of asthma in the region. It could be used as a basis for similar public health programmes in other countries, as well as a resource for educational material and management programmes.

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Berrill WT. Death certification in asthma is inaccurate. BMJ 1997; 315: 1013.


Chang AB, Newson TP. Labelling of cough alone as asthma may partially explain increase. BMJ 1997; 1015.


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Lung and Asthma Information Agency. Trends in hospital admissions for asthma. Factsheet 95/1.

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Partridge MR. In what way may race, ethnicity or culture influence asthma outcomes? Thorax 2000; 55: 175-6.


Strachan D, Griffiths JM, Johnston IDA, Anderson HR. Ventilatory function in British adults after asthma or wheezing illness at ages 0-35. Am J Respir Crit Care Med 1996; 154: 1629-35.


Western Europe

Austria  France  Germany  Italy  Luxembourg  Netherlands  Portugal  Spain  Switzerland

<table>
<thead>
<tr>
<th>Number of persons with asthma:</th>
<th>17.2 m</th>
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<tr>
<td>Total population:</td>
<td>290.8 m</td>
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<tr>
<td>Mean prevalence of clinical asthma:</td>
<td>5.9%</td>
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Key Points:

1. The prevalence of asthma is generally high within Western Europe. The prevalence of other atopic diseases such as allergic rhinitis and eczema are amongst the highest in the world.

2. The prevalence of asthma is generally higher in urban areas compared with suburban areas, and lower in communities living at high altitude. The lowest levels are in individuals who have lived on a farm in childhood.

3. The available evidence indicates that the prevalence of asthma has increased markedly in both children and adults over recent decades within the region. The increase has been particularly marked in the former East Germany, which now has prevalence rates which are similar to those in former West Germany.

4. There are wide variations in the treatment of asthma within Western Europe; however, in general asthma is often undertreated and management generally falls short of that recommended in international guidelines.

5. The burden of asthma is considerable within the region, with over one in four children and adults with asthma requiring an unscheduled urgent care visit in the previous twelve-month period.

6. Asthma remains an important cause of hospital admissions. For example, in Switzerland there are over 40,000 asthma-related hospitalizations annually, representing the largest category of direct medical expenditures for asthma.

7. The experience with the soybean epidemic asthma in Barcelona demonstrates the potential impact of exposure to a workplace sensitizing agent within the general community. It also suggests that episodes of severe asthma in the community which are considered “idiopathic” may be due to the inhalation of airborne occupational agents and illustrates the importance of vigilance with respect to the patterns of asthma exacerbations in communities.
8. Asthma is a major health-care cost in countries within this region with both significant direct medical and indirect costs for asthma-related morbidity. For example, in the Netherlands it has been estimated that the annual direct medical cost per person with asthma is about US $500.

9. There has been a general trend of declining asthma mortality in most countries within Western Europe. This pattern has been primarily attributed to changes in management, in particular the increasing use of inhaled corticosteroids. For example, in Germany, in the 1990s there was a strong and significant negative correlation between asthma mortality and prescribed inhaled corticosteroid use.

10. There are a number of countries within Western Europe, such as France, in which the asthma mortality rate has not fallen over the last decade to the degree observed in other countries. One of the priorities within these countries is public health strategies to reduce the number of deaths from asthma.

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**Key Points:**

1. There is a wide range of asthma prevalence rates from countries within this region. The prevalence rates for asthma are amongst the lowest in the world in the Balkans and Caucasus regions, whereas in some countries, such as Turkey and Malta, the prevalence rates are generally higher.

2. The rates of reported asthma symptoms and diagnosed asthma have increased markedly in a number of countries in the region over the last few decades.

3. It is likely that the greatest future increase in the number of persons with asthma in the region will occur in Turkey, due to its large population and the forecast major changes in lifestyle and urbanisation.

4. The human and socioeconomic burden of asthma in many countries within the region is marked, with considerable time lost from work and frequent emergency room visits and hospital admissions.

5. There has been a progressive and marked increase in the rate of hospital admissions due to asthma in children in a number of countries. The trends differ in some respects compared with other regions of the world. For example, in Greece the increase has been most marked in the 5- to 14-year age group, in contrast to most countries worldwide where the greatest increase has occurred in the 0- to 4-year age group.

6. The availability of asthma medicines is limited in part by the cost. For example, in Turkey the cost of a year of treatment for a person with moderate persistent asthma is about half the monthly salary of a nurse.

7. Occupational asthma constitutes a substantial cause of asthma in the region. As in other regions of the world, occupational asthma remains an important preventable public health problem.

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**Balkans/Turkey/Caucasus/Mediterranean Islands**

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**Number of persons with asthma:** 6.9 m  
**Total population:** 112.4 m  
**Mean prevalence of clinical asthma:** 6.1%
8. Asthma mortality rates are generally low in countries within this region, reflecting to some degree the low prevalence rates.

9. Asthma mortality rates increase with increasing age, a pattern which is seen in most other regions of the world. Even taking into consideration the decline in certification accuracy in the older age groups, it does indicate a considerably greater risk of death in older asthmatics and the importance of asthma care in this group.

10. Socioeconomic factors play an important role in the adverse health outcomes, including those surrounding asthma, caused by the lack of access to appropriate health care.

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Dutu ST, Paun G. Prevalenta unor simptome respiratorii, a astmului bronsic si a bronsitei cronice (simple si obstructive) intr-un esantion reprezentativ pentru o populatie adulta rurala. Pneumoftiziologia 1998; XLVII: 151-60.


Zivkovic Z. Correlation between clinical score, laboratory findings and radiographic changes in acute asthma in children. Thesis: Medical School University of Belgrade, 1991.


Key Points:

1. The prevalence of asthma is generally low in countries within this region, with some of the lowest prevalence rates recorded worldwide.

2. The prevalence of asthma is likely to increase markedly during the next decade due to the rapid changes in lifestyle that are currently occurring within the region. Indeed, in some countries within the region, such as the Czech Republic, asthma is already of a similar prevalence as in countries in Western Europe. The prevalence of asthma is generally higher in urban areas compared with rural areas. With the trend of increasing urbanisation it is likely that this social phenomenon will lead to further increases in the prevalence of asthma.

3. The speed and magnitude of the increase in asthma (and associated bronchial hyperresponsiveness and atopic sensitisation) in the former East Germany (with the changes in lifestyle that have occurred since reunification) indicate the potential burden of asthma facing Eastern Europe, in terms of the likely increase in the prevalence of asthma, as socioeconomic conditions improve.

4. The underestimation of severity of exacerbations, lack of access to medical care, and inadequate treatment contribute to asthma morbidity and mortality within the region.

5. The implementation of locally adapted asthma education and management programmes based on the GINA guidelines has been shown to be effective in terms of changing prescribing and management practices, and reducing morbidity in patients with severe asthma in a number of countries within the region.

6. The poor economic conditions in many countries within the region, together with the low expenditure on health by national governments, represent major barriers to the delivery of health...
care services, including those related to asthma. For example, Russia’s national government expenditure on health, which is currently around 4% of the Gross National Product, is too low to provide adequate health care.

7. Many communities within the region are exposed to high levels of air pollution, greater than those observed in Western Europe. Developing strategies to reduce the level of air pollution remains one of the many public health priorities for the region.

8. Political and public health measures to reduce tobacco smoking also represent important priorities. Russia is the fourth-largest cigarette market in the world and one of the fastest growing. While cigarette sales have fallen in many Western countries over the last decade, they have increased in Eastern Europe and the former Soviet Union during this period.

9. Occupational asthma remains an important problem in the region, with workplace exposures to various substances often considerably greater than that recommended by national and international standards. Reducing the workplace exposures to within safe limits represents one of the priorities in terms of occupational safety and health. Epidemiological investigations of adults exposed to radiation while working in the contaminated zone after the Chernobyl accident, in which the prevalence of asthma was observed to be over five times greater than in a non-exposed population, illustrate that an increased risk of asthma is amongst the health risks in people exposed to significant levels of radiation in nuclear accidents.

10. The mortality rate due to asthma is generally higher than would be expected given the relatively low prevalence rates in the region. This is suggested by the high case fatality rates which are likely to be due to a number of factors including access to medical care, particularly medications and acute medical services.

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Tcherniak BA, Buinova SN, Tyarenkova SV. Epidemiology of bronchial asthma (BA) in East Siberia. Eur Respir J 1998; 12(Suppl.28): 198s.

Vondra V, Maly M, Svandova E, Reisova M. Mortality due to chronic obstructive pulmonary disease in the Czech Republic in the past 50 years. Studia Pneumologica et Phthiseologica 2002; 62(5): 159-65.


Key Points:

1. The prevalence of asthma is generally low within the Middle East, although high rates have been recorded in the Kingdom of Saudi Arabia, Kuwait, Lebanon, and Israel.

2. The prevalence of asthma in migrant communities often differs from that in the resident population in countries in the region. In Israel the prevalence of asthma is three times greater among adults of Ethiopian origin compared with the general population. In contrast, in the Kingdom of Saudi Arabia asthma is less common in the non-Saudi population.

3. Children from refugee camps in the Occupied Territory of Palestine appear to be at greater risk of asthma than children from neighbouring villages and cities. This observation adds further evidence of the major adverse health and socioeconomic conditions present within this community.

4. The available evidence indicates that the prevalence of asthma has increased over recent decades throughout the Middle East.

5. The burden of severe asthma is considerable within the Middle East, with hospital admission rates in excess of 150-200 per 100,000 per year in some of the ‘high prevalence’ countries. For example, in Israel, one in five asthmatic children visits the emergency room per year, and one in ten asthmatic children is hospitalised in the same period due to severe asthma.

6. There remains a gap between available medical knowledge and medical therapy and its utilisation for the benefit of the asthmatic population in the Middle East. Underdiagnosis of asthma is a common problem. In terms of management, both undertreatment and treatment different from that recommended by national and international guidelines commonly occur. In particular, there is an inadequate use of inhaled corticosteroids in the long-term treatment of asthma.
7. The cost and availability of medications represent important barriers to effective management in a number of low- and middle-income countries within the region. For example, in Syria, the cost of a year of treatment for a person with moderate persistent asthma is greater than the monthly salary of a nurse.

8. Programmes based on locally adapted asthma management guidelines have been shown to result in marked changes in prescribing patterns, and reductions in morbidity and mortality from asthma.

9. The level of major air pollutants is considerably above internationally recognised standards, which contributes to severe exacerbations of asthma and to respiratory and all-cause mortality.

10. The use of WHO management guidelines for childhood illnesses, including asthma, is complicated by the similar presentations of respiratory infectious diseases including tuberculosis and pneumonia. This suggests that a more practical, symptom-based approach to the diagnosis of asthma and other respiratory conditions may be required for use at the primary-care level within the region.

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Varsano S. Bronchial asthma in Israel. IMAJ 2002; 4: 661-3.
Central Asia & Pakistan

Key Points:
1. The prevalence of asthma is generally low within Central Asia and Pakistan.
2. The experience in Pakistan, in which the prevalence of asthma symptoms has increased markedly within the last decade, illustrates the potential magnitude by which the prevalence of asthma may increase over a short period.
3. With increasing urbanisation and changes in lifestyle, it is likely that the number of asthmatics will increase further during the next decade.
4. Within the Aral Sea Area, sites with high dust deposition levels do not appear to be associated with higher rates of asthma.
5. The therapy received by many asthmatics is often inadequate, due to numerous factors including the reluctance to use inhaler devices.
6. Inadequate knowledge and widespread misconceptions about asthma and its treatment contribute to the burden of asthma.
7. The lack of access to medications limits the opportunity to obtain good asthma control in many countries in the region.
8. Levels of outdoor and indoor air pollution are generally high within the region and represent an important cause of preventable respiratory illness, including asthma.
9. The mortality data available indicate that asthma case fatality rates are high within the region. This suggests that a disproportionately high proportion of persons with asthma die, compared with other countries.
10. Political, social, and economic factors are major causes of the limited access to health care in the region, which leads to preventable morbidity and mortality from asthma. Improving the political stability and economic wealth of the countries in the region is crucial if the burden of disease, including that from asthma, is to be reduced.

Number of persons with asthma: 9.7 m
Total population: 224.7 m
Mean prevalence of clinical asthma: 4.3%


Hussain SF, Zahid S, Haqee R, Khan JA. Impact of asthma management guidelines on the physicians prescribing practices in an Asian community. (submitted)


Ubaydullaev AM, Uzakova GT. The prevalence of bronchial asthma in Tashkent City (Uzbekistan). Eur Respir J 2002; 20(Suppl.38): 100s.

Southern Asia

Bangladesh  Nepal
Bhutan      Seychelles
India       Sri Lanka

Number of persons with asthma: 42.2 m
Total population: 1,210.0 m
Mean prevalence of clinical asthma: 3.5%

Key Points:

1. There is a wide variation in the prevalence of asthma within Southern Asia. In India, a tenfold variation in the prevalence of childhood asthma has been observed.

2. There has been a marked increase in the prevalence of asthma in Southern Asia over the last two decades with up to threefold increases in children. There has also been a corresponding increase in the prevalence of severe asthma.

3. The region’s industrialisation and urban growth is occurring at an unprecedented rate in what was previously a predominately agrarian society. India is projected to become the world’s most populous nation by the year 2050. As a result, further predicted increases in the prevalence of asthma will result in a marked increase in the number of asthmatics. For example, if the prevalence of asthma in the region increases by an absolute 2%, then this will result in at least an additional 20 million asthmatics in the region.

4. Both underdiagnosis and undertreatment of asthma represent common problems relating to the management of asthma.

5. The limited availability of asthma medications is a major problem in the countries in Southern Asia.

6. The use of WHO management guidelines for childhood illnesses, including asthma, is complicated by the similar presentations of respiratory infectious diseases including tuberculosis and pneumonia. This suggests that a more practical, symptom-based approach to the diagnosis and management of asthma and other respiratory conditions may be required for use at the primary-care level within the region.

7. Low-cost asthma management programmes should be developed to ensure asthma care is available and affordable for all socio-economic sectors within the population.
8. The levels of air pollution in cities in the region are well above the permissible levels recommended by national and international guidelines. Indeed, large parts of the Indian and Bangladeshi urban populations are exposed to some of the highest air pollutant levels in the world. In view of the well-documented association between high levels of air pollution and exacerbations of asthma, and the important role of air pollution as a risk factor contributing to respiratory and all-cause mortality, reducing the level of air pollution remains one of the most important public health priorities in Southern Asia.

9. Occupational asthma is an important problem throughout the region, with high rates of asthma occurring in a wide range of common industries. The Bhopal incident illustrates the risk of acute respiratory mortality and prolonged respiratory morbidity from major industrial accidents. It also highlights the need for adequate prevention of major industrial hazards and the implications of exporting hazardous chemicals and work processes to lower-income countries.

10. Indoor air pollution remains a major risk factor for respiratory disease, including asthma, in Southern Asia. It has been estimated that over half a million premature deaths can be attributed annually to the use of biomass fuels in India.

**FURTHER READING**


Key Points:

1. There are marked regional differences in the prevalence of asthma symptoms within this region, with generally higher prevalence rates being found in more affluent communities. In China, a tenfold variation in the prevalence of asthma has been observed, with the lowest rate in Tibet and the highest rate in Chongqing. The prevalence of asthma symptoms is higher in urban compared with rural communities. With increasing urbanisation and adoption of the Western lifestyle in China, it is likely that the number of asthmatics will increase markedly during the next decade.

2. The greatest burden in terms of increasing asthma prevalence worldwide is likely to occur in China, due to its population and the rate of economic development with associated lifestyle changes. An absolute 2% increase in the prevalence of asthma would result in an additional 20 million asthmatics.

3. The experience in Taiwan, where the prevalence of asthma symptoms increased almost fivefold within a 20-year period, illustrates the potential magnitude of the increase in asthma prevalence that may occur over a short period. It is also interesting that there are different time courses for the increase in different allergic disorders, with the increase in asthma occurring before that for allergic rhinitis and eczema.

4. There is a major burden in the region in terms of severe asthma attacks, with over one in three people with asthma requiring urgent medical care, emergency room visits, or hospital admission. The rate of hospitalisations due to asthma is very high in urban populations in this region, with 10% to 15% of asthmatics requiring a hospital admission within a 12-month period.

5. Lack of access to asthma medications among large proportions of the population in China severely limits the opportunity to obtain...
good asthma control. Low-cost asthma management programmes are required to ensure that asthma care is available for all socioeconomic sectors within the population.

6. Difficulties exist in the diagnosis of asthma, in particular the underdiagnosis of asthma. This is likely to be due to multiple factors including the high rates of respiratory symptoms associated with smoking and infectious diseases, poor access to medical care, and patients' underestimating the importance of their asthma symptoms.

7. The levels of outdoor air pollution in cities in the region are well above those recommended. Air pollution represents an important cause of exacerbations of asthma and a major risk factor for respiratory (and all-cause) mortality in the region. Indoor air pollution also represents a major risk factor for respiratory disease, including asthma, in the region. Indoor air pollution results from the widespread practice of using unprocessed solid fuels for cooking and heating, often in unventilated situations. Reducing the levels of both indoor and outdoor air pollution remains one of the most important public health priorities.

8. The high rate of tobacco smoking represents a major public health problem in the region. There are an estimated 350 million smokers in China, smoking a total of about 2.0 trillion cigarettes per year. One out of every three cigarettes smoked in the world today is smoked in China. The WHO estimates that in 1993, China gained US$ 4.9 billion in cigarette taxes, but lost US$ 7.8 billion in productivity losses and health care costs due to cigarette smoking.

9. Experience to date with asthma guidelines in the region has indicated poor adherence and lack of understanding by health professionals. This highlights the need for further educational programmes, tailored to health professionals in the region, that will result in the required changes in management.

10. China has one of the highest asthma case fatality rates in the world. The asthma mortality rate in rural areas is about double that recorded in urban areas. One of the public health priorities in the region is to ensure that cost-effective management approaches which have been shown to reduce mortality are available to as many persons as possible with asthma.
FURTHER READING


Northeast Asia

Key Points:

1. Japan has one of the highest asthma prevalence rates within Asia. In both Japan and the Koreas there are regional differences in asthma prevalence, with generally higher rates in urban and temperate regions.

2. The prevalence of asthma symptoms and asthma attacks has increased over the last few decades. This trend has occurred both in cities and in rural areas.

3. In Japan the number of asthma patients treated by medical facilities has increased from three cases per day, per 100,000 people 30 years ago, to over 100 cases per day, per 100,000 people currently.

4. There is a major burden from severe asthma in terms of the requirement for hospital admissions. It has been estimated that the number of inpatients with asthma is around 15 cases per 100,000 in the general population in Japan.

5. A number of asthma programmes based on long-term treatment with inhaled corticosteroids have been shown to lead to a marked reduction in asthma severity in populations in the region.

6. The Japanese Asthma Guidelines are a good example of how international asthma guidelines can be modified to take into account local cultural and health system requirements. It is considered that the introduction and use of these guidelines has contributed to a reduction in asthma mortality in Japan over the last decade.

7. Currently around 10,000 people die from asthma in Japan and the Koreas each year. Mortality surveys have identified similar factors contributing to death as have been reported from communities in other regions. These include delays in seeking medical help, over-reliance on beta-agonist therapy, and poor adherence to long-term therapy with underuse of inhaled corticosteroid therapy.
8. In Japan, after 20 years of increasing asthma mortality rates, during which the death rate in young asthmatics increased over two-fold, asthma mortality has begun to fall again over recent years.

9. Outdoor air pollution represents one of the major causes of asthma attacks in the region, and reducing pollution levels represents one of the public health priorities.

10. Work remains an important cause of asthma in adults in Japan and the Koreas. In a number of high-risk occupations, the prevalence of asthma symptoms is around 10% to 20%. Reducing workplace exposure to agents known to cause occupational asthma is another public health priority.

FURTHER READING


Southeast Asia

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<th>Brunei</th>
<th>Malaysia</th>
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<td>Cambodia</td>
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Number of persons with asthma: 17.5 m  
Total population: 529.3 m 
Mean prevalence of clinical asthma: 3.3% 

Key Points:

1. There is a wide variation of asthma prevalence within this region, with the lowest rates in Indonesia and Vietnam and the highest rates in Thailand, the Philippines, and Singapore.

2. There are marked differences in the prevalence of asthma among different ethnic groups in the same community, and among the same ethnic group in different communities. These differences enable the development of community- or ethnic-group-specific education and management strategies.

3. The prevalence of asthma is generally higher in urban compared with rural populations in Southeast Asia.

4. Asthma prevalence appears to be increasing in most countries in the region where serial data are available. It is likely that the prevalence of asthma will increase further as the countries increasingly adopt Western lifestyles and with greater urbanisation.

5. The burden of asthma within the region is considerable with 1 in 4 adults with asthma losing time from work in the last year, and 1 in 3 children with asthma having missed school in the last year due to their asthma.

6. The rate of hospitalisation for asthma is particularly high in Southeast Asia. Inpatient medical care represents the major proportion of asthma costs in a number of countries within Southeast Asia. This situation underlines the importance of implementing public health strategies based on management regimes which have been shown to be effective in reducing hospital admissions.

7. Both under-recognition of asthma severity and undertreatment of the disease represent common problems leading to high asthma morbidity and mortality within the region. Current levels of asthma control in the region fall short of those that can be achieved with modern management.
8. Increasing tobacco consumption represents a major public health problem. Currently Vietnam has the highest male smoking rate in the world, with an estimated 3 of every 4 men smoking. Political and public health initiatives to reduce rates of smoking are a high priority for countries in Southeast Asia.

9. Mortality from asthma is high within the region when underlying asthma prevalence rates are considered. Mortality rates are particularly high in certain defined communities, such as among ethnic Malays in Singapore.

10. Similar to other regions of the world, the highest age-related asthma mortality rates are in the elderly, a group which has often received less attention in terms of intervention strategies.

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Oceania

Key Points:

1. Oceania has some of the highest prevalence rates for asthma in the world for both children and adults.

2. Available evidence indicates that asthma has become more common in both children and adults in the region over recent decades.

3. When people from Southeast Asia and the Pacific Islands emigrate to Australia and New Zealand there is a marked increase in the prevalence of asthma within one generation. For example, the rate of asthma doubles when people emigrate from the Pacific Islands to New Zealand; children born in Australia have about a two-fold greater rate of asthma than those living in Australia but born elsewhere.

4. The hospitalisation rates for asthma have more than doubled in the region over the last 30 years. The rates of increase in hospital admission for asthma have been particularly marked in children. In New Zealand and Australia, asthma is the most common cause of hospital admission in children. Low-income and minority populations experience higher rates of asthma, hospital admissions, and emergency room visits. In Australia more than 60,000 persons with asthma are admitted to hospitals annually.

5. The experience in Papua New Guinea is relevant globally in illustrating the magnitude and speed at which asthma rates can increase when an isolated community makes dramatic changes to its lifestyle. In the highlands of Papua New Guinea asthma was extremely rare in the 1970s, but within 10 years after contact with the outside world and the adoption of certain Western lifestyle practices, asthma had become common and represented a major health problem.

6. Within centres in the region different ethnic groups may have markedly different hospital admission rates, despite similar overall asthma prevalence rates. This indicates that differences in
asthma severity and morbidity may occur in different population groups with similar asthma prevalence and provides the basis for targeted asthma management and education programmes in the high-priority groups.

7. Asthma is one of the highest ranking specific diseases in terms of years lost to disability. This high ranking of asthma reflects a combination of the high prevalence of the disease and the prolonged and severe disability it can cause.

8. The national asthma education and management programmes that have been developed and implemented in Australia and New Zealand represent successful models that can be adopted in other countries. The National Asthma Council in Australia has implemented an integrated multidisciplinary programme over a 10-year period, based on their locally developed guidelines in general practice. The New Zealand programme has been based on the promotion of the guided self-management plan system of care in primary-care practice.

9. The importance of government recognition of asthma as a high priority disorder is illustrated by Australia, where this recognition has led to major public health initiatives. Most recently this has led to the Three Plus plan in which general practitioners are funded to review and manage their asthmatics in a series of three structured consultations.

10. Mortality patterns in Australia and New Zealand over the last 40 years have been dominated by drug-related epidemics, but with the restriction of the specific implicated agents and improvements in management, mortality rates are now similar to those observed in other countries.

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North America

Canada
United States of America

Number of persons with asthma: 35.5 m
Total population: 316.9 m
Mean prevalence of clinical asthma: 11.2%

Key Points:
1. The prevalence of asthma symptoms and diagnosed asthma in Canada and the United States is amongst the highest in the world for both children and adults.
2. The prevalence of asthma is higher in certain racial groups such as Blacks and Hispanics compared with white children, and in urban compared with rural areas.
3. The prevalence of diagnosed asthma and asthma symptoms has increased markedly over recent decades. For example, in the United States the prevalence of diagnosed asthma and asthma symptoms in children and adolescents has been reported to have increased by 25-75% per decade during the period since 1960.
4. The increase in hospital admission rates in the region reflects an increase in the prevalence of severe asthma. In support of this it has been observed that there has been an increase in the percentage of patients hospitalised for asthma requiring intubation, even as the total number of hospital admissions for respiratory diseases has decreased.
5. In the United States the rates of hospital admission for patients of colour compared with white patients are 50% higher in adults and up to 150% higher in children. These trends emphasise the importance of implementing education and management programs that specifically target high-risk groups.
6. The morbidity for asthma is considerable with around 40% of all children and adults with asthma requiring hospitalisation or treatment in the emergency room or requiring other urgent care for the asthma in the previous 12 months.
7. Trends of asthma mortality in the United States contrast with those of most other Western countries in that there has been a progressive increase over the last two decades. The magnitude of
the increase has been substantial, such that the rate of asthma mortality in the mid-1990s was approximately double that in the mid-1970s. One of the priorities in the United States is the further implementation of public health strategies to reduce the number of deaths from asthma.

8. Investigations of asthma-related deaths in the United States and Canada have shown that mortality rates are greater in disadvantaged groups such as Black and Hispanic populations, as well as in those who are poorly educated, live in large cities, or are poor. The reasons for these findings are multifactorial, including differences in prevalence, risk factors for severe disease, asthma management, and access to medical care.

9. The economic burden of asthma is considerable in North America. For example, in the United States it has been estimated that the total direct medical and indirect economic costs of asthma were around US $12 billion in 1994. This represents an increase of over 50% from 10 years before. It is probable that the current economic burden is considerably higher, if a similar rate of increase has been maintained over the last decade. Inpatient hospital services and pharmaceuticals represent the largest direct medical costs.

10. Occupational asthma remains a major problem in North America, with a population attributable risk for adult-onset asthma in high-risk groups of around 20%.

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Central America

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of persons with asthma</th>
<th>Total population</th>
<th>Mean prevalence of clinical asthma</th>
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<td>Belize</td>
<td>5.2 m</td>
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**Key Points:**

1. There is a wide range in the reported prevalence of asthma among different countries within Central America. Countries with documented high asthma prevalence rates include Costa Rica and Panama, whereas the prevalence of asthma is considerably lower in Mexico.

2. There has been a marked increase in the prevalence of asthma symptoms over the last 30 to 40 years within the region. In Mexico alone it has been estimated that in 1997, there were over 120,000 new asthma cases.

3. Persons from Central America who emigrate to the United States experience disproportionate morbidity from asthma in the United States.

4. Many asthmatics use the emergency room as primary health care centres for the management of their asthma. This highlights the importance of developing effective management programmes in primary care to reduce morbidity and mortality from asthma.

5. Inpatient hospital care represents a major component of asthma-related health care costs within Central America. Management programmes focussed on treatment regimes which have been shown to reduce hospital admissions represent a cost-effective strategy for the management of asthma within the region.

6. In most but not all countries in Central America the rates of hospital admission due to asthma have increased markedly over recent decades. For example, in Mexico hospitalisations due to asthma have increased over 10-fold over the last 40 years. This represents a huge toll in terms of morbidity and economic cost. Countries such as Costa Rica, where hospital admission rates have decreased over the last decade, can serve as models of health care which can be established to reduce morbidity from asthma.
7. The cost and availability of asthma medications vary markedly within Central America. In some countries the government supplies all medications free, while in others there is limited government provision of medications and many patients are unable to afford medications through the private sector.

8. Poor socioeconomic status and limited access to health care are likely to be responsible for the frequent undertreatment of asthma and inappropriate prescribing practices seen in the region, and contribute to the substantial morbidity and mortality from asthma.

9. An important cause of severe attacks of asthma requiring hospital admission is air pollution, particularly photochemical pollutants (of which ozone is an important component). Reducing air pollution remains one of the public health priorities for a number of countries, particularly Mexico, because of its potential to reduce not only asthma morbidity, but also overall mortality, particularly in the elderly.

10. Asthma mortality rates are generally high within Central America. For example, Mexico has a death rate of 5.6 per 100,000 with over 4,000 deaths per year due to asthma.

FURTHER READING


Key Points:

1. The prevalence of asthma is generally high within Caribbean countries.

2. In children the prevalence of asthma has increased markedly in parts of the Caribbean over recent decades. For example, in Barbadian schoolchildren the prevalence of asthma has reportedly increased from 1% in 1970 to 15% in 1996.

3. The prevalence of severe asthma also appears to have increased markedly over recent decades in many parts of the Caribbean. For example in Barbados between 1970 and 1990, the rate of Accident and Emergency admissions for asthma increased 10-fold.

4. Immigrants from the Caribbean experience a disproportionately higher prevalence and morbidity from asthma following emigration to the United States.

5. The dependency of many asthmatics on the emergency room for asthma management indicates the requirement for improved primary health care programmes within the region.

6. The observation that asthma attacks are more frequent during periods of the Saharan dust cloud cover indicates the potential effect that environmental changes resulting from global warming have on asthma worldwide.

7. Asthma represents an important cause of hospital admissions on many Caribbean islands, particularly in children. The high admission rates represent a major burden in terms of life-threatening attacks, morbidity, and economic cost. For example, in Puerto Rico in a random population sample, around 1 in 4 persons with asthma reported a previous hospital admission.

8. On some Caribbean islands, prescribing practices are inconsistent with modern management of asthma. For example, on St Lucia, Grenada, and St Kitts and Nevis, oral preparations of
beta agonists and corticosteroids are prescribed most frequently, with inhaled preparations prescribed far less frequently.

9. The Caribbean Guidelines for Asthma Management and Prevention represent a good model of how international guidelines may be modified for local implementation. This model includes non-pharmaceutical funding for the initiative, a workshop with multidisciplinary local and international experts, and publication in a regional medical journal as part of the implementation strategy.

10. Limited asthma mortality data are available within the region. In Cuba it is apparent that the death rate from asthma increased markedly between the 1970s and 1990s. While the causes for this trend are likely to be multifactorial, the lack of medicines resulting from the trade embargo imposed by the United States is likely to be a significant factor.

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South America

<table>
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<tr>
<th>Argentina</th>
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Number of persons with asthma: 34.7 m
Total population: 350.4 m
Mean prevalence of clinical asthma: 9.9%

Key Points:

1. The prevalence of asthma in South America is generally above the average for countries worldwide. Countries with childhood asthma prevalence rates in the top quartile of countries worldwide include Peru, Brazil, Paraguay, and Uruguay.

2. The prevalence of asthma in childhood in many countries in South America is higher than that in Spain and Portugal, and other former Spanish or Portuguese colonies such as Macau, Cape Verde, and Madeira.

3. The prevalence of asthma in South America does not seem to relate to industrialisation or economic wealth. In contrast to the trends seen in other regions of the world, asthma prevalence is higher in poorer cities than in cities with a higher socioeconomic level. This suggests that lower socioeconomic status is a risk factor for asthma within the region.

4. The limited data available suggest that the prevalence of asthma has increased markedly in different countries in South America over recent decades.

5. Throughout the region the lack of adequate treatment of asthma remains a common problem, and is primarily due to the cost of medical care including pharmaceuticals. The lack of government funding of pharmaceuticals has resulted in a situation where the private sector constitutes about three-quarters of the total pharmaceutical market in South America.

6. Despite socioeconomic constraints, there are a number of examples in the region where the health of asthmatic children in low-income communities has been markedly improved through the implementation of adapted asthma management guidelines and related educational programmes.
8. Asthma mortality is generally high in South America, although there is a wide range of mortality rates in different countries in this region.

9. The effectiveness of modern management in reducing mortality in the region is illustrated by Argentina, where there has been a progressive decline in asthma mortality over the last decade in association with marked changes in management, particularly an increasing use of inhaled corticosteroid therapy.

10. Air pollution is sufficiently severe in some of the major cities in South America that it increases both general mortality rates and death rates due to respiratory disease, including asthma. The different government strategies to reduce air pollution represent important public health initiatives in many countries in South America.

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North Africa

Algeria    Chad    Egypt
Libya    Morocco    Niger
Sudan    Tunisia

Number of persons with asthma: 7.7 m
Total population: 196.5 m
Mean prevalence of clinical asthma: 3.9%

Key Points:
1. The prevalence of asthma is generally low in the countries within this region.
2. Marked regional differences in the prevalence of asthma occur within countries in North Africa. For example, over fivefold differences in the prevalence of asthma have been noted in Algeria between the rural mountain and urban coastal areas.
3. The prevalence of asthma has increased markedly over recent decades, having previously been uncommon within North African countries.
4. It is anticipated that, with increasing Westernisation of lifestyle and continued urban shifts in population, the burden of asthma will increase considerably in coming years.
5. Asthma is a common cause of emergency room visits and hospital admissions. For example, in some areas of Egypt asthma is the most common cause of hospital admission for a respiratory complaint in adults.
6. The burden of asthma is higher than generally recognised, particularly in children. For example, in Egypt up to one in four children with asthma is unable to attend school regularly because of poor asthma control.
7. There are major inequities in asthma care in the low-income countries within North Africa. This results in good quality care being limited to high socioeconomic sectors of the community.
8. The limited availability of asthma medications represents a major problem, contributing to the undertreatment of both chronic asthma and acute severe attacks.
9. Although mortality rates for asthma are low in absolute terms throughout the region, when the prevalence rates of severe asthma are considered the derived case fatality rates are relatively higher.
10. Social and economic factors including the limited access to health care are major contributors to morbidity and mortality from asthma in North Africa. Improving the economic wealth of the countries is crucial if the burden of disease, including that due to asthma, is to be reduced in the region.

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West Africa

| Number of persons with asthma: | 13.7 m |
| Total population:             | 239.5 m |
| Mean prevalence of clinical asthma: | 5.7% |

Key Points:

1. The prevalence of asthma is generally low within countries in West Africa.

2. The prevalence of asthma is higher in urban communities of high compared with low socioeconomic status, and lowest in rural communities.

3. The prevalence of asthma has increased over recent decades, having previously been rare within the countries that make up this region. For example, in 1975 no cases of asthma could be found among over 1,000 children and adults in a rural Gambian community, whereas 3% of a rural Gambian population reported current asthma symptoms in 1997. With increasing urbanisation and lifestyle changes it is likely that the prevalence of asthma will increase further in West Africa over the next decade.

4. While communicable diseases remain the major public health problems within the region, certain non-communicable diseases including asthma are increasingly recognised as contributing significantly to the overall burden of disease.

5. A major barrier to effective management of asthma in the region is the cost and availability of medications. In a number of countries inhaled beta-agonist and corticosteroid therapy are not included in the national essential drug lists, even though they are now recommended for inclusion by the WHO. Drug selection, procurement, and distribution present the greatest problems, especially in countries with the greatest need.

6. Both underdiagnosis and undertreatment of asthma contribute to the morbidity from asthma within the region. The overlap of asthma symptomatology with tuberculosis and other pulmonary infections, which remain common and important respiratory
problems within the region, leads to practical difficulties in the
diagnosis of asthma.

7. The wide variation in medical practices in West Africa indicates a
need for guidelines for asthma management. However, practical
constraints which exist in this region preclude the adoption of
international guidelines without local modification. Such locally
developed guidelines need to take into account local
circumstances, such as drug availability and cost and other
healthcare resources.

8. The majority of asthma deaths in the region are "preventable." As in
other regions of the world, it should be possible to reduce mortality by
overcoming the common avoidable factors which contribute to asthma fatalities.

9. Public health campaigns to reduce the rates of tobacco smoking
represent an important priority for the region. Although there are
severe funding limitations, some of the most successful public
health campaigns have been carried out by non-governmental
organisations. For example, the Anti-Tobacco Movement of
Senegal was awarded the Gold Medal from the WHO for its
youth programmes.

10. Social and economic factors including the limited access to
health care are major contributors to morbidity and mortality
from asthma in West Africa. Improving the economic wealth of
the countries is crucial if the burden of disease, including that
due to asthma, is to be reduced in the region.

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East Africa

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<th>Country</th>
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<td>Burundi</td>
<td>Kenya</td>
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Number of persons with asthma: 10.1 m  
Total population: 230.2 m  
Mean prevalence of clinical asthma: 4.4%

Key Points:

1. The prevalence of asthma is variable within East Africa, with low rates in Ethiopia but relatively high rates in Kenya.
2. The prevalence of asthma is higher in urban compared with rural areas. The magnitude of the urban-rural differences has lessened over recent years due to the relatively greater increase in asthma prevalence in rural communities as they increasingly adopt Western lifestyles.
3. With the continued trend for those in rural communities to move to urban centres and the general improvement in living standards, the prevalence of asthma within the region is likely to further increase over the next decade.
4. While the burden of asthma is significant in East Africa, the most prominent health problems remain overwhelmingly those of poor housing, malnutrition, and infectious diseases (amongst which HIV/AIDS is increasingly important).
5. The treatment received by many asthmatics is often inadequate. There is reliance on oral rather than inhaled therapy and prophylactic medicines are insufficiently prescribed.
6. The limited availability and high cost of medications seriously limit the management of asthma in the region, leading to preventable morbidity and mortality.
7. The diagnosis of asthma is difficult due to the lack of health care facilities and the overlap of clinical signs and symptoms with other respiratory conditions such as pneumonia in children. This issue has been addressed with the inclusion of asthma in the Integrated Management of Childhood Illness (IMCI) strategy.
8. Occupational asthma is a significant problem in East Africa with increasing industrialisation. Occupational asthma occurs in a wide range of industries and represents a preventable cause of morbidity.
9. It has been estimated that only a minority of asthma cases in need of medical care actually receive such review. This provides an insight into the magnitude of the asthma burden that is unrecognised in East Africa.

10. Social and economic factors including the limited access to health care are major contributors to morbidity and mortality from asthma. Improving the economic wealth of the countries is crucial if the burden of disease, including that due to asthma, is to be reduced in the region.

FURTHER READING


Southern Africa

Key Points:

1. The prevalence of asthma is higher in Southern Africa than in many other regions in Africa.
2. Asthma is considerably more common in urban compared with rural areas. For example, in Zimbabwe the prevalence of exercise-induced asthma is 25 times higher in urban compared with rural communities, where asthma is rare.
3. There is a major preventable burden of asthma in the region due to under-recognition and undertreatment, which are both in part related to limited access to health care.
4. Asthma is a common cause of admission to hospital in the region, particularly in children. In the case of South Africa, asthma is the third most common cause of hospital admission in children, after pneumonia and gastroenteritis.
5. In South Africa the number of admissions to hospital for asthma has increased markedly over the last few decades, with the greatest increase occurring among infants. This suggests that the burden of severe asthma has increased markedly during this period.
6. In Southern Africa, mining-related diseases such as pneumoconiosis remain the leading occupational respiratory diseases, but occupational asthma is becoming increasingly prevalent as non-mining industrialisation expands. Occupational asthma now represents the second most frequently reported occupational respiratory disease. The surveillance programme established in South Africa (SORDSA) represents a good model for use in other countries to provide useful information on which to base prevention activities.
7. Ethnic factors and socioeconomic status have only a modest effect on asthma prevalence but a large effect on asthma
hospitalisation and mortality rates. Improving the overall socioeconomic status of communities in the region represents a priority if the burden of disease, including that due to asthma, is to be reduced.

8. The combination of changes in health services designed to improve access to and quality of asthma management and education in South Africa, and a national education programme based on locally adapted guidelines, represents a good model for other countries in Africa to follow. The locally adapted guidelines, including those developed for children, provide a simple and practical approach applicable to local circumstances.

9. Despite progressive reductions over the last few decades, asthma mortality remains high within the region. For example, in South Africa among 5- to 34-year-olds the asthma mortality rate has decreased by 0.13 deaths per 100,000 per year over recent decades, however at 1.5 it still represents a relatively high rate internationally and is associated with the fifth-highest case fatality rate in the world.

10. Asthma mortality rates are disproportionately higher in certain racial groups within the region. In South Africa the rates are highest amongst people of mixed race, followed by Blacks and then whites. The majority of asthma deaths in the region occur outside hospitals. Poor availability of health care, poor transport and emergency services, and inadequate home management of acute asthma are recognised as important contributing factors.

FURTHER READING

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