



# Level of asthma control and health care utilization in Asia-Pacific countries



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## KEYWORDS

Global Initiative for Asthma (GINA) guidelines; Healthcare utilization; Long term maintenance medications; Oral steroids; Productivity

## Summary

**Background:** Data on the impact of asthma in many countries in the Asia-Pacific region is limited. This study investigated whether partly- and uncontrolled asthma were associated with increased medication use/healthcare utilization and productivity loss among a population of asthma patients from nine Asia-Pacific countries.

**Methods:** We used cross-sectional data from 3630 asthma patients  $\geq 12$  years from the 2011 Asia-Pacific Asthma Insights and Management (AP-AIM) survey. Using Global Initiative for Asthma (GINA) guidelines, patients were categorized as having well-controlled, partly- controlled, or uncontrolled asthma. Chi-square tests were used to assess the relation of degree of asthma control with utilization of asthma medications, health services, productivity, and mood.

**Results:** Overall, 7.6% of the patients surveyed had asthma that was well-controlled, with the highest proportions in Singapore (14%) and the lowest in India (0%) and China (2%). Patients whose asthma was not well-controlled reported greater use of asthma medications, more emergency healthcare visits or hospitalizations for their asthma, and more interference of their mood due to asthma. They also reported significant decreases in productivity due to asthma.

**Conclusions:** Patients who did not have well-controlled asthma had greater utilization rates of asthma medications and healthcare services and were more likely to report missing multiple days of work/school compared to patients whose asthma was well-controlled. These associations suggest that emphasis on improving asthma control could have dramatic effects on patient well-being and utilization of healthcare resources.

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## Introduction

A World Health Survey conducted in 2002–2003 estimated that 3–6% of the 4.2 billion residents of Asian-Pacific countries have asthma and, although data are sparse, the prevalence of asthma in most of these countries is believed to be increasing [1–3]. Asthma causes significant morbidity in Asia-Pacific countries. In the 2003 Asthma Insights and Reality in Asia-Pacific (AIRIAP) Study, 44% of the respondents reported at least one unscheduled emergency healthcare visit for treatment of asthma in the previous year [4]. Additionally, some of the highest mortality rates from asthma are in Asia-Pacific countries [1]. Although affordable medications that have been shown to be highly effective at managing asthma have been available since the 1990s [5], the majority of patients worldwide, including in Asia-Pacific countries [6], do not have well-controlled asthma. The economic burden of asthma in terms of both direct and indirect costs has been shown to be substantial—a recent U.S. study estimated that the total annual cost of asthma was \$56 billion [7] and substantial costs have also been attributed to asthma in Asian-Pacific settings [8,9]. Because the economic and societal impacts of asthma are almost certainly correlated with disease severity, we conducted these analyses to shed light on the relationship between degree of asthma control and utilization of health services and reduced productivity.

Over the past decade, physiological measurements of asthma control, such as forced expiratory volume in one second (FEV<sub>1</sub>), have been replaced with symptom and quality-of-life questionnaires to define asthma control. The Global Initiative for Asthma (GINA) and the United States National Asthma Education Prevention Program (NAEPP) revised their guidelines to focus on regulating asthma symptoms, rather than lung function, in order to maintain normal daily activity levels [10,11]. We recently conducted studies on asthma patients in the U.S. and in Latin America that demonstrated that asthma that is not well-controlled according to GINA guidelines is associated with increased rates of adverse outcomes compared to asthma that is well-controlled [12]. The purpose of the current study was to investigate whether partly- and uncontrolled asthma are associated with outcomes such as increased medication use, visits to healthcare providers, hospital admissions, and decreases in productivity among a population of asthma patients from nine Asia-Pacific countries. Determining whether uncontrolled asthma is associated with these costly health outcomes is an important step toward lessening the burden of this disease in these countries.

## Methods

### Asia-Pacific Asthma Insights and Management (AP-AIM) survey

Details about the Asia-Pacific Asthma Insights and Management (AP-AIM) survey have been described previously [6]. In brief, the cross-sectional AP-AIM survey was designed to complement the United States AIM (US-AIM) survey and was conducted from February–July 2011. Subjects included in our analyses were

3630 asthma patients  $\geq 12$  years old identified from a sample of 57,131 households in Australia, China, Hong Kong, India, Malaysia, Singapore, South Korea, Taiwan, and Thailand. These countries were non-randomly selected based on population size, accessibility, and cost of survey implementation. Patients were selected by random digit dialing and interviews were conducted by telephone in Australia, China, and Hong Kong. Patients were selected by random face-to-face interviews at pre-specified locations and were conducted in person in the remaining countries. Both telephone and in-person interviews averaged 35 min in length. For subjects between 12 and 17 years, the survey was completed by a parent or guardian. In order to be included in this study, patients had to have answered that they had been diagnosed with asthma AND that they were currently taking medications for their asthma or they had had an asthma attack or asthma symptoms in the previous 12 months. The 53 questions in this survey were drafted in English as part of the US-AIM survey and were then translated into local languages. The questions were designed to assess asthma burden (short- and long-term symptoms, functional impact, and healthcare utilization such as provider visits and use of asthma medications) and patient beliefs on appropriate use of medications for asthma control. Patients were also asked to assess their (or their children's) productivity on a scale of 0–100% on both typical days and on days when their asthma was at its worst. Additionally, demographic variables, such as gender, age, smoking status, education level, and diagnosis of nasal allergies, were also queried.

### Classification of asthma control

Patients were characterized based on GINA guidelines [10] into three categories of level of asthma control: well-controlled, partly-controlled, and uncontrolled (Table 1). The manifestations of asthma that were used for the categorizations included daytime symptoms, restriction of daily activities, nighttime symptoms, and need for reliever/rescue treatment. We used questions from the surveys that correlated with the GINA-defined asthma manifestations, with the exception of a lung function measurement  $< 80\%$  predicted, because lung function measurement data were not obtained.

### Statistical analysis

Frequencies, chi-square, and Fisher's exact tests were calculated for demographic variables such as age, gender, country of residence, family history of asthma, and level of education. Next, using chi-square tests, differences by GINA-defined level of asthma control in rates of utilization of asthma-related medications, use of healthcare services, and effects of asthma on patient mood and productivity were examined. For an analysis of the relationship of level of asthma control with productivity and the number of days of missed school/work, Kruskal–Wallis tests were used to detect the significance of the means of the different levels of asthma control.

All analyses were conducted using SAS for Windows, Version 9.3 (SAS Institute, Inc, Cary, NC).

Because the data used for this paper did not include individually identifiable data, nor could the data be linked to specific individuals, this study was deemed not to meet the

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