

# Advance Data



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## Ambulatory Care Visits for Asthma: United States, 1993–94

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### Abstract

**Objective**—This report describes ambulatory visits for asthma in the United States across three ambulatory care settings. The primary focus is on visits to office-based physicians.

**Methods**—The data sources include the National Ambulatory Medical Care Survey (NAMCS), a national probability survey of visits to office-based physicians in the United States, and the National Hospital Ambulatory Medical Care Survey (NHAMCS), a national probability survey of visits to hospital emergency and outpatient departments in the United States. Most estimates presented are annual averages for the 2-year period, 1993–94. Visits for asthma are defined as those for which asthma was the first-listed diagnosis. A trend analysis compares office visit data collected in 1993–94 to data collected in the 1980–81 NAMCS.

**Results**—There was an average annual estimate of 13.7 million ambulatory care visits for asthma in 1993–94, an annual rate of 53.4 visits per 1,000 persons. Four-fifths of ambulatory care utilization for asthma was conducted in physician offices. Relative utilization of office-based physicians was less for adolescent and black patients. The office visit rate for asthma increased 50 percent between 1980–81 and 1993–94. During 1993–94, use of office visits for asthma averaged 43 visits per 1,000 persons or 11 million office visits per year. The office visit rate in the Northeast was almost 2.5 times that in the South, although the prevalence of asthma was similar among regions. There were 5.8 return asthma visits for every new problem encounter. More than 40 percent of asthma visits had one or two comorbidities, mostly other respiratory conditions. Spirometry was used in 28 percent of asthma visits by new patients. Bronchodilators and anti-inflammatory agents were the most common medications prescribed. The use of corticosteroids and beta<sub>2</sub>-adrenergic agonists, either alone or in combination, increased substantially since 1980–81. The rate of utilization of methylxanthines decreased 61 percent between 1980–81 and 1993–94.

**Conclusions**—The patient populations receiving care for asthma vary depending on the ambulatory care setting. Patients relying on hospital outpatient care for chronic asthma conditions may receive differential treatment and have different outcomes compared with patients of office-based physicians. For office-based ambulatory care, visits for asthma have increased substantially since 1980. Medication is the primary method of treatment with an increasing use of anti-inflammatory agents. The preferred bronchodilator has changed from methylxanthines to beta<sub>2</sub>-adrenergic agonists.

### Introduction

Asthma prevalence, morbidity, and mortality are increasing in the United States and other nations (1,2). During the 2-year period 1993–94, there were an estimated 14 million people in the United States with a chronic asthma condition (3,4). As of 1990, the cost of illness associated with asthma was estimated as 6.2 billion dollars (5).

Asthma is a chronic lung disease characterized by temporary obstruction of airflow that leads to breathing difficulty, inflammation of the airways, and increased sensitivity of the airways to a variety of triggers that cause breathing difficulty. The clinical manifestation is called airway hyperresponsiveness where there is an exaggerated broncho-constrictor response to many physical changes and chemical and pharmacologic agents. Asthma patients develop clinical symptoms such as wheezing and dyspnea after exposure to allergens, environmental irritants, viral infections, cold air, or exercise.

The primary method of treatment is through medications that either prevent and reduce the airway inflammation (anti-inflammatory agents) or open the airways by relaxing bronchial smooth muscles (bronchodilator drugs). Corticosteroids and nonsteroidals are types of anti-inflammatory agents. Beta<sub>2</sub>-adrenergic agonists, methylxanthines, and anticholinergics



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Assurance of Confidentiality-All information which would permit identification of an individual, a practice, or an establishment will be held confidential, will be used only by persons engaged in and for the purposes of the survey and will not be disclosed or released to other persons or used for any other purpose.		Department of Health and Human Services Public Health Service Centers for Disease Control National Center for Health Statistics		B		
1. DATE OF VISIT Month / Day / Year		<b>NATIONAL AMBULATORY MEDICAL CARE SURVEY 1993-94 PATIENT RECORD</b>				OMB NO. 0920-0234 Expires 4-30-95 CDC 64.21B
2. DATE OF BIRTH Month / Day / Year	4. COLOR OR RACE 1 <input type="checkbox"/> White 2 <input type="checkbox"/> Black 3 <input type="checkbox"/> Asian / Pacific Islander 4 <input type="checkbox"/> American Indian / Eskimo / Aleut	5. ETHNICITY 1 <input type="checkbox"/> Hispanic origin 2 <input type="checkbox"/> Not Hispanic	6. EXPECTED SOURCE(S) OF PAYMENT [Check all that apply] 1 <input type="checkbox"/> Private / commercial 5 <input type="checkbox"/> HMO/ other prepaid 2 <input type="checkbox"/> Medicare 6 <input type="checkbox"/> Patient paid 3 <input type="checkbox"/> Medicaid 7 <input type="checkbox"/> No charge 4 <input type="checkbox"/> Other government 8 <input type="checkbox"/> Other		7. WAS PATIENT REFERRED FOR THIS VISIT BY ANOTHER PHYSICIAN? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No	8. IS THIS VISIT INJURY RELATED? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No
3. SEX 1 <input type="checkbox"/> Female 2 <input type="checkbox"/> Male	10. PATIENT'S COMPLAINT(S), SYMPTOM(S), OR OTHER REASON(S) FOR THIS VISIT [In patient's own words] a. Most important: b. Other: c. Other:		11. PHYSICIAN'S DIAGNOSES [As specific as possible] a. Principal diagnosis / problem associated with item 10.a. b. Other: c. Other:		9. DOES PATIENT SMOKE CIGARETTES? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No 3 <input type="checkbox"/> Unknown	12. HAVE YOU OR ANYONE IN YOUR PRACTICE SEEN PATIENT BEFORE? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No ↓ If yes, for the condition in item 11a? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No
13. DOES PATIENT HAVE: [Check all that apply regardless of any entry in item 11] 1 <input type="checkbox"/> Asthma 2 <input type="checkbox"/> Diabetes 3 <input type="checkbox"/> HIV 4 <input type="checkbox"/> Obesity 5 <input type="checkbox"/> Osteoporosis 6 <input type="checkbox"/> None of the above						
14. TESTS, SURGICAL AND NONSURGICAL PROCEDURES, AND THERAPIES <span style="float: right;">None <input type="checkbox"/></span>						
a. SELECTED SERVICES [Check all ordered or provided]						
b. ALL OTHER SERVICES [Record one on each line and check performed or ordered for each.]						
Include: • Tests • Imagings • Surgeries and other procedures Exclude: • Services in item 14a • Other therapies (such as contact lens Rx, individual psychotherapy, or physiotherapy) • Counseling / education • Medications						
1 <input type="checkbox"/> Blood pressure	2 <input type="checkbox"/> Urinalysis	3 <input type="checkbox"/> Spirometry	4 <input type="checkbox"/> Allergy testing	5 <input type="checkbox"/> HIV serology	6 <input type="checkbox"/> Other blood test	7 <input type="checkbox"/> Growth / development
Performed	Ordered	Performed	Ordered	Performed	Ordered	Ordered
1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	1 <input type="checkbox"/>
15. COUNSELING / EDUCATION [Check all ordered or provided]						
16. MEDICATIONS / INJECTIONS <span style="float: right;">None <input type="checkbox"/></span>						
17. DISPOSITION THIS VISIT [Check all that apply]						
18. DURATION OF THIS VISIT [Time actually spent with physician]						
1 <input type="checkbox"/> None	2 <input type="checkbox"/> Exercise	3 <input type="checkbox"/> Cholesterol reduction	4 <input type="checkbox"/> Weight reduction	5 <input type="checkbox"/> Smoking cessation	6 <input type="checkbox"/> Growth / development	7 <input type="checkbox"/> Injury prevention
8 <input type="checkbox"/> HIV transmission	9 <input type="checkbox"/> Other STD transmission	10 <input type="checkbox"/> Other	[Include: • Rx and OTC • Immunizations • Allergy shots • Anesthetics • Meds ordered, supplied, or administered • New meds • Continuing meds (with or without new orders)]			1 <input type="checkbox"/> No follow-up planned
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/> Return at specified time
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	3 <input type="checkbox"/> Return if needed, P.R.N.
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	4 <input type="checkbox"/> Telephone follow-up planned
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	5 <input type="checkbox"/> Referred to other physician
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	6 <input type="checkbox"/> Returned to referring physician
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	7 <input type="checkbox"/> Admit to hospital
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	8 <input type="checkbox"/> Other [Specify]
1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	Minutes

Figure 1. Patient Record form

are types of bronchodilator drugs. For a technical discussion of the mechanisms of action for these drugs, see references 1 and 2. Changes in medication patterns from the early 1980's to the present are expected because of recommendations put forward in the late 1980's and early 1990's culminating in national and international guidelines on asthma diagnosis and treatment published in 1991 and 1992, respectively (1,2).

This report presents national annual estimates pertaining to asthma-related ambulatory care visits, averaged over a 2-year period. These estimates are based upon data collected in the NAMCS and

the NHAMCS. Both surveys are national probability sample surveys conducted by the Division of Health Care Statistics of the National Center for Health Statistics, Centers for Disease Control and Prevention. Statistics are presented on patient characteristics, physician practice characteristics, and visit and drug characteristics for visits with a principal diagnosis of asthma.

## Methods

Data were combined across 1993 and 1994 because the survey instruments, definitions, and procedures did not change from 1993 to 1994 for

either the NAMCS or the NHAMCS. The 1993 NAMCS is especially suited for an analysis of asthma visits because it had an oversample of physician specialties that treat asthma. The oversampled specialties included allergy and immunology and pulmonary diseases. The visit sampling weights were formulated to provide national estimates that accounted for the oversampling in 1993. The resulting 2 years of data have been combined to provide more reliable estimates of asthma visits. In most cases, the estimates, percent distributions, and rates presented in this report reflect

average annual estimates based on the combined 1993 and 1994 data. Data from the NHAMCS for 1993 and 1994 do not yield a suitable sample size for a complete analysis of asthma visits by all visit and drug characteristics; however, summary utilization rates are presented.

A copy of the NAMCS Patient Record form, the survey instrument used by participating physicians to record information about their patients' office visits, is shown in [figure 1](#). The NHAMCS Patient Record form for outpatient departments was mostly the same as the NAMCS form, and the NHAMCS form for emergency departments had many items that were identical to the NAMCS form. In item 11 of the NAMCS form, physicians were to record a principal diagnosis (the diagnosis most closely associated with the patient's most important reason for visit) as well as any other current diagnoses. Up to three diagnoses were coded and classified according to the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM) (6). For this report, asthma visits are defined as office visits at which the patient's principal diagnosis was recorded as asthma (ICD-9-CM codes 493.0-493.9). Diagnosis data from the NHAMCS were collected and defined in the same manner.

Up to five medications provided or prescribed at the visit were listed on the Patient Record form. These could be new or continued medications, including prescription and nonprescription preparations, immunizing agents, and desensitizing agents. The Patient Record form does not ascertain which drugs were prescribed for the principal diagnosis versus any concomitant diagnoses, nor does it collect the dosage form, route, or dosing regimen. Overall therapeutic class of the drugs mentioned was determined using the *National Drug Code Directory*, 1985 edition (NDC)(7). Class and subclass of antiasthmatic drugs were further determined using guidelines presented by the National Asthma Education and Prevention Program (NAEPP) (formerly, National Asthma Education Program) in their *Guidelines for the Diagnosis and Management of Asthma* (1) and the

*International Consensus Report on Diagnosis and Treatment of Asthma* (ICR) (2).

Measures of the prevalence of asthma in the United States were obtained from the National Health Interview Survey (NHIS), which is a population-based survey of approximately 49,000 occupied households yielding sample data for 127,000 persons (3,4). For chronic conditions, the NHIS sample was divided into six representative subsamples, each of which was administered a different checklist of types of chronic conditions, one of which included asthma. Respondents were asked to specify the presence or absence of each condition on the checklist.

Prevalence and visit rates presented in this report are based on denominators using the U.S. civilian noninstitutional population as of July 1 of any given year. For combined averaged data for 1993 and 1994, an average population figure was used. Age-adjusted rates were calculated when comparing visit rates over time or between subpopulations. However, since adjusting for differences in the age distribution between comparison groups did not affect the conclusions, they are not presented in this report.

The estimates presented in this report are based on a sample, rather than on the entire universe, of ambulatory care visits, and, as such, they are subject to sampling variability. The Technical notes found at the end of this report include a brief discussion of the sample design, sampling errors, and guidelines for use in evaluating the precision of NAMCS and NHAMCS estimates. The estimates for office visits and drugs mentioned are based on 1,691 sampled visits that had a first-listed diagnosis of asthma from 446 sampled physicians who participated in either the 1993 or 1994 NAMCS. The estimates from the NHAMCS are based on 1,117 emergency department visits and 843 outpatient department visits. Additional reports have been published that summarize general findings from the 1993 and 1994 NAMCS and NHAMCS (8-13).

## Results

In 1993-94, there were 27 million visits made to ambulatory care providers in office and hospital settings in the United States, at which the principal, or first-listed, diagnosis was asthma—an average of 13.7 million visits per year. There were averages of 11 million asthma visits to office-based physicians, 1 million asthma visits to hospital outpatient departments, and 1.6 million asthma visits to hospital emergency departments. For all visits to office-based physicians and hospital outpatient departments, asthma was the sixth most frequently reported morbidity-related principal diagnosis. It was the 11th most frequently reported principal diagnosis in emergency departments. Within each setting, asthma represented about 1.6 percent of visits for all principal diagnoses. It represents slightly higher proportions of case loads for children under 15 years of age and for black patients.

Physician offices were the provider setting of choice for most patients with asthma, accounting for 80 percent of all utilization. The annual rate of visit for asthma across all settings was 53.4 visits per 1,000 persons. [Table 1](#) shows the utilization rates and percent distributions for asthma visits by ambulatory care setting according to various patient and visit characteristics. Utilization of the various types of providers may be related to patient's age ( $\chi^2 = 56.01$ ,  $p < .001$ ). While persons between 15 and 24 years of age had the lowest rate of visit to physician offices for asthma, they had one of the highest rates of visit to emergency departments compared with other age groups. Only 70 percent of the asthma visits for persons 15-24 years were to offices, 9 percent were to hospital outpatient departments, and 22 percent were to hospital emergency departments ([figure 2](#)). Persons in this age group had the lowest overall ambulatory care utilization rate (33.4 visits per 1,000 persons). It may be likely that some persons in this age category received ambulatory care for asthma from institutional settings such as college health centers, which are out of the scope for both the NAMCS and NHAMCS.

**Table 1. Annual rate and percent distribution of asthma visits by ambulatory care setting according to various patient and visit characteristics, averaged over a 2-year period: United States, 1993–94**

Patient or visit characteristic	All ambulatory care settings	Physician offices	Outpatient departments	Emergency departments
	Rate per 1,000 persons <sup>1</sup>			
All visits . . . . .	53.4	43.0	4.0	6.4
Age				
Under 15 years . . . . .	73.0	54.3	7.9	10.8
15–24 years . . . . .	33.4	23.2	2.9	7.4
25–44 years . . . . .	41.2	33.6	2.2	5.4
45–54 years . . . . .	63.2	54.4	4.1	4.7
65 years and over . . . . .	55.5	50.8	2.3	2.5
Sex				
Female . . . . .	58.0	46.7	4.5	6.8
Male . . . . .	48.5	39.1	3.4	6.0
Race				
White . . . . .	48.9	41.1	3.3	4.5
Black . . . . .	75.1	46.9	8.6	19.6
Other . . . . .	74.1	67.3	2.9	3.9
Geographic region				
Northeast . . . . .	84.0	68.8	6.3	8.9
Midwest . . . . .	57.5	44.9	5.9	6.7
South . . . . .	35.6	27.8	2.0	5.7
West . . . . .	48.8	41.2	2.6	5.0
	Percent distribution			
All visits . . . . .	100.0	80.5	7.5	12.0
Age				
Under 15 years . . . . .	100.0	74.4	10.8	14.8
15–24 years . . . . .	100.0	69.5	8.7	22.2
25–44 years . . . . .	100.0	81.6	5.3	13.1
45–54 years . . . . .	100.0	86.1	6.5	7.4
65 years and over . . . . .	100.0	91.5	4.1	4.5
Sex				
Female . . . . .	100.0	80.5	7.8	11.7
Male . . . . .	100.0	80.7	7.0	12.4
Race				
White . . . . .	100.0	84.0	6.7	9.2
Black . . . . .	100.0	62.5	11.5	26.1
Other . . . . .	100.0	90.8	3.9	5.3
Geographic region				
Northeast . . . . .	100.0	81.9	7.5	10.6
Midwest . . . . .	100.0	78.1	10.3	11.7
South . . . . .	100.0	78.2	5.8	16.1
West . . . . .	100.0	84.4	5.4	10.2

<sup>1</sup>Based on U.S. Bureau of the Census estimates of the civilian noninstitutionalized population of the United States as of July 1, averaged over 1993 and 1994.

NOTE: Numbers may not add to totals because of rounding.

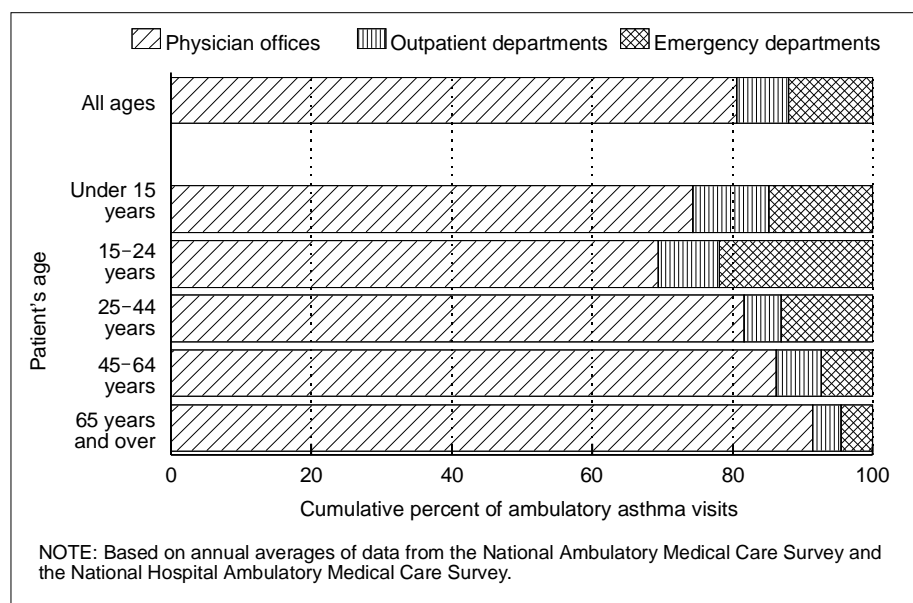
Utilization of different ambulatory care settings for asthma also may be related to the patient's race ( $\chi^2 = 30.7$ ,  $p < .001$ ). Physician offices represent a smaller proportion of asthma visits by black persons compared with white persons and persons of other races. Only

62.5 percent of asthma visits by black persons were to physician offices, 11.5 percent were to hospital outpatient departments, and 26.1 percent were to hospital emergency departments. The annual rate of visit by black persons to hospital emergency departments for

asthma was 19.6 visits per 1,000 persons, which is significantly higher than the asthma visit rate by white persons and persons of other races (4.5 and 3.9 visits per 1,000 persons, respectively). Ambulatory visit rates to hospital settings overall are higher for black persons than white persons (11,13).

Asthma visits to hospital emergency departments were primarily characterized by hospital staff as urgent (70 percent) as opposed to nonurgent and resulted in 14 percent being admitted to the hospital for further diagnosis or treatment. Roughly one-fifth of the visits had intravenous (IV) fluids administered to the patient in the emergency department. These statistics do not vary by race, age, or source of payment for patients under 65 years of age. Elderly patients were more likely to be admitted to the hospital and therefore, so were patients with an expected source of payment as Medicare.

Asthma visits to hospital outpatient departments resembled visits to physician offices for the most part although the patient characteristics were different with a higher proportion of the visits being made by black persons, children under 15 years of age, and persons for whom the expected source of payment was Medicaid. The outpatient department visits were also more likely to be made by new patients as opposed to established patients, more likely to be referred by another physician, and less likely to have mentions of medication therapy compared with office-based asthma visits. Asthma visits to hospital outpatient departments had 20 percent of the patients referred by another physician, had about three-quarters of the visits being made by established patients with previous asthma visits, and 14 percent had no mention of medications being either prescribed or provided. For visits to physician offices, the percents were 7, 85, and 5, respectively. Patients making visits to outpatient departments were also less likely to see a physician compared with visits to office-based physicians (90 versus 97 percent).



**Figure 2. Cumulative percent distribution of asthma visits by ambulatory care setting, according to patient's age: United States, 1993-94**

Because of the variability associated with the outpatient and emergency department asthma estimates, other differences with asthma visits to physician offices were not statistically significant and are not presented here. The remainder of the results addresses the person, visit, and drug characteristics of the asthma visits to office-based physicians, which represent the bulk of ambulatory care for asthma.

### Patient characteristics

Visits with a principal diagnosis of asthma to office-based physicians are described in terms of the patient's age, sex, and race, and geographic region of the visit in [table 2](#). More than half of these visits (55.8 percent) were made by females. About eight-tenths (79.2 percent) were made by white persons.

The overall rate of office visits with a principal diagnosis of asthma was 43 visits per 1,000 persons per year. The visit rate was significantly lowest for persons 15-24 years of age compared with all other age groups, except those 25-44 years of age. There was no significant difference between male and female office visit rates either over all ages or within each age group.

The rate of visits with a principal diagnosis of asthma was 41.1 per 1,000 white persons, 46.9 per 1,000 black

persons, and 67.3 per 1,000 persons of other races. These differences were not statistically significant, however.

Visit rates varied significantly by geographic region of the country, with the highest rate in the Northeast (68.8 visits per 1,000 persons) and the lowest in the South (27.8 visits per 1,000 persons) ([figure 3](#)). The rates in the Midwest and West were not significantly different from each other, however (44.9 and 41.2, respectively). It should be noted that while visit rates differed by region, the prevalence of asthma among the population did not differ by region. Using data from the NHIS, prevalence rates were between 50 and 60 cases per 1,000 persons in each region. Comparing the numbers of office visits over the estimated numbers of persons with an asthma condition resulted in great variability in utilization of physician services for asthma ([table 2](#)). In the Northeast, there were an estimated 12.0 visits for each 10 persons with an asthma condition, whereas in the South, there were only 5.5 visits for each 10 persons with the condition.

### Physician practice characteristics

[Table 3](#) presents the annual number and percent distribution of asthma visits among physician specialties. Primary care specialties (pediatrics, general and family practice, and internal medicine)

accounted for two-thirds of all asthma visits. The relevant specialties of allergy and immunology and pulmonary diseases were associated with three-tenths of the asthma visits. The specialty with the highest frequency of asthma visits was general and family practice, accounting for one-quarter of the visits. It should be noted that estimates that differ in ranked order may not be statistically different from each other. For example, in this table, the number of visits to pediatricians is not significantly different from the number of visits to specialists in allergy and immunology.

[Table 3](#) also presents the percent of all office visits that have a principal diagnosis of asthma according to physician specialty, showing the variability among specialties in asthma case load. Almost one-third of all visits to allergists and immunologists were for asthma. In comparison, only 1.6 percent of office visits to all physicians were for asthma.

Comparing the distributions of asthma visits across specialties for children and adults revealed that adults were more likely to use specialists for treating asthma. Less than 20 percent of the asthma visits by children (defined as persons under 15 years of age) were to specialists whereas 40 percent of asthma visits by persons 15 years of age and over were to specialists. Almost 60 percent of the asthma visits made by children were to pediatricians. Roughly one-quarter of the asthma visits by both children and adults were to general and family practice physicians.

### Office visit characteristics

*Referral status and prior-visit status*— Data pertaining to patient's referral status and prior-visit status are shown in [table 4](#). Only 7.4 percent of all asthma visits during 1993-94 were the result of a referral by another physician. However, of all visits made by new patients (that is, patients who had not seen the physician previously), about one-third (34.6 percent) were recorded as referrals from another physician. This finding is consistent with office visit patterns in general.

**Table 2. Annual number, percent distribution, and rate of visits with a principal diagnosis of asthma to office-based physicians, rate of asthma in the population, and rate of asthma visits per asthma condition by selected patient and visit characteristics, averaged over a 2-year period: United States 1993–94**

Patient or visit characteristic	Number of visits in thousands	Percent distribution	Number of visits per thousand persons <sup>1</sup>	Number of asthma cases per thousand persons <sup>2</sup>	Rate of visit per 10 cases <sup>3</sup>
All visits . . . . .	11,048	100.0	43.0	53.8	8.0
Age					
Under 15 years . . . . .	3,157	28.7	54.3	68.2	8.0
15–24 years . . . . .	818	7.4	23.2	68.1	3.4
25–44 years . . . . .	2,764	25.0	33.6	42.7	7.9
45–64 years . . . . .	2,728	24.7	54.4	47.9	11.4
65–74 years . . . . .	895	8.1	48.6	52.7	9.2
75 years and over . . . . .	687	6.1	54.0	44.5	12.1
Sex and age					
Female . . . . .	6,161	55.8	46.7	57.4	8.1
Under 15 years . . . . .	1,233	11.2	43.4	54.7	7.9
15–24 years . . . . .	498	4.5	28.3	72.2	3.9
25–44 years . . . . .	1,692	15.3	40.5	52.0	7.8
45–64 years . . . . .	1,738	15.7	67.0	63.5	10.6
65–74 years . . . . .	597	5.4	58.5	58.3	10.0
75 years and over . . . . .	404	3.7	51.0	42.0	12.1
Male . . . . .	4,887	44.2	39.1	49.9	7.8
Under 15 years . . . . .	1,924	17.5	64.6	81.2	8.0
15–24 years . . . . .	319	2.9	18.1	63.9	2.8
25–44 years . . . . .	1,072	9.6	26.5	33.0	8.0
45–64 years . . . . .	990	9.0	41.0	31.2	13.1
65–74 years . . . . .	299	2.7	36.3	45.7	7.9
75 years and over . . . . .	283	2.4	59.0	48.5	12.2
Race					
White . . . . .	8,749	79.2	41.1	53.2	7.7
Black . . . . .	1,524	13.8	46.9	58.8	8.0
Other . . . . .	775	6.9	67.3	49.6	13.6
Geographic region					
Northeast . . . . .	3,463	31.5	68.8	57.3	12.0
Midwest . . . . .	2,812	25.5	44.9	50.7	8.8
South . . . . .	2,414	21.9	27.8	50.8	5.5
West . . . . .	2,359	21.1	41.2	58.6	6.9

<sup>1</sup>Based on U.S. Bureau of the Census estimates of the civilian noninstitutionalized population of the United States as of July 1, averaged over 1993 and 1994.

<sup>2</sup>Based on data from the 1993 and 1994 National Health Interview Surveys.

<sup>3</sup>Rate is the number of asthma office visits divided by the number of persons with an asthma condition.

NOTE: Numbers may not add to totals because of rounding.

The majority (85.2 percent) of asthma visits were made by patients who were making return visits to the physician for care of their condition. Less than 10 percent of the visits were made by new patients.

The chronic nature of asthma is highlighted by the fact that among all return visits for the care of previously treated problems, asthma was the fourth most frequently recorded principal diagnosis related to illness or injury, exceeded only by hypertension, diabetes, and otitis media. Among visits with asthma as a principal diagnosis, there

were 5.8 return visits recorded during the 2-year period for every visit recorded as a new problem encounter. It should be noted that the return rate in hospital outpatient departments for asthma was half of that found in physicians' offices (2.8 return asthma visits for every new asthma visit).

*Expected source of payment*—In item 6 of the Patient Record form, the physician is asked to list the expected source of payment for the visit; more than one source may be listed by the physician for each visit. Private/commercial insurance was the expected

source of payment for 38.1 percent of visits with a principal diagnosis of asthma, followed by HMO/other prepaid plan (21.7 percent), Medicaid (15.6 percent), Medicare (14.8 percent), and paid by the patient (14.0 percent) (table 5).

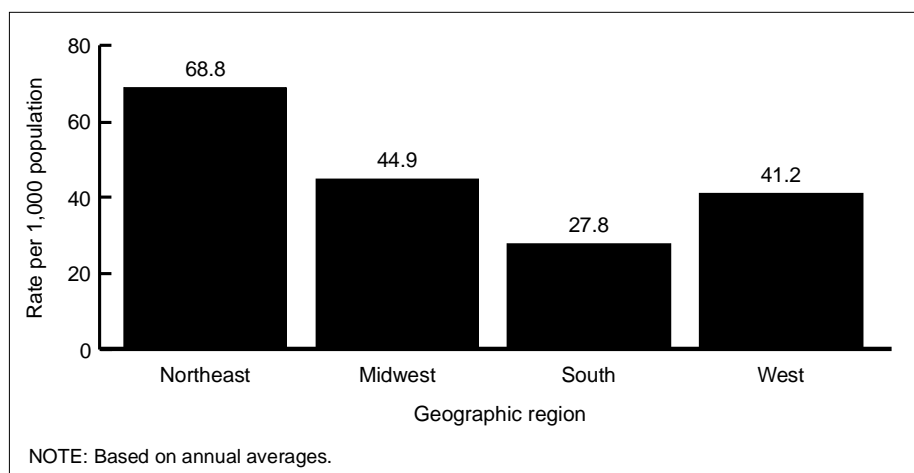
*Reason for visit*—In item 10a of the Patient Record form, the physician is asked to record the patient's most important complaint, symptom, or other reason for this visit using the patient's (or patient surrogate's) own words. These responses have been classified and coded using the *Reason for Visit Classification for Ambulatory Care (RVC)* (14).

This classification is divided into eight modules, or groups of reasons, four of which applied to asthma visits. The symptom (S) module accounted for the highest percent of visits with a first-listed diagnosis of asthma (56.8 percent), with the disease (D) module accounting for 22.0 percent of the reasons given by the patient. These were followed by the treatment (T) module (12.9 percent) and the diagnostic, screening, and preventive (X) module (5.0 percent). Table 6 presents the top 20 specific reasons given by the patient for making the asthma visit, one-fifth of which were stated as asthma. Another fifth of the visits had cough recorded as the principal reason for the visit. Combining shortness of breath with difficult breathing and breathing problems, accounts for 9.5 percent of reasons reported.

*Principal diagnosis*—Asthma is classified into more specific diagnoses according to volume 1 of the ICD-9-CM (6). Of the total number of asthma visits made during 1993–94, the majority (74.2 percent) were coded as unspecified asthma (ICD-9-CM code 493.9); 18.0 percent were extrinsic asthma (ICD-9-CM code 493.0), and 7.3 percent were coded as chronic obstructive asthma (ICD-9-CM code 493.2).

The prominence of asthma as a principal diagnosis among office visits by children is underscored by the finding that for persons under 15 years of age, it was the fourth most frequently reported morbidity-related principal





**Figure 3. Annual rate of asthma visits to office-based physicians, by geographic region: United States, 1993-94**

**Table 3. Annual number and percent distribution of office visits with a principal diagnosis of asthma by physician specialty, averaged over a 2-year period: United States, 1993-94**

Physician specialty	Number of visits in thousands	Percent distribution	Percent of all visits that are for asthma <sup>1</sup>
All specialties . . . . .	11,048	100.0	1.6
General and family practice . . . . .	2,834	25.7	1.6
Pediatrics . . . . .	2,443	22.1	3.0
Allergy and immunology . . . . .	2,421	21.9	29.3
Internal medicine . . . . .	2,088	18.9	2.1
Pulmonary diseases . . . . .	860	7.8	18.1
All other specialties . . . . .	401	3.6	0.1

<sup>1</sup>Based on office visits in general, averaged over 1993 and 1994.

NOTE: Numbers may not add to totals because of rounding.

**Table 4. Annual number and percent distribution of office visits with a principal diagnosis of asthma by referral status and prior-visit status, averaged over a 2-year period: United States, 1993-94**

Visit characteristic	Number of visits in thousands	Percent distribution
All visits . . . . .	11,048	100.0
Referral status		
Patient was referred by another physician . . . . .	818	7.4
Patient was not referred by another physician . . . . .	10,230	92.6
Prior-visit status		
New patient . . . . .	811	7.3
Old patient . . . . .	10,237	92.7
New problem . . . . .	825	7.5
Old problem . . . . .	9,413	85.2

NOTE: Numbers may not add to totals because of rounding.

diagnosis, accounting for 2.5 percent of the visits. Visits for asthma represented a smaller proportion of office visits by persons 25-44 years and 65 years of age and over. Morbidity-related diagnoses

are defined here as those that are classifiable to disease or injury, in contrast to non-illness or non-injury-related visits. Examples of visits with diagnoses that are not morbidity-related

would include visits for routine pregnancy examination or general medical examination. Asthma represents the principal diagnosis for 1.4 percent of visits by white persons, 2.6 percent of visits by black persons, and 2.9 percent of visits by persons of other races.

*Concomitant diagnoses*—About four-tenths (42.4 percent) of asthma visits had a second diagnosis listed on the Patient Record form, and 14.9 percent included a third diagnosis (table 7). Essential hypertension was the most frequently reported second- or third-listed diagnosis, showing up at about 4.7 percent of all visits with a principal diagnosis of asthma. Combining across specific diagnoses showed that other respiratory diseases accounted for over one-third of the comorbid conditions.

For the 3.5 million office visits where asthma is listed as a second- or third-listed diagnosis, the overwhelming majority of visits had a principal diagnosis in the respiratory diseases category as shown in table 8. The potential confounding of the asthma condition with other respiratory problems is shown in these two tables.

*Tests, procedures, and therapies*—Data on tests, surgical and nonsurgical procedures, and nonmedication therapies are shown in table 9. These data were collected in item 14 of the Patient Record form, which combined six checkbox categories in part a with space to record up to eight additional services in part b. Results from part b were coded to volume 3 of the ICD-9-CM (6). Nearly two-thirds of the asthma visits included at least one diagnostic or nonmedication therapeutic service ordered or provided by the physician. More than half of the asthma visits included a blood pressure check by the physician (53.0), more than was found in office visits in general (47.7). Spirometry tests were ordered or provided at 14.4 percent of asthma visits. Asthma visits accounted for nearly 30 percent of all office visits with spirometry checked in item 14a. Spirometers measure lung volume and airflow rates to assess abnormalities in lung function such as airflow restriction. Spirometry tests are recommended for use in diagnosing asthma and

**Table 5. Annual number and percent of office visits with a principal diagnosis of asthma by expected source(s) of payment, averaged over a 2-year period: United States, 1993–94**

Expected source(s) of payment <sup>1</sup>	Number of visits in thousands	Percent of visits
All visits . . . . .	11,048	...
Private/commercial insurance . . . . .	4,215	38.1
HMO/other prepaid plan <sup>2</sup> . . . . .	2,394	21.7
Medicaid . . . . .	1,724	15.6
Medicare . . . . .	1,635	14.8
Patient-paid . . . . .	1,544	14.0
Other government . . . . .	195	1.8
Other . . . . .	214	1.9
Unknown . . . . .	208	1.9

... Category not applicable.

<sup>1</sup>Numbers do not add to totals because more than one expected source of payment may be reported per visit.

<sup>2</sup>HMO is health maintenance organization.

**Table 6. Annual number and percent distribution of office visits with a principal diagnosis of asthma by the 20 principal reasons for visit most frequently mentioned by patients, averaged over a 2-year period: United States, 1993–94**

Principal reason for visit and RVC code <sup>1</sup>	Number of visits in thousands	Percent distribution
All visits . . . . .	11,048	100.0
Cough . . . . . S440	2,181	19.7
Asthma . . . . . D625	2,127	19.3
Wheezing . . . . . S425	1,019	9.2
Shortness of breath . . . . . S415	642	5.8
Allergy medication . . . . . T100	641	5.8
General medical exam . . . . . X800	471	4.3
Injections . . . . . T110	345	3.1
Progress visit, NOS . . . . . T800	332	3.0
Upper respiratory infection . . . . . S445	290	2.6
Nasal congestion . . . . . S400	284	2.6
Difficult breathing (Dyspnea) . . . . . S420	246	2.2
Allergy, NOS . . . . . S90	193	1.7
Breathing problems, NEC . . . . . S430	163	1.5
Chest pain and related symptoms . . . . . S050	141	1.3
Fever . . . . . S010	138	1.2
Congestion in chest . . . . . S475	103	0.9
Bronchitis . . . . . D610	102	0.9
Medication, other and unspecified kinds . . . . . T115	92	0.8
Symptoms referable to the throat . . . . . S455	89	0.8
General ill feeling . . . . . S025	82	0.7
All other reasons . . . . .	1,368	12.4

<sup>1</sup>Based on *A Reason for Visit Classification for Ambulatory Care (RVC)* (14).

NOTE: Numbers may not add to totals because of rounding. NOS is not otherwise specified. NEC is not elsewhere classified.

periodically checking lung capacity (1). They were utilized in 28.2 percent of asthma visits by new patients.

An association between asthma and allergy is common, with 75–85 percent of asthma patients having a positive skin test reaction to common inhalant allergens (15). Allergy testing was performed at 3.5 percent of asthma visits overall. However, 16.2 percent of the asthma visits by new patients included allergy testing.

A routine x ray was ordered at 6.8 percent of the asthma visits, which is

three times higher than at office visits in general.

**Counseling and education services**—Counseling and education services ordered or provided at asthma visits are shown in [table 10](#). At least one counseling or education service was mentioned at 50.2 percent of asthma visits, with exercise (12.5 percent), weight reduction (9.2 percent), cholesterol reduction (8.3 percent), and smoking cessation (7.4 percent) recorded most often. Only 10 percent of asthma

visits were made by patients who smoked cigarettes, but of these, 25 percent included smoking cessation counseling. While the proportion of visits made by cigarette smokers is equivalent for asthma visits and office visits in general, the relative proportion of visits with smoking cessation counseling reported is higher for asthma visits.

**Medication therapy**—Medication therapy was the most frequently mentioned therapeutic service, recorded at 95.1 percent of asthma visits ([table 11](#)). This is significantly higher than the 65.2 percent of office visits in general at which medication therapy was mentioned.

As used in the NAMCS, the term “drug” is interchangeable with the term “medication” and includes all new or continued medications ordered or provided at the visit, including both prescription and nonprescription preparations, immunizing agents, and desensitizing agents. The term “drug mention” refers to each mention of medication on the Patient Record form. Because physicians can record more than one drug per visit, the total number of drug mentions will generally be higher than the number of visits. The term “drug visit” refers to any visit in which at least one drug is ordered or provided by the physician. An earlier report is available that describes the method and instruments used in collecting and processing NAMCS drug data (16).

The vast majority of asthma visits had medication prescribed or provided; only 5 percent had no medications mentioned. About one-quarter of asthma visits included a single medication (23.1 percent), while an additional one-quarter of the visits had two medications, and 19.6 percent listed three medications ([table 11](#)). There were about 56.8 million drug mentions at asthma visits during 1993–94, an average of 28.4 million mentions per year. This yields an average of 2.7 drug mentions per drug visit or 2.6 drugs ordered or provided per asthma visit overall.

**Drug characteristics**—Characteristics of the drugs mentioned at asthma visits are shown in [tables 12–](#)



**Table 7. Annual number and percent of office visits with a principal diagnosis of asthma by presence of comorbidities, averaged over a 2-year period: United States, 1993–94**

Comorbidity and ICD–9–CM code <sup>1</sup>	Number of visits in thousands <sup>2</sup>	Percent of visits
All visits . . . . .	11,048	...
No comorbidity . . . . .	6,358	57.6
With comorbidity . . . . .	4,690	42.4
Essential hypertension . . . . . 401	518	4.7
Chronic sinusitis . . . . . 473	387	3.5
Acute upper respiratory infection . . . . . 465	386	3.5
Chronic pharyngitis . . . . . 472	301	2.7
Osteoarthritis . . . . . 715	268	2.4
Otitis media . . . . . 382	241	2.2
Diabetes mellitus . . . . . 250	239	2.2
Chronic ischemic heart disease . . . . . 414	234	2.1
Disorders of conjunctiva . . . . . 372	215	1.9
Disorders of lipid metabolism . . . . . 272	169	1.5
Respiratory and chest symptoms . . . . . 786	165	1.5
Bronchitis NOS . . . . . 490	164	1.5
Neurotic disorders . . . . . 300	111	1.0
Allergic rhinitis . . . . . 477	111	1.0
Emphysema . . . . . 492	107	1.0
All other diagnoses . . . . .	1,023	9.3

... Category not applicable.

<sup>1</sup>Based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM) (6).

<sup>2</sup>Disease may be listed as either a second- or third-listed diagnosis; therefore, more than one diagnosis could be listed per record.

NOTE: NOS is not otherwise specified.

**Table 8. Annual number and percent distribution of office visits with a comorbidity of asthma by principal diagnosis: United States, 1993–94**

Principal diagnosis and ICD–9–CM code <sup>1</sup>	Number of visits in thousands	Percent distribution
All visits . . . . .	3,528	100.0
Acute upper respiratory infection . . . . . 465	353	10.0
Bronchitis NOS . . . . . 490	334	9.5
Chronic sinusitis . . . . . 473	218	6.2
Essential hypertension . . . . . 401	187	5.3
Otitis media . . . . . 382	137	3.9
Respiratory and chest symptoms . . . . . 786	100	2.8
Well baby exam . . . . . V20	99	2.8
Influenza . . . . . 487	91	2.6
Acute bronchitis . . . . . 466	89	2.5
Acute sinusitis . . . . . 461	82	2.3
Chronic pharyngitis . . . . . 472	79	2.2
Pneumonia . . . . . 486	66	1.9
Functional digestive disorders . . . . . 564	66	1.9
Adverse effect, NEC . . . . . 995	61	1.7
Allergic rhinitis . . . . . 477	61	1.7
All other diagnoses . . . . .	1,505	42.7

<sup>1</sup>Based on the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD–9–CM)(6).

NOTE: Numbers may not add to totals because of rounding. NOS is not otherwise specified. NEC is not elsewhere classified.

15. The majority of drugs mentioned at asthma visits were single-ingredient preparations (83.5 percent), were prescribed as trade names rather than generics (71.4 percent), and were available only by prescription (85.0 percent).

As expected, most of the drugs prescribed were classified as respiratory

drugs, specifically agents used to treat asthma (for example, bronchodilators, 37.5 percent) and agents affecting hormonal mechanisms including anti-inflammatory agents (for example, adrenal corticosteroids, 13.1 percent). Bronchodilators quickly reverse the tightening of the muscles that surround airways. Anti-inflammatory agents

reduce the swelling in the airway linings and if taken regularly, may prevent inflammation. Steroidal anti-inflammatory agents, such as adrenal corticosteroids, also help reduce the production of thick mucus during an acute asthma episode. Drug mentions at asthma visits are listed in [table 12](#) by therapeutic classification based on the 1985 NDC Directory (7).

Drug mentions at asthma visits are displayed in [table 13](#), according to their most frequently occurring generic ingredients. Antiasthmatic generic substances were coded into one of five categories to indicate the class of the antiasthmatic medication. Bronchodilators were classified as either beta<sub>2</sub>-adrenergic agonists (BA), methylxanthines (MX), or anticholinergics (AC). Anti-inflammatory agents were classified as either corticosteroids (CS) or nonsteroidals (NS). The number of visits with oxygen provided or prescribed was too few to enable a reliable estimate for a separate category. Albuterol was the generic ingredient that appeared most frequently, showing up in 20.9 percent of all asthma drug mentions. Theophylline was the next most frequently occurring generic substance showing up in 7.1 percent of the drug mentions.

[Table 14](#) presents the 20 most frequently mentioned drug entry names in asthma visits. Ventolin and Proventil lead the list; both drugs are brands of albuterol, which was the most frequently occurring generic substance.

[Figure 4](#) shows that the majority of drug visits included a beta<sub>2</sub>-adrenergic agonist (62 percent) with corticosteroids being prescribed in 41 percent of the visits. It is often recommended that multiple classes of antiasthmatic drugs be prescribed at the same visit, depending on the severity of the condition. [Table 15](#) presents drug patterns for the five categories of antiasthmatic drugs previously defined. The most popular pattern prescribed was a beta<sub>2</sub>-adrenergic agonist by itself, occurring at 22.1 percent of the asthma drug visits. The second most frequent pattern was a beta<sub>2</sub>-adrenergic agonist with a corticosteroid, occurring at 18.3 percent of the asthma drug visits. The third most frequent pattern was a

**Table 9. Annual number of office visits with a principal diagnosis of asthma by tests, surgical and nonsurgical procedures, and therapies ordered or provided, averaged over a 2-year period: United States, 1993–94**

Selected service and ICD–9–CM code <sup>1</sup>	Number of visits in thousands <sup>2</sup>	Percent of visits
All visits . . . . .	11,048	...
None . . . . .	3,876	35.1
Checkbox:		
Blood pressure . . . . .	5,851	53.0
Spirometry . . . . .	1,587	14.4
Blood test . . . . .	1,311	11.9
Urinalysis . . . . .	1,013	9.2
Allergy testing . . . . .	386	3.5
Open format:		
Routine x ray . . . . . 87.44	753	6.8
Other respiratory procedures . . . . . 93.99	168	1.5
Electrocardiogram . . . . . 89.52	95	0.9
Other mammography . . . . . 87.37	91	0.8
Respiratory medication by nebulizer . . . . . 93.94	89	0.8
General physical exam . . . . . 89.70	81	0.7
Other nonoperative measures . . . . . 89.39	70	0.6
Ambulatory cardiac monitoring . . . . . 89.50	60	0.5
Pap smear . . . . . 91.46	58	0.5
Bacterial smear of lung . . . . . 90.41	57	0.5

... Category not applicable.  
<sup>1</sup>Based on the *International Classification of Diseases, 9th Revision, Clinical Modification (ICD–9–CM) (6)*.  
<sup>2</sup>Numbers do not add to total because more than one service may be reported per visit.

**Table 10. Annual number and percent of office visits with a principal diagnosis of asthma by counseling/education ordered or provided, averaged over a 2-year period: United States, 1993–94**

Counseling/education ordered or provided	Number of visits in thousands <sup>1</sup>	Percent of visits
All visits . . . . .	11,048	...
None . . . . .	5,505	49.8
Exercise . . . . .	1,384	12.5
Weight reduction . . . . .	1,021	9.2
Cholesterol reduction . . . . .	915	8.3
Smoking cessation . . . . .	823	7.4
HIV transmission <sup>2</sup> . . . . .	631	5.7
STD transmission <sup>3</sup> . . . . .	602	5.5
Growth/development . . . . .	259	2.3
Injury prevention . . . . .	68	0.6
Other . . . . .	4,163	37.7

... Category not applicable.  
<sup>1</sup>Numbers do not add to total because more than one category may be reported per visit.  
<sup>2</sup>HIV is human immunodeficiency virus.  
<sup>3</sup>STD is sexually transmitted disease.

corticosteroid by itself (7.6 percent of the asthma drug visits). Thus, the use of a beta<sub>2</sub>-adrenergic agonist and a corticosteroid, either singly or together, comprised nearly half the asthma drug visits. For 21.9 percent of the drug visits, there was no mention of any of these categories of antiasthmatic drugs.

*Disposition of visit*—Seven out of 10 asthma visits (68.7 percent) resulted

in a scheduled return visit. This is similar to office visits in general. Almost 30 percent of the visits had a disposition of return if needed. Only 4 percent of the visits had no followup planned, which is half the number for office visits in general. Data on disposition of visit are shown in [table 16](#).

*Duration of visit*—The mean duration of physician-patient contact for

asthma visits was 20.4 minutes compared with 18.6 minutes for office visits in general. Mean duration does not include visits in which no face-to-face contact with the physician occurred. Physician-patient contact only includes the time spent in actual face-to-face contact between physician and patient. Data on duration of asthma visits are also shown in [table 16](#). Of the asthma visits, 3 percent had no face-to-face time with the physician compared with 1.6 percent of office visits in general.

*Asthma visits between 1980 and 1994*—In 1980, asthma was the 13th most frequently mentioned morbidity-related principal diagnosis; by 1994, it was the 6th. Overall, the asthma visit rate was 27.3 visits per 1,000 persons in 1980. However, the rate for 1994 was 41.4 visits per 1,000 persons, up by about 50 percent. The increase in office visits is paralleled by an increase in the prevalence of asthma in the population. [Figure 5](#) shows the rates of prevalence as measured by the NHIS (4,17–19), office visits as measured by the NAMCS, and hospital discharge rates as measured by the National Hospital Discharge Survey (NHDS)(20–23). The rates are shown for single year estimates for 1980, 1985, 1990, and 1994. The trend for hospital discharges with a principal diagnosis of asthma, has remained the same since 1980, whereas, the prevalence and office visit rates have increased. Most of the increase has occurred since 1990. Hospitalizations of children under 15 years of age have also shown no significant increase over the last 15 years although previous studies reported slight increases in hospitalization rates in the 1980's (24). Hospitalization rates are 2.5 times higher for black persons than for white persons, and have ranged between 2 and 3 times higher over the last 15 years.

Over the past 15 years, the rate of medication prescribed at asthma visits has increased. Using an annualized estimate from the 1980 and 1981 NAMCS, the percent of asthma visits without mention of drugs was 8.3 percent. By 1993–94, the percent had decreased to 4.9 percent. [Figure 6](#) shows the patterns of antiasthmatic drug prescribing that have changed significantly since 1980–81. Those

**Table 11. Annual number and percent distribution of office visits with a principal diagnosis of asthma by medication therapy and number of medications ordered or provided, averaged over a 2-year period: United States, 1993–94**

<i>Visit characteristic</i>	<i>Number of visits in thousands</i>	<i>Percent distribution</i>
All visits . . . . .	11,048	100.0
<i>Medication therapy<sup>1</sup></i>		
Drug visits <sup>2</sup> . . . . .	10,504	95.1
Visits without mention of medication . . . . .	544	4.9
<i>Number of medications provided or prescribed</i>		
None . . . . .	544	4.9
One . . . . .	2,557	23.1
Two . . . . .	2,709	24.5
Three . . . . .	2,166	19.6
Four . . . . .	1,459	13.2
Five . . . . .	1,613	14.6

<sup>1</sup>Includes prescription drugs, over-the-counter preparations, immunizing agents, and desensitizing agents.

<sup>2</sup>Visits at which one or more drugs were provided or prescribed by the physician.

NOTE: Numbers may not add to totals because of rounding.

**Table 12. Annual number and percent distribution of drug mentions at office visits with a principal diagnosis of asthma by therapeutic classification, averaged over a 2-year period: United States, 1993–94**

<i>Therapeutic classification<sup>1</sup></i>	<i>Number of drug mentions in thousands</i>	<i>Percent distribution</i>
All drug mentions. . . . .	28,375	100.0
Respiratory tract drugs . . . . .	12,803	45.1
Bronchodilators, antiasthmatics . . . . .	10,649	37.5
Nasal decongestants . . . . .	690	2.4
Antitussives, expectorants, mucolytics . . . . .	664	2.3
Antihistamines . . . . .	790	2.8
Hormones and agents affecting hormonal mechanisms . . . . .	4,228	14.9
Adrenal corticosteroids . . . . .	3,719	13.1
Estrogens and progestins . . . . .	202	0.7
Blood glucose regulators. . . . .	179	0.6
Antimicrobial agents . . . . .	2,620	9.2
Penicillins . . . . .	701	2.5
Cephalosporins . . . . .	590	2.1
Eythromycins and lincosamides . . . . .	733	2.6
Radiopharmaceutical/contrast media . . . . .	1,689	6.0
Cardiovascular-renal drugs. . . . .	1,531	5.4
Cardiac glycosides . . . . .	159	0.6
Antianginal agents. . . . .	377	1.3
Antihypertensive agents . . . . .	471	1.7
Diuretics . . . . .	336	1.2
Ophthalmic drugs . . . . .	915	3.2
Drugs used for relief of pain . . . . .	661	2.3
Skin/mucous membrane . . . . .	483	1.7
Immunologic agents . . . . .	450	1.6
Gastrointestinal agents . . . . .	409	1.4
Psychopharmacologic drugs . . . . .	389	1.4
Metabolic and nutrient agents . . . . .	360	1.3
Other and unclassified <sup>2</sup> . . . . .	1,835	6.5

<sup>1</sup>Based on the standard drug classification used in the *National Drug Code Directory*, 1985 edition (NDC) (7).

<sup>2</sup>Includes anesthetic drugs, antidotes, hematologic agents, neurologic drugs, oncology, otologic drugs, antiparasitic agents, and unclassified/miscellaneous drugs.

NOTE: Numbers may not add to totals because of rounding and not all subcategories are listed.

patterns utilizing a methylxanthine decreased from 1980–81 to 1993–94, whereas, those involving a beta<sub>2</sub>-adrenergic agonist only, a corticosteroid only, or the two together increased from 1980–81 to 1993–94. The rate of return visits for asthma compared with new problem visits has also increased from 1980–81 when the rate was 4.4. The 1993–94 data indicated a rate of return around 5.8, an increase of 30 percent.

## Discussion

The trend in antiasthmatic drug treatment between 1980–81 and 1993–94 shows that physicians have increased the prescribing of anti-inflammatory agents. It appears that anti-inflammatory agents are playing a bigger role in ambulatory asthma treatment. This finding is consistent with the guidelines presented by the NAEPP and in the ICR. In fact, current guidelines emphasize the importance of inhaled corticosteroids for patients with moderate or severe asthma. Unfortunately, data from the NAMCS cannot be used to determine drug prescription patterns for patients with varying degrees of severity of asthma, nor the route or dosage form of medication, as neither is collected in the survey. Also, the drugs prescribed may have been intended by the physician to treat a comorbidity rather than the asthma.

Analysis of the combined NAMCS and NHAMCS data for 1993–94 showed that provider setting is related to both patient's age and race. For a complete analysis of asthma visits by children and adolescents or by race, hospital emergency and outpatient department data should be considered.

Unfortunately, trend data cannot be analyzed across settings because the NHAMCS was initiated in 1992. The fact that the use of hospital services for black persons compared with white persons is greater for both emergency and inpatient services but not different for physician offices implies a lack of good preventive asthma management with possible barriers to effective medication treatment. Care received in outpatient department settings appears less stable (i.e., lower return rate) than

**Table 13. The 20 most frequently occurring generic substances in drug mentions at office visits with a principal diagnosis of asthma by number of occurrences, percent of all drug mentions, and therapeutic classification, averaged over a 2-year period: United States, 1993–94**

Generic substance <sup>1</sup>	Number of occurrences in thousands <sup>2</sup>	Percent of all drug mentions <sup>3</sup>	Therapeutic classification <sup>4</sup>
All generic substances . . . . .	31,000	...	...
<b>Albuterol</b> . . . . .	5,924	20.9	Bronchodilator-BA
<b>Theophylline</b> . . . . .	2,016	7.1	Bronchodilator-MX
<b>Beclomethasone</b> . . . . .	1,446	5.1	Anti-inflammatory-CS
<b>Prednisone</b> . . . . .	1,430	5.0	Anti-inflammatory-CS
<b>Triamcinolone</b> . . . . .	1,350	4.8	Anti-inflammatory-CS
<b>Cromolyn</b> . . . . .	812	2.9	Anti-inflammatory-NS
Amoxicillin . . . . .	782	2.8	Antimicrobial
<b>Flunisolide</b> . . . . .	566	2.0	Anti-inflammatory-CS
Terfenadine . . . . .	411	1.4	Respiratory tract
<b>Ipratropium</b> . . . . .	386	1.4	Bronchodilator-AC
Guaifenesin . . . . .	362	1.3	Respiratory tract
Phenylephrine . . . . .	355	1.3	Respiratory tract
Phenylpropanolamine . . . . .	350	1.2	Respiratory tract
<b>Prednisolone</b> . . . . .	343	1.2	Anti-inflammatory-CS
Erythromycin . . . . .	338	1.2	Antimicrobial
Acetaminophen . . . . .	319	1.1	Relief of pain
<b>Metaproterenol</b> . . . . .	305	1.1	Bronchodilator-BA
Chlorpheniramine . . . . .	303	1.1	Respiratory tract
Influenza virus vaccine . . . . .	291	1.0	Immunologic agent
<b>Salmeterol</b> . . . . .	263	0.9	Bronchodilator-BA
All other antiasthmatic drugs . . . . .	1,290	4.5	...
All other drugs . . . . .	11,358	40.0	...

... Category not applicable.  
<sup>1</sup>Bolded generic substances are antiasthmatic drugs.  
<sup>2</sup>Frequency of mention combines single-ingredient agents with mentions of the agent as an ingredient in a combination drug.  
<sup>3</sup>Based on an estimated average of 28,375,000 drug mentions per year for 1993–94.  
<sup>4</sup>Antiasthmatic drugs are classified by the pharmacologic class and subclass used by the *National Asthma Education Program* (1) and *International Consensus Report on Diagnosis and Treatment of Asthma*(2). Generic substances not used for treating asthma are classified by the *National Drug Code Directory*, 1985 (NDC) (7).

NOTE: Numbers may not add to totals because of rounding. BA is beta<sub>2</sub>-adrenergic agonist. MX is methylxanthine. AC is anticholinergic. CS is corticosteroid, NS is nonsteroidal.

**Table 14. Annual number, percent of all drug mentions, and generic name, for the 20 most frequently occurring drugs for office visits with a principal diagnosis of asthma, averaged over a 2-year period: United States, 1993–94**

Entry name of drug <sup>1</sup>	Number of drug mentions in thousands	Percent distribution	Generic substance
All visits . . . . .	28,375	...	...
Ventolin . . . . .	2,813	9.9	Albuterol
Proventil . . . . .	2,425	8.5	Albuterol
Allergy relief or shots . . . . .	1,685	5.9	...
Prednisone . . . . .	1,428	5.0	Prednisone
Theo-Dur . . . . .	1,231	4.3	Theophylline
Azmacort . . . . .	1,184	4.2	Triamcinolone
Intal . . . . .	663	2.3	Cromolyn
Albuterol . . . . .	609	2.1	Albuterol
Vanceril . . . . .	593	2.1	Beclomethasone
Aerobid . . . . .	476	1.7	Flunisolide
Slo-Bid . . . . .	466	1.6	Theophylline
Seldane . . . . .	411	1.4	Terfenadine
Atrovent . . . . .	386	1.4	Ipratropium
Amoxicillin . . . . .	379	1.3	Amoxicillin
Vancenase . . . . .	306	1.1	Beclomethasone
Alupent . . . . .	294	1.0	Metaproterenol
Influenza virus vaccine . . . . .	291	1.0	...
Amoxil . . . . .	283	1.0	Amoxicillin
Beclovent . . . . .	279	1.0	Beclomethasone
Serevent . . . . .	263	0.9	Salmeterol

... Category not applicable.  
<sup>1</sup>The entry made by the physician on the prescription or other medical records. This may be a trade name, generic name, or desired therapeutic effect.

NOTE: Numbers may not add to totals because of rounding.

office-based care with less emphasis on medication therapy. This may contribute to the increased rate of acute asthma problems that require emergency services or hospitalization for these patients. It should be noted, however, that for visits with mention of drugs, the drug utilization pattern of antiasthmatic drug prescribing is comparable between outpatient department visits and physician office visits (for example, heavy reliance on a beta<sub>2</sub>-adrenergic agonist alone or with an anti-inflammatory substance).

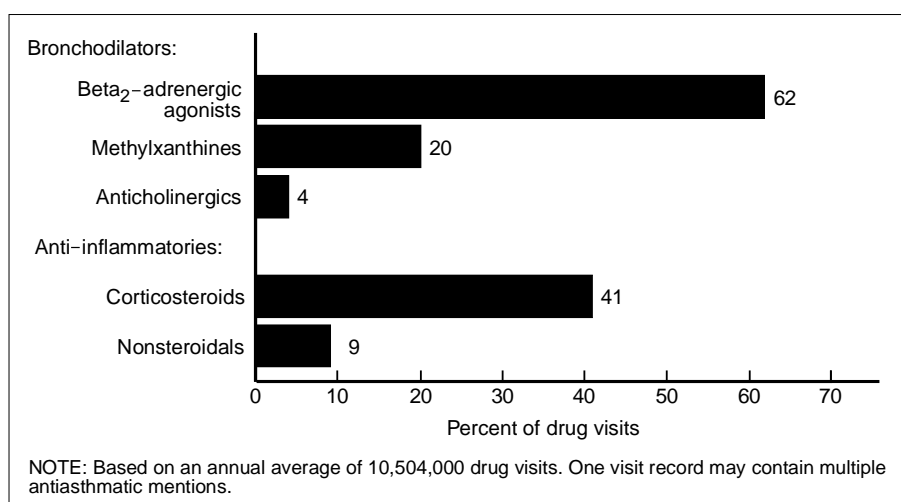
The reasons for the observed increase in asthma prevalence and corresponding office visits are unclear. A possibility may be increased diagnosis of asthma by physicians. This is likely because of the greater awareness of the problem of asthma underdiagnosis generated by the NAEPP guidelines. The fact that regional variation in frequency of visits in 1993–94 was observed, but variation in prevalence rates was not observed, is of interest. The Northeast had more than twice the visit rate per condition than the South did. We examined seasonal estimates to help explain this finding. The number of visits in the Northeast tended to increase during May, September, and December, whereas the number of visits in the South increased in April, August, and January. Nevertheless, the visit rates in the Northeast were still much higher than the South. It has been shown that physician office visit rates in general, are higher in the Northeast than in the South (8) implying more utilization of physician services for other diagnoses besides asthma. It is also possible that the exposure in the Northeast to more extreme changes in the weather and other allergens may result in more frequent acute exacerbations for the asthma patient. This is supported by NHDS data that show the hospitalization rate for asthma in the Northeast was 46 percent higher than in the South in 1993 (25.9 versus 17.7 discharges per 10,000 persons) (25). It is also supported by NAMCS data that show the rates of visit per asthma condition for new diagnoses of asthma were not different among the geographic regions but the rate of return visits per asthma condition was higher in the Northeast

**Table 15. Annual number and percent distribution of various antiasthmatic drug utilization patterns at office visits with a principal diagnosis of asthma, averaged over a 2-year period: United States, 1993–94**

Drug utilization pattern	Number of drug visits in thousands	Percent distribution
All drug visits . . . . .	10,504	100.0
Antiasthmatic drug pattern <sup>1</sup>		
BA only . . . . .	2,320	22.1
BA and CS . . . . .	1,921	18.3
CS only . . . . .	798	7.6
BA, MX, and CS . . . . .	709	6.8
BA and MX . . . . .	559	5.3
MX only . . . . .	406	3.9
BA, CS, and NS . . . . .	396	3.8
BA and NS . . . . .	233	2.2
MX and CS . . . . .	165	1.6
NS only . . . . .	112	1.1
Other antiasthmatic drug patterns . . . . .	588	5.5
Nonasthmatic drug patterns . . . . .	2,297	21.9

<sup>1</sup>Drugs were classified according to the pharmacologic class used by the *National Asthma Education Program* (1) and the *International Consensus Report on Diagnosis and Treatment of Asthma* (2).

NOTE: Numbers may not add to totals because of rounding. BA is beta<sub>2</sub>-adrenergic agonist. MX is methylxanthine. CS is corticosteroid. NS is nonsteroidal.



**Figure 4. Percent of asthma drug visits in physician offices, by class and subclass of antiasthmatic drugs: United States, 1993–94**

compared with the South. Unfortunately, the 1993–94 NAMCS data did not indicate whether the visit was for an acute or chronic situation. An item added to the 1997–98 Patient Record form may help answer this question. Questions regarding this report, future reports, or the NAMCS may be directed to the Ambulatory Care Statistics Branch by calling (301) 436–7132.

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**Table 16. Annual number and percent of office visits with a principal diagnosis of asthma by disposition and duration of the visit, averaged over a 2-year period: United States, 1993–94**

Visit characteristic	Number of visits in thousands <sup>1</sup>	Percent of visits
All visits . . . . .	11,048	...
Disposition of visits		
Return at a specific time . . . . .	7,586	68.7
Return if needed . . . . .	3,098	28.0
Telephone follow-up planned. . . . .	479	4.3
Refer to other physician . . . . .	457	4.1
No follow-up planned . . . . .	439	4.0
Return to referring physician. . . . .	70	0.6
Admit to hospital . . . . .	69	0.6
Other . . . . .	89	0.8
Duration of visits		
0 minutes <sup>2</sup> . . . . .	331	3.0
1–5 minutes . . . . .	235	2.1
6–10 minutes . . . . .	1,842	16.7
11–15 minutes . . . . .	3,738	33.8
16–30 minutes . . . . .	3,950	35.8
More than 30 minutes . . . . .	952	8.6

... Category not applicable.  
<sup>1</sup>Numbers by disposition do not add to total because more than one disposition may be reported per visit. Numbers by duration may not add to totals because of rounding.  
<sup>2</sup>Visits at which there were no face-to-face contact between the physician and the patient.

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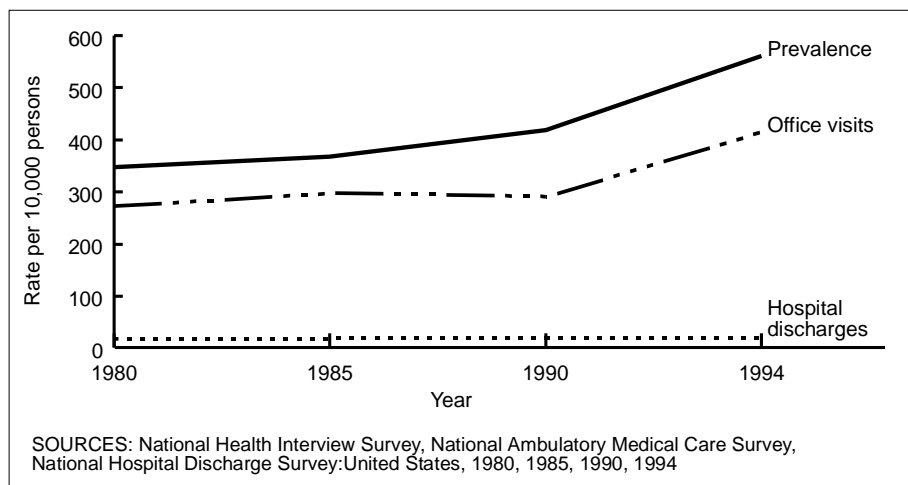
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**Figure 5. Trend data for prevalence, office visits, and hospital discharges for asthma: United States, 1980–94**

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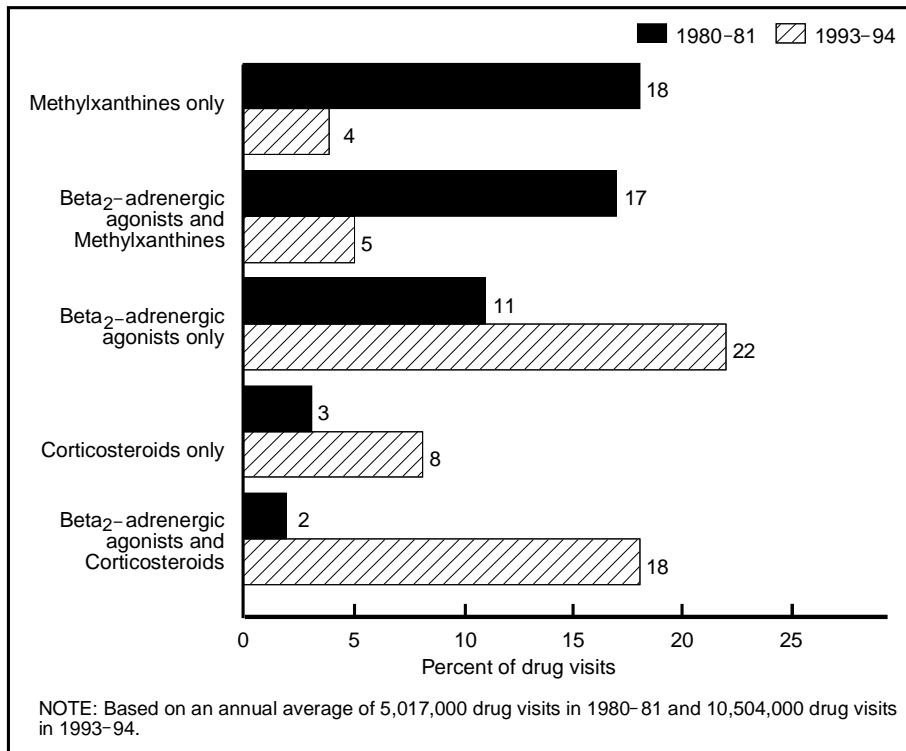
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**Figure 6. Utilization patterns for antiasthmatic drugs at office visits with a principal diagnosis of asthma: United States, 1980-81 and 1993-94**

## Technical notes

### Source of data and sample design

The information presented in this report is based on data collected in the National Ambulatory Medical Care Survey (NAMCS) and the National Hospital Ambulatory Medical Care Survey (NHAMCS) over the 2-year period from January 1993 through December 1994. The target universe of NAMCS includes office visits made in the United States by ambulatory patients to nonfederally employed physicians who are principally engaged in office practice, but not in the specialties of anesthesiology, pathology, or radiology. The sampling frame included physicians who were classified by the American Medical Association (AMA) or the American Osteopathic Association (AOA) as “office-based, patient care.” Visits to private, nonhospital-based clinics and health maintenance organizations were within the scope of the survey, but those that took place in government-operated facilities and hospital-based outpatient departments were not. The target universe of the NHAMCS includes visits made in the United States by patients to emergency departments (ED’s) and outpatient departments (OPD’s) of non-Federal, short-stay, or general hospitals. Only outpatient department clinics that are under the supervision of a physician were included within the scope of the survey. Clinics specializing in radiology, laboratory services, physical rehabilitation, or other ancillary services were excluded from the survey. Telephone contacts are excluded in both NAMCS and NHAMCS.

### NAMCS

A multistage probability sample design is used in NAMCS, involving samples of primary sampling units (PSU’s), physician practices within PSU’s, and patient visits within physician practices. The PSU’s are counties, groups of counties, county equivalents (such as parishes or independent cities), or towns and townships (for some PSU’s in New

England). For 1993, a sample of 3,400 non-Federal, office-based physicians was selected from master files maintained by the AMA and AOA. Physicians were screened at the time of the survey to ensure that they were eligible for survey participation. Of those screened, 2,464 physicians were eligible (in-scope) to participate in the survey. The remaining 936 physicians were ineligible (out-of-scope) due to reasons of being retired, employed primarily in teaching, research, or administration, or other reasons. The physician response rate for the 1993 NAMCS was 73 percent.

For 1994, a different sample of 3,499 non-Federal, office-based physicians was selected from the AMA and AOA master files. Of those screened, 1,073 physicians were ruled ineligible (out-of-scope); 2,426 were in-scope for the survey. The physician response rate for the 1994 NAMCS was 70 percent.

Sample physicians were asked to complete Patient Record forms (figure 1) for a systematic random sample of office visits occurring during a randomly assigned 1-week reporting period. Responding physicians completed 35,978 Patient Records in 1993 and 33,598 Patient Record forms in 1994.

For 1993, physicians that specialize in asthma cases were oversampled to provide more precise estimates for visits for asthma in general. Accordingly, the relative proportion of the sample of physicians that specialize in allergy and immunology and pulmonary diseases was increased compared with previous years. The other specialties that see high numbers of asthma patients—pediatrics, general and family practice, and internal medicine—already had sizeable representation in the physician sample.

### NHAMCS

A four-stage probability sample design is used in the NHAMCS, involving samples of PSU’s, hospitals with ED’s and/or OPD’s within PSU’s, ED’s within hospitals and/or clinics within OPD’s, and patient visits within ED’s and/or clinics. For 1993, a sample of 489 non-Federal, short-stay, or general hospitals was selected from the SMG Hospital Market Database. Of this

group, 445 hospitals were in scope, or eligible to participate in the survey. The hospital response rate for the NHAMCS during this period was 94 percent. Based on the induction interview, 228 of the sample hospitals had OPD’s and 395 of the sample hospitals had ED’s.

For 1994, a sample of 489 non-Federal, short-stay, or general hospitals (of which about 80 percent were the same hospitals sampled in 1993), was selected from the SMG Hospital Market Database. Of this group, 443 hospitals were in scope, or eligible to participate in the survey. The hospital response rate for the NHAMCS during this period was 95 percent. Based on the induction interview, 260 of the sample hospitals had OPD’s and 418 of the sample hospitals had ED’s.

Hospital staff were asked to complete Patient Record forms (11,12) for a systematic random sample of patient visits occurring during a randomly assigned 4-week reporting period. The Patient Record forms were similar to that used in the NAMCS. The number of Patient Record forms completed for OPD’s was 28,357 in 1993 and 29,095 in 1994. The number of Patient Record forms completed for ED’s was 29,117 in 1993 and 26,547 in 1994.

Characteristics of the physician’s practice (such as primary specialty and type of practice) and the hospital (such as ownership and expected number of outpatient department and/or emergency department visits) were obtained from the physician or hospital administrator during an induction interview. The U.S. Bureau of the Census, Housing Surveys Branch, was responsible for the survey’s data collection. Data processing operations and medical coding were performed by the National Center for Health Statistics, Health Care Surveys Section, Research Triangle Park, North Carolina.

### Asthma visits

This report primarily analyzes records with a principal, or first-listed, diagnosis of asthma (ICD-9-CM codes 493.0-493.9). Because of the differences in the 1993 and 1994 sample distributions across physician specialties,

the result is an asthma visit database with 1,273 sample visits in 1993 and 418 sampled visits in 1994. The asthma visits were made to 446 physicians who participated in the 1993 or 1994 NAMCS and whose sampled visits included at least one visit with a principal diagnosis of asthma during the reporting period. Because the weighting scheme takes the oversampling into account, the national estimates are remarkably similar across the 2 years. The major gain in the oversampling is more precise estimates for the 1993 estimates compared with the 1994 estimates. Combining the data across 2 years produces averaged estimates with even greater precision. It should be noted, however, that 50 percent of the weighted asthma visits come from only 10 percent of the physicians with sampled asthma visits. This is because half of the weighted total comes from 1994 when the specialties of allergy/immunology and pulmonary medicine were not oversampled.

The asthma visit database for hospital outpatient departments consists of 430 records for 1993 and 413 records for 1994. The asthma visit database for hospital emergency departments consists of 615 records for 1993 and 502 records for 1994. All estimates, percent distributions, and rates presented here, unless otherwise noted, reflect 1993 and 1994 data that were averaged over the 2-year period.

### Sampling errors

The standard error is primarily a measure of the sampling variability that occurs by chance when only a sample, rather than an entire universe, is surveyed. The standard error also reflects part of the measurement error, but does not measure any systematic biases in the data. The chances are 95 out of 100 that an estimate from the sample differs from the value that would be obtained from a complete census by less than twice the standard error.

The standard errors that were used in tests of significance for this report were calculated using generalized linear models for predicting the relative standard error for estimates based on the linear relationship between the actual

standard error, as approximated using SUDAAN software, and the size of the estimate. SUDAAN computes standard errors by using a first-order Taylor approximation of the deviation of estimates from their expected values. A description of the software and the approach it uses has been published (26). The relative standard error (RSE) of an estimate is obtained by dividing the standard error by the estimate itself. The result is then expressed as a percent of the estimate.

Relative standard errors for annual averages may be calculated using the following general formula, where  $x$  is the annual estimate of interest in thousands and  $A$  and  $B$  are the appropriate coefficients from table I. The relative standard error that is obtained in this way applies to both the 2-year total and the 2-year average.

$$RSE(x) = \sqrt{A + \frac{B}{x}} \cdot 100$$

Similarly, relative standard errors for percents may be calculated using the following general formula, where  $p$  is the percent of interest and  $x$  is the denominator of the percent in thousands, using the appropriate coefficient from table I.

$$RSE(p) = \sqrt{\frac{B \cdot (1-p)}{p \cdot x}} \cdot 100$$

Standard errors for rates that have the U.S. population estimates as the denominator may be found by multiplying the rate by the corresponding RSE (expressed as a proportion) of the estimate used in the numerator. For rates that have a denominator that is subject to sampling variation, a conservative estimate of the SE may be obtained using the following formula where  $p$  is the estimated rate expressed as a ratio of two estimates,  $p=x/y$  (inflated by 100 or 1,000 when appropriate) and  $RSE(x)$  and  $RSE(y)$  have been determined using the RSE formula above.

$$SE(p) = p \sqrt{RSE(x)^2 + RSE(y)^2}$$

### Adjustments for nonresponse

#### Office-based nonresponse

Estimates from NAMCS data were adjusted to account for sample physicians who were in scope but did not participate in the study. This adjustment was calculated to minimize

**Table I. Coefficients appropriate for determining relative standard errors and minimum reliable estimates by survey and type of annual estimate for data shown in this report**

Type of estimate	Coefficient for use with estimates in thousands		Minimum reliable estimate in thousands
	A	B	
1993-94 NAMCS			
Asthma visits . . . . .	0.01701	4.08073	52
Asthma drug mentions . . . . .	0.01709	11.17300	154
All office visits . . . . .	0.00087	32.04100	360
All drug mentions . . . . .	0.00121	70.32200	793
1980-81 NAMCS			
All office visits . . . . .	0.00111	19.92098	224
All drug mentions . . . . .	0.00165	29.24164	331
1993-94 NHAMCS			
All ED visits . . . . .	0.00158	2.64183	30
All OPD visits . . . . .	0.01393	3.11805	41
1994 NHDS			
All discharges . . . . .	0.00164	0.80710	9
1993-94 NHIS			
1993 Prevalence of chronic conditions . . . . .	-0.00017	12.90000	143
1994 Prevalence of chronic conditions . . . . .	-0.00011	14.30000	159

the impact of response on final estimates by imputing to nonresponding physicians data from visits to similar physicians. For this purpose, physicians were judged similar if they had the same specialty designation and practiced in the same PSU.

### Hospital nonresponse

Estimates from NHAMCS data were adjusted to account for sample hospitals that were in scope but did not participate in the study. This adjustment was calculated to minimize the impact of nonresponse on final estimates by imputing to nonresponding hospitals data from visits to similar hospitals. For this purpose, hospitals were judged similar if they were in the same region, ownership control group, and metropolitan statistical area control group.

### ED and/or clinic nonresponse

Estimates from NHAMCS data were adjusted to account for ED's and sample clinics that were in scope but did not participate in the study. This adjustment was calculated to minimize the impact of nonresponse on final estimates by imputing to nonresponding ED's or clinics data from visits to similar ED's or clinics. For this purpose, emergency departments or clinics were judged similar if they were in the same emergency department or clinic group.

### Test of significance and rounding

In this report, the determination of statistical inference is based on the two-tailed *t*-test. The Bonferroni inequality was used to establish the critical value for statistically significant differences (0.05 level of significance over all analyses performed on estimates in a table). Terms relating to differences such as "greater than" or "less than" indicate that the difference is statistically significant. A lack of comment regarding the difference between any two estimates does not mean that the difference was tested and found to be not significant. Chi-square tests were performed using SUDAAN routines that

take into account the complex sampling design.

In the tables, estimates of ambulatory care visits have been rounded to the nearest thousand. Consequently, estimates will not always add to totals. Rates and percents were calculated from original unrounded figures and do not necessarily agree with percents calculated from rounded data.

### Definition of terms

*Ambulatory patient*—An ambulatory patient is an individual seeking personal health services who is not currently admitted to any health care institution on the premises.

*Clinic*—A clinic is an administrative unit of the outpatient department where ambulatory medical care is provided under the supervision of a physician. The following are examples of the types of clinics excluded from the NHAMCS: ambulatory surgical centers, chemotherapy, employee health service, renal dialysis, methadone maintenance, and radiology.

*Drug mention*—A drug mention is the physician's entry on the Patient Record form of a pharmaceutical agent—by any route of administration—for prevention, diagnosis, or treatment. Generic as well as brand-name drugs are included, as are nonprescription and prescription drugs. Along with all new drugs, the physician also records continued medications if the patient was specifically instructed during the visit to continue the medication. Physicians may report up to five medications per visit.

*Drug visit*—A drug visit is a visit at which medication was prescribed or provided by the physician.

*Emergency department*—An emergency department is a hospital facility for the provision of unscheduled outpatient services to patients whose conditions require immediate care and is staffed 24 hours a day. If an emergency department provided emergency services in different areas of the hospital, then all of these areas were selected with certainty into the sample. Off-site emergency departments open less than

24 hours are included if staffed by the hospital's emergency department.

*Office*—An office is the space identified by a physician as a location for his or her ambulatory practice. Offices customarily include consultation, examination, or treatment spaces that patients associate with the particular physician.

*Office-based physician*—A physician is a duly licensed doctor of medicine (M.D.) or doctor of osteopathy (D.O.) who is currently in office-based practice and who spends some time caring for ambulatory patients. Excluded from the NAMCS are physicians who are hospital based; who specialize in anesthesiology, pathology, or radiology; who are federally employed; who treat only institutionalized patients; or who are employed full time by an institution and spend no time seeing ambulatory patients.

*Outpatient department*—An outpatient department is a hospital facility where nonurgent ambulatory medical care is provided under the supervision of a physician.

*Urgent*—An ED visit is urgent/emergent if the patient requires immediate attention for an acute illness or injury that threatens life or function and where delay would be harmful to the patient.

*Visit*—A visit is a direct personal exchange between an ambulatory patient and a physician or a staff member working under the physician's supervision, for the purpose of seeking care and rendering personal health services. Excluded from the NAMCS and NHAMCS are visits where medical care was not provided, such as visits made to drop off specimens, pay bills, make appointments, and walk-outs.



**Keywords:** • Asthma • NAMCS • NHAMCS • Antiasthmatic drugs

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**Trade name disclaimer**

The use of trade names is for identification only and does not imply endorsement by the Public Health Service, U.S. Department of Health and Human Services.

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