

Trends of Asthma in Mexico*

An 11-Year Analysis in a Nationwide Institution

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Study objectives: Asthma prevalence is increasing in many countries. Some recent articles, however, claim that this tendency is ending. Our aim was to investigate asthma trends in Mexico.
Design: Annual data on health services provided to asthmatic patients were retrospectively analyzed from 1991 to 2001.

Setting: The Instituto Mexicano del Seguro Social, the largest nationwide medical institution in Mexico (approximately 24 to 32 million insured subjects).

Participants: Health services provided to subjects of any age.

Interventions: None.

Measurements and results: Asthma-associated health services, either expressed as absolute number or as rate per insured subjects, progressively increased until 1997 in family physician office visits (FPOVs) [newly diagnosed cases only], emergency department visits (ERVs), and hospital discharges (HDs). From that year onward, the number and rates of asthma-associated health services decreased. The same trends were observed for age groups 0 to 4 years, 5 to 14 years, 15 to 44 years, and 45 to 64 years. Using a different approach, asthma was diagnosed each year in approximately 0.4% of all FPOVs, but a decrease in this percentage was observed from 1997 onward. Likewise, asthma caused increasing percentages of all ERVs and HDs until 1997, followed by a sharp decline thereafter.

Conclusions: A decline in absolute and relative numbers of asthma-associated health services occurred over recent years in all medical settings, suggesting that the epidemic of new asthma cases is ending and/or that better control of the disease has been achieved.

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Key words: asthma epidemic; asthma epidemiology; health services; time trend

Abbreviations: ERV = emergency department visit; FPOV = family physician office visit; HD = hospital discharge

The rising worldwide trend of asthma remains a major medical concern. Studies carried out in the same population and with the same instruments have corroborated this increment in many regions of the world.^{1–8} In Latin America, scant information is available concerning this issue; although suspected,

to our knowledge such an increase in asthma rates has not been documented. However, some studies^{9–13} showed that a plateau or diminution in the

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frequency of asthma cases apparently has occurred over the last years. Thus, in order to assess temporal trends of asthma in Mexico, we investigated the number of health services provided to asthmatic patients in the largest nationwide medical institution with a close population of insured subjects. This approach, although not completely comparable to data obtained by large population-based surveillance studies, allowed us to draw an estimate of asthma trends.

MATERIALS AND METHODS

This study was conducted at the Instituto Mexicano del Seguro Social, the largest nationwide institution devoted to provide social

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services and health care for nongovernment workers and their families (wife or husband, parents, and sons or daughters up to 17 years old). The total insured population registered with a family physician was 23.9 million subjects in 1991 and 31.8 million in 2001. This insured population comprises approximately one third of the Mexican population and roughly coincides with national age, gender, and socioeconomic distribution. Institutional facilities include > 1,195 medical units with family-physician outpatient departments (primary level of medical care), > 220 general hospitals (second care level), and > 25 specialized hospitals (tertiary care level) distributed throughout the 32 Mexican states. Each unit registers on a day-to-day basis each medical service provided to its insured population. In these units, trained personnel carry out codification of diagnoses made by physicians. The quality of information is continuously monitored at the State level by specialized staffs, who apply corrective measures when needed. This information is centralized regionally and then nationally; we obtained data from this last information source.

Health services provided from 1991 to 2001 to asthmatic patients of all ages due to asthma were identified as those coded as 493 (from 1991 to 1997) or J45 plus J46 (from 1998 to 2001) according to the ninth or tenth International Classification of Diseases, respectively. Information on total number of health services provided to subjects of all ages for all conditions was also obtained for the same time period. Thus, two sets of data were obtained, pertaining either to asthma or to all conditions. Each set of data included family-physician office visits (FPOVs), emergency department visits (ERVs), and hospital discharges (HDs). In the case of FPOVs, only visits in which a new diagnosis was established for the first time in the patient were taken into account (*ie*, newly diagnosed cases). Analysis of data was carried out through evaluation of the following: (1) absolute number of health services, (2) absolute number of health services in relation to insured population (*ie*, rate of health services per 100 or 100,000 insured subjects), and (3) percent of asthma-associated health services in relation to health services for all conditions. Additionally, age-adjusted rates of newly diagnosed asthma were calculated from 1991 to 2000. Spearman rank correlation coefficient (r) was used to evaluate some trends, and statistical significance was set at $p < 0.05$ bimariginally.

RESULTS

Trends of absolute number of asthma-associated health services in the different settings are displayed in Figure 1, along with corresponding absolute number of total health services for all conditions. A progressive increment in the number of asthma-associated health services was evident in all settings until 1997 ($r = 0.96$ to 1 ; $p < 0.001$). From 1997 onward, number of services required by these patients sharply declined so as to reach again in 2001 the initial levels observed in 1991.

The number of total health services for all conditions in FPOVs and ERVs had an initial rising trend followed by stabilization or decrease in the last 2 years. In the case of HDs, the number was roughly constant during the entire period studied, with a small increment in the last 3 years.

When the previously mentioned absolute figures were adjusted by the number of insured subjects (Fig 2), curves for trends followed a somewhat

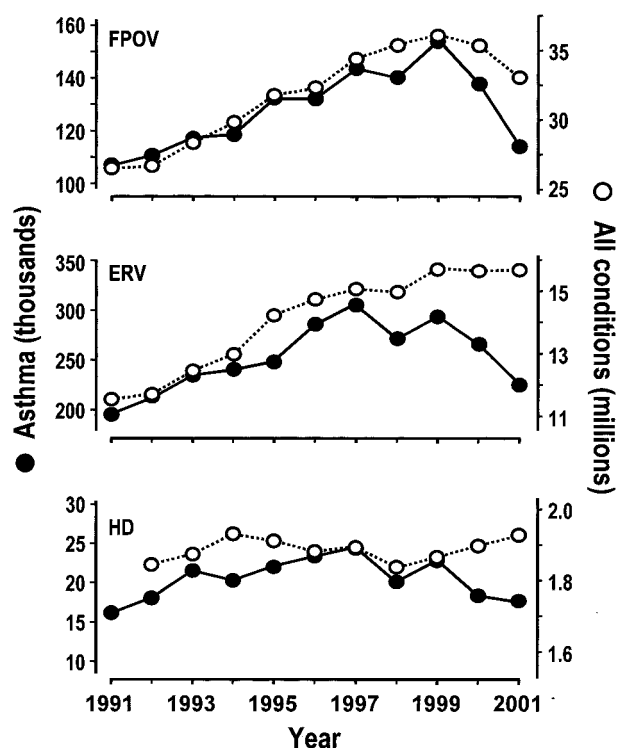


FIGURE 1. Absolute number of health services motivated by asthma (closed circles) or by all conditions (open circles).

similar pattern. Thus, nearly all curves showed an initial increasing trend ($r = 0.81$ to 0.96 ; $p < 0.05$), reached a plateau around 1995 and 1998, and showed a decline in the following years. The sole exception was the trend of HDs for all conditions, which showed progressive decline throughout the period. Small divergences of pairwise curves were evident in all settings for the last 4 to 5 years, with a steeper decline in asthma-associated health services in comparison with health services for all conditions.

Due to similarities between trends in health services for asthma and health services for all conditions, the ratio between both variables, expressed as percentage, was also calculated (Fig 3). With this approach, the percentage of health services for asthma was approximately 0.4% of all FPOVs until 1997 ($r = 0.46$, $p = 0.29$), with a subsequent decrease ($r = -0.90$, $p = 0.037$). This percentage was more variable in ERVs and HDs, with an initial increasing trend until 1997 ($r = 0.75$, $p = 0.052$, and $r = 0.94$, $p = 0.005$, respectively) and a sharp decrement thereafter ($r = -1$, $p < 10^{-6}$, and $r = -0.90$, $p = 0.037$, respectively).

Age-adjusted rates of newly diagnosed asthmatics (FPOVs) showed an initial increasing trend in nearly all age groups ($r = 0.86$ to 0.96 , $p < 0.05$) followed by a plateau between 1995 and 1997, and then a decline (Fig 4). The only exception was the ≥ 65 -

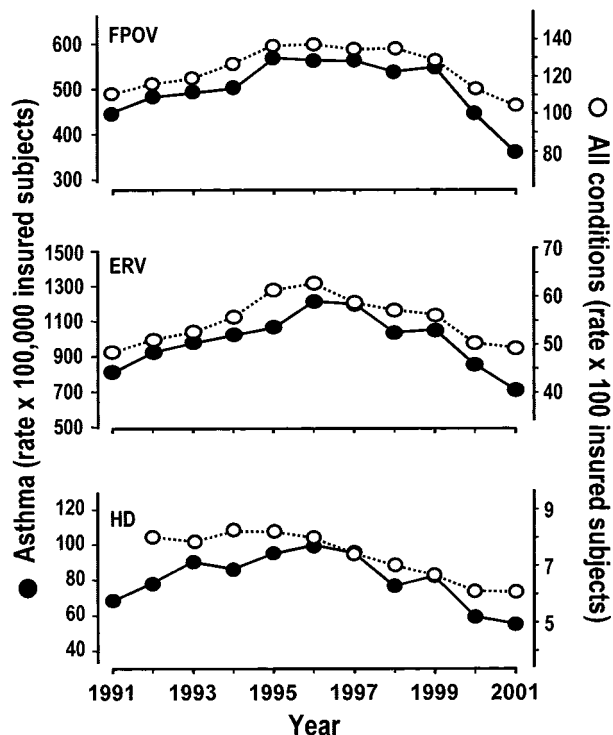


FIGURE 2. Annual rates of health services motivated by asthma (closed circles) or by all conditions (open circles).

year age group, which showed a continuous decreasing trend throughout the studied period.

DISCUSSION

From a number of years ago, medical institutions and physicians in Mexico as well as those in many parts of the world¹⁻⁸ have perceived that the number of patients with asthma requesting health services has been constantly increasing. In agreement with this, in the present study we found that a global increment in absolute number of health services for asthma took place in all settings until 1997. This increment was followed by a stabilization phase or more commonly by a notable decrease in subsequent years. When expressed as rate per 100,000 insured subjects, which in epidemiologic research is a more appropriate notation than crude data, these figures showed a similar trend to that for absolute numbers. Thus, at first glance it appeared that health services for asthma progressively increased as to peak from 1995 to 1997, and that a strong decline occurred thereafter in almost all settings. A similar trend was found at the Instituto Nacional de Enfermedades Respiratorias in Mexico City, a tertiary-level referral center specializing in respiratory diseases that provides medical care to the open population. While in

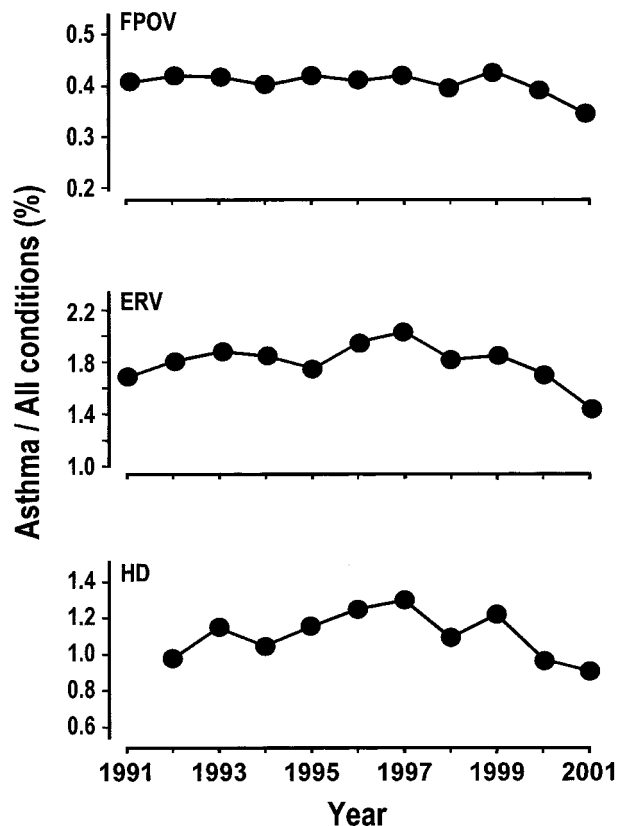


FIGURE 3. Annual variations in the health services for asthma, expressed as percentage of total health services (for all conditions).

1986 newly diagnosed asthma represented approximately 13% of all first-time visits in this center, by 1996 this figure had risen to nearly 30%, followed by a decline in the last 5 years (data not shown).

Contrasting with the large number of reports demonstrating increasing trends in asthma preva-

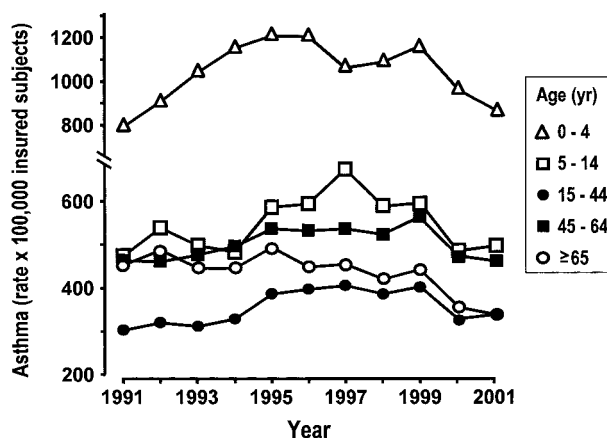


FIGURE 4. Age-adjusted annual rates of newly diagnosed asthma cases in the family-physician office setting.

lence, at least five articles have described a plateau or decrease in trends of asthma frequency in recent years. In 2000, Fleming et al⁹ analyzed data from approximately 680,000 patients visiting general practitioners in England and Wales from 1989 to 1998 and found that new episodes of asthma peaked in 1993, with a downward trend thereafter. In 2001, Ronchetti et al¹⁰ reported the comparison of three surveys conducted in schoolchildren in Rome in 1974, 1992, and 1998. While they found a significant increase in asthma prevalence between 1974 and 1992, a subsequent stabilization phase was observed in the period from 1992 to 1998; thus, they concluded that increase in asthma prevalence has probably come to an end. Two articles published in 2002 analyzed some of the major US nationwide health statistics to evaluate asthma trends. From the National Health Interview Surveys, Akinbami and Schoendorf¹¹ found a 4.3% annual increase in 12-month asthma prevalence between 1980 and 1996 in a pediatric population, while an equivalent 73.9% increment was found by Mannino et al¹² in adult subjects in the same period. Although both studies found that a plateau was reached in the subsequent years (from 1997 to 1999), changes in population sampling and in items of this interview complicated interpretation of this stable tendency, and the authors concluded that additional years of data collection are needed to confirm a change in asthma trends. Finally, Senthilselvan et al¹³ analyzed the Saskatchewan Health Department (Canada) database from 1991 to 1998. They concluded that asthma prevalence increased during the 1980s and early 1990s, but was stable or in decline during the latter part of the 1990s.

Unexpectedly, in our study we found that total health services also followed a similar trend to those motivated by asthma (an initial rising trend followed by a stabilization or decrease). The cause of these changes in number and/or rate of total health services is unclear. It is possible that changes in health services utilization due to economic deterioration (personal or institutional) or disproportionate growth of insured population could be involved. Nonetheless, whatever the cause of variations in trends of total health services, it is clear that asthma-associated figures might be just reflecting the general trend of all other diseases. Thus, in this situation other estimators may be more reliable than rates per insured subjects. In this context, the number of health services provided to asthmatic patients expressed as a percentage of total health services showed that proportion of services for asthma remained unvarying or increased until 1997, when progressive decline in all medical settings began. Therefore, even with this additional index of asthma trends, it appears that in the last few years the frequency of asthma services

is gradually diminishing, a feature much more noteworthy in ERV and HD settings.

Asthmatic patients seeking medical care in an emergency department or needing hospital admission for asthma exacerbations are mainly those with the most severe forms of the disease; thus, both ERVs and HDs can be considered as markers of severe asthma. Within the last decade, improvement achieved in asthma diagnosis and treatment as well as diffusion of guidelines to the medical community have led to better management of the asthmatic patient.^{14,15} Thus, the substantial decline of asthma-related ERVs and HDs in the last years might be explained by achievement of better control of the disease through educational and preventive measures, especially through the use of inhaled steroids and better techniques for drug delivery. However, a possible alternative explanation is that in recent years patients with newly diagnosed asthma tended to have milder forms of the disease, as was found in other countries.^{16,17}

In the United States, the ERV rate (per 100,000 population) for asthma was approximately 575 in 1992, progressively increased to approximately 752 in 1998, and then declined to approximately 582 in 2001¹⁸; within this context, ERV rates for asthma were approximately 50% higher in our study. With regard to HDs, rates (per 100,000 population) for asthma in the United States progressively decreased from approximately 196 in 1991 to approximately 167 in 2000.¹⁸ Thus, in the United States, HDs for asthma almost doubled the corresponding numbers observed in our study. If asthma prevalence was the same in the United States and Mexico, divergence in these rates might reflect differences in asthma control and/or in admission criteria for hospitalization.

Family physicians usually constitute the first contact of sick subjects with the health system; at our institution, those patients with a newly diagnosed disease are registered separately and only once. Thus, the number of first-time visits to the physician's office when obtained within the context of a known population yields a good estimate of the annual incidence of the disease. According to our study, a declining trend of FPOVs has been occurring over the last years, indicating that progressively fewer subjects are becoming asthmatics. Interestingly, this tendency was likely occurring at all age periods, except in subjects aged ≥ 65 years. Obviously, better management of asthma could not account for decline in frequency of new asthma cases. It is difficult to outline a satisfactory explanation for this trend. Introduction of the tenth review of the International Classification of Diseases seems to not fully account for these changes, mainly because it began to be applied in 1998, *ie*, once the asthma plateau was clearly established, and because this new classification only modified code numbers but asthma concepts

remained nearly equivalent to previous code numbers. Moreover, even if the change in asthma codes accounted for the lower absolute and relative numbers observed in 1998, it should be expected that after this adjustment the trend would continue as before. This was not the case, inasmuch as trends progressively decreased thereafter. Increased awareness of the disease among the general population followed by avoidance of known risk factors for asthma is an attractive but improbable explanation, mainly because in Mexico an almost total lack of information on asthma is the rule in the popular mass media. In the absence of a clear explanation, it is reasonable to speculate that those factors that motivated the epidemic increase of new cases of asthma in the last 2 decades weakened in recent years or, less probably, that down-regulating mechanisms were developed by persons exposed to risk factors for asthma.

A potential drawback of our study is that proportion of underdiagnosis or overdiagnosis was unknown. Nevertheless, whatever the degree of diagnostic error, it is probably that such an error remained the same throughout the studied period, mainly because the only nationwide asthma education program for institutional physicians took place in the second half of 2000. Thus, our major conclusions should be essentially the same even with this potential diagnostic bias. On the other hand, regional differences in data collection and codification are unlikely to occur, inasmuch as these activities are regulated and continuously supervised at the institution where the study was carried out.

In conclusion, decline of absolute and relative numbers of health services for asthma occurred within the last years in all medical settings. Although these results suggest that physicians achieved better control of the disease, the decline of newly diagnosed asthma rates also suggests that the asthma epidemic is coming to an end.

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