# Asthma in California:

## Findings from the 2001 California Health Interview Survey


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**November 2003**


UCLA CENTER FOR HEALTH POLICY RESEARCH

THE CALIFORNIA ENDOWMENT

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summary

Asthma is a chronic inflammatory disorder of the airways characterized by recurrent episodes of shortness of breath, wheezing, coughing, and chest tightness.[1] Asthma is one of the most common chronic conditions in the United States and around the world, and the prevalence has been increasing over the past three decades.[2] Furthermore, asthma is a costly condition. Direct and indirect costs associated with the condition were an estimated $12.7 billion in 1998.[3] Asthma can have serious health, quality of life, and economic consequences for patients, families, and society. Fortunately, asthma can generally be controlled with effective pharmacologic treatment, self-management, education, and avoidance of triggers.

This report examines asthma in California based on data from the 2001 California Health Interview Survey (CHIS 2001). First, we report on the prevalence of asthma in California. Next we discuss access to care for people with asthma. Then we discuss emergency department use and hospitalizations among people with asthma. Finally, we examine those Californians who experience frequent asthma symptoms. All comparative statements in this report reflect statistically significant differences ($p < 0.05$) unless otherwise noted. A more detailed description of the data source and methods can be found in the Appendix.

## PREVALENCE

An estimated 3.9 million California children and adults, 11.9% of the state's population, report that they have been diagnosed with asthma at some point in their lives (referred to as "lifetime asthma prevalence"). Lifetime asthma prevalence varies with several important population characteristics.

- Asthma disproportionately affects school-age children and young adults. In California, adolescents (ages 12-17) report the highest lifetime asthma prevalence (16.3%), followed by young adults ages 18-24 (14.4%), and children ages 6-11 (13.7%).
- African Americans and American Indians and Alaska Natives (AIAN) disproportionately bear the burden of lifetime asthma prevalence. In California, one in four AIAN children (25.5%), one in five AIAN adults (20.8%), one in five African-American children (21.1%), and one in six African-American adults (16.2%) report having been diagnosed with asthma – significantly higher than whites, Latinos, and Asians.

## ACCESS TO CARE AMONG CALIFORNIANS WITH ASTHMA

People with asthma need continuous and timely access to effective health care to manage their chronic condition. Having health insurance coverage and a place one usually goes when in need of health care (i.e., a usual source of care) are key factors affecting access to medical care.

- In California, 6.4% of children and 12.9% of nonelderly adults with asthma – nearly 400,000 in all – are currently uninsured and thus have no financial protection against medical expenses for this chronic condition.
- Over 64,000 children (5.4%) and 300,000 adults (11.1%) with asthma do not have a usual source of care. These children and adults are at increased risk for not receiving appropriate care for their asthma.

1 Sears MR. Epidemiology of childhood asthma. Lancet 1997; 350:1015-20.

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3 Weiss KB, Sullivan SD. The health economics of asthma and rhinitis: assessing the economic impact. Journal of Allergy and Clinical Immunology 2001; 107:3-8.

The National Heart, Lung, and Blood Institute (NHLBI) recommends that people with asthma see a doctor at least twice a year and that *all* people with asthma receive education from a health care provider about how to manage their condition. Unfortunately, the basic level of care recommended by the NHLBI is not available to all Californians with asthma. One significant reason for not receiving this recommended care is lack of access to health care services.

- Over 38,000 children ages 1-11 with asthma (5.4%) and nearly 275,000 adults with asthma (10.0%) have not seen a doctor at all in the past year.
- Nonelderly adults with asthma who have no insurance coverage are at least three times as likely as those with Medi-Cal or employment-based insurance not to have seen a doctor in the past year (27.5% compared with 6.1% and 8.7%, respectively).
- One out of every two children ages 1-11 with asthma who has no usual source of care (48.7%) has seen a doctor just once or not at all in the past year compared with only one in five of those with a usual source of care (21.1%).
- In California, 130,000 adolescents ages 12-17 with asthma (27.0%) and 673,000 adults with asthma (24.5%) report they did not receive information on how to avoid asthma triggers or on how to recognize the signs of an asthma attack.

Delays in receiving appropriate medical care and important prescription medications and tests can result in more severe asthma symptoms, thus increasing absenteeism and reducing quality of life. In some cases delays result in preventable emergency department visits and hospital stays. In severe cases, a delay in timely care can result in death.

- Nearly 200,000 adults (7.2%) reported experiencing delays in care specifically for their asthma. An additional 36,000 children (3.1%) experienced delays in care for their asthma.

## EMERGENCY DEPARTMENT USE AND HOSPITALIZATION

Unlike other chronic conditions in which a certain amount of emergency department (ED) use and hospitalization may be inevitable, ED use and hospitalization due to asthma are thought to be largely preventable with optimum management of the condition.

- In California, nearly 136,000 children under the age of 18 (11.4% of children with asthma) and over 197,000 adults (7.2% of adults with asthma) reported an ED visit for treatment of asthma in the 12 months prior to the survey.[4]
- Over 31,000 children (2.6%) and nearly 60,000 adults with asthma (2.2%) reported that they were hospitalized within the last year because of asthma.

4 Self-reported reasons for emergency department visits or hospitalizations may not be accurate due to misclassification on the part of the respondent regarding the reason for an emergency department visit or admittance to a hospital. However, it is unclear whether any inaccuracy would, on the average, result in overestimation, underestimation, or no bias in reported rates.

Many Californians with asthma lack adequate access to the healthcare system. This lack of access can have serious consequences. For example, those who reported experiencing delays in care such as delaying or not receiving a prescription medication or other needed health care were more likely to go to an emergency department.

- Among children under age 18 with asthma, those who experienced delays in care for asthma were more than twice as likely as those with no delays in care to visit the emergency department for asthma (25.5% and 11.0%, respectively). Adults who reported delayed or foregone care for asthma were four times as likely as adults who did not report delayed care to visit the emergency department because of asthma (23.1% and 5.8%, respectively).

## CALIFORNIANS WITH FREQUENT ASTHMA SYMPTOMS

Frequent asthma symptoms among people with asthma can be a sign of inadequate medical control and persistent exposure to environmental triggers as well as greater severity of the disease. Despite the fact that asthma symptoms can be controlled, over 620,000 adults with asthma (nearly 25%) experience asthma symptoms every day or every week. An additional 124,000 children with asthma, one in every 10, are suffering from daily or weekly symptoms. Frequency of asthma symptoms varies with race and ethnicity, income, and area of residence.

- More than one third of American Indian and Alaska Native adults with asthma experience symptoms every day or every week (36.7%) compared to less than 25% of whites, Latinos, Asians, and African Americans.
- Among adults with asthma, those with incomes below the Federal Poverty Level (FPL) were nearly twice as likely to experience daily/weekly symptoms as those with incomes at or above 300% FPL (34.2% and 18.6%, respectively).
- Adults with asthma living in rural areas are more likely to have daily or weekly symptoms (27.0%) than those living in suburban areas (21.8%). Higher proportions of children living in rural areas have daily or weekly symptoms than those living in urban areas, 17.0% and 7.9%, respectively.

If inadequately controlled, asthma can have serious health, quality of life, and economic consequences.

- Among people with asthma, adults with daily or weekly symptoms are more likely to report poor or fair health status (40.7%) than those with monthly symptoms (25.0%) or symptoms less than once a month (16.6%).
- More than half of adolescents (ages 12-17) with asthma who experience daily or weekly symptoms missed one or more days of school per month (54.0%) compared with one in three of those with symptoms less than once a month (32.8%).
- More than half of children under age 12 with asthma who experience daily or weekly asthma symptoms limited their physical activities due to asthma at least some of the time (54.3%) compared with 17.9% for those with symptoms less than once a month.

Many Californians who suffer from daily or weekly asthma symptoms report not having regular visits to a physician, not receiving education about self-management of asthma, not taking medication for asthma, currently smoking, or experiencing delays in needed care for asthma.

- Nearly one in five adults (19.4%) and one in four adolescents (25.1%) who experience asthma symptoms every week or every day report that they neither received information about how to recognize an asthma attack nor information about how to avoid the things that trigger an asthma attack.
- Over 115,000 people who experience daily or weekly asthma symptoms – 14.9% of adults and 18.2% of children under age 18 – are not taking *any* medication to control their asthma.

## CONCLUSIONS AND POLICY IMPLICATIONS

In California, nearly 1.2 million children (12.9%) and over 2.7 million adults (11.5%) have been diagnosed with asthma. Approximately 750,000 experience asthma symptoms every week and of these, 428,000 suffer from asthma symptoms every day. The focus for all Californians should be on the effective control of asthma to minimize the burden of asthma. Strategies and policies that promote the effective prevention and control of asthma need to be implemented. Individuals, communities, health care providers, community organizations, schools, workplaces, and state and local governmental organizations (such as public health, environmental, and housing agencies) will need to work together to address the disparities in prevalence, level of control, and impact of asthma in California. This can be achieved by focusing on asthma surveillance, improving access to health care, reducing disparities, and improving control of asthma through comprehensive management and the reduction of exposure to environmental triggers. We recommend the following:

- Continue support for the on-going surveillance of asthma at the local level. Timely and comprehensive data are needed to inform the development and evaluation of targeted interventions at the state and local levels.
- Improve access to healthcare for all people with asthma. Timely access to comprehensive, high quality health care services through enhancement of health insurance coverage with appropriate benefits is critical for improving control of asthma.
- Reduce disparities in the burden of asthma. Community-based, culturally appropriate interventions that assure adequate education about asthma management, access to sufficient medications and equipment, and efforts to improve living environments are needed to reduce the disproportionate burden of asthma among low-income families, racial and ethnic groups, and the uninsured.
- Improve control of asthma through comprehensive asthma management and the reduction of environmental triggers. Comprehensive asthma education and management can improve control of asthma. Programs should be developed to promote the implementation of current guidelines for the diagnosis and management of asthma. Programs are also needed to reduce exposure to environmental triggers in home, school, work, and outdoor environments to reduce the prevalence and frequency of asthma episodes.

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# 1. ASTHMA IN CALIFORNIA: INTRODUCTION



Asthma is one of the most common chronic conditions in the United States and its prevalence has been increasing. Over the past 30 years, the prevalence of asthma has increased sharply both in the United States and around the world.[2] From 1980 to 1996, the number of Americans afflicted with asthma more than doubled, with children under five years old experiencing the highest rate of increase. In 1997, a total of 26.7 million people nationally (9.7% of the population) reported a physician diagnosis of asthma at some point in their lives.[5] Asthma remains a critical clinical and public health problem. Based on forecasted estimates of self-reported current asthma prevalence from the Centers for Disease Control and Prevention (CDC), an estimated 17.3 million people in the U.S. had active asthma in 1998, and California had the largest number of people affected (2.27 million), followed by New York (1.24 million) and Texas (1.18 million).[6]

The effects of asthma can be costly to individuals, families, employers, and society. Direct and indirect costs associated with asthma during 1998 were an estimated $12.7 billion.[3] Asthma accounts for enormous demands on the medical care system – 9 million visits to health care providers, over 1.8 million emergency department visits, and about 500,000 hospitalizations.[7] Asthma results in many lost nights of sleep, restricted activities, and reduced work productivity.[8] It is estimated that there are 134 million days of restricted activity a year due to asthma.[9] Asthma is also one of the leading causes of school absenteeism, accounting for over 14 million missed school days annually. Asthma results in considerable loss of life; it causes nearly 5,000 deaths each year nationally.[5]

Asthma is a chronic inflammatory disorder of the airways characterized by recurrent episodes of shortness of breath, wheezing, coughing, and chest tightness.[1] The causes of asthma, however, are not well understood; it is a complex condition that has been associated with genetic, infectious, allergenic, socioeconomic, psychosocial, occupational and environmental factors.[10, 11, 12, 13, 14] People with asthma may experience life-threatening exacerbations. However, symptoms not severe enough to prompt a visit to a physician can still substantially impair quality of life. Left untreated, airway inflammation may lead to irreversible changes in lung structure, a process called airway remodeling.[15, 16]

Although there is currently no cure for asthma, episodes of asthma symptoms can be effectively managed and prevented. Following important advances in science in the last decade, the National Asthma Education and Prevention Program (NAEPP), sponsored by the National Heart, Lung, and Blood Institute (NHLBI) developed the Guidelines for the Diagnosis and Management of Asthma.[17] According to the guidelines, effective management of asthma is comprised of four major components: controlling exposure to environmental factors – such as air pollution and indoor


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tobacco smoking – that trigger asthma episodes, managing asthma adequately with medication, educating asthma patients and their families to become partners in their care, and monitoring the condition by using objective measures of lung function. Many of the problems caused by asthma could be avoided if people with asthma, in partnership with their caregivers and healthcare providers, managed the condition according to established national guidelines.

Why is the burden of asthma still so great despite the progress made in understanding the mechanisms of the condition and developing guidelines to effectively manage asthma? First, many people with asthma are not receiving optimal care in accordance with the guidelines.[18, 19, 20, 21] Second, the populations and communities experiencing the greatest burden of asthma often lack access to high quality medical care, including adequate education about asthma management and appropriate medications.[18, 22, 23] Recent data indicate that women, people with low incomes, and minority populations have been most severely affected.[24, 25] Third, for many with asthma, poor housing and environmental conditions make it difficult to control exposures that worsen the condition.[18] Fourth, limited asthma surveillance at the state and local levels hampers public health efforts to track the condition closely enough to develop targeted interventions and understand the underlying factors.[18]

This report examines asthma in California based on data from the 2001 California Health Interview Survey (CHIS 2001), the largest state-level health survey in the nation. First, we report on the prevalence of asthma in California. Next we discuss access to care for people with asthma. Then we discuss emergency department use and hospitalizations among people with asthma. Finally, we examine those Californians who experience frequent asthma symptoms. All comparative statements in this report reflect statistically significant differences ($p < 0.05$) unless otherwise noted.

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# 2. PREVALENCE

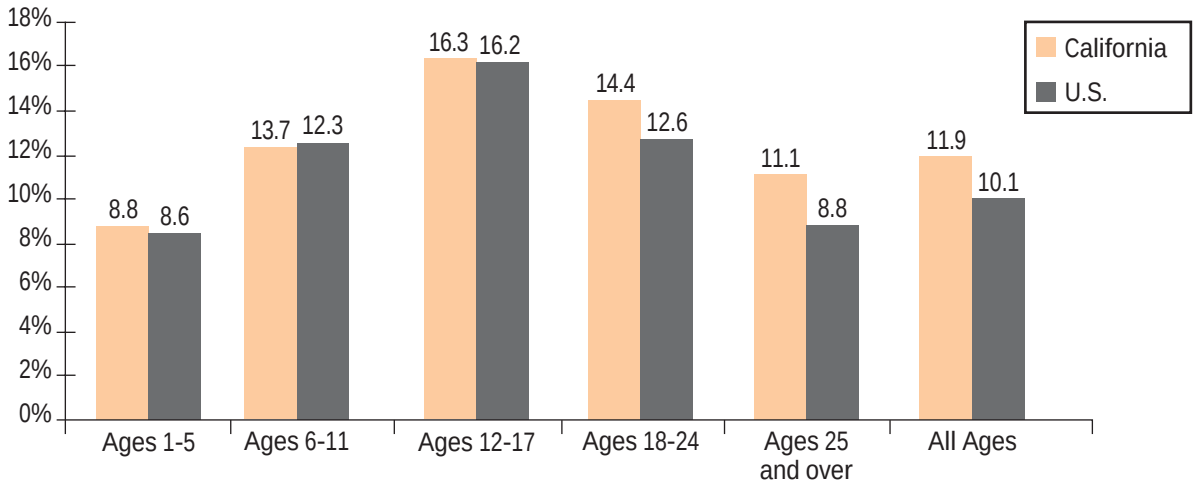
## LIFETIME ASTHMA PREVALENCE

In California, nearly 1.2 million children (12.9%) and over 2.7 million adults (11.5%) have been diagnosed with asthma at some point in their lives (referred to as "lifetime asthma prevalence"). Based on the 2000 National Health Interview Survey (NHIS), the comparable national rate is 10.1%. Lifetime asthma prevalence appears to be higher in California than nationally for some groups (Exhibits 1 and 2).

Asthma disproportionately affects school-age children and young adults (Exhibit 1). In California, adolescents ages 12-17 report the highest lifetime asthma prevalence (16.3%), followed by young adults ages 18-24 (14.4%), and children ages 6-11 (13.7%). The lifetime prevalence is lower for children younger than six years old (8.8%), and for adults over age 25 (11.1%). This same pattern can be seen nationally, however the prevalence for many age groups appears slightly higher in California than nationally (Exhibit 1).[26]

Among children under the age of 18 in California, asthma is more prevalent in boys than girls (14.7% and 11.0%, respectively; Exhibit 2). However, among adults 18 and over, asthma is more prevalent among women than men (13.0% and 10.0%, respectively). A similar pattern can be found in national data. Higher asthma rates among adult women have

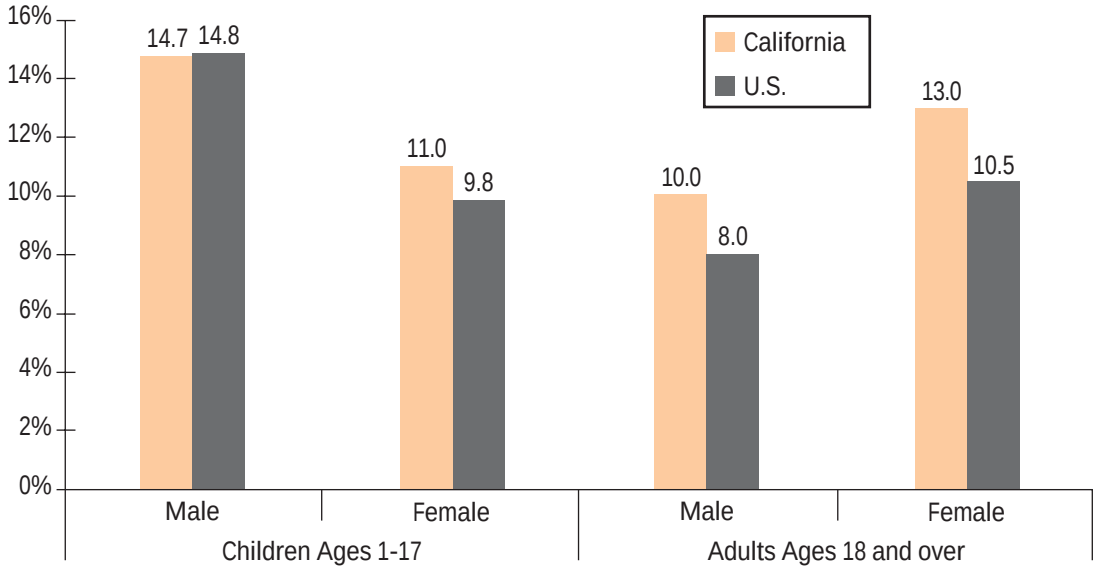
**EXHIBIT 1. LIFETIME ASTHMA PREVALENCE BY AGE IN CALIFORNIA AND THE UNITED STATES**




Source: 2001 California Health Interview Survey and 2000 National Health Interview Survey

26 Please note that although CHIS and the NHIS ask similar questions regarding lifetime asthma prevalence, there are some methodological differences between the two surveys. For example, CHIS is a telephone survey and the NHIS is an in-person interview.

**EXHIBIT 2. LIFETIME ASTHMA PREVALENCE BY GENDER IN CALIFORNIA AND THE UNITED STATES**




Source: 2001 California Health Interview Survey and 2000 National Health Interview Survey

been shown for prevalence as well as other measures such as hospitalization, mortality, and activity limitations related to asthma exacerbations.[7, 27]

## RACIAL AND ETHNIC DISPARITIES IN LIFETIME ASTHMA PREVALENCE

African Americans and American Indians and Alaska Natives (AIAN) disproportionately bear the burden of lifetime asthma prevalence. In California, one in four AIAN children (25.5%) and one in five adults (20.8%) have been diagnosed with asthma (Exhibit 3), as have one in five African-American children (21.1%) and one in six adults (16.2%). Rates among African-American and AIAN adults and children are significantly higher than rates among whites, Latinos, and Asians. In addition, one in five Native Hawaiian and other Pacific Islander (NHOPI) children and adults (22.3% and 20.8%, respectively) have been diagnosed with asthma although their rates are not statistically different from those of whites.

Recent studies suggest that although Latinos have overall lower rates of asthma diagnosis, variations among subgroups may be masked when Latinos are studied on an aggregate level.[28, 29] For example, Puerto Ricans tend to have higher asthma prevalence than Mexicans.[28] In California, there was considerable variation in lifetime asthma prevalence by ethnic group among respondents of Latino ancestry (Exhibit 4). Latinos who report their heritage as Puerto Rican or South American have significantly higher lifetime prevalence than other groups, including Mexicans, Salvadorans, and Central Americans. Based on data from the 2000 Census, over 75% of Latinos in California are of Mexican heritage. This may contribute to the overall low prevalence of asthma among Latinos in California.

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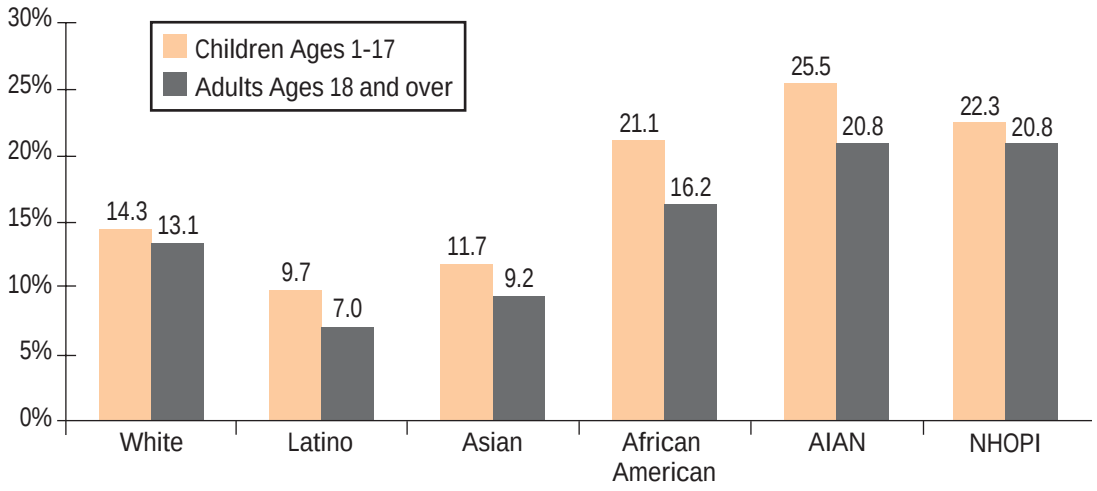
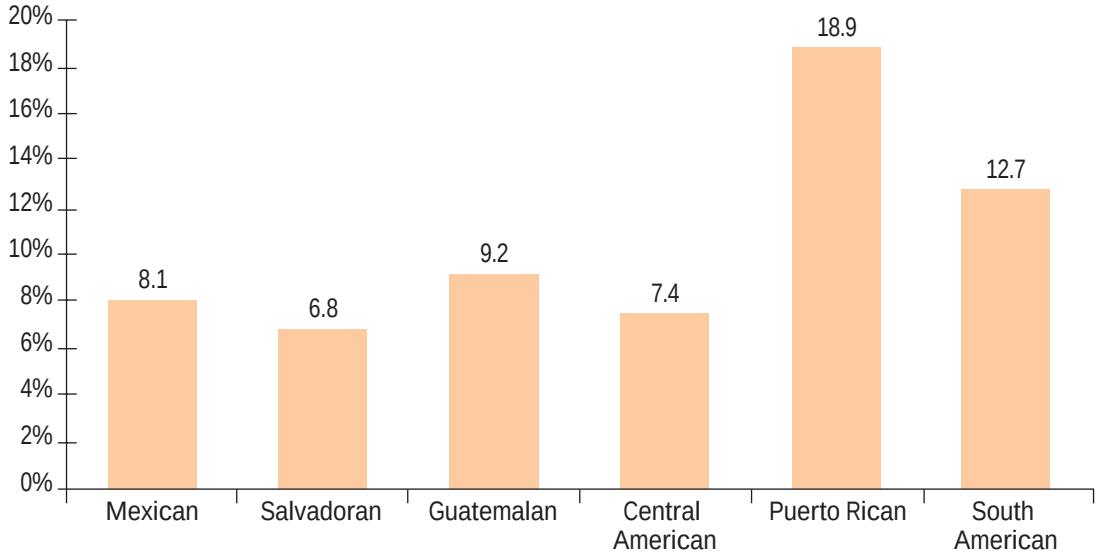
## EXHIBIT 3. LIFETIME ASTHMA PREVALENCE BY RACE/ETHNICITY, CALIFORNIA, 2001




Note: American Indian and Alaska Native is abbreviated AIAN. Native Hawaiian and other Pacific Islander is abbreviated NHOPI.

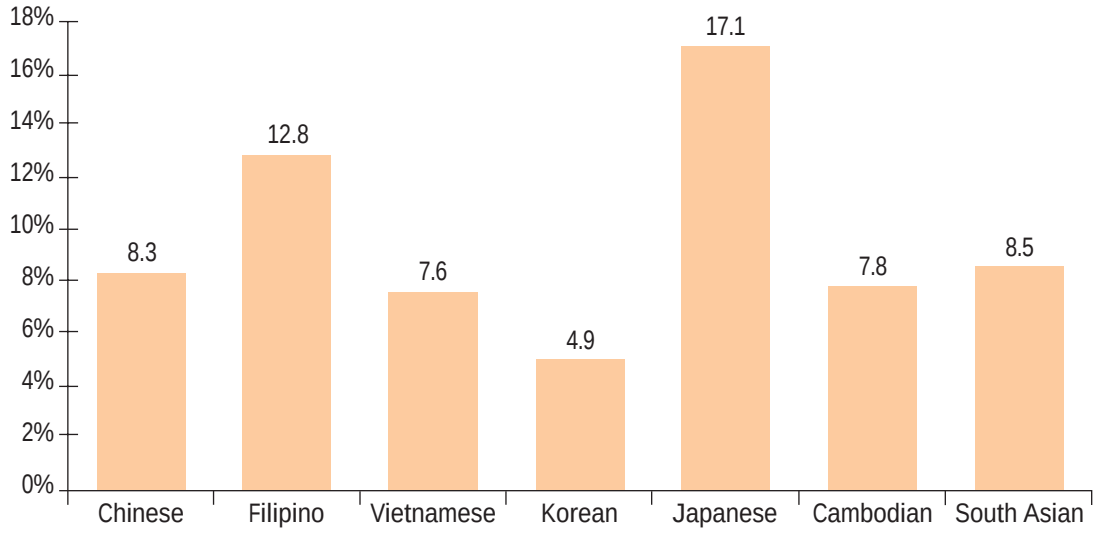
Source: 2001 California Health Interview Survey

## EXHIBIT 4. LIFETIME ASTHMA PREVALENCE BY LATINO ETHNIC GROUPS, ALL AGES, CALIFORNIA, 2001




Source: 2001 California Health Interview Survey

**EXHIBIT 5. LIFETIME ASTHMA PREVALENCE BY ASIAN ETHNIC GROUPS, ALL AGES, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

The Asian-American population is also heterogeneous. In California, Asians whose ethnic background is Japanese or Filipino have high lifetime asthma prevalence, significantly higher than Chinese, Vietnamese, Korean, Cambodian, or South Asian (Exhibit 5). It should be mentioned that it is not clear to what extent observed variations in asthma prevalence between populations are due to differences in actual asthma prevalence or differences in the likelihood of receiving a diagnosis of asthma. Many cases of asthma in a population may remain undiagnosed, therefore prevalence based on self-reported physician diagnosis may underestimate the actual rate. [30, 31, 32] A discrepancy between actual rates and diagnosed rates could be related to differences in financial or geographic access to health care, health care-seeking behaviors of patients, and physicians' practice patterns.[33, 34] For example, populations who are less likely to see a doctor may be less likely to be diagnosed with asthma. Thus, populations who on average have higher rates of poverty, uninsurance, or underinsurance may have prevalence rates that are underestimated. In addition, recent immigrants face significant barriers to care due to the added issues of language, acculturation, and immigration status. Since the proportion of new immigrants is higher among some Latino and Asian-American populations, they may have higher rates of underdiagnosis of asthma or limited understanding of asthma when it is diagnosed. Low prevalence levels for these groups may therefore reflect limited access to care, under-diagnosis, communication barriers, and failure to capture the heterogeneity among these populations.

30 Speight AP, Lee DA, Hey EN. Under diagnonis and under treatment of asthma in childhood. British Medical Journal 1983; 286:1253-1256.

31 Siersted H, Boldsen J, Hansen J, Mostgarrd G, Hyldebrandt N. Population-based study of risk factors for under diagnosis of asthma in adolescence: Odense schoolchild study. British Medical Journal 1998; 316:651-655.

32 Yeatts K, Davis KJ, Sotir M, Hergert C, Shy C. Who gets diagnosed with asthma? Frequent wheeze among adolescents with and without a diagnosis of asthma. Pediatrics 2003; 111:1046-1054.

33 Stout JW, White LC, Redding, GJ, Morrary BH, Martinez PE, Gergen PJ. Differences in asthma prevalence between samples of American Indian and Alaska Native children. Public Health Reports 2001; 116:51-57.

34 Eggleston PA. Urban children and asthma. Immunology and Allergy Clinics of North America 1998; 18:75-84.

## GEOGRAPHIC VARIATION IN ASTHMA SYMPTOM PREVALENCE

Asthma is a chronic condition that can have serious health, quality of life, and economic consequences for patients, families, and society. However, asthma can be controlled with effective clinical treatment and environmental control. People with asthma have more frequent symptoms if they are exposed to environmental "triggers" such as certain air pollutants, outdoor allergens, tobacco smoke, cockroaches, dust mites, animal dander, mold, and viral respiratory infections. They will also have more symptoms if they do not take appropriate or adequate long-term control medications. Thus, frequent asthma symptoms can be a sign of inadequate medical control or persistent exposure to environmental triggers as well as greater severity of the condition.

Almost 9% of Californians—an estimated 2.9 million people – experience asthma symptoms at least once a year, referred to here as "asthma symptom prevalence."[35] Nearly three-quarters of a million people experience such symptoms every day or every week.

Asthma symptom prevalence varies across California's counties (Exhibit 6). It ranges from 5.9% in Monterey and San Benito Counties to 16.4% in Fresno County for children and from 5.6% in Monterey and San Benito Counties to 13.3% in Solano County for adults. Among adults, Solano, Humboldt and Del Norte, El Dorado, Fresno, Napa, Merced, Mendocino and Lake, Sacramento, Madera, and Shasta counties have higher asthma symptom prevalence rates than the state average of 8.5%. Among children, San Bernardino, Kings, Solano, and Fresno counties have higher asthma symptom prevalence rates than the state average of 9.6%. However, please note that many counties have wide, overlapping confidence intervals.

Possible explanations for this variation in asthma symptom prevalence among counties include differences in demographic factors (for example, age, gender, and race and ethnicity), socioeconomic status (such as income and education levels), environmental factors (e.g. outdoor air pollution and climate), physician diagnostic practices, and access to care.[36, 37] Variations may also relate to the migration of families with members who suffer from asthma, such as moving away from highly polluted areas or to areas with more accessible health care. Additionally, CHIS is a geographically stratified survey. Response rates vary by county and county groups. Some counties' low prevalence may be related to selection bias on the part of respondents. For example, undocumented respondents may choose not to respond. Furthermore, counties with a greater proportion of people living in poverty, uninsured residents, and recent or undocumented immigrants may have higher rates of undiagnosed asthma.

35 "Asthma symptom prevalence" refers to the number of people who reported being diagnosed with asthma at any time and reported asthma symptoms in the past 12 months divided by the total number of people in the population group.

36 Bair YA, Garcia JA, Romano PS, Siefkin AD, Kravitz RL. Does "mainstreaming" guarantee access to care for Medicaid recipients with asthma? Journal of General Internal Medicine 2001; 16:475-81.

37 Mansour ME, Lanphear BP, DeWitt TG. Barriers to asthma care in urban children: Parent perspectives. Pediatrics 2000; 106:512-519.

**EXHIBIT 6. ASTHMA SYMPTOM PREVALENCE IN CALIFORNIA COUNTIES OR COUNTY GROUPS, 2001**

| | CHILDREN (AGES 1-17) | | ADULTS (AGES 18+) | | ALL AGES | |
|---|---|---|---|---|---|---|
| | % | (90% CI*) | % | (90% CI) | % | (90% CI) |
| **NORTHERN AND SIERRA COUNTIES** | **9.6** | **(8.3-11.0)** | **10.7** | **(9.9-11.4)** | **10.4** | **(9.8-11.0)** |
| BUTTE | 11.2 | (7.2-15.3) | 9.5 | (7.5-11.4) | 9.9 | (8.1-11.7) |
| SHASTA | 11.2 | (6.2-16.1) | 11.0 | (9.0-13.1) | 11.1 | (9.1-13.1) |
| HUMBOLDT, DEL NORTE | 9.4 | (5.5-13.4) | 13.0 | (10.7-15.4) | 12.2 | (10.1-14.2) |
| SISKIYOU, LASSEN, TRINITY, MODOC | ** | ** | 11.0 | (8.8-13.2) | 9.6 | (7.7-11.4) |
| MENDOCINO, LAKE | 8.5 | (4.8-12.3) | 11.4 | (9.0-13.8) | 10.7 | (8.7-12.7) |
| TEHAMA, GLENN, COLUSA | 8.2 | (5.4-11.1) | 13.0 | (10.6-15.3) | 11.6 | (9.7-13.4) |
| SUTTER, YUBA | 12.2 | (8.2-16.1) | 9.7 | (7.9-11.6) | 10.5 | (8.7-12.2) |
| NEVADA, PLUMAS, SIERRA | 8.3 | (4.9-11.7) | 9.1 | (7.2-10.9) | 8.9 | (7.3-10.5) |
| TUOLOMNE, CALAVERAS, AMADOR, INYO, MARIPOSA, MONO, ALPINE | 8.9 | (5.5-12.2) | 9.4 | (7.5-11.2) | 9.3 | (7.6-10.9) |
| **GREATER BAY AREA** | **10.2** | **(9.0-11.4)** | **9.0** | **(8.4-9.6)** | **9.3** | **(8.7-9.9)** |
| SANTA CLARA | 9.3 | (6.7-11.8) | 8.0 | (6.7-9.4) | 8.3 | (7.1-9.5) |
| ALAMEDA | 9.9 | (6.9-12.9) | 10.2 | (8.5-11.9) | 10.1 | (8.7-11.6) |
| CONTRA COSTA | 9.1 | (5.9-12.2) | 10.4 | (8.5-12.2) | 10.0 | (8.4-11.6) |
| SAN FRANCISCO | 10.5 | (6.2-14.7) | 8.3 | (6.9-9.7) | 8.6 | (7.3-9.9) |
| SAN MATEO | 9.0 | (5.8-12.1) | 6.1 | (4.8-7.3) | 6.7 | (5.5-8.0) |
| SONOMA | 11.6 | (7.6-15.7) | 8.7 | (6.8-10.6) | 9.4 | (7.7-11.1) |
| SOLANO | 15.9 | (12.8-18.9) | 13.3 | (11.7-15.0) | 14.1 | (12.6-15.5) |
| MARIN | 14.2 | (9.2-19.2) | 8.1 | (6.1-10.1) | 9.4 | (7.5-11.3) |
| NAPA | 8.9 | (5.2-12.6) | 11.9 | (9.2-14.5) | 11.1 | (8.9-13.3) |
| **SACRAMENTO AREA** | **10.9** | **(8.6-13.2)** | **11.2** | **(9.9-12.5)** | **11.1** | **(10.0-12.2)** |
| SACRAMENTO | 11.2 | (8.1-14.4) | 11.3 | (9.5-13.1) | 11.3 | (9.7-12.8) |
| PLACER | 10.5 | (6.5-14.4) | 10.4 | (8.1-12.7) | 10.4 | (8.5-12.4) |
| YOLO | 11.2 | (7.6-14.7) | 10.6 | (8.5-12.8) | 10.8 | (8.9-12.6) |
| EL DORADO | 8.8 | (5.1-12.4) | 12.1 | (9.5-14.8) | 11.3 | (9.1-13.5) |

Continued

Note: *Asthma symptom prevalence* refers to people who reported being diagnosed with asthma by a physician at any time and reported symptoms of asthma during the preceding 12 months.

* The 90% Confidence Interval (CI) is a range that provides a more reliable prevalence estimate of persons in the population who fit that category, compared to the "point estimate."

** The estimate was not statistically reliable.

Source: 2001 California Health Interview Survey

**EXHIBIT 6. ASTHMA SYMPTOM PREVALENCE IN CALIFORNIA COUNTIES OR COUNTY GROUPS, 2001 (CONTINUED)**

| | CHILDREN (AGES 1-17) | | ADULTS (AGES 18+) | | ALL AGES | |
|---|---|---|---|---|---|---|
| | % | (90% CI*) | % | (90% CI) | % | (90% CI) |
| **SAN JOAQUIN VALLEY** | **11.9** | **(10.5-13.2)** | **10.1** | **(9.3-10.8)** | **10.7** | **(10.0-11.3)** |
| FRESNO | 16.4 | (12.5-20.4) | 11.9 | (9.9-13.8) | 13.4 | (11.5-15.2) |
| KERN | 10.0 | (7.5-12.4) | 9.0 | (7.5-10.5) | 9.3 | (8.0-10.6) |
| SAN JOAQUIN | 10.1 | (7.3-12.9) | 8.9 | (7.2-10.6) | 9.3 | (7.8-10.7) |
| STANISLAUS | 9.3 | (6.0-12.5) | 9.9 | (7.5-12.2) | 9.7 | (7.8-11.6) |
| TULARE | 10.5 | (7.4-13.7) | 8.8 | (6.7-10.8) | 9.4 | (7.7-11.1) |
| MERCED | 11.8 | (7.8-15.8) | 11.7 | (9.5-13.9) | 11.7 | (9.8-13.7) |
| KINGS | 14.7 | (11.1-18.3) | 10.0 | (7.9-11.9) | 11.5 | (9.7-13.3) |
| MADERA | 11.1 | (7.3-14.9) | 11.2 | (9.0-13.3) | 11.2 | (9.3-13.1) |
| **CENTRAL COAST** | **8.4** | **(6.8-10.0)** | **8.1** | **(7.3-8.9)** | **8.2** | **(7.4-8.9)** |
| VENTURA | 9.1 | (5.8-12.4) | 8.3 | (6.7-10.0) | 8.6 | (7.1-10.1) |
| SANTA BARBARA | 6.7 | (3.6-9.7) | 8.4 | (6.6-10.2) | 8.0 | (6.4-9.5) |
| SANTA CRUZ | 10.2 | (6.5-13.9) | 8.9 | (7.0-10.7) | 9.2 | (7.5-10.9) |
| SAN LUIS OBISPO | 12.5 | (8.4-16.6) | 10.2 | (8.0-12.3) | 10.7 | (8.8-12.6) |
| MONTEREY, SAN BENITO | 5.9 | (3.4-8.3) | 5.6 | (4.2-7.0) | 5.7 | (4.5-6.9) |
| **LOS ANGELES** | **8.0** | **(7.2-8.9)** | **7.5** | **(7.0-8.0)** | **7.6** | **(7.2-8.1)** |
| LOS ANGELES | 8.0 | (7.2-8.9) | 7.5 | (7.0-8.0) | 7.6 | (7.2-8.1) |
| **OTHER SOUTHERN CALIFORNIA COUNTIES** | **9.9** | **(8.8-11.0)** | **8.0** | **(7.5-8.6)** | **8.6** | **(8.1-9.1)** |
| ORANGE | 8.3 | (6.4-10.2) | 7.7 | (6.6-8.7) | 7.8 | (6.9-8.7) |
| SAN DIEGO | 9.8 | (7.7-11.9) | 7.4 | (6.5-8.3) | 8.0 | (7.2-8.9) |
| SAN BERNARDINO | 13.1 | (10.3-15.9) | 9.7 | (8.2-11.2) | 10.9 | (9.5-12.2) |
| RIVERSIDE | 8.9 | (6.3-11.5) | 8.0 | (6.7-9.3) | 8.3 | (7.1-9.5) |
| IMPERIAL | 11.2 | (8.1-14.3) | 8.9 | (6.9-10.9) | 9.7 | (8.0-11.4) |
| **STATEWIDE** | **9.6** | **(9.1-10.1)** | **8.5** | **(8.3-8.8)** | **8.8** | **(8.6-9.1)** |

Note: *Asthma symptom prevalence* refers to people who reported being diagnosed with asthma by a physician at any time and reported symptoms of asthma during the preceding 12 months.

* The 90% Confidence Interval (CI) is a range that provides a more reliable prevalence estimate of persons in the population who fit that category, compared to the "point estimate."

** The estimate was not statistically reliable.

Source: 2001 California Health Interview Survey

# 3. ACCESS TO CARE AMONG CALIFORNIANS WITH ASTHMA

People with asthma need continuous and timely access to effective health care to manage their chronic condition. Access to effective care for asthma consists of access to health care providers with appropriate knowledge and skills (including community outreach workers), prescription of preventive medications that are appropriate for the severity classification of the asthma, instruction in proper use of medication, equipment such as spacers, and education about the condition such as information about avoiding asthma triggers. Access to the healthcare system has important implications for people with asthma.[38, 39] For example, people with inadequate access to health care are more likely to have an asthma-related visit to an emergency department and to have increased rates of hospitalization for asthma.[36, 38, 39] There is also evidence of a relationship between the increasing prevalence of severe childhood asthma and inadequate access to health care.[39]

Having health insurance coverage and a medical home – a place one usually goes when in need of health care – are key factors affecting access to medical care. People with asthma cannot receive appropriate and necessary care for their condition if they do not have access to the healthcare system. CHIS 2001 asked an extensive series of questions about health insurance coverage and the place that people usually go when they need health care or advice about their health. In this section, we examine the health insurance coverage of Californians with asthma and the types of places to which people with asthma typically go for their health care. Then we discuss the relationship between these factors and receipt of care for asthma such as visits to a doctor, taking asthma medication, receiving education about asthma, and delays in needed care for asthma.

## HEALTH INSURANCE COVERAGE

One of the most important factors affecting access to care is health insurance coverage.[40, 41, 42] Research shows that adults with health insurance are more likely to receive a routine checkup, less likely to be hospitalized for "avoidable hospital conditions" such as asthma, and less likely to postpone needed care.[43, 44] In addition, once an uninsured person obtains health insurance coverage, access to health care tends to improve considerably.

**EXHIBIT 7. CURRENT HEALTH INSURANCE COVERAGE OF CHILDREN AND NONELDERLY ADULTS WITH ASTHMA, CALIFORNIA, 2001**

| | CHILDREN AGES 1-17 (N=1,187,000) % | NONELDERLY ADULTS AGES 18-64 (N=2,402,000) % |
|---|---|---|
| EMPLOYMENT-BASED | 64.4 | 66.1 |
| MEDI-CAL | 21.8 | 12.0 |
| HEALTHY FAMILIES | 4.2 | * |
| PRIVATELY PURCHASED | 2.5 | 7.5 |
| OTHER PUBLIC | * | 1.4 |
| UNINSURED | 6.4 | 12.9 |
| TOTAL | 100 | 100 |

Note: Totals may not add to 100% due to rounding.
* Estimate was not statistically reliable

Source: 2001 California Health Interview Survey


38 Murray MD, Stang P, Tierney WM. Health care use by inner-city patients with asthma. Journal of Clinical Epidemiology 1997; 50:167-174.

39 Ortega AN, Calderon JG. Pediatric asthma among minority populations. Current Opinion in Pediatrics 2000; 12:579-583.

40 Aday L, Begley CE, Lairson DR, Slater CH. Evaluating the Health Care System: Effectiveness, Efficiency, and Equity. Chicago: Health Administration Press; 1998.

41 Andersen RM, Davidson, PL. Improving access to care in America: Individual and contextual indicators. In Andersen RM, Rice TH, Kominski GF, eds. Changing the U.S. health care system. San Francisco, CA: Jossey-Bass; 2001: 3-30.

42 Smith LA, Finkelstein JA. The impact of sociodemographic factors on asthma. In Weiss KB, Buist AS, Sullivan SD eds. Asthma's impact on Society. NY: Marcel Dekker; 2000: 219-243.

43 The Kaiser Commission on Medicaid and the Uninsured. Uninsured in America: A Chart Book. 2nd ed. Menlo Park, CA: the Commission; 2000.

44 Institute of Medicine Committee on the Consequences of Uninsurance. Care without coverage: Too little, too late. Washington, DC: National Academy Press; 2002.

In California, 76,000 children with asthma (6.4%) and over 300,000 nonelderly adults with asthma (12.9%) – one out of every ten people with asthma under age 65 – are currently uninsured (Exhibit 7). Children (10.4%) and nonelderly adults (18.9%) not diagnosed with asthma are more likely to be uninsured than those diagnosed with asthma (6.4% for children and 12.9% for nonelderly adults). However, uninsured adults with asthma and the uninsured families of children with asthma have no financial protection against medical expenses and thus are at greatly increased risk for not obtaining the medical care they need to manage this chronic condition. In addition to differences in rates of uninsurance between those with and without asthma, nonelderly adults with asthma are more likely to be covered by Medi-Cal than those not diagnosed with asthma (12.2% and 10.2%, respectively).

In addition, among elderly adults with asthma, nearly 22,000 (6.2%) are covered by Medicare only or are completely uninsured leaving them vulnerable to the high costs of medications and other medical care (Exhibit 8). The insurance coverage of elderly adults with asthma is very similar to those not diagnosed with asthma. However, elderly adults with asthma are more likely to be covered by a combination of Medicare and Medi-Cal than those not diagnosed with asthma (21.9% and 18.2%, respectively).

**EXHIBIT 8. CURRENT HEALTH INSURANCE COVERAGE OF ELDERLY ADULTS WITH ASTHMA, AGES 65 AND OVER, CALIFORNIA, 2001**

| | ELDERLY ADULTS AGES 65 AND OVER (N=345,000) % |
|---|---|
| MEDICARE AND MEDI-CAL | 21.9 |
| MEDICARE AND OTHER | 68.5 |
| MEDICARE ONLY | 6.0 |
| OTHER ONLY | 3.4 |
| UNINSURED | 0.2* |
| TOTAL | 100 |

Note: Totals may not add to 100% due to rounding.
* Estimate was not statistically reliable
Source: 2001 California Health Interview Survey

## USUAL SOURCE OF CARE

Having a usual source of care is another important factor affecting access to health care. Having a usual source of care means that individuals have a medical home or a place that they usually go when they need medical care or health-related advice. This medical home should be accessible, continuous, comprehensive, and culturally effective.[45] In addition, the provider should be able to develop a partnership of mutual responsibility and trust with the patient. Even among those who have health insurance, having a usual source of care can be an important factor in assuring access to care.[46, 47] A usual source of care is especially

**EXHIBIT 9. PERCENT WITH EACH TYPE OF USUAL SOURCE OF CARE BY INSURANCE COVERAGE, CHILDREN WITH ASTHMA, AGES 1-17, CALIFORNIA, 2001**

| USUAL SOURCE OF CARE | EMPLOYMENT-BASED | MEDI-CAL | HEALTHY FAMILIES | UNINSURED |
|---|---|---|---|---|
| DOCTOR'S OFFICE OR HMO | 85.5 | 57.4 | 83.0 | 40.5 |
| COMMUNITY CLINIC OR OTHER PUBLIC CLINIC | 10.3 | 36.1 | 14.4 | 42.6 |
| NONE OR EMERGENCY DEPARTMENT | 4.0 | 6.1 | * | 16.4 |

Note: The sample sizes for children with some other type of usual source of care and for children covered by privately purchased or other public insurance were too small to present estimates.
* The estimate was not statistically reliable.
Source: 2001 California Health Interview Survey

45 American Academy of Pediatrics. The medical home. Pediatrics 2002; 110:184-186.

46 U.S. Department of Health and Human Services. Healthy People 2010. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: U.S. Government Printing Office; November 2000.

47 Baren JM, Shofer FS, Ivey B, Reinhard S, DeGeus J, Stahmer SA, et al. A randomized, controlled trial of a simple emergency department intervention to improve the rate of primary care follow-up for patients with acute asthma exacerbations. Annals of Emergency Medicine 2001; 38:115-122.

**EXHIBIT 10. PERCENT WITH EACH TYPE OF USUAL SOURCE OF CARE BY INSURANCE COVERAGE, NONELDERLY ADULTS WITH ASTHMA, AGES 18-64, CALIFORNIA, 2001**

| USUAL SOURCE OF CARE | EMPLOYMENT-BASED | MEDI-CAL | PRIVATELY PURCHASED/ OTHER PUBLIC | UNINSURED |
|---|---|---|---|---|
| DOCTOR'S OFFICE OR HMO | 85.2 | 63.9 | 74.7 | 30.9 |
| COMMUNITY CLINIC OR OTHER PUBLIC CLINIC | 6.9 | 24.8 | 15.8 | 24.7 |
| NONE OR EMERGENCY DEPARTMENT | 7.4 | 10.7 | 8.2 | 42.7 |

Note: Nonelderly adults who reported some other type of usual source of care are not included in the table because of their small sample size.

Source: 2001 California Health Interview Survey

important for those with chronic conditions such as asthma because of their need for continuous monitoring and care. For example, research shows that people who have a primary care provider have fewer preventable hospitalizations for conditions such as asthma.[48]

In California, over 64,000 children (5.4%) and 300,000 adults (11.1%) with asthma have no usual source of care. Although respondents with asthma (90.6%) are more likely than respondents without asthma (85.9%) to have a usual source of care, children and adults with asthma who have no usual source of care are at increased risk for not receiving appropriate medical care for their asthma. In addition, many of these individuals indicate that they visit an emergency department when they need healthcare – a costly alternative that does not allow for continuity of care.

Having insurance improves the likelihood that a person has a usual source of care. For both children and adults with asthma, the uninsured were more likely to have no usual source of care compared with those who have health insurance coverage. One in six uninsured children with asthma had no usual source of care (16.4%) compared with only 4% of those covered by employment-based insurance and 6.1% of those with Medi-Cal (Exhibit 9). Among nonelderly adults with asthma, the uninsured (42.7%) are six times as likely to have no usual source of care as those with employment-based insurance (7.4%) and more than four times as likely as those covered by Medi-Cal (10.7%) (Exhibit 10).

Children and nonelderly adults with asthma who were uninsured or covered by Medi-Cal and who had a usual source of health care relied heavily on the health care safety net. Among children with asthma, nearly one-half who were uninsured (42.6%) and over one-third who were covered by Medi-Cal (36.1%) used a public or community clinic compared with 10.3% of those with employment-based coverage (Exhibit 9). Among nonelderly adults with asthma, one-fourth who were uninsured (24.7%) or covered by Medi-Cal (24.8%) identified a public or community clinic as their usual source of care compared with 6.9% of those with job-based coverage (Exhibit 10).

Virtually all elderly Californians with asthma had a usual source of care (98.2%) regardless of their particular type and combination of health insurance coverage. However, those covered by a combination of Medicare and Medi-Cal (17.8%) or by Medicare only (13.9%) were more likely to rely on

48 Gadomski A, Jenkins P, Nichols M. Impact of a Medicaid primary care provider and preventive care on pediatric hospitalization. Pediatrics 1998; 101:e1.

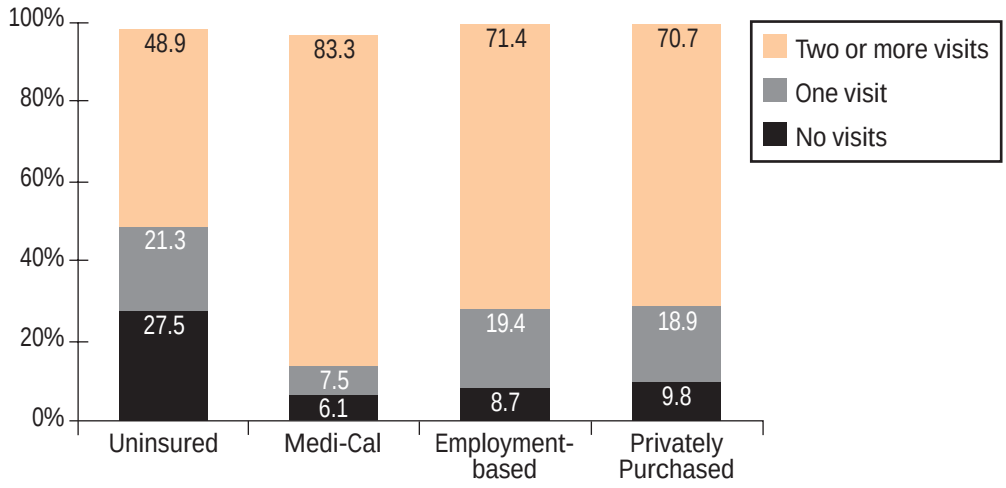
**EXHIBIT 11. PERCENT WITH EACH TYPE OF USUAL SOURCE OF CARE BY INSURANCE COVERAGE, ELDERLY ADULTS WITH ASTHMA, AGES 65 AND OVER, CALIFORNIA, 2001**

| USUAL SOURCE OF CARE | MEDICARE AND MEDI-CAL | MEDICARE AND OTHER | MEDICARE ONLY |
|---|---|---|---|
| DOCTOR'S OFFICE OR HMO | 80.2 | 93.2 | 83.0 |
| COMMUNITY CLINIC OR OTHER PUBLIC CLINIC | 17.8 | 5.2 | 13.9 |

Note: Among elderly adults with asthma, the sample sizes for those who are uninsured, for those who have no usual source of care or use the emergency department, and for those who reported some other type of usual source of care were too small to present estimates.

Source: 2001 California Health Interview Survey

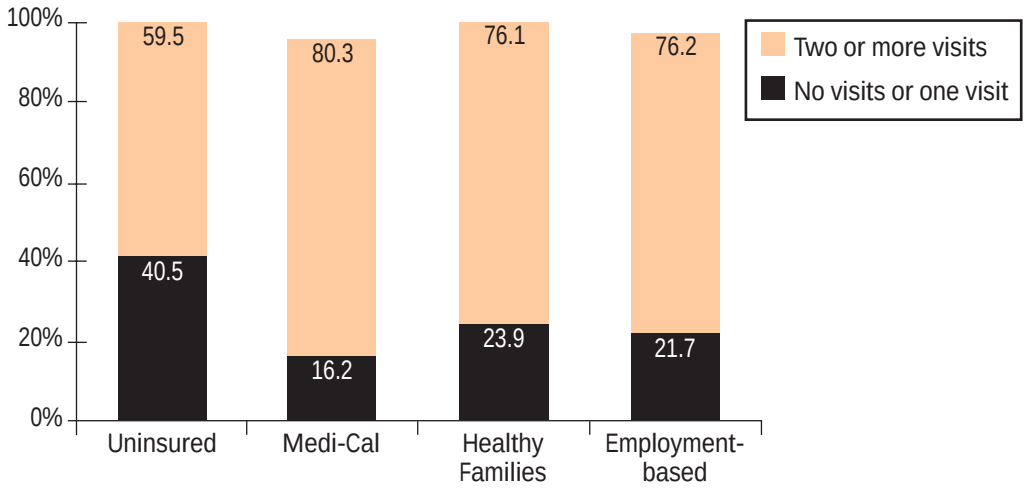
**EXHIBIT 12. VISITS TO A MEDICAL DOCTOR IN THE PAST YEAR BY TYPE OF INSURANCE, NONELDERLY ADULTS WITH ASTHMA, AGES 18-64, CALIFORNIA, 2001**




Note: Totals may not add to 100% because a small percentage of respondents reported they did not know how many times they had seen a doctor in the past 12 months.

Source: 2001 California Health Interview Survey

**EXHIBIT 13. VISITS TO A MEDICAL DOCTOR IN THE PAST YEAR BY TYPE OF INSURANCE, CHILDREN WITH ASTHMA, AGES 1-11, CALIFORNIA, 2001**




Note: The sample sizes were too small to report estimates for no doctor visits and for one doctor visit separately. Totals may not add to 100% because a small percentage of respondents reported they did not know how many times they had seen a doctor in the past 12 months.

Source: 2001 California Health Interview Survey

public or community clinics for their care than were those with Medicare plus some type of private supplemental insurance or HMO coverage (5.2%) (Exhibit 11).

## DOCTOR VISITS

The National Heart, Lung, and Blood Institute (NHLBI) recommends that people with asthma see a doctor at least twice a year. However, many children and adults with asthma are unable to meet this recommendation. Over 38,000 children ages 1-11 diagnosed with asthma (5.4%) and nearly 275,000 adults diagnosed with asthma (10.0%) have not seen a doctor at all in the past year.[49] An additional 115,000 children under 12 with asthma (16.3%) and 461,000 adults with asthma (16.8%) have seen a doctor just once in the past year. Furthermore, a considerable number of people with asthma who experienced symptoms in the past year did not meet the NHLBI recommendation for doctor visits. Among respondents diagnosed with asthma who experienced symptoms in the past year, over 16,000 children ages 1-11 (3.0%) and 59,000 adults 18 and over (24.7%) had not seen a doctor even once in the past year. It is important to note that the measure of doctor visits used here cannot distinguish between a doctor visit in the emergency department for an acute exacerbation and a doctor visit as part of a routine exam. However, it is very important for people with asthma to have "well visits" to a clinician and not just acute emergency department visits.

Health insurance coverage is an important factor affecting the regularity of visits to a physician. Among nonelderly adults with asthma, those with no insurance coverage (27.5%) are at least three times as likely as those with Medi-Cal (6.1%) or employment-based insurance (8.7%) not to have seen a doctor at all in the past year (Exhibit 12). A similar pattern is found among children ages 1-11 (Exhibit 13). Over 40% of uninsured children with asthma have seen a doctor just once or not at all in the past

49 Adolescents ages 12-17 were not asked about the number of doctor visits in the past year. Instead, they were asked how long it had been since they had seen a doctor for a routine physical exam or check-up.

| EXHIBIT 14. VISITS TO A MEDICAL DOCTOR IN THE PAST YEAR BY USUAL SOURCE OF CARE, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001 | | |
|---|---|---|
| | USUAL SOURCE OF CARE % | NO USUAL SOURCE OF CARE % |
| **CHILDREN AGES 1-11** | | |
| NO DOCTOR VISITS OR ONE VISIT | 21.1 | 48.7 |
| TWO OR MORE DOCTOR VISITS | 76.5 | 49.2 |
| TOTAL | 100 | 100 |
| **ADULTS AGES 18 AND OVER** | | |
| NO DOCTOR VISITS | 6.6 | 37.6 |
| ONE DOCTOR VISIT | 15.8 | 24.7 |
| TWO OR MORE DOCTOR VISITS | 76.2 | 36.9 |
| TOTAL | 100 | 100 |

Note: Totals may not add to 100% because a small percentage of respondents reported they did not know how many times they had seen a doctor in the past 12 months. Respondents who reported using the emergency department as a usual source of care were included in the *No Usual Source of Care* category.

Source: 2001 California Health Interview Survey

year – a rate much higher than among those covered by Medi-Cal or employment-based insurance (16.2% and 21.7%, respectively).

Having a usual source of care is another key factor that influences the regularity of doctor visits for people with asthma. Among adults with asthma, those with no usual source of care are six times as likely as those with a usual source of care to report no visits to a medical doctor in the past year (37.6% and 6.6%, respectively) (Exhibit 14). In addition, one out of every two children ages 1-11 with asthma who has no usual source of care (48.7%) has seen a doctor just once or not at all in the past year compared with only one in five of those with a usual source of care (21.1%). Among adults with asthma, those with no usual source of care, whether insured or uninsured (33.0% and 43.4%, respectively), were more than twice as likely not to have seen a doctor in the past year as those who were uninsured but had a usual source of care (15.9%), and they were more than five times as likely not to have seen a doctor as those who had both insurance and a usual source of care (5.9%) (Exhibit 15).

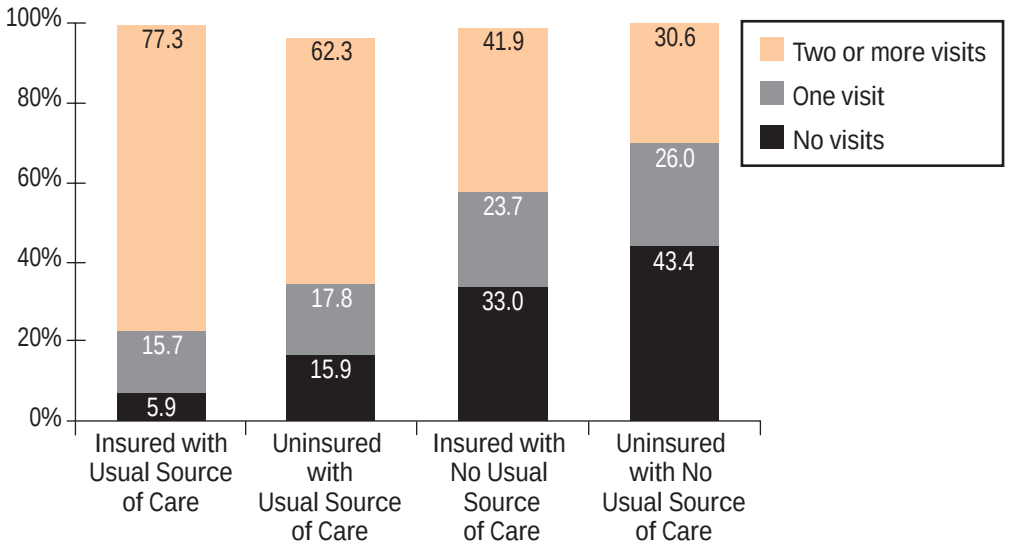
## ASTHMA MEDICATION AND ASTHMA EDUCATION

The NHLBI recommends that all people with persistent asthma take daily preventive medication to control their asthma. Daily medication is not required for people with mild intermittent asthma. However, people with any level of severity of asthma can experience periodic mild, moderate, or even severe exacerbations; therefore, all people who have been diagnosed with asthma need to have access to medications for immediate relief of asthma exacerbations wherever they are including at home, at school, at work, and on trips.[50]

Having adequate health insurance coverage and a usual source of care increases the likelihood that a person with asthma is taking asthma medication. Among nonelderly adults with asthma who experienced symptoms in the past year, 46.7% of the uninsured are not taking medications to control their asthma. This number drops to 24.2% among those covered by Medi-Cal. Among elderly adults who

50 CHIS 2001 asked respondents if they were currently taking any medications to control asthma, including inhalers. We cannot distinguish between those taking asthma medication daily for long-term control and those taking medication periodically for immediate relief of exacerbations. However, a "no" response to this question is indicative of potential problems in asthma care because anyone with asthma may experience periodic asthma exacerbations. Therefore all people with asthma – particularly those who experienced symptoms – need to have access to medications for immediate relief of exacerbations.

**EXHIBIT 15. VISITS TO A MEDICAL DOCTOR IN THE PAST YEAR BY INSURANCE STATUS AND USUAL SOURCE OF CARE, ADULTS WITH ASTHMA, AGES 18 AND OVER, CALIFORNIA, 2001**




Note: Totals may not add to 100% because a small percentage of respondents reported they did not know how many times they had seen a doctor in the past 12 months.

Source: 2001 California Health Interview Survey

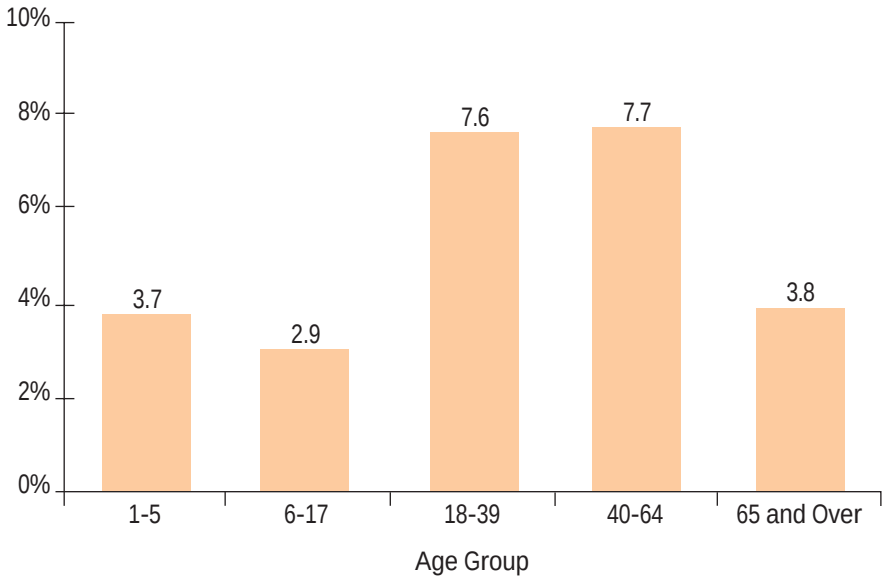
experienced asthma symptoms in the past year, 30.4% of those covered by Medicare alone are not taking any asthma medications compared to 18.3% of those covered by Medicare and Medi-Cal and 24.0% of those covered by Medicare plus a private supplement.

Interestingly, 40.6 % of nonelderly adults with asthma symptoms in the past year who are covered by employment-based insurance are not taking any medications for asthma – only slightly lower than rates among the uninsured and much higher than for those covered by Medi-Cal. One possible explanation for the high percent of adults with employment-based insurance who are not taking asthma medications is that these adults have less severe asthma and therefore are more likely to be covered by employment-based insurance because asthma is less likely to interfere with their ability to work.[51] For example, adults with asthma who experience symptoms every day or every week are less likely than those with symptoms less than once a month to have employment-based coverage (55.4% and 70.9%, respectively) and are more likely to be covered by Medi-Cal (21.5% and 8.0%, respectively). In addition, among adults diagnosed with asthma, only 49.8 % of those with daily or weekly symptoms are currently employed compared to 71.0% of those with symptoms less than once a month.

In addition, adults with asthma symptoms who have no usual source of care are more likely than those with a usual source of care not to be taking medications to control their asthma (55.0% compared to 34.7%). This same pattern is found among children with asthma symptoms. Nearly half of children under age 18 with no usual source of care are not taking any medications to control their asthma (48.6%) compared to less than 40% of those with a usual source of care (39.3%), however this difference is not significant.

51 Erickson SR, Kirking DM. A cross-sectional analysis of work-related outcomes in adults with asthma. Annals of Allergy, Asthma, and Immunology 2002; 88: 292-300.

**EXHIBIT 16. PERCENT EXPERIENCING DELAYS IN NEEDED CARE FOR ASTHMA BY AGE, PEOPLE WITH ASTHMA, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

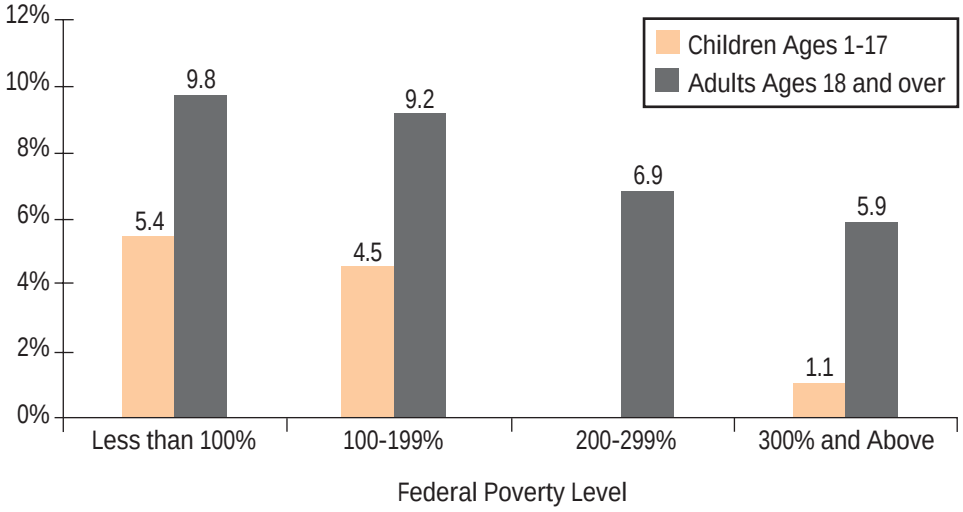
The NHLBI also recommends that all people with asthma receive education from a health care provider about how to manage their condition by avoiding asthma triggers and recognizing the early signs of an asthma attack. In California, 130,000 adolescents ages 12-17 with asthma (27.0%) and 673,000 adults with asthma (24.5%) report they did not receive information on how to avoid asthma triggers or on how to recognize the signs of an asthma attack.

Having health insurance coverage and a usual source of care impacts the likelihood that a person with asthma receives education about managing the condition. For adults having a usual source of care appears to be more important for receiving this information, but for adolescents, having insurance appears to be a more important factor. In California, more than half of adults with asthma who have a usual source of care (50.4%) reported they received information from a health care provider about how to manage their condition by avoiding asthma triggers and recognizing the early signs of an asthma attack compared with 36.9% of those with no usual source of care. Adults with insurance coverage were slightly more likely than uninsured adults to report receiving this information (49.6% and 43.5%, respectively). Among adolescents with asthma, those with a usual source of care are not significantly more likely than those with no usual source of care to have received this information (36.0% and 31.5%, respectively). However, adolescents with insurance (36.5%) were much more likely than uninsured adolescents (21.0%) to report receiving this information.

## DELAYS IN CARE

People with asthma need timely access to health care to manage their chronic condition. Delaying or not getting needed health care – such as prescription medications, specific tests or treatment, as well as other types of medical care – may result in worse outcomes for people with asthma. Health insurance coverage and having a usual source for health care are important factors in the timely receipt of needed medical care.

**EXHIBIT 17. PERCENT EXPERIENCING DELAYS IN NEEDED CARE FOR ASTHMA BY FEDERAL POVERTY LEVEL, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001**




Note: In 2001, the annual income at 100% of the Federal Poverty Level (FPL) was $9,039 for one person, $11,569 for a family of two, $14,128 for a family of three, and $18,104 for a family of four. The number of children at 200-299% of the Federal Poverty Level who experienced delays in needed care for asthma was too small to produce a reliable estimate.

Source: 2001 California Health Interview Survey

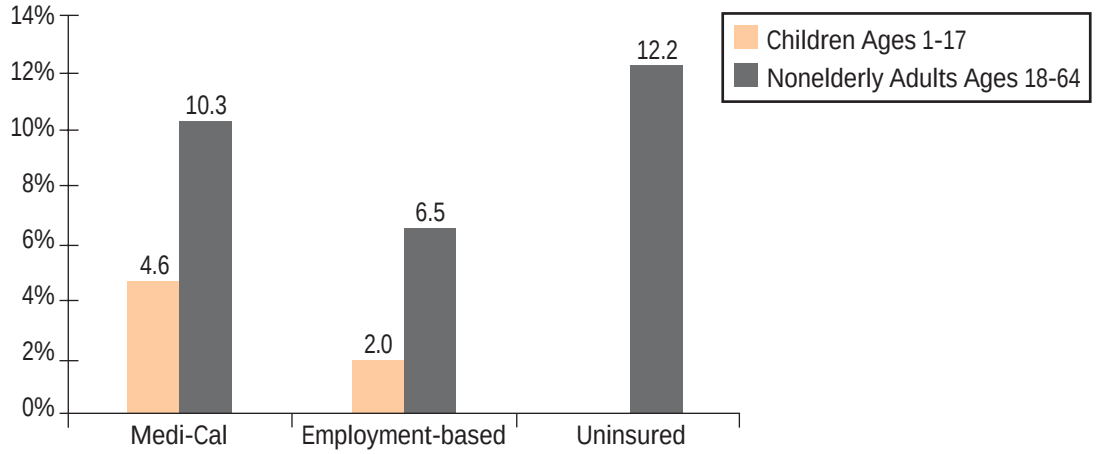
More than one third of adults with asthma (34.2%) – nearly 940,000 – reported they experienced delays in receiving or did not receive necessary medical care. This includes nearly 200,000 adults (7.2%) who reported that the delayed care was specifically for their asthma. An additional 130,000 children with asthma experienced delayed or foregone care (10.9%). This includes 36,000 children (3.1%) whose parents reported that the care was specifically for their asthma. The percent of individuals experiencing delays in care for asthma varied according to sociodemographic characteristics, such as age and income, as well as indicators of access to care, such as insurance status and usual source of care.

Among adults with asthma, the percentage experiencing delayed or foregone care specifically for asthma was nearly twice as high for those under age 65 compared to adults age 65 and over, possibly due to Medicare coverage eligibility upon reaching age 65 (Exhibit 16). Among children with asthma, levels of delayed care for asthma were slightly higher among children ages 1-5 than among school age children (ages 6-17), though this difference is not statistically significant.

The percentage of people with asthma who experienced delayed or foregone care for asthma declines as income increases (Exhibit 17). Adults living below the Federal Poverty Level (FPL) are nearly twice as likely to experience delays in needed medical care for asthma compared with adults living at or above 300% FPL (9.8% and 5.9%, respectively). Among children, the difference is even greater. Children living below the FPL are more than four times as likely to experience delays in care for asthma compared to children living at or above 300% FPL (5.4% and 1.1%, respectively).

Among adults who experienced delays in health care for asthma, 40.1% reported that the delay was because the care cost too much or because they did not have insurance to cover the care.

**EXHIBIT 18. PERCENT EXPERIENCING DELAYS IN NEEDED CARE FOR ASTHMA BY TYPE OF INSURANCE, CHILDREN AND NONELDERLY ADULTS WITH ASTHMA, CALIFORNIA, 2001**




Note: The number of children who were uninsured and experienced delays in needed care for asthma was too small to produce a reliable estimate.

Source: 2001 California Health Interview Survey

Health insurance coverage is also an important factor in receiving timely care for asthma. In California, being uninsured increases the likelihood of delayed or foregone care for asthma. Uninsured adults with asthma ages 18 and over were twice as likely as adults with insurance to report delaying or not getting needed care for their asthma (12.1% and 6.5%, respectively). The percent experiencing delayed or foregone care for asthma also varied by type of insurance. Among nonelderly adults ages 18-64 with asthma, those covered by Medi-Cal were more likely to experience delays in needed care for asthma than those with employment-based insurance (10.3% and 6.6%, respectively) (Exhibit 18). This same pattern was found among children with asthma. Children covered by Medi-Cal were more likely to have experienced delays in care for asthma than those covered by employment-based insurance (4.6% and 2.0%, respectively). Some caution should be taken in interpreting the higher levels of delayed care experienced by individuals with Medi-Cal coverage. It is important to keep in mind that those covered by Medi-Cal are more likely to have lower socioeconomic status and more severe asthma compared to those with employment-based insurance coverage.

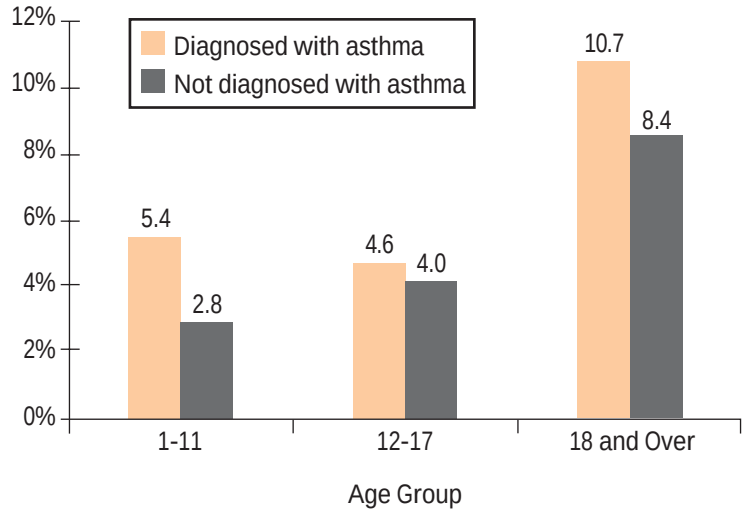
# 4. EMERGENCY DEPARTMENT USE AND HOSPITALIZATION

Unlike other chronic conditions in which a certain amount of emergency department (ED) use and hospitalization may be inevitable, ED use and hospitalization due to asthma are thought to be largely preventable with optimum management of the condition.[52, 53] Hospitalization and ED visits may reflect both more severe asthma as well as asthma that is not well controlled through appropriate medications and/or decreases in exposure to environmental triggers. Emergency department visits and hospitalizations for asthma can also be a reflection of lack of access to care or lack of continuity with health care providers from one visit to another.[54]

Utilization of these services is very costly. In the case of asthma, the major proportion of dollars spent goes toward medications, hospitalization, and emergency department use.[3, 55] With hospitalization and emergency department use, there are the added indirect costs of missed work and school days. The costs of emergency department use, hospitalizations, outpatient visits, tests, and medications for 1998 were estimated to be $7.4 billion in direct asthma costs as well as an additional $5.3 billion in indirect costs – a total of $12.7 billion attributed to asthma nationally.[3] Improving the control of asthma symptoms could lead to considerable decreases in the use of emergency and hospital services as well as the number of lost work and school days. Improving control of asthma through both clinical management and reduction in exposure to environmental triggers could therefore significantly reduce the economic impact of this condition.

In California, people with asthma are hospitalized more frequently than people without asthma (Exhibit 19). This difference is particularly apparent for young children. Children under the age of 12 with asthma are hospitalized nearly twice as often as children without asthma (5.4% and 2.8%, respectively).

**EXHIBIT 19. PERCENT REPORTING AT LEAST ONE HOSPITALIZATION IN THE PAST YEAR BY ASTHMA DIAGNOSIS AND AGE GROUP, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

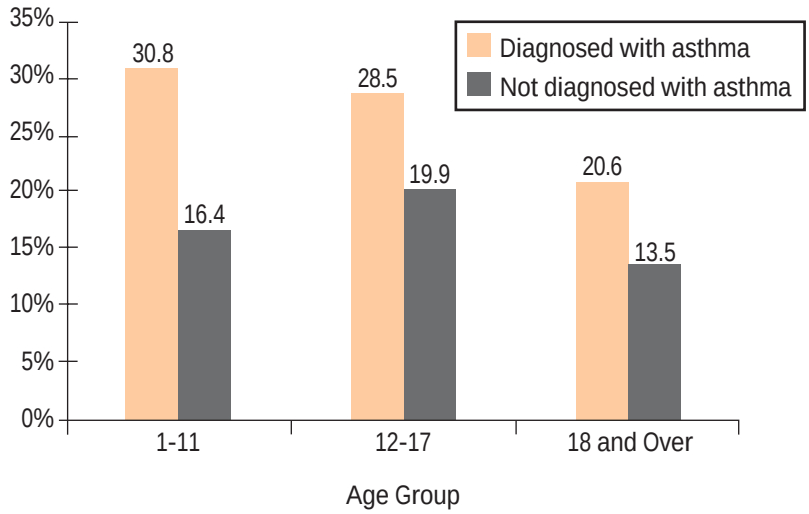
52 Bindman AB, Grumbach K, Osmond D, et al. Preventable hospitalizations and access to health care. JAMA 1995;274:305-311.

53 Pappas G, Hadden WC, Kozak LJ, Fisher GF. Potentially avoidable hospitalizations: Inequalities in rates between US socioeconomic groups. American Journal of Public Health 1997;87:811-816.

54 Christakis DA, Mell L, Koepsell TD, Zimmerman FJ, Connell FA. Association of lower continuity of care with greater risk of emergency department use and hospitalization in children. Pediatrics 2001;107(3):524-529.

55 Weiss KB, Gergen PJ, Hodgson TA. An economic evaluation of asthma in the United States. New England Journal of Medicine 1992;326(13):862-866.

**EXHIBIT 20. PERCENT REPORTING AT LEAST ONE EMERGENCY DEPARTMENT VISIT IN THE PAST YEAR BY ASTHMA DIAGNOSIS AND AGE GROUP, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

Californians with asthma go to the emergency department more often than Californians without asthma (Exhibit 20). Again, the difference is particularly apparent for young children. Almost one-third of children ages 1-11 with asthma (30.8%) went to an emergency department in the past year. This rate is nearly twice as high as the rate among children without asthma (16.4%).

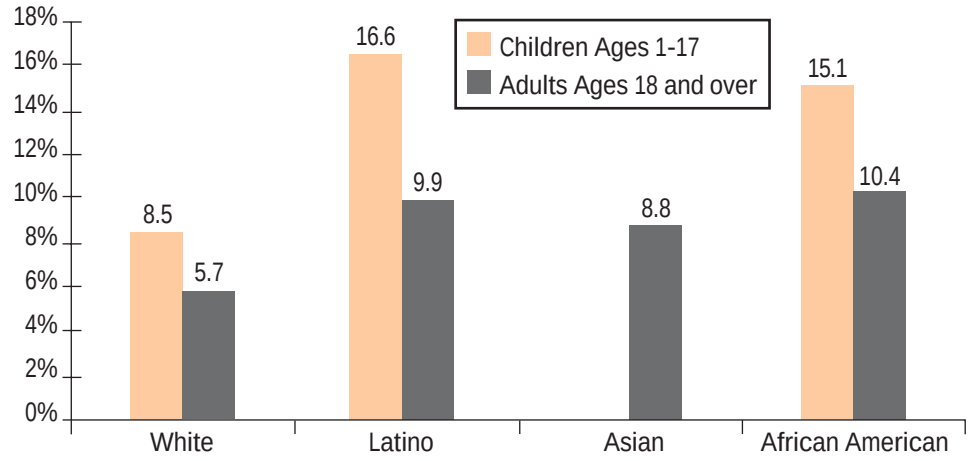
Despite the fact that emergency department use and hospitalizations for asthma can often be prevented, many people with asthma report using these services. In California, nearly 136,000 children under the age of 18 (11.4% of children with asthma) and over 197,000 adults (7.2% of adults with asthma) reported an emergency department visit for treatment of asthma in the 12 months prior to the survey.[56] Children with asthma have higher rates of emergency department visits due to asthma than adults (11.4% and 7.2%, respectively). Over 31,000 children with asthma (2.6%) and nearly 60,000 adults with asthma (2.2%) reported that they were hospitalized because of asthma in the past year. Rates of emergency department visits and hospitalizations differ according to several sociodemographic factors such as race and ethnicity, area of residence, and income, as well as indicators of access to care.

## DISPARITIES IN EMERGENCY DEPARTMENT USE AND HOSPITALIZATION

Emergency department visits for asthma vary by race and ethnicity. Among adults with asthma, African Americans (10.4%) and Latinos (9.9%) had higher rates of emergency department visits due to asthma compared to whites (5.7%) (Exhibit 21). Among children with asthma, Latino children have high rates of emergency department visits for asthma

56 Self-reported reasons for emergency department visits or hospitalizations may not be accurate due to misclassification on the part of the respondent regarding the reason for an emergency department visit or admittance to a hospital. However, it is unclear whether any inaccuracy would, on the average, result in overestimation, underestimation, or no bias in reported rates.

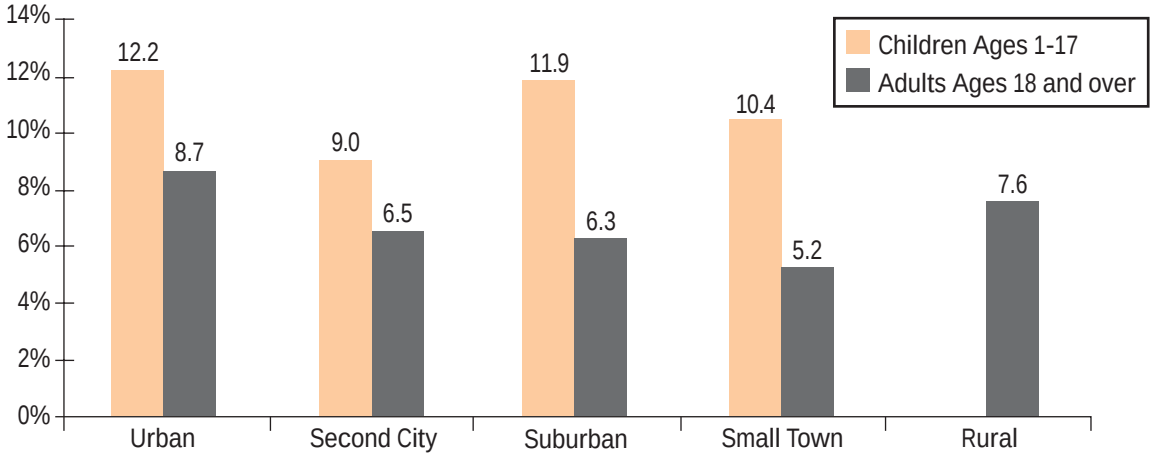
## EXHIBIT 21. PERCENT REPORTING AT LEAST ONE EMERGENCY DEPARTMENT VISIT DUE TO ASTHMA IN THE PAST YEAR BY RACE/ETHNICITY, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001




Note: The numbers of American Indian and Alaska Natives and Native Hawaiians and other Pacific Islanders were too small to produce a reliable estimate of emergency department visits for adults or children. The number of Asian children was too small to produce a reliable estimate.

Source: 2001 California Health Interview Survey

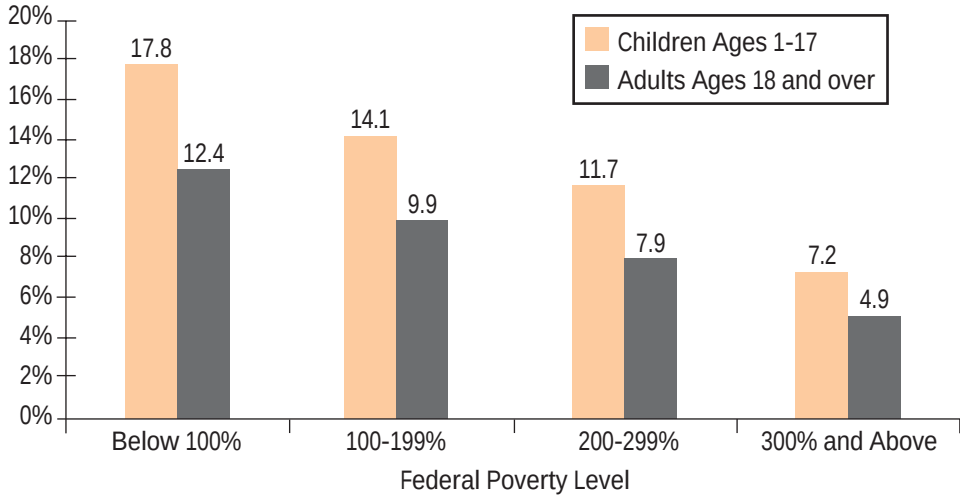
## EXHIBIT 22. PERCENT REPORTING AT LEAST ONE EMERGENCY DEPARTMENT VISIT DUE TO ASTHMA IN THE PAST YEAR BY AREA OF RESIDENCE, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001




Note: Classification of area of residence is based on the population density of the zip code in which the respondent lives. For example, *second city* refers to a zip code with a population density between 1,000 and 4,150 persons per square mile. *Rural* refers to a zip code with a population density equal to or less than 210 persons per square mile. For more information about this classification system, please see the appendix. The number of children living in rural areas was too small to produce a reliable estimate.

Source: 2001 California Health Interview Survey

**EXHIBIT 23. PERCENT REPORTING AT LEAST ONE EMERGENCY DEPARTMENT VISIT DUE TO ASTHMA IN THE PAST YEAR BY FEDERAL POVERTY LEVEL, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001**




Note: In 2001, the annual income at 100% of the Federal Poverty Level was $9,039 for one person, $11,569 for a family of two, $14,128 for a family of three, and $18,104 for a family of four.

Source: 2001 California Health Interview Survey

(16.6%) compared to white children (8.5%). Similar patterns are found for hospitalization rates, but the differences are not significant.

More people with asthma in urban areas report visits to an emergency department for asthma than do people in rural areas. Adults living in urban areas report a higher rate of emergency department use specifically for asthma (8.7%) compared to those living in small towns (5.2%). Across locations, a higher percentage of children visit emergency departments. This trend mirrors national findings.[5]

The percent of respondents reporting asthma-related emergency department visits decreases with increasing income. In California, a striking disparity in emergency department visits exists. Low-income adults and children with asthma are much more likely to seek care for asthma in an emergency department than are more affluent adults and children (Exhibit 23). Children with asthma whose families have incomes below the Federal Poverty Level (FPL) are more than twice as likely to visit the emergency department for asthma as children whose families have incomes above 300% FPL (17.8% and 7.2%, respectively). A similar pattern is found among adults with asthma, although adults have lower rates of emergency department visits than children. Adults with incomes below the Federal Poverty Level were more than twice as likely to report visiting the emergency department for asthma as adults with incomes above 300% FPL (12.4% and 4.9%, respectively). In addition, similar patterns are found for hospitalization rates, but the differences are not significant.

## EMERGENCY DEPARTMENT USE AND HOSPITALIZATION ARE RELATED TO ACCESS

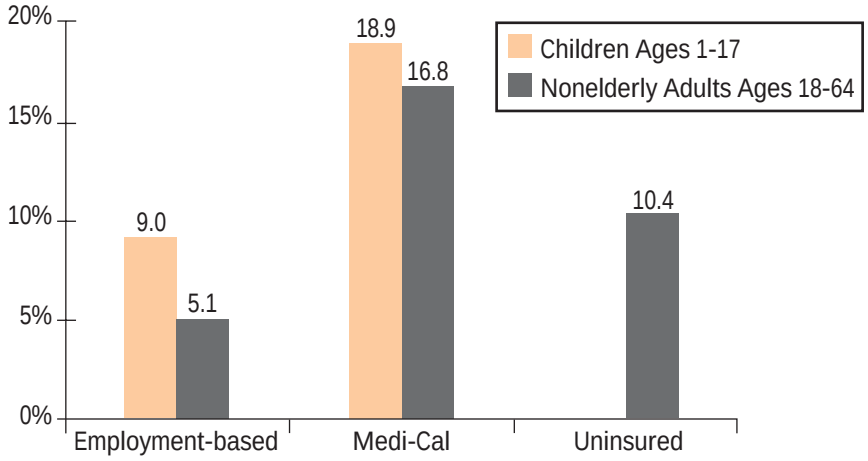
Many Californians with asthma lack adequate access to the healthcare system. For these people, the economic, social, and health costs of controlling their condition can be enormous. This is because they lack health insurance coverage, the coverage they have is inadequate, or they have no regular connection to the health care system – a usual

source of care. Because of inadequate control of asthma coupled with a lack of access to health care, many of these people will go to an emergency department for treatment of their asthma and some of them may need to be hospitalized.

In California, adults and children with asthma who are covered by Medi-Cal have the highest rates of reported emergency department visits for asthma (Exhibit 24). Nearly one in five children covered by Medi-Cal (18.9%) reported at least one visit to the emergency department for asthma in the past year compared with one in eleven children with employment-based coverage (9.0%). A similar pattern is found among adults. Adults covered by Medi-Cal (16.8%) were more likely to report visiting an emergency department for asthma than adults with employment-based coverage (5.1%) or than uninsured adults (10.4%). In addition, uninsured adults were twice as likely to go to the emergency department for asthma as adults with employment-based insurance. Similar patterns are found for hospitalization rates, but the differences are not significant.

Caution should be taken in interpreting the higher rates of emergency department visits and hospitalizations for asthma reported by individuals with Medi-Cal coverage. It is important to keep in mind that those covered by Medi-Cal are more likely to have lower socioeconomic status and more severe asthma compared to those with no insurance. Differences between those covered by Medi-Cal and the uninsured or those covered by employment-based insurance could be due to differences in asthma severity, asthma management, or access to health care.[57] In addition, it is possible that some of those who went to the emergency department (ED) or were hospitalized for asthma were not insured before the ED visit or hospitalization. Rather, they may have been assessed for Medi-Cal eligibility and enrolled at the time of the ED visit or hospitalization.

**EXHIBIT 24. PERCENT REPORTING AT LEAST ONE EMERGENCY DEPARTMENT VISIT DUE TO ASTHMA IN THE PAST YEAR BY TYPE OF INSURANCE, CHILDREN AND NONELDERLY ADULTS WITH ASTHMA, CALIFORNIA, 2001**

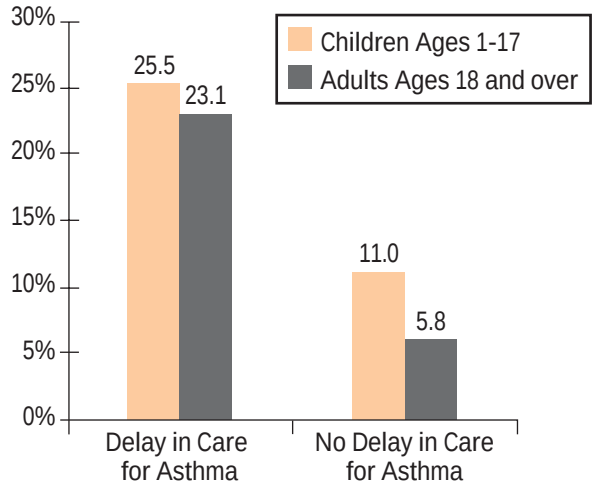



Note: The sample size for uninsured children with asthma who went to the emergency department because of asthma was too small to report an estimate.

Source: 2001 California Health Interview Survey

57 Utilization by Medicaid beneficiaries is generally higher than utilization among the uninsured. This pattern is well documented in the literature. (see: Hadley J. Sicker and poorer: the consequences of being uninsured. Washington DC: the Kaiser Commission on Medicaid and the Uninsured; 2002.) Several reasons have been postulated for this discrepancy. First, people who are covered by Medicaid are generally more financially, socially and medically disadvantaged than the uninsured. Thus, they are more likely to face barriers with regard to control of their chronic illness that make the condition less manageable. Second, because people voluntarily enroll in Medicaid, they tend to be a more medically complicated group and are more likely to have severe asthma. A third factor in the higher use of health care services in the Medicaid population (compared to the uninsured) has to do with the fact that people who are enrolled in some type of insurance tend to use more health care services than people who face the barrier of self-pay for all health care services. (see: Pauly MV. The economics of moral hazard: comment. The American Economic Review 1968; 58:531-537.)

**EXHIBIT 25. PERCENT REPORTING AT LEAST ONE VISIT TO THE EMERGENCY DEPARTMENT FOR ASTHMA IN THE PAST YEAR BY DELAYS IN CARE FOR ASTHMA, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

Emergency department visits for asthma are related to delays in receipt of health care. In California, children and adults with asthma who delay care for their asthma are much more likely to report visiting the emergency department because of their asthma compared with those who did not delay care. Among children under age 18 with asthma, those who experienced delays in care for asthma were more than twice as likely as those who did not experience delays in care for asthma to visit an emergency department for asthma (25.5% and 11.0%, respectively) (Exhibit 25). The discrepancy is even larger among adults. Adults who experienced delayed or foregone care for asthma were four times as likely as adults who did not report delayed care to visit the ED because of asthma (23.1% and 5.8%, respectively).

Hospitalizations for asthma also appear to be related to delayed or foregone care for asthma. Among people of all ages with asthma, those who experienced delays in care for asthma were more than four times as likely to report being hospitalized for asthma compared to those with no delayed care (8.5% and 1.9%, respectively).

# 5. CALIFORNIANS WITH FREQUENT ASTHMA SYMPTOMS

Many people with asthma experience frequent asthma symptoms, which can be a sign of inadequate medical control and persistent exposure to environmental triggers, as well as greater severity of the condition. However, in the majority of cases, asthma symptoms can be controlled and prevented with effective clinical treatment and environmental control.

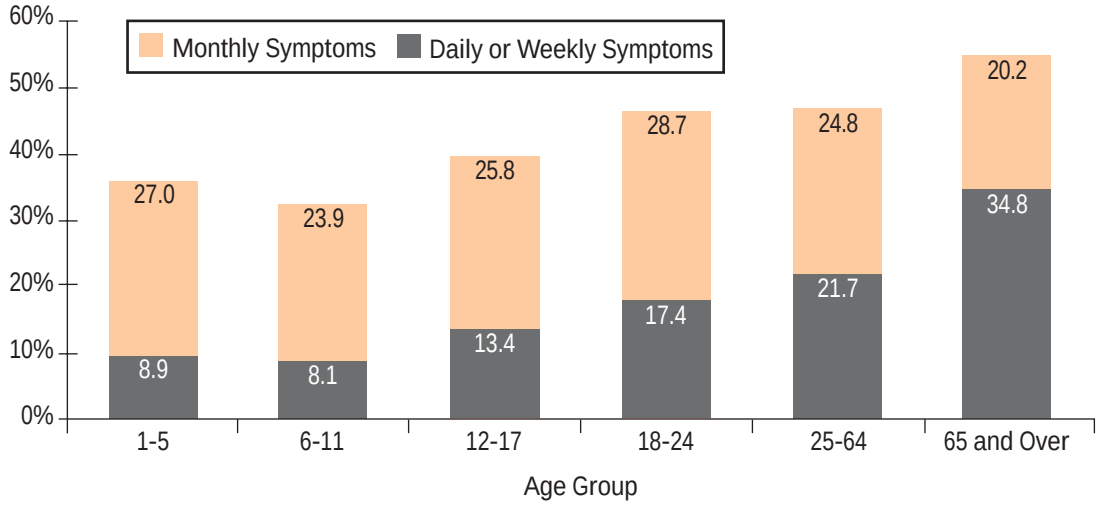
Despite the fact that asthma can be controlled, a significant number of Californians with asthma experience frequent symptoms. Over 1.7 million children and adults with asthma experience symptoms at least once every month. A total of 744,000 adults and children experience symptoms every day or every week, including more than 620,000 adults (nearly 25% of those diagnosed with asthma) and 124,000 children (one in every ten diagnosed with asthma).

## FREQUENT ASTHMA SYMPTOMS DISPROPORTIONATELY AFFECT CERTAIN POPULATIONS

Control of asthma symptoms varies with several demographic factors such as age, race and ethnicity, income, and area of residence. The proportion of people with asthma who experience daily or weekly symptoms rises with age (Exhibit 26). Elderly adults are more likely to have daily or weekly symptoms than non-elderly adults: 34.8% for adults age 65 and over, 21.6% for ages 25-64, and 17.4% for ages 18-24. Adolescents (ages 12-17) are more likely to have daily or weekly symptoms than younger children (ages 1-11): 13.4% and 8.4%, respectively.

Increased asthma symptomatology among older adults may reflect inadequate treatment despite the improvements in asthma diagnosis, treatment and management that occurred during the last decade.[58] Increased symptomatology

**EXHIBIT 26. PERCENT EXPERIENCING ASTHMA SYMPTOMS BY AGE, PEOPLE WITH ASTHMA, CALIFORNIA, 2001**

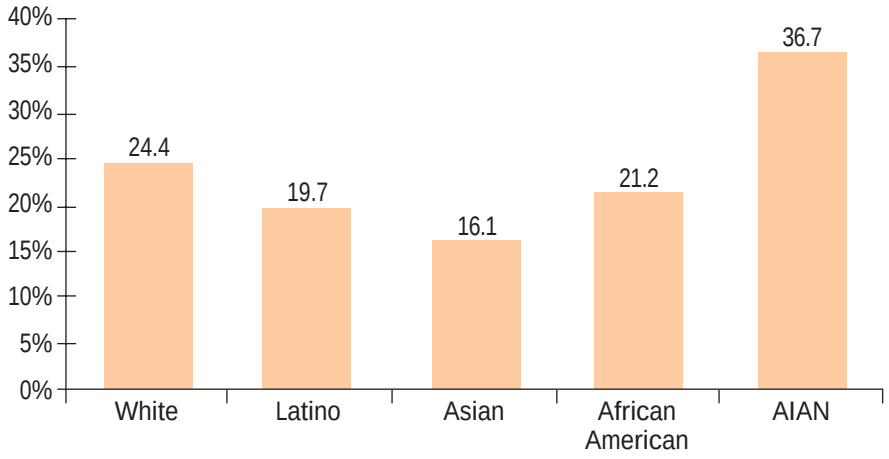



Note: The adult most knowledgeable about the child, usually a parent, reported frequency of asthma symptoms for children under age 12.

Source: 2001 California Health Interview Survey

58 Sin DD, Tu JV. Underuse of inhaled steroid therapy in elderly patients with asthma. Chest 2001; 119:720-725.

**EXHIBIT 27. PERCENT EXPERIENCING DAILY OR WEEKLY ASTHMA SYMPTOMS BY RACE/ETHNICITY, ADULTS WITH ASTHMA, AGES 18 AND OVER, CALIFORNIA, 2001**




Note: American Indian and Alaska Native is abbreviated AIAN.
Source: 2001 California Health Interview Survey

with age may also reflect a relapse from childhood asthma, greater disease severity, an increase in the number of co-morbid conditions, or inadequate self-management skills, as well as continued exposures to health risks associated with asthma exacerbation, such as cigarette smoking or exposure to second-hand tobacco smoke.[59, 60, 61, 62]

The proportion of people who experience frequent asthma symptoms varies across racial and ethnic groups. Among adults with asthma, one in three American Indians and Alaska Natives (36.7%) experience daily or weekly asthma symptoms compared to one in four whites (24.4%), one in five Latinos (19.7%) and African Americans (21.2%), and one in six Asians (16.1%) (Exhibit 27). Among children with asthma, there were no significant differences in the percent experiencing daily or weekly symptoms by race and ethnicity.

Asthma symptom control also differs by income. People at lower income levels do not, on average, report higher lifetime asthma prevalence. However, they are more likely to experience frequent asthma symptoms. Among adults with asthma, the percent experiencing frequent asthma symptoms declines with increasing income. Adults with asthma with family incomes below the Federal Poverty Level are nearly twice as likely to experience symptoms every day or every week as those with incomes three times the poverty level (34.2% and 18.6%, respectively) (Exhibit 28). Children from

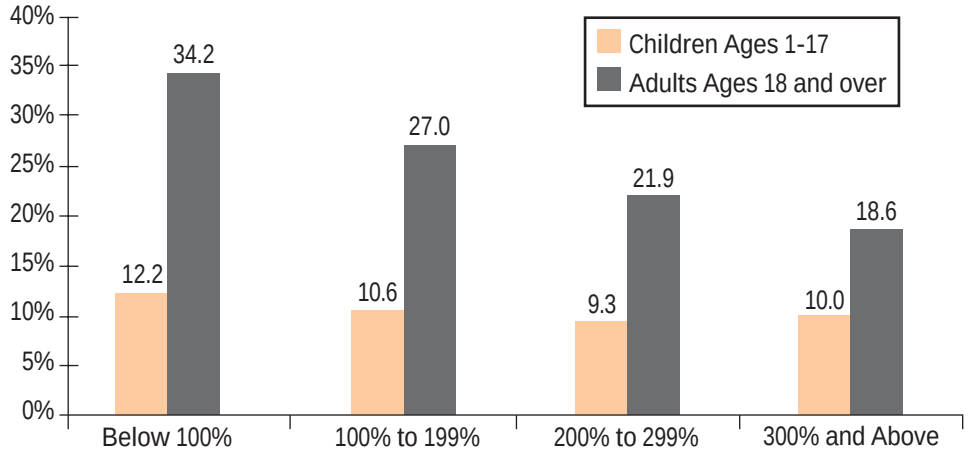
59 Radeo MS, Leak LV, Lugo BP, Hanrahan JP, Clark S, Camargo CA. Risk factors for lack of asthma self-management knowledge among emergency department patients not on inhaled steroids. American Journal of Emergency Medicine 2001; 19:253-259.

60 Eisner MD, Yelin EH, Katz PP, Shiboski SC, Henke J, Blanc PD. Predictors of cigarette smoking and smoking cessation among adults with asthma. American Journal of Pubic Health 2000; 90:1307-1311.

61 Gilliland FD, Berhane K, McConnell R, Gauderman WJ, Vora H, Rappaport EB, Avol E, Peter JM. Maternal smoking during pregnancy, environmental tobacco smoke exposure and childhood lung function. Thorax 2000; 55:272-276.

62 Priol SG, Soussan D, Liard R, Neukirch F, Touron D, Lepage T. Asthma in adults: Comparison of adult-onset asthma with childhood-onset asthma relapsing in adulthood. Allergy 2000; 55:634-640.

**EXHIBIT 28. PERCENT EXPERIENCING DAILY OR WEEKLY ASTHMA SYMPTOMS BY FEDERAL POVERTY LEVEL, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001**




Note: In 2001, the annual income at 100% of the Federal Poverty Level was $9,039 for one person, $11,569 for a family of two, $14,128 for a family of three, and $18,104 for a family of four.

Source: 2001 California Health Interview Survey

low-income families appear slightly more likely to experience frequent symptoms than those children from more affluent families, but the difference is not significant.

The relationship between socioeconomic factors and asthma exacerbation has been documented in other studies.[63, 64] More frequent asthma symptoms among low income groups and certain racial and ethnic groups may reflect lack of insurance, higher exposure to environmental triggers, differences in access to and use of medical care such as receipt of recommended medications for asthma, or differences in prevention and self-management behaviors across income and cultural groups.[65, 66, 67, 68]

Children and adults with asthma who live in rural areas are more likely to experience daily or weekly symptoms than those who live in other areas, although lifetime prevalence of asthma does not differ across these geographic areas. More adults with asthma living in rural areas have daily or weekly symptoms (27.0%) than those living in suburban areas

63 Goodman DC, Stukel TA, Chang C. Trends in pediatric asthma hospitalization rates: Regional and socioeconomic differences. Pediatrics 1998; 101: 208-213.

64 Miller JE. The effects of race/ethnicity and income on early childhood asthma prevalence and health care use. American Journal of Public Health 2000; 90:428-430.

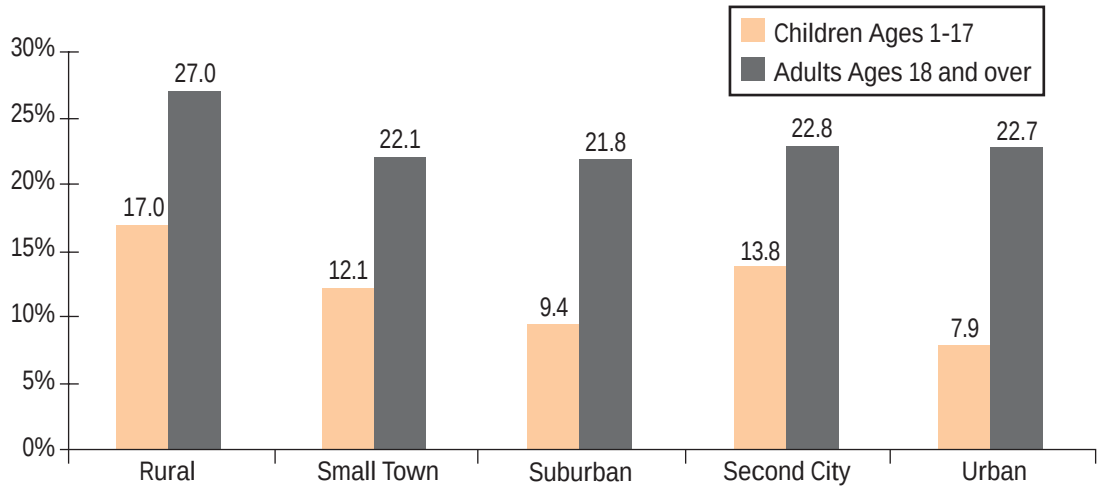
65 Bosco LA, Gerstman BB, Tomita DK. Variations in the use of medication for the treatment of childhood asthma in the Michigan Medicaid population, 1980 to 1986. Chest 1993; 104:1727-1733.

66 Eggleston PA, Malveaux FJ, Butz AM, et al. Medications used by children with asthma living in the inner city. Pediatrics 1998; 101:349-354.

67 Guarnaccia PJ, Pelto PJ, Schensul SL. Family health culture, ethnicity, and asthma: Coping with illness. Medical Anthropology 1985; 9:203-224.

68 Haire-Joshu D, Fisher EB Jr, Munro J, Wedner HJ. A comparison of patient attitudes toward asthma self-management among acute and preventive care settings. Journal of Asthma 1993; 30:359-371.

**EXHIBIT 29. PERCENT EXPERIENCING DAILY OR WEEKLY ASTHMA SYMPTOMS BY AREA OF RESIDENCE, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001**




Note: Classification of area of residence is based on the population density of the zip code in which the respondent lives. For example, *second city* refers to a zip code with a population density between 1,000 and 4,150 persons per square mile. *Rural* refers to a zip code with a population density equal to or less than 210 persons per square mile. For more information about this classification system, please see the appendix.

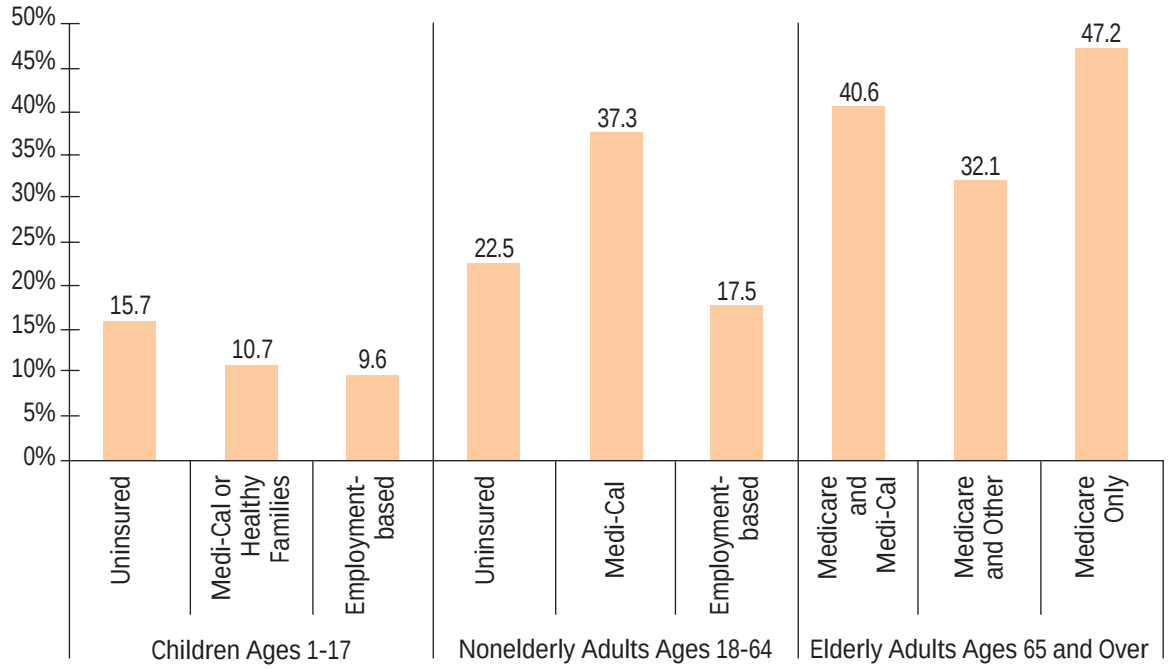
Source: 2001 California Health Interview Survey

(21.8%) (Exhibit 29). Higher proportions of children living in rural areas have daily or weekly symptoms than those living in urban areas (17.0% and 7.9%, respectively).

The percent of people experiencing daily or weekly asthma symptoms also varies by health insurance coverage (Exhibit 30). Among children with asthma, the uninsured suffered from the highest level of frequent asthma symptoms (15.7% compared to 10.7% of those covered by Medi-Cal or Healthy Families and 9.6% of those with employment-based coverage; however, these differences are not significant). Among nonelderly adults with asthma, those covered by Medi-Cal reported the highest rates of frequent asthma symptoms (37.3% compared with 22.5% of the uninsured and 17.5% of those with employment-based coverage). The high rate of frequent asthma symptoms for uninsured children suggests that their asthma may be exacerbated by inadequate access to medical care to effectively manage their condition. Eligibility rules and outreach programs for Medi-Cal and Healthy Families ensure that children are more likely than adults to be covered regardless of their health status. Adults on Medi-Cal are often enrolled due to health needs – even under the family coverage program – or due to eligibility under the disability program as a result of a severely limiting chronic condition.

Among elderly adults, nearly half of those who are covered only by Medicare report frequent asthma symptoms (47.2%) compared to less than one third of those with Medicare plus a private supplement (32.1%). Because these

**EXHIBIT 30. PERCENT EXPERIENCING DAILY OR WEEKLY ASTHMA SYMPTOMS BY AGE AND HEALTH INSURANCE COVERAGE, PEOPLE WITH ASTHMA, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

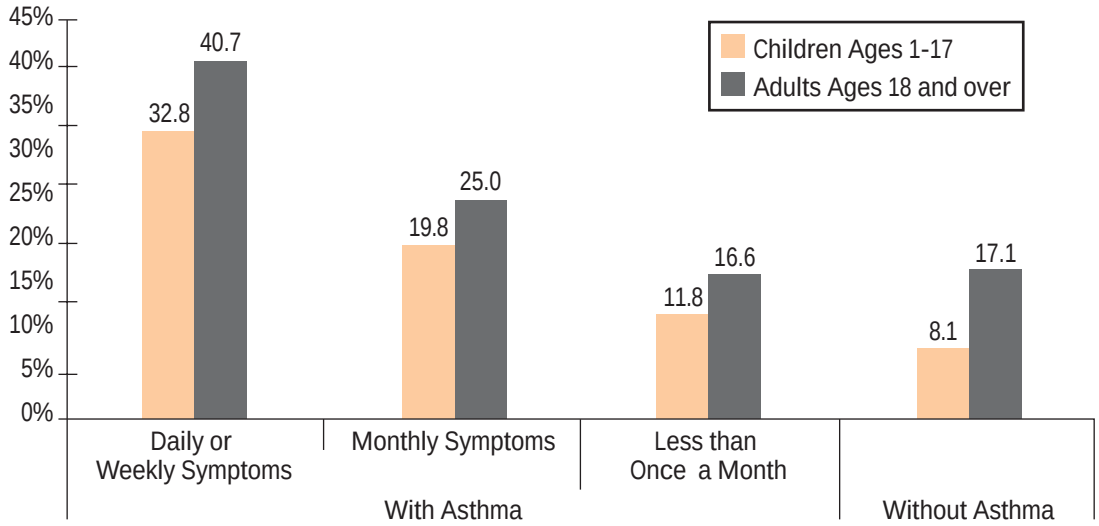
Medicare beneficiaries have no supplementary coverage, they are likely to bear a substantial financial burden due to out-of-pocket costs related to their asthma episodes, and are likely to receive less care to help them manage their condition.

Although people who have low income, who live in rural areas, and the elderly do not have high asthma prevalence they do disproportionately suffer from daily or weekly symptoms. They may have more severe asthma or less well-controlled asthma due to frequent exposures to environmental triggers and inadequate access to quality asthma care. However, African Americans and American Indians and Alaska Natives have high levels of both lifetime asthma prevalence and frequent asthma symptoms.

## CONSEQUENCES OF FREQUENT ASTHMA SYMPTOMS

Inadequate control of asthma can have serious health, quality of life, and economic consequences, such as poor health status, missed work or school, and increased emergency department utilization. In California, adults with daily or weekly symptoms are more likely to report poor or fair health status (40.7%) than those with monthly symptoms (25.0%) or symptoms less than once a month

**EXHIBIT 31. PERCENT WITH REPORTED POOR OR FAIR HEALTH STATUS, CHILDREN AND ADULTS, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

(16.6%) (Exhibit 31). Children under age 18 with daily or weekly symptoms are also more likely to have fair or poor health status (32.8%) than children with less frequent symptoms (11.8% among those with symptoms less than once a month).

Many adults with asthma have to work less than their peers without asthma, due to loss of sleep and other disturbances caused by symptoms.[69, 70] In California, over 800,000 adults with asthma (30.5%) reported that their physical health limited their work or other activities in the past four weeks. Among these adults with asthma, more than half who experience symptoms every day or every week reported that their physical health limited their work or other activities (51.9%) compared with only 25.3% of those with symptoms less than once a month (Exhibit 32). In addition, adults who suffer from frequent asthma symptoms are less likely to be employed than those with less severe asthma. Among adults with asthma, less than half of those with daily or weekly symptoms are currently employed (49.8%) compared to 71.0% of those with symptoms less than once a month.

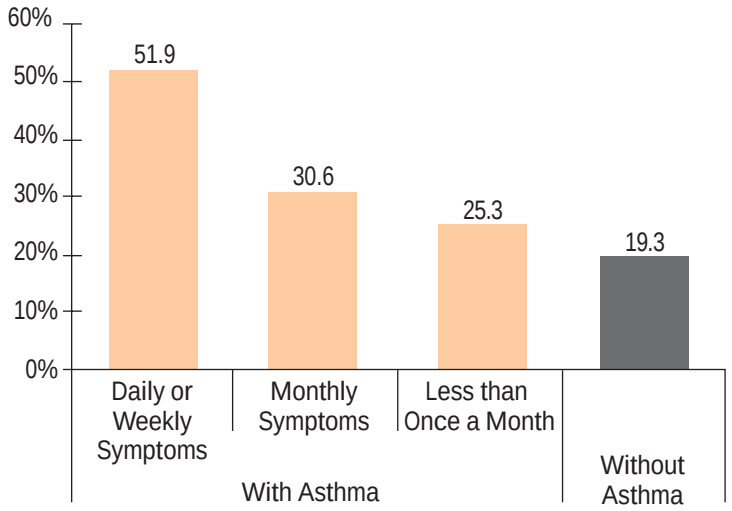
Uncontrolled asthma affects children's school attendance and physical activities. In California, nearly 180,000 adolescents ages 12-17 with asthma missed one or more days of school per month (37.2%). Among these adolescents, more than half who experience daily or weekly symptoms missed one or more days of school per month compared to one in three of those with symptoms less than once a month (54.0% and 32.8%, respectively) (Exhibit 33).

In addition, over 167,000 children under age 12 with asthma limited their physical activities due to asthma (23.7%). Among children with asthma, more than half who experience daily or weekly symptoms (54.3%) limited their physical activities due to asthma at least some of the time

69 Erickson SR, Kirking DM. A cross-sectional analysis of work-related outcomes in adults with asthma. Annals of Allergy, Asthma, and Immunology 2002; 88: 292-300.

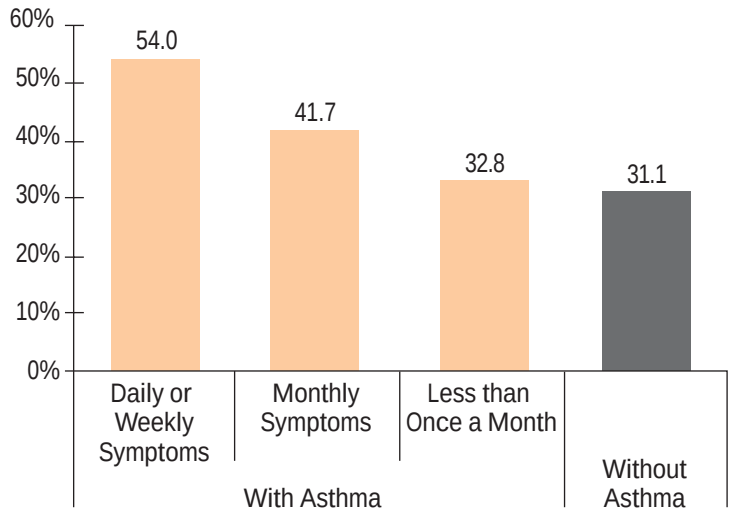
70 Blanc PD, Trupin L, Eisner M, et al. The work impact of asthma and rhinitis: Findings from a population-based survey. Journal of Clinical Epidemiology 2001; 54: 610-618.

**EXHIBIT 32. PERCENT REPORTING LIMITATIONS IN WORK AND OTHER ACTIVITIES IN PAST FOUR WEEKS DUE TO PHYSICAL HEALTH, ADULTS AGES 18 AND OVER, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

**EXHIBIT 33. PERCENT REPORTING AT LEAST ONE MISSED SCHOOL DAY PER MONTH DUE TO HEALTH PROBLEMS, ADOLESCENTS AGES 12-17, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

compared to 17.9% of those with symptoms less than once a month (Exhibit 34).

Inadequate control of asthma also results in greater utilization of costly emergency services. In California, children with asthma who experience frequent asthma symptoms are more than twice as likely to have at least one visit to an emergency department as those with symptoms less than once a month (23.0% and 11.0%, respectively) (Exhibit 35). A similar relationship between frequency of asthma symptoms and visits to the emergency department for asthma is found among adults with asthma.

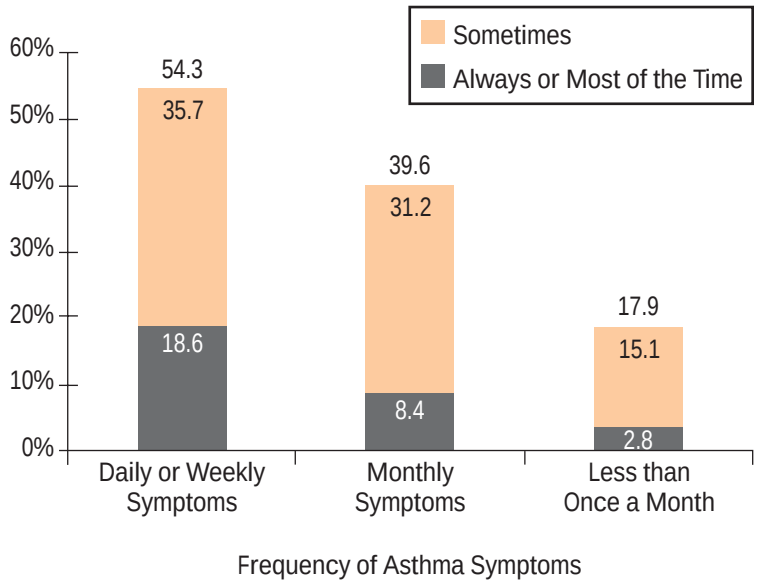
Californians who suffer from frequent asthma symptoms are more likely to report fair or poor health status, that physical health limited their work, missed school, limited physical activity, and visits to an emergency department. These findings demonstrate some of the serious consequences of uncontrolled asthma symptoms for the health and well being of Californians.

## POSSIBLE EXPLANATIONS FOR FREQUENT ASTHMA SYMPTOMS

Control of asthma requires effective treatment and management of the condition. This entails timely access to health care, regular consultation with a physician or health care professional, receiving education about self-management of asthma, receiving assistance with the reduction of environmental triggers, and for many, taking daily medications to control asthma. When these conditions do not occur, control of asthma is less likely to be maintained. Many Californians who suffer from daily or weekly asthma symptoms report not having regular visits to a physician, not receiving education about self-management of asthma, not taking medication for asthma, being a current smoker, or delaying or not receiving needed care for asthma.

The National Heart, Lung, and Blood Institute (NHLBI) recommends that people with asthma visit a physician at least twice a year in order to optimize asthma management.[17]

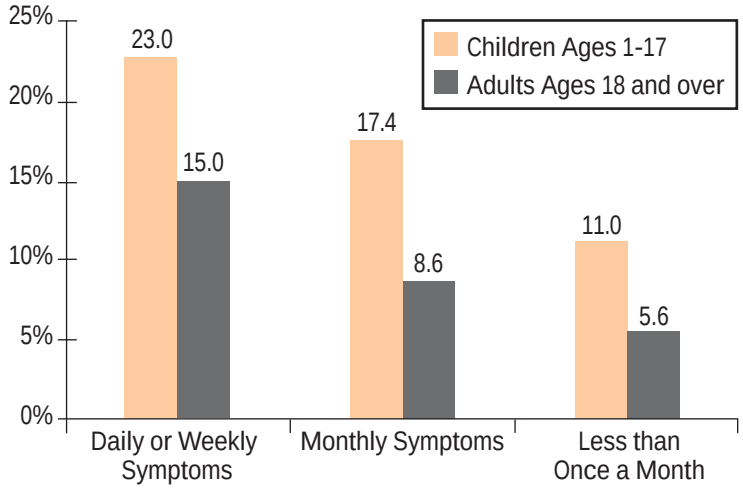
**EXHIBIT 34. PERCENT REPORTING LIMITED PHYSICAL ACTIVITY DUE TO ASTHMA BY FREQUENCY OF SYMPTOMS, CHILDREN WITH ASTHMA, AGES 1-11, CALIFORNIA, 2001**




Note: No comparison can be made to children not diagnosed with asthma because the question about limited physical activity due to asthma was only asked for children diagnosed with asthma.

Source: 2001 California Health Interview Survey

**EXHIBIT 35. PERCENT REPORTING AT LEAST ONE EMERGENCY DEPARTMENT VISIT FOR ASTHMA IN THE PAST YEAR BY FREQUENCY OF ASTHMA SYMPTOMS, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

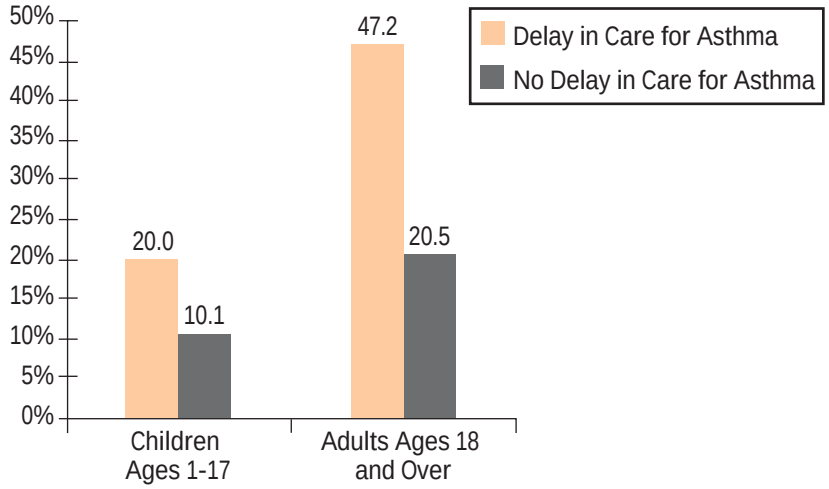
Regular consultation with a health professional is especially critical for people with asthma who experience frequent symptoms. However, over 15% of the adults who experience asthma symptoms every week or every day (nearly 95,000 people) report that they had fewer than two visits to a doctor during the year prior to the survey. Nearly 37,000 adults who experience symptoms every day or every week (6.0%) did not see a doctor at all in the past year.

Asthma is a condition in which self-management plays an important role. To properly self-manage the disease, people with asthma need to receive information about how to recognize early signs of an attack and how to modify their school, work and home environments in order to avoid exposure to individual asthma triggers. However, one in four adolescents with asthma (25.1%) who experience symptoms every week or every day report that they neither received information about how to recognize an asthma attack nor information about how to avoid the things that trigger an attack. Among adults with asthma, 15.7% of those who experience symptoms every week and 22.0% of those who experience symptoms every day report that they neither received information about how to recognize an asthma attack nor information about how to avoid the things that trigger an attack.

Medication is also a vital part of the proper control of asthma. However, not all people who suffer from asthma have access to medications. Among adults with asthma, 14.9% who experience symptoms every week or every day report that they are not on medications to control their asthma. In addition, 18.2% of children and teens with asthma (ages 1-17) who experience symptoms every week or every day are not using medications to control asthma. According to guidelines from the NHLBI, any person who has symptoms more than twice a week, and particularly people who experience symptoms every day, should be on one or more of the medications that are used to control asthma.[71] In spite of this, there are over 115,000 children, adolescents, and adults in California who experience asthma

71 National Asthma Education and Prevention Program. Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma – Update on Selected Topics 2002. National Institutes of Health publication number 02-5075. Bethesda, MD, 2002.

**EXHIBIT 36. PERCENT EXPERIENCING DAILY OR WEEKLY ASTHMA SYMPTOMS BY DELAYS IN CARE FOR ASTHMA, CHILDREN AND ADULTS WITH ASTHMA, CALIFORNIA, 2001**




Source: 2001 California Health Interview Survey

symptoms every day or every week who are not using *any* medications, including an inhaler, to control their asthma (18.6% of those with weekly symptoms and 13.2% of those with daily symptoms).

Smoking can exacerbate asthma and lead to worsening of the disease. In spite of this, 21.2% of adults who experience asthma symptoms at least once a week are current smokers. In addition, 29.4% of adults with asthma who currently smoke every day reported having daily or weekly asthma symptoms compared to 19.6% of those who currently smoke only some days and 19.7% of those who never smoked regularly. It is vital that health care providers and public health campaigns address the importance of smoking cessation in adults and smoking prevention and cessation in adolescents when advocating for the proper control of asthma.

Lack of timely health care can also have significant consequences for the control of asthma. People who delay getting needed medical care, such as a prescription medication or treatment for asthma, are more likely to experience frequent asthma symptoms (Exhibit 36). Among adults with asthma, those who delayed getting a prescription or other needed care for their asthma are more than twice as likely to have symptoms every day or every week as those who did not delay care for asthma (47.2% and 20.5%, respectively). Although children with asthma – on the average – were less likely than adults to have experienced delays in care for asthma, the same relationship between delayed care and frequent symptoms is found among children. Among children with asthma, those who experienced delays getting needed medical care for their asthma are twice as likely to suffer from asthma symptoms every day or every week compared to children who did not experience delays in care for asthma (20.0% and 10.1%, respectively; although this difference is not significant).

Asthma is a condition that can be effectively controlled with proper medical treatment and self-management. However, many people who show signs of poorly controlled asthma are not receiving the medical care and education they need to engage in appropriate self-management activities. Without this care and education, people with asthma are at increased risk for poor health, visiting the emergency department, missing school or work, and other serious consequences that can result from poorly controlled asthma.

# 6. CONCLUSIONS AND POLICY IMPLICATIONS

In California, nearly 1.2 million children (12.9%) and over 2.7 million adults (11.5%) have been diagnosed with asthma. School age children and young adults, African Americans, and American Indians and Alaska Natives disproportionately bear the burden of lifetime asthma prevalence. In addition, over 880,000 children (9.6%) and over two million adults (8.5%) with asthma experience asthma exacerbations at least once a year.

Asthma is a complex and multifactorial disease. Over the past 15 years, biomedical research has produced major advances in the understanding of asthma. Asthma is now known to be a disease of airway inflammation resulting from a complex interplay between environmental exposures, genetics, and other factors, such as lifestyle, access to care, socioeconomic status, location of residence, child care, work and school environments. As a result, the prevention and control of asthma require both clinical and public health efforts.

## ASTHMA SURVEILLANCE

Asthma symptom prevalence (the percentage of a population who reported being diagnosed with asthma and who experienced symptoms in the past year) varies across California's counties. **The variation in asthma prevalence highlights the need for targeted interventions based on timely and comprehensive data on the impact of asthma at the state and local levels.** Interventions should be based on comprehensive information regarding the impact of asthma at the state and local levels including the prevalence of asthma, the number of people with asthma, hospitalization rates and other asthma morbidity data, as well as asthma mortality rates. Before CHIS 2001, statewide or county-level data were available only on hospital discharges and mortality. Prevalence data were only available for adults at the state level through the Behavioral Risk Factor Surveillance System. State level prevalence data alone are of limited use in planning targeted interventions and monitoring changes in asthma trends. Timely data on the impact of asthma at the state and local levels are needed to support the design and implementation of effective public health and clinical interventions. Federal and state agencies call for a systematic local, state, and national system for asthma surveillance. **As a key strategy in prevention of asthma, federal and state governments are taking initiatives to develop methods to track occurrences of asthma in addition to possible causes such as hazardous exposures in our environment.** In October 2001, California became the first state to declare its intent to establish an environmental health tracking network for chronic conditions and environmental hazards and exposures, when California Senate Bill 702 (Escutia) was signed. Subsequently, a multidisciplinary Expert Working Group was convened to begin laying the groundwork for establishing an environmental health tracking system for California and to propose recommendations to the state legislature. Continuous support for the ongoing surveillance of asthma at the local level is needed.

## IMPROVING ACCESS TO HEALTH CARE FOR THOSE WITH ASTHMA

Californians with asthma face serious issues related to access to health care. Nearly 400,000 children (6.4%) and nonelderly adults (12.9%) with asthma are currently uninsured. In addition, 368,000 children (5.4%) and adults (11.1%) with asthma have no usual source of care. Nearly 7.2% of adults and 3.1% of children experienced delays in care for their asthma. **However, timely access to comprehensive, culturally relevant health care services is critical for improving control of asthma.** Affordable health insurance coverage with appropriate benefits is essential for people with asthma because it is related to both access to appropriate care and improved outcomes. Adults and children with asthma need access to physicians who can diagnose the condition and provide regular follow-up visits, and they need to learn how to self-manage their chronic condition. Individuals with asthma require adequate

coverage for prescription drugs and durable medical equipment to ensure financial access to the medications and equipment (such as metered dose inhaler spacers and peak flow meters) necessary for both on-going treatment and monitoring of asthma. They need health education, case management, and access to advice from a health professional twenty-four hours a day to assist them and their families in managing the condition. Many Californians with asthma do not receive this recommended level of care. For example, we found that nonelderly adults without health insurance are at least three times as likely as those with Medi-Cal or employment-based insurance not to have seen a doctor at all in the past year. In addition, over 40% of uninsured children with asthma had seen a doctor just once or not at all in the past year, compared to less than 25% of those covered by Medi-Cal or employment-based insurance. Among uninsured people with asthma, 42.6% of children and 24.7% of nonelderly adults rely on the health care safety net provided by public or community clinics. We recommend improving access to health care for all people with asthma through enhancements to health insurance coverage with appropriate benefits that include needed asthma medications and equipment (such as spacers). In particular, the health care safety net for vulnerable uninsured people with asthma needs to be strengthened.

## REDUCING DISPARITIES IN THE BURDEN OF ASTHMA

Many individuals feel the burden of asthma, whether it's a frightening asthma attack or the constant vigilance and adherence to treatment plans required to keep it under control. However, low-income groups, populations of color, and the uninsured in California disproportionately bear the burden of asthma. African Americans and AIANs have higher lifetime asthma prevalence. Children and adults with family incomes below the Federal Poverty Level (FPL) are more likely to experience delays in care for asthma, go to the emergency department because of asthma, and experience frequent asthma symptoms. Uninsured adults and children with asthma are more likely to experience delays in care for asthma and to have seen a doctor just once or not at all in the past year. Hospitalizations and emergency department visits for asthma demonstrate some of the disparities in the impact of asthma. Despite the fact that emergency department use and hospitalization for asthma can often be prevented, many people with asthma report going to an emergency department or being hospitalized because of asthma. In California, nearly 136,000 children with asthma and over 197,000 adults with asthma report going to an emergency department because of asthma in the past year. Over 31,000 children and an additional 60,000 adults with asthma report they were hospitalized for asthma in the past year. Rates of emergency department visits for asthma were higher among African Americans, Latinos, those with low incomes, the uninsured, and those who delayed care for their asthma. **Community-based, culturally appropriate interventions that assure adequate education about asthma management, along with efforts to improve access to quality health care and to improve living environments are needed to reduce the disproportionate burden of asthma among low-income families, racial and ethnic groups, and the uninsured.** Programs to improve housing conditions and indoor/outdoor air quality for low-income communities are particularly important.

## CONTROLLING ASTHMA THROUGH COMPREHENSIVE ASTHMA MANAGEMENT AND THE REDUCTION OF ENVIRONMENTAL TRIGGERS

Asthma is a potentially debilitating but controllable lung condition. However, nearly 750,000 children and adults with asthma experience symptoms every day or every week in California. Control of asthma requires effective treatment and management of the condition. This entails timely access to health care, regular consultation with a physician or other health care professional, receiving education about self-management of asthma, reducing exposure to environmental asthma triggers, and for many, taking daily medications to control asthma. Many Californians with asthma do not have access to the level of care necessary for adequate control of asthma. Improving control of asthma symptoms could lead to significant reductions in the use of costly emergency and hospital services, decrease time lost from school or work, and improve long-term health outcomes. Many Californians with asthma who suffer from daily or weekly asthma symptoms report not having regular visits with a physician, not receiving education about self-management of asthma, not taking medication for asthma, currently smoking, or delaying or not receiving needed care for asthma. For example, 130,000 adolescents ages 12-17 with asthma (27.0%) and 673,000 adults with asthma (24.5%) report they did not receive information on how to avoid asthma triggers or on how to recognize the signs of an asthma attack. Better control of asthma symptoms can be achieved with the following efforts.

**Comprehensive asthma education and management can improve control of asthma. Programs should be developed to promote the implementation of current guidelines for the diagnosis and management of asthma.** State and local health departments, community-based organizations, medical professional societies, health plans, and other organizations should assist health professionals to improve the quality of asthma care, educate families and patients, foster partnerships among the patient, family, and clinicians, and support effective community-based asthma programs. Parents, school nurses and personnel, and child-care providers should receive appropriate training in the environmental and medical management of asthma, including how to assist children in medically managing their conditions. **Programs that include intensive community outreach and education, school-based interventions, promotion of written asthma action plans, case management, and health plan- or community-based initiatives and strategies should be promoted to reduce the frequency and severity of asthma symptoms.**

**Programs are needed to reduce exposure to environmental triggers in home, school, work, and outdoor environments to reduce the prevalence and frequency of asthma episodes.** Environmental triggers include air pollutants, tobacco smoke, dust mites, animal dander, cockroaches, pollens, and molds. Environmental prevention requires systematic efforts by individuals and families as well as schools, employers, communities, and government. For example, the Environmental Protection Agency (EPA) has developed Indoor Air Quality (IAQ) Tools for Schools. This program provides schools with low-cost solutions for improving indoor air quality such as inexpensive maintenance that prevents high costs resulting from delayed repairs and deterioration of school buildings. The program also provides education for school staff, students, and parents about the importance of indoor air quality. Effective action can reduce the frequency of asthma episodes. Public policies that improve air quality by reducing ozone and particulate matter will improve outdoor environments. Effective local policies for communicating health advisories on poor air quality (high ozone level) days will result in reduced exposure risk. Public policies and private efforts to educate families, schools, and employers to

reduce exposures to dust mites and other indoor allergens, to prevent exposures to second-hand smoke and chemicals, to prohibit smoking indoors, and to prevent children and adults from smoking can help create asthma-friendly environments. In addition, policies that promote or require improvements in substandard housing can reduce exposure to environmental triggers for many people in low-income communities.

## CONCLUSION

The development and exacerbation of asthma are related to genetic, infectious, allergenic, socioeconomic, psychosocial, occupational and environmental factors. Left untreated, airway inflammation may lead to irreversible changes in lung structure, called airway remodeling. In California, 3.9 million children and adults have been diagnosed with asthma. Approximately 750,000 experience asthma symptoms every week and of these, 428,000 suffer from asthma symptoms every day. The focus for all Californians should be on the effective control of asthma to minimize the burden of asthma on individuals, families, communities and societies. Strategies and policies that promote the effective prevention and control of asthma need to be implemented. To achieve this, individuals, communities, health care providers, the health care system, community organizations, schools, workplaces, and a variety of state and local governmental organizations (such as public health, environmental, and housing agencies) will need to work together to address the disparities in prevalence, level of control, and impact of asthma throughout the state.

# APPENDIX

## DATA SOURCE

The findings presented in this report are based on data from the 2001 California Health Interview Survey (CHIS 2001). CHIS 2001 interviewed 55,428 households drawn from every county in California for its random-digit dial (RDD) telephone survey, providing a sample that is representative of the state's noninstitutionalized population living in households. Data were weighted to the 2000 Census. CHIS interviewed one sample adult in each household. In households with children, CHIS interviewed one adolescent ages 12-17 (a total of 5,801), and obtained information for one child under age 12 by interviewing the adult who was most knowledgeable about the child (a total of 12,592). Westat, a private survey research organization, conducted the RDD portion of the CHIS 2001 interviews between November 2000 and September 2001. In addition to the RDD sample, CHIS 2001 conducted an oversample of American Indians and Alaska Natives residing in both urban and rural areas and oversamples of Japanese, Vietnamese, South Asians, Koreans, and Cambodians; this report does not include data from these oversamples.

Expert teams reviewed all CHIS questionnaires to ensure that question wording was culturally appropriate for a variety of population groups. Questionnaires were also translated, and interviews were conducted in six languages: English, Spanish, Chinese (Mandarin and Cantonese dialects), Vietnamese, Korean, and Khmer (Cambodian). Community-outreach campaigns were conducted in communities of color to encourage the participation of populations that often have low participation rates in surveys. These campaigns used media and materials that were both culturally and linguistically appropriate to particular communities.

CHIS 2001 covered a broad range of public health concerns, including health insurance coverage, eligibility for and participation in public health care programs, access to and use of health care services, health and mental health status, chronic conditions (asthma, cancer, cardiovascular disease, arthritis, and diabetes), health behaviors (including diet and physical activity, alcohol and tobacco use, and cancer screening and prevention), dental health, women's health, and demographic characteristics (including employment; income; race; Latino, Asian, and Pacific Islander ethnicity; nativity of the respondent and his or her parents; citizenship; immigration status; and English proficiency).

CHIS is a collaboration of the UCLA Center for Health Policy Research, the California Department of Health Services, and the Public Health Institute. Funding for CHIS 2001 was provided by the California Department of Health Services, The California Endowment, the National Cancer Institute, the California Children and Families Commission, the Centers for Disease Control and Prevention (CDC), and the Indian Health Service. For more information on CHIS, visit *www.chis.ucla.edu.*

## BRIEF DESCRIPTION OF VARIABLES USED

CHIS 2001 includes a wide range of demographic and health information obtained from respondents, including extensive information on race and ethnicity as well as information on the prevalence of asthma, access to health care, and emergency department use and hospitalization due to asthma.

**Race and Ethnicity**

Respondents were first asked if they are of Latino or Hispanic origin. They were then asked which one or more of the following racial groups they would use to describe themselves: Native Hawaiian and other Pacific Islander, American Indian and Alaskan Native, Asian, African American, or white. Any respondent who selected more than one racial group or who said they were Latino and selected a racial group were asked which group they most identified with. Responses to this question were used to categorize respondents who identified more than one race or ethnicity into the following racial and ethnic categories: Latino, white, African American, Asian, Native Hawaiian and other Pacific

Islander (NHOPI), American Indian and Alaska Native (AIAN), and Other. Respondents who did not select a single race or ethnicity with which they most identified were assigned to the "Other" race category. Finally, any respondent who said they were AIAN and reported that he or she was enrolled as a member of a tribe was assigned to be AIAN.

The number of NHOPI in the CHIS 2001 sample is relatively small (219 adults using the classification described in the previous paragraph). Estimates for this group were reported whenever the sample size permitted. In addition, we did not report any estimates for the "Other" race and ethnicity category in this report.

**Asthma-specific Variables**

The *lifetime prevalence* of asthma was calculated from adult (ages 18 and over) and adolescent (ages 12-17) respondent answers to the question "Has a doctor ever told you that you have asthma?" For children ages 1 to 11, the adult most knowledgeable about the child (usually the parent) responded about the child. Respondents with a "yes" response to the asthma diagnosis question were asked additional items, including frequency of asthma symptoms, use of medication to control asthma, visits to an emergency department for asthma, hospitalizations for asthma, and delayed or foregone health care for asthma. In addition, adults and adolescents were asked whether they had received information from a doctor on how to avoid asthma triggers or on how to recognize the signs of an asthma attack. The most knowledgeable adult was also asked the following question about children under age 12 diagnosed with asthma: "How often does asthma limit your child's physical activities?" It should be noted that the question regarding use of asthma medication did not allow us to determine what type of medication a respondent is using. The question asked: "Are you currently taking any medications to control your asthma, including an inhaler?" Therefore, we cannot distinguish between respondents taking medication for immediate relief (acute attacks) from those that are taking preventive medications for long-term control.

*Asthma symptom prevalence* refers to the number of people who reported being diagnosed with asthma at any time and also reported asthma symptoms in the past 12 months divided by the total number of people in the population group. Please note that the estimates of lifetime asthma prevalence and asthma symptom prevalence presented in this report are based on respondents reporting that they received a diagnosis of asthma from a doctor, which may underestimate the true prevalence of asthma due to limitations of respondent recall or limited access to medical care.

Estimates of emergency department use and hospitalization due to asthma are based on respondents reporting that they visited a hospital emergency department because of asthma or were a patient in a hospital overnight or longer because of asthma in the past 12 months. Please note that self-reported reasons for emergency department visits or hospitalizations may not be accurate due to possible misclassification on the part of the respondent regarding the reason for an emergency department visit or admittance to a hospital. However, it is unclear whether any inaccuracy would, on the average, result in overestimation, underestimation, or no bias in reported use of emergency departments or hospitalizations for asthma.

**Geographic Area of Residence**

Classification of area of residence into urban, second city, suburban, small town, and rural is based on a definition from the company Claritas, Inc. Claritas assigns the zip codes in California to five urbanization categories based on analysis of population density grids of 1990 geoboundaries, 2000 redistricting updates, and 2001 population estimates. *Urban* refers to zip codes associated with dense neighborhoods that represent the central cities of most major metropolitan areas. These zip codes have a population density greater than 4,150 persons per square mile. *Second city* refers to zip codes associated with moderate density neighborhoods in population centers (above 1,000 and below 4,150 persons per square mile). *Suburban* refers to zip

codes associated with moderate density neighborhoods that are not surrounded by urban or second city population centers (above 1,000 persons per square mile and not in an urban or second city population center). *Small town* refers to zip codes associated with isolated small towns or other less-developed areas with a population density higher than 210, but lower than 1,000 persons per square mile. *Rural* refers to zip codes associated with small villages and rural communities surrounded by farmland or wide-open spaces (210 persons per square mile and below).

**Usual Source of Care**

Please note that the definition of usual source of care used in this report excludes emergency and urgent care facilities from being considered a usual source of care. Respondents were asked "Is there a place that you USUALLY go when you are sick or need advice about your health?" If respondents said "yes", they were then asked about the type of place they went to most often. Respondents who reported that they most often used the emergency department or an urgent care facility as a usual source of care were categorized as having no usual source of care.

## LIMITATIONS

CHIS 2001 is a large survey designed to be representative of the state's non-institutionalized population living in households. However, as with any survey, there are caveats that should be kept in mind when using these findings. First, CHIS is a telephone survey of people living in households and weighted to reflect this non-institutionalized population. Therefore, certain populations (such as those living in nursing homes or prisons) are excluded. In addition, populations without access to telephones may be excluded or under-represented. However, the proportion of Californians without access to a telephone is very small, and even for very poor populations – and some relatively isolated groups – it does not exceed 12 percent. Moreover, recent studies show that the health characteristics of those with and without telephones are not as different as they have been in the past.[72, 73] In addition, information collected by CHIS 2001 was used in weighting the sample to mitigate the effects of this characteristic of telephone surveys.

Second, the findings presented in this report are based on self-reported, cross-sectional data. It is possible that respondents' self-reports were influenced by a recall bias. However, this bias may not have much influence on the health effect measures. Previous studies have shown that people are able to recall frequent events (such as frequent asthma symptoms) or rare episodes (such as emergency department visits or being diagnosed with asthma) very well. [74, 75] As a cross-sectional survey, caution should be taken in drawing causal conclusions from statistical relationships found in this study.

Finally, response rates should be taken into account with other factors in interpreting findings from CHIS and other surveys. The overall response rate for CHIS 2001 is a composite of the screener completion rate and the extended interview completion rate. CHIS 2001 used a conservative method for calculating the response rate that allocates undetermined numbers. Using this conservative method, the screener completion rate was 59.2%. For the adult survey, the extended interview completion rate was 63.7%, resulting in an overall response rate of 37.7%. Overall response rates for the adult survey varied by sampling strata (ranging from 30% in San Francisco county to 68.9% in Colusa, Glen, and Tehama counties). The child survey had an extended interview completion rate of 87.6% and the adolescent survey an extended interview completion rate of 63.5%. The

72 Anderson JE, Nelson DE, Wilson RW. Telephone coverage and measurement of health risk indicators: Data from the National Health Interview Survey. American Journal of Public Health 1998; 88:1392-1395.

73 Ford ES. Characteristics of survey participants with and without a telephone: Findings from the Third National Health and Nutrition Examination Survey. Journal of Clinical Epidemiology 1998;51:55-60.

74 Pless CE, Pless IB. How well they remember. The accuracy of parent reports. Archives of Pediatric and Adolescent Medicine 1995; 149:553-558.

75 Bluck S, Li KZH. Predicting memory completeness and accuracy: Emotion and exposure in repeated autobiographical recall. Applied Cognitive Psychology 2001; 15:145-158.

lower completion rate for adolescents is largely due to parents not giving permission for the adolescent interview. If these non-responses are excluded, the rate increases to 84.5%. The overall response rate of 37.7% for adults is not very different from the response rate of 43.4% reported for the 2000 Behavioral Risk Factor Surveillance System (BRFSS) in California (another recently conducted telephone survey). The response rate for CHIS 2001 is lower than the response rate for the 1999 National Survey of America's Families (NSAF). The response rate for the California sample of the 1999 NSAF was 51.7%. However, the 1999 NSAF used monetary incentives for participation whereas CHIS 2001 did not use monetary incentives. Nevertheless, it should be noted that many factors should be taken into account in assessing the representativeness of the survey data. For more information on these issues, please see *CHIS 2001 Methodology Report Series: Report 4 – Response Rates.*[76]

## STATISTICAL ANALYSES AND REPORTING OF FINDINGS

All estimates presented in this study have a "coefficient of variation" (CV) less than or equal to 0.30 unless otherwise noted. The CV provides information about the precision of estimates from survey data. It was determined that estimates with a CV greater than 0.30 should not be presented because the "true" estimate might be very different from the one that was calculated. In addition, all comparative statements reflect statistically significant differences ($p < 0.05$) unless otherwise noted.

76 California Health Interview Survey. CHIS 2001 Methodology Report Series: Report 4 – Response Rates. Los Angeles, CA: UCLA Center for Health Policy Research, 2002.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