

# ***Asthma Surveillance Report*** **OKLAHOMA**

**2008**

**Asthma Prevention and Control Program  
Chronic Disease Service  
Oklahoma State Department of Health**

**Oklahoma Asthma Initiative**



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## **DISCLAIMER**

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**The analyses, interpretations, discussions, conclusions, or opinions expressed in this report do not represent the views of CDC, OSDH, OAI, American Lung Association of the Central States, or any organization provided data for this report.**



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## EXECUTIVE SUMMARY

This report provides information and data about the mortality and morbidity of asthma in Oklahoma, and compared to the Healthy People 2010 objectives where applicable. This report also provides information about prevalence of asthma related risk behaviors, asthma hospitalizations, and the cost of asthma.

### In the United States

- Each year, 4,210 Americans die from asthma.
- Over 20 million Americans reported that they currently have asthma. Of those, 6.2 million were children under the age of 18 years old, and approximately 2 million persons were aged >65 years.
- Each year, there are 1.8 million emergency department visits, 504,000 hospital discharges (299,300 for adults and 204,700 for children) due to asthma.
- Asthma affecting nearly 1 in 13 school-aged children is the leading cause of school absenteeism due to chronic disease.

### Asthma in Oklahoma Adults

- 365,400 adults 18 years and older (13.5%) reported that they had ever been diagnosed with asthma by health professionals.
- 232,900 adults 18 years and older (8.6%) reported that they currently have asthma.
- Female adults in Oklahoma have significantly higher prevalence of lifetime and current asthma than males ( $p < 0.05$ ).
- Hispanic adults reported significantly lower prevalence of lifetime and current asthma than Non-Hispanic adults ( $p < 0.01$ ), while Non-Hispanic American Indians and African Americans had slightly higher prevalence of asthma than Whites ( $p > 0.05$ ).

### Asthma in Oklahoma Children

- 114,300 children under age 18 (13.4%) reported that had been told by a health professional that he/she had asthma.
- 78,500 children under age 18 (9.2%) reported that they currently have asthma.
- African American children had the highest prevalence of both lifetime and current asthma.

## **Asthma Control and Management in Oklahoma**

- About 38.4% of adults with current asthma did not take any medication in the past month.
- About 40.5% of children with current asthma took medication within last 24 hours.
- 58.1% of adults with current asthma reported they had an asthma attack during the past 12 months. Adults without health coverage reported significantly higher percentage of asthma attacks than those with coverage ( $p<0.05$ ).
- Among children with current asthma, 71.9% experienced an episode or attack of asthma during the past 12 months.
- 16.6% of adults with current asthma visited an emergency room (ER) or urgent care center because of their asthma during the past 12 months. Females were more likely to have ER visits than males ( $p<0.05$ ). Adults with household incomes  $< \$15,000$  reported significantly more visits to ER, compared with those who had  $\$50,000$  and up ( $p<0.05$ ).
- 24.1% of adults with current asthma visited a physician or nurse for urgent treatment of worsening asthma symptoms during the past 12 months. Females were more likely to have urgent visits than males ( $p<0.05$ ).
- 47.3% of adults with current asthma went to their physician for a routine asthma checkup during the past 12 months. Adults without health coverage reported significantly lower percentage of routine checkup than those with coverage ( $p<0.05$ ).
- 27.8% of adults with current asthma were unable to work or carry out usual activities at least one day during the past 12 months because of asthma.
- 48.7% of adults with current asthma reported influenza vaccination during the past year, while 42.6% of adults with current asthma reported ever received pneumococcal vaccination. Adults without health coverage reported significantly lower percentage of vaccinations than those with coverage ( $p<0.05$ ).

## **Asthma Hospitalizations in Oklahoma**

- In 2007, there were 4,983 hospital admissions with asthma as the principle diagnosis.
- The total charges in 2007 were approximately \$57.9 million for hospitalizations with asthma as the principle diagnosis. Females accounted for 67.7% of the total charges and had higher average charges than males.
- In 2007, the average length of stay for hospitalizations with asthma as the principle diagnosis was 3.3 days. Females stayed longer than males on average.
- Among patients hospitalized with asthma as the principle diagnosis, 66.3% were admitted from the emergency room.
- Although most of asthma hospital admission cases came from Oklahoma City and Tulsa, the counties in southern and western Oklahoma had higher hospitalization rates.

## **Asthma in Oklahoma Medicaid Beneficiaries**

- In 2007, there were 37,221 Medicaid beneficiaries that received paid claims with asthma as the primary diagnosis.
- 53.3% of beneficiaries who had claims with asthma as the primary diagnosis were children younger than 10 years of age.
- The total paid claims with primary diagnosis of asthma was over \$47.8 million in 2007.

## **Asthma Mortality**

- There were 47 people died from asthma in 2006 in Oklahoma, 11 of them (23.4%) were under the age of 25 years old.
- The age-adjusted mortality rate for asthma was similar to that in the US.
- African Americans have more than doubled asthma mortality rates than Whites.
- Asthma mortality rates were much higher among people aged 65 years and over.

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# INTRODUCTION

Asthma is a chronic respiratory disease, impacting adults and children, characterized by cough, shortness of breath, tightening of the chest, and wheezing. These symptoms can be triggered by a variety of sources including respiratory infections, allergens, air pollutants, allergenic food and chemicals, and psychosocial factors. Symptoms of asthma can range from mild to severe and life threatening.

The Healthy People 2010 objectives included the following goals to improve the lives of people with asthma.

- Reduce asthma deaths.
- Reduce hospitalizations for asthma.
- Reduce hospital emergency department visits for asthma.
- Reduce activity limitations among persons with asthma.
- Reduce the number of school or workdays missed by persons with asthma due to asthma.
- Increase the proportion of persons with asthma who receive formal patient education, including information about community and self-help resources, as an essential part of the management of their condition.
- Increase the proportion of persons with asthma who receive appropriate asthma care according to the NAEPP Guidelines.
- Increase the number of States with an asthma surveillance system for tracking asthma cases, illness, and disability.

Asthma is a prevalent disease in the United States, affecting about 16 million adults and 6.5 million children. With the steady increase in the incidence of asthma during recent decades, medical costs, urgent care and hospitalizations, and work loss associated with this disease have risen to nearly \$13 billion. Asthma drugs represented 43% of the \$7 billion direct medical costs.

School absence days among children were 3.7 days/year (1994/1996 NHIS). The percentage of children with 1 or more absence for asthma in the previous two weeks was 5.4%.

The Oklahoma Asthma Initiative (OAI) is a statewide coalition of health and social care organizations and professionals, advocates, and individuals who have asthma or caregivers of people with asthma. The mission of OAI is **to improve the health status of Oklahomans affected by asthma**, thus, the OAI members are working in an effort to implement and sustain changes in medical professional education, patient and caregiver education, community education, public policy, data and surveillance, and public relations.

The purpose of this surveillance report is to present a variety of the latest statewide, county level when appropriate, asthma-related statistics, to assist policy makers, health professionals, public health programs, media, and the public in identifying problems, program planning, and evaluation.

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## **METHODS AND DATA SOURCES**

The Oklahoma Asthma Prevention and Control Program facilitated the Data and Surveillance Committee of the Oklahoma Asthma Initiative. The committee is responsible for maintaining and updating the Oklahoma Asthma Surveillance System. Committee members include staff within the Oklahoma State Department of Health (OSDH, including Chronic Disease Service, Center for Health Statistics, Health Care Information, Vital Records, Tobacco Use Prevention Service, and Maternal and Child Health Service) and staff from external organizations (including American Lung Association of the Central States, Oklahoma Department of Environmental Quality, Oklahoma Health Care Authority, College of Public Health and College of Medicine in University of Oklahoma Health Science Center). The committee members provide technical assistance to the asthma program epidemiologist in gathering data and reviewing data for appropriateness.

Statistical analysis was performed on those data that were available to the asthma Epidemiologist.

The data analysis was performed with SAS v9.

### **Behavioral Risk Factor Surveillance System (BRFSS)**

The Behavioral Risk Factor Surveillance System (BRFSS), which is administered and supported by the Centers for Disease Control and Prevention (CDC), is a state-based, ongoing, random-digit-dialed (RDD) telephone survey of the non-institutionalized civilian population 18 years of age and older. It is designed to monitor the prevalence of the major behavioral risks among adults associated with premature morbidity and mortality.

Two asthma prevalence measures were constructed in BRFSS core questions. In addition, nine questions on adult asthma history and two questions on child prevalence are available as optional modules. Lifetime asthma is defined as an affirmative response to the question "Have you ever been told by a doctor {nurse or other health professional} that you have asthma?". Current asthma is defined as an affirmative response to that question followed by an affirmative response to the subsequent question "Do you still have asthma?"

The latest asthma data from Oklahoma BRFSS includes two asthma prevalence questions in the core of the 2007 survey, the adult asthma history module and the childhood asthma module from the 2006 and 2007 survey.

Due to the survey design, prevalence data is not available if respondents <50 in the category or the half of the 95% Confidence Interval >10 to ensure the stable results. The statistical results are subject to reporting, non-response and processing errors. These types of errors are kept to a minimum either by methods built into the survey, or by using aggregated data.

Because the estimates do not account for geographic differences in the prevalence of chronic and acute diseases, the sum of the estimates for each of the counties may not exactly reflect the states' estimates derived by the corresponded survey.

There are limitations to the BRFSS. First, the Oklahoma BRFSS is a telephone survey of Oklahoma residences. While it is estimated that only 5% of Oklahomans do not have residential phone service, these individuals could have higher rates of asthma than the general population. Although statistical weights were used to minimize this effect, it can never be completely eliminated. Second, the BRFSS data is self-reported and cannot be verified.

## **Hospitalization data**

The Oklahoma Health Care Information Act mandates the collection of inpatient hospitalization data from licensed facilities within the state. The Oklahoma Health Care Information Center, housed at the Oklahoma State Department of Health, is responsible for the collection, processing, and dissemination of this data.

Asthma related hospital discharge data is currently available through 2007 in the Public Used File, which undergone the de-identification process.

There are limitations for hospital discharge data. One limitation is that it reflects encounters rather than individuals. Thus, one individual could be in the dataset more than once. Another limitation is that discharges from Indian Health Service hospitals, military and veteran hospitals are not collected. Also, out of state hospital discharges of the Oklahoma residents were not included.

## **Medicaid**

Medicaid is the federal and state entitlement program that provides funding for medical benefits to low-income individuals who have inadequate or no health insurance coverage. Medicaid guarantees coverage for basic health and long-term care services based upon income and/or resources. The Oklahoma Health Care Authority (OHCA) is the primary entity in the State of Oklahoma charged with controlling costs of State-purchased health care. The mission of OHCA is to purchase state and federally funded health care in the most efficient and comprehensive manner possible and to study and recommend strategies for optimizing the accessibility and quality of health care.

In Oklahoma, a prearranged fee (capitated payment) is paid to the SoonerCare Primary Care Provider/Case Manager (PCP/CM) monthly for primary and preventive care. Other services not included in the capitated benefit package are paid as fee-for-service. Under fee-for-service, payments are made directly to the providers once an allowable service has been provided and billed.

The statistical results of Medicaid claim data were obtained through an inter-agency data sharing agreement between OSDH and OHCA. The data is currently available through 2007.

## **Mortality Data**

Asthma mortality data for the US were from CDC WONDER (Wide-ranging OnLine Data for Epidemiologic Research, <http://wonder.cdc.gov/>), which contains mortality and population counts for the years through 2005. Data for Oklahoma asthma mortality were from Oklahoma Vital Records, the official registration point and repository for certificates for all birth and death events that occur in the state of Oklahoma. The latest available data was through 2006. Oklahoma data was made available from the interactive web-based inquiries through OK2SHARE, the Oklahoma State Department of Health (OSDH) internet databases at <http://www.health.state.ok.us/ok2share/>.

Underlying causes of deaths with ICD-9 code 493-493.9 before 1999 and ICD-10 code J45-J46 on 1999 and after were considered as asthma mortality cases. The comparability ratio from ICD-10 to ICD-9 for asthma deaths was 0.89, indicates that 11% fewer deaths are coded as caused by asthma in the ICD-10 revision due to the change (see <http://wonder.cdc.gov/> for details). Age-adjusted mortality rates (based on US 2000 standard population) were either obtained from the CDC WONDER or OK2SHARE.

There were some limitations with asthma mortality data. Asthma mortality rates might be underreported since persons with asthma may die of other diseases. Furthermore, decedents with asthma recorded as a cause of death are not representative of decedents known to have asthma.

An additional limitation is the misclassification of American Indians on death certificates, particularly in Oklahoma where the American Indian population represents 8.5% of the state Non-Hispanic population. According to a report by the National Center for Health Statistics, all cause death rates for Native Americans are 21% lower than they should be due to misclassification on death certificates and underreporting in the census. To eliminate the misclassification, Oklahoma Vital Records has been making continuing efforts to have a linkage between Oklahoma death data and Indian Health Services (IHS) administrative records in Albuquerque, New Mexico. These administrative records include all patients seen at any Indian Health Services or reporting Tribal Health Service Facility throughout the United States – including all areas offices. The IHS linked mortality data were through 2003.

## **National Survey of Children's Health**

The National Survey of Children's Health is the 3<sup>rd</sup> State and Local Area Integrated Telephone Survey (SLAITS) to produce national estimates concerning the health of children, conducted by the Centers for Disease Control and Prevention's (CDC) National Center of Health Statistics (NCHS). A random digit dial (RDD) sample of households with children under 18 years of age was selected from each of the 50 states and the District of Columbia. One child was randomly selected from all children in each identified household to be the subject of the survey. The respondent was the parent or guardian who knew the most about the child's health care. Estimates based on the sampling weights generalize to the noninstitutionalized population in each state and nationwide.

## **Youth Risk Behavior Survey**

The Youth Risk Behavior Survey (YRBS) was developed in 1990 to monitor priority health risk behaviors that contribute markedly to the leading causes of death, disability, and social problems among youth and adults in the United States. These behaviors, often established during childhood and early adolescence, include: tobacco use, unhealthy dietary behaviors, inadequate physical activity, alcohol and other drug use, sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection, and behaviors that contribute to unintentional injuries and violence. Oklahoma YRBS collected asthma information in 2007 based on the following questions, “Has a doctor or nurse ever told you that you have asthma?” and “Do you still have asthma?”

CDC randomly selected a certain number of schools and a certain number of classrooms from the list of all public schools in Oklahoma. The YRBS program contacted the schools and asked for their participation and a list of all second hour classrooms. The classrooms, which would conduct the survey, were randomly selected from that list. After the classrooms are selected and the school has agreed to participate, each county health department that has a school in the sample was asked to pick a person to help. Those people were trained on how to administer the survey and the state YRBS program also provide staff to assist. The county health department staff worked with the school to arrange a date for the survey, and on that date, they administered the survey in the selected classrooms and collected the survey booklets. After every school had finished, the survey booklets were sent back to the CDC for data entry. The finalized dataset was then provided to YRBS staff in OSDH.

## **Oklahoma Youth Tobacco Survey**

The Oklahoma Youth Tobacco Survey is a school-based survey administered to a random sample of 6<sup>th</sup>-8<sup>th</sup>, and 9<sup>th</sup>-12<sup>th</sup> graders statewide. Sample selection and survey administration procedures are the same as for the Youth Risk Behavior Survey. Two asthma questions were asked in the YTS: “Have you ever been told by a doctor or other health care provider that you had asthma?” and “Do you still have asthma?” The latest available asthma information obtained from YTS data is from the 2007 survey. In the year 2007, 3,008 students of 9<sup>th</sup> to 12<sup>th</sup> grade in 48 schools and 3,498 students of 6<sup>th</sup> to 8<sup>th</sup> grade in 55 schools completed the statewide survey.

# ASTHMA RELATED HEALTHY PEOPLE 2010 OBJECTIVES AND OKLAHOMA DATA

## Healthy People 2010 Objective 24 Respiratory Diseases

The Healthy People 2010 Objective 24. Respiratory Diseases has the goal of “Promote respiratory health through better prevention, detection, treatment, and education efforts”.

### 24-1. Reduce asthma deaths

Target and baseline: (Rate per Million)	Oklahoma		HP2010 Objective	
	1999-2001	2003-2006	1999 Baseline	2010 Target
24-1a. Children under age 5 years	0.00	2.70	1.7	0.9
24-1b. Children aged 5 to 14 years	2.71	4.24	3.1	0.9
24-1c. Adolescents and adults aged 15 to 34 years	4.89	6.96	5.6	1.9
24-1d. Adults aged 35 to 64 years	11.36	12.28	15.5	8.0
24-1e. Adults aged 65 years and older	68.24	49.75	69.5	47.0

The baselines of Oklahoma asthma mortality for people younger than 65 years old increased in recent years, without meeting the 2010 target. On the other hand, the asthma mortality for people 65 years and over was similar to the national baseline and decreased without meeting the 2010 target.

### 24-2. Reduce hospitalizations for asthma

Target and baseline: (Rate per 10,000)	Oklahoma		HP2010 Objective	
	2002-2003	2007	1998 Baseline	2010 Target
24-2a. Children under age 5 years	15.9	15.4	45.6	25.0
24-2b. Children and adults aged 5 to 64 years	12.9	11.5	12.5	7.7
24-2c. Adults aged 65 years and older*	4.5	5.1	17.7	11.0

The data indicated the hospitalization with asthma as the principle diagnosis. The hospitalization rates for children under age of 5 years group and adults aged 65 years and over group kept unchanged, and the 2002-2003 data and 2007 data were lower than the national baseline and 2010 target. For children and adults 5-64 years old, Oklahoma 2002-2003 data indicated similar hospitalization rate with the national 1998 baseline. With the slightly decrease, the rate for this age group has not met the 2010 target.

### 24-3. Reduce hospital emergency department visits for asthma

Target and baseline: (Rate per 10,000)	1995-97 Baseline	2010 Target
24-3a. Children under age 5 years	150.0	80.0
24-3b. Children and adults aged 5 to 64 years	71.1	50.0
24-3c. Adults aged 65 years and older	29.5	15.0

The emergency department data were not collected in the state of Oklahoma.

**24-4. Reduce activity limitations among persons with asthma.**

*Target: 6 percent.*

*Baseline: 10 percent of persons with asthma experienced activity limitations in activity in 1997<sup>2</sup> (age adjusted to the year 2000 standard population).*

According to Oklahoma 2007 BRFSS data, among adults (18 years and over) with current asthma, 27.5% reported they had activity limitations due to their asthma, which decreased from 32.6% in 2002. While HP2010 target used NHIS data, direct comparison is not recommended.

**24-5. Reduce the number of school or work days missed by persons with asthma due to asthma.**

*Target: 2.0 days.*

*Baseline: The number of school or workdays missed by persons aged 5 to 64 years with asthma due to asthma was 6.1 days in 2002.*

There is no available data collected in Oklahoma.

**24-6. Increase the proportion of persons with asthma who receive formal patient education, including information about community and self-help resources, as an essential part of the management of their condition.**

*Target: 30.0 percent.*

*Baseline: 8.4 percent of persons aged 12 to 49 years with asthma received formal patient education in 1998 (age-adjusted to the year 2000 standard population).*

There is no available data collected in Oklahoma.

**24-7. Increase the proportion of persons with asthma who receive appropriate asthma care according to the NAEPP Guidelines.**

Target and baseline: Percent	2002 Baseline(unless noted)	2010 Target
24-7a. Written asthma management plans from their health care provider	32	38
24-7b. With prescribed inhalers who receive instruction on how to use them properly	96.0 (2003)	98.8
24-7c. Education about recognizing early signs and symptoms of asthma episodes and how to respond appropriately, including instruction on peak flow monitoring for those who use daily therapy	68 (2003)	71
24-7d. Medication regimens that prevent the need for more than one canister of short-acting, inhaled, beta agonists per month for relief of symptoms	80 (2003)	92
24-7e. Followup medical care for long-term management of asthma after any hospitalization due to asthma	76 (2003)	87
24-7f. Assistance with assessing and reducing exposure to environmental risk factors in their home, school, and work environments	42	50

There is no available data collected in Oklahoma.

**24-8. Increase the number of States with an asthma surveillance system for tracking asthma cases, illness, and disability.**

Target: 25 States.

Baseline: 19 States had a surveillance system for tracking asthma cases, illness, and disability in 2003.

This is a national target, not applicable to individual state. However, Oklahoma established the surveillance system after received the funding from CDC.

## Healthy People 2010 objectives 14-29 Increase the proportion of adults who are vaccinated annually against influenza and ever vaccinated against pneumococcal disease

	Noninstitutionalized adults aged 65 years and older	2010 Target
14-29a.	Influenza vaccine	90%
14-29b.	Pneumococcal vaccine	90%
	Noninstitutionalized high-risk adults aged 18 to 64 years	
14-29c.	Influenza vaccine	60%
14-29d.	Pneumococcal vaccine	60%

### Results from 2007 Oklahoma BRFSS

Vaccine	Population groups	Percent	95%CI
Influenza	Adults aged 18-64 years old	35.5	33.9-37.2
	Adults aged 65 years and over	75.9	73.9-77.9
	Adults with current asthma aged 18-64 years old	48.0	42.3-53.7
	Adults with current asthma aged 65 years and over	82.6	76.9-88.2
Pneumococcal	Adults aged 18-64 years old	17.6	16.4-18.9
	Adults aged 65 years and over	69.5	67.3-71.6
	Adults with current asthma aged 18-64 years old	36.3	31.0-41.6
	Adults with current asthma aged 65 years and over	90.8	86.7-94.9

# ASTHMA IN OKLAHOMA ADULTS

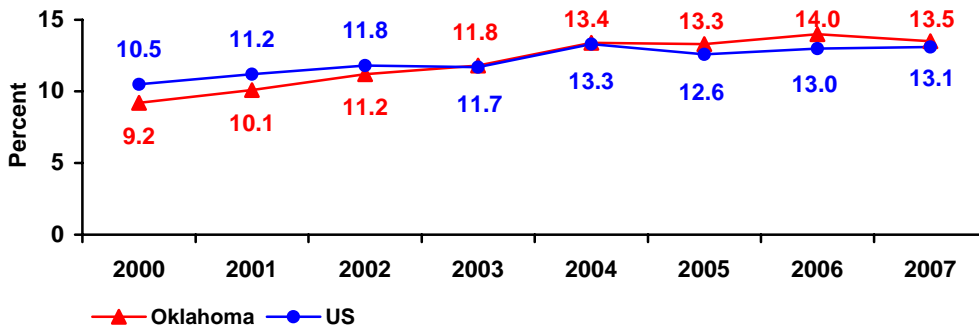
Prevalence data of asthma in adults (18 years and older) was obtained from the Behavioral Risk Factor Surveillance System (BRFSS). Oklahoma 2007 BRFSS data includes two asthma prevalence questions in the core. The data from nine questions on the adult asthma history module for 2006 and 2007 were the latest available data. See Data Sources and Methods for details.

## PREVALENCE OF LIFETIME AND CURRENT ASTHMA

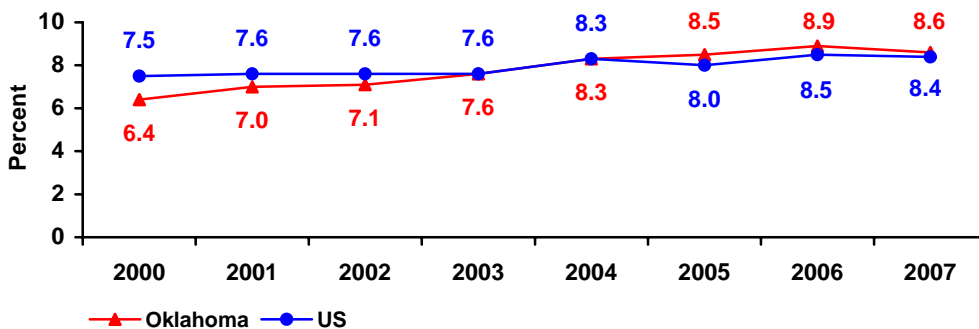
In 2007, 13.5% of adults in Oklahoma (365,400 people) had ever been told by a health professional that they have asthma (lifetime asthma) and 8.6% of adults in Oklahoma (232,900 people) currently have asthma.

The prevalence of lifetime asthma in Oklahoma and US adults increased slightly during the past six years (Figure 1). The prevalence of asthma in Oklahoma and US adults increased slightly during the past six years (Figure 1, 2).

**Figure 1. Prevalence of Lifetime Asthma: Oklahoma and US, BRFSS 2000-2007**

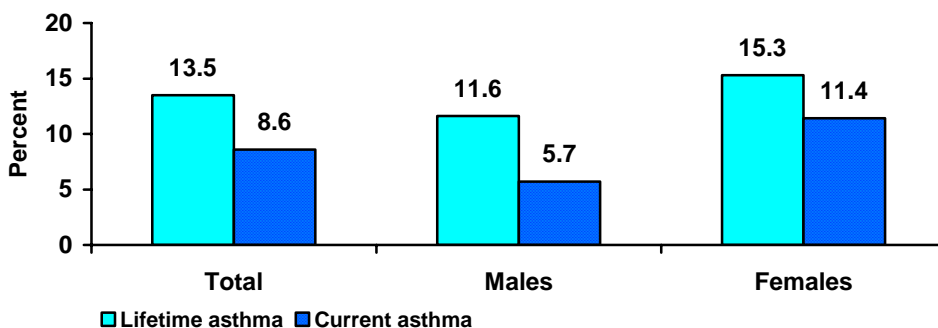


**Figure 2. Prevalence of Current Asthma: Oklahoma and US, BRFSS 2000-2007**



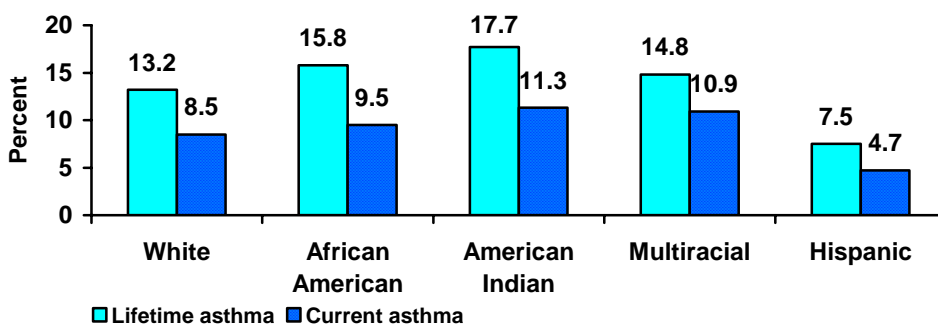
Female adults in Oklahoma have significantly higher prevalence of lifetime and current asthma than males ( $p < 0.05$ , Figure 3).

**Figure 3. Prevalence of Lifetime and Current Asthma by Gender: Oklahoma BRFSS 2007**



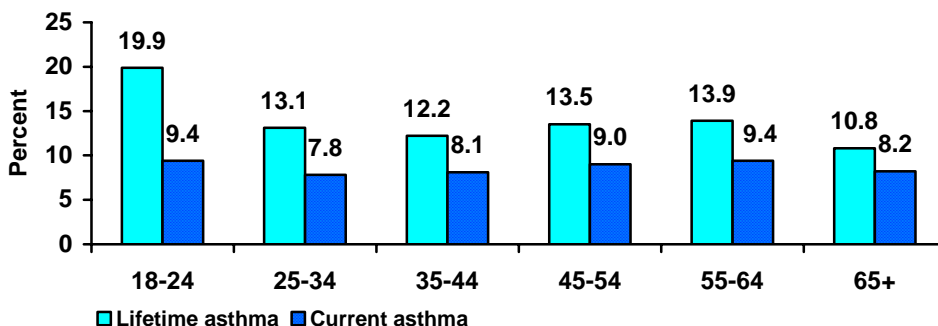
Hispanic adults in Oklahoma reported significantly lower prevalence of lifetime and current asthma than Non-Hispanic adults ( $p < 0.01$ ). Among Non-Hispanic adults, although not significantly different from other racial groups, American Indians reported higher prevalence of lifetime and current asthma (Figure 4).

**Figure 4. Prevalence of Lifetime and Current Asthma by Race/ethnicity: Oklahoma BRFSS 2007**



There is no statistically significant difference in prevalence of current asthma by age groups, although those 18-24 years old and 55-64 years old reported slightly higher prevalence than people in other age groups (Figure 5). For lifetime asthma, those in the 18-24 years old age groups reported significantly higher prevalence than those in the 65 and over age group ( $p < 0.05$ , Figure 5, Table 1).

**Figure 5. Prevalence of Lifetime and Current Asthma by Age Group: Oklahoma BRFSS 2007**



There is no significant difference in prevalence of lifetime or current asthma by education level (Table 1). Adults with annual household incomes lower than \$15,000 reported much higher prevalence of current asthma than those in other incomes levels did ( $p < 0.05$ , Table 1). For lifetime asthma, those with annual household incomes \$25,000 and over reported significantly lower prevalence than those with  $< \$15,000$  ( $p < 0.05$ , Table 1).

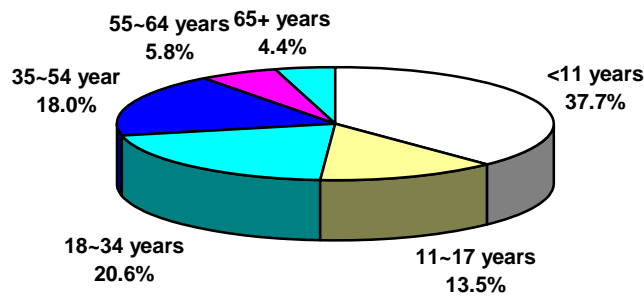
**Table 1. Prevalence of Asthma Among Adult Oklahoman: Oklahoma BRFSS 2007**

	Lifetime Asthma		Current Asthma	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	13.5	12.4-14.5	8.6	7.8-9.4
<b>Gender</b>				
Males	11.6	9.8-13.3	5.7	4.6-6.8
Females	15.3	14.0-16.6	11.4	10.2-12.5
<b>Race/Ethnicity*</b>				
NH-White	13.2	12.0-14.4	8.5	7.6-9.4
NH-Black	15.8	11.5-20.1	9.5	6.3-12.8
NH-American Indian	17.7	13.2-22.2	11.3	7.4-15.3
NH-Multiracial	14.8	10.9-18.6	10.9	7.5-14.3
Hispanic	7.5	4.2-10.8	4.7	2.2-7.3
<b>Age (years)</b>				
18-24	19.9	14.1-25.6	9.4	5.6-13.3
25-34	13.1	10.4-15.8	7.8	5.7-9.9
35-44	12.2	10.1-14.3	8.1	6.4-9.8
45-54	13.5	11.5-15.5	9.0	7.4-10.7
55-64	13.9	11.9-15.9	9.4	7.8-11.1
65+	10.8	9.3-12.2	8.2	6.9-9.5
<b>Education</b>				
< High School	15.0	12.1-18.0	9.3	7.1-11.5
HS Diploma/GED	13.3	11.2-15.4	8.7	7.2-10.2
Some College	13.3	11.4-15.2	8.2	6.7-9.7
College Degree	12.9	11.1-14.8	8.5	7.0-10.0
<b>Income</b>				
<\$15,000	19.7	16.2-23.2	15.6	12.4-18.8
\$15,000-24,999	16.2	13.0-19.4	8.9	7.0-10.9
\$25,000-34,999	10.9	8.0-13.7	6.6	4.3-9.0
\$35,000-49,999	11.0	8.3-13.8	6.5	4.7-8.3
\$50,000+	11.9	10.3-13.5	7.5	6.2-8.9

\*: NH: Non Hispanic.

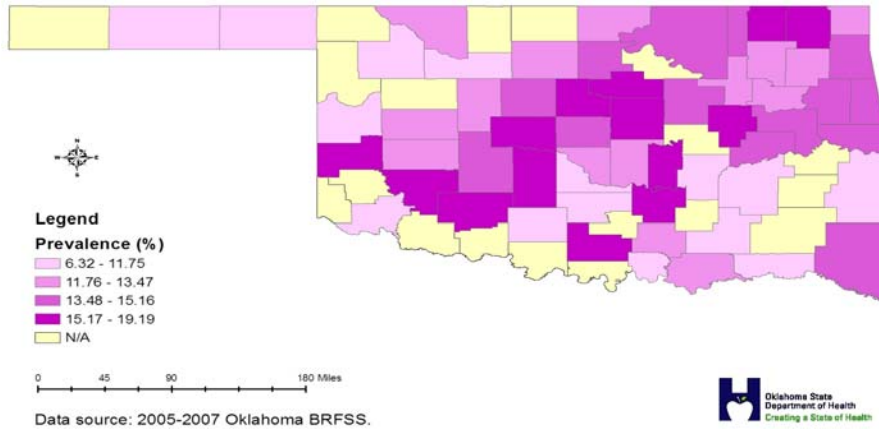
Among those adults that have ever been diagnosed with asthma in their lifetime, 37.7% of them were diagnosed prior to the age of 11 years old (Figure 6).

**Figure 6. Age Diagnosed of Asthma Among Adults Ever Diagnosed with Asthma: Oklahoma BRFSS 2006-2007**



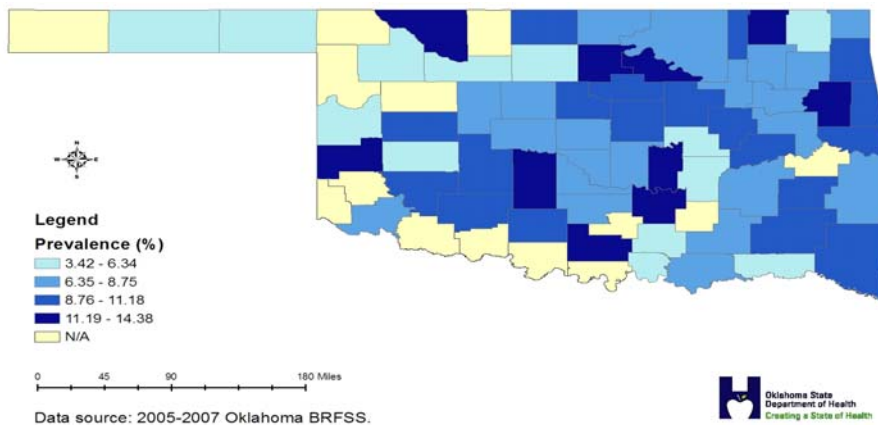
Prevalence of lifetime asthma among adults in Oklahoma were higher in some counties. Those counties on the belt from northeastern to southwestern Oklahoma along I-44 tend to have slightly higher prevalence of lifetime asthma (Figure 7, Table 2).

**Figure 7. Prevalence of Lifetime Asthma among Adults by County, Oklahoma BRFSS 2005-2007**



Prevalence of current asthma among adults in Oklahoma is higher in south central Oklahoma. The northwestern panhandle area has lower prevalence of current asthma (Figure 8, Table 2).

**Figure 8. Prevalence of Current Asthma among Adults by County, Oklahoma BRFSS 2005-2007**



**Table 2. Prevalence of Current Asthma among Adults by County, Oklahoma BRFSS 2005-2007\***

County	Prevalence of current asthma (%)	Prevalence of lifetime asthma (%)	County	Prevalence of current asthma (%)	Prevalence of lifetime asthma (%)
Adair	10.3	14.3	Le Flore	7.7	10.7
Alfalfa	N/A	N/A	Lincoln	11.2	16.4
Atoka	6.9	7.9	Logan	11.2	17.1
Beaver	4.3	9.0	Love	N/A	N/A
Beckham	12.5	15.4	McClain	8.5	11.0
Blaine	8.6	12.1	McCurtain	10.0	15.0
Bryan	7.5	12.9	McIntosh	9.7	13.6
Caddo	9.4	14.1	Major	5.8	9.8
Canadian	8.2	15.6	Marshall	6.0	7.1
Carter	12.6	16.4	Mayes	7.6	13.3
Cherokee	11.6	14.4	Murray	N/A	N/A
Choctaw	4.0	6.3	Muskogee	8.5	13.9
Cimarron	N/A	N/A	Noble	12.8	14.4
Cleveland	8.0	12.3	Nowata	14.4	18.2
Coal	N/A	N/A	Okfuskee	6.0	N/A
Comanche	10.2	15.9	Oklahoma	8.8	14.0
Cotton	N/A	N/A	Okmulgee	10.4	18.3
Craig	6.3	15.3	Osage	6.8	14.1
Creek	9.2	15.2	Ottawa	7.6	13.5
Custer	9.7	13.0	Pawnee	11.7	N/A
Delaware	9.5	13.7	Payne	10.9	17.3
Dewey	N/A	N/A	Pittsburg	7.7	10.8
Ellis	N/A	N/A	Pontotoc	13.2	16.1
Garfield	6.1	11.9	Pottawatomie	8.2	13.0
Garvin	8.1	11.8	Pushmataha	9.7	N/A
Grady	11.6	19.2	Roger Mills	4.6	7.9
Grant	10.7	N/A	Rogers	7.8	12.1
Greer	N/A	N/A	Seminole	14.4	17.4
Harmon	N/A	N/A	Sequoyah	10.0	14.2
Harper	N/A	N/A	Stephens	9.0	10.9
Haskell	N/A	N/A	Texas	4.6	8.2
Hughes	3.4	7.1	Tillman	N/A	N/A
Jackson	7.0	9.1	Tulsa	7.2	11.9
Jefferson	N/A	N/A	Wagoner	8.0	13.0
Johnston	4.7	12.3	Washington	9.4	14.0
Kay	8.3	13.3	Washita	4.6	12.1
Kingfisher	7.4	14.2	Woods	13.3	13.3
Kiowa	9.6	16.1	Woodward	5.9	8.0
Latimer	9.9	N/A			

Prevalence is not available if respondents <50 in the county or the half of the 95% Confidence Interval >10 to ensure the stable results.

## SEVERITY OF ASTHMA IN ADULTS

According to the guideline from The National Asthma Education and Prevention Program (NAEPP), classification of asthma severity includes severe persistent, moderate persistent, mild persistent, and mild intermittent. An individual should be assigned to the most severe grade in which any feature occurs. The characteristics noted in the guideline are general and may overlap because asthma is highly variable. Furthermore, an individual's classification may change over time.

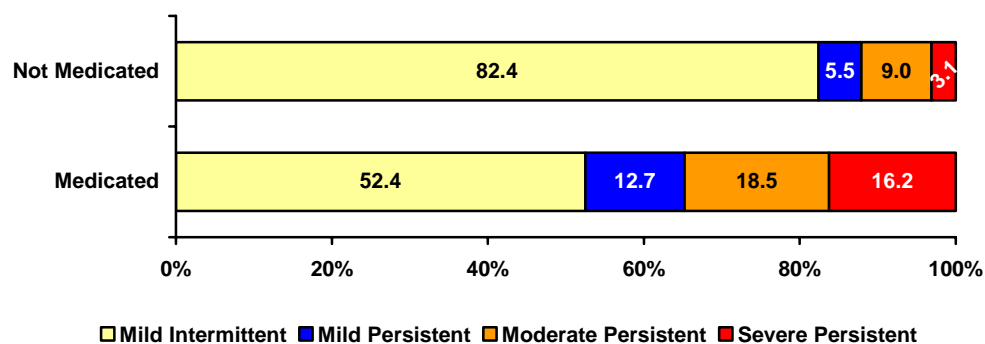
Because the physical examination and pulmonary function testing are not available, using the BRFSS data to assess the severity of asthma could only be based on reported symptoms, sleep disturbances, activity limitations, ER visits, urgent care visits, and medication usages (see following table).

### Asthma Severity Classification Based on BRFSS Data

Simple Method	Detailed Method
Symptoms in past 30 days	Symptoms in past 30 days
Sleep disturbance in past 30 days	Sleep disturbance in past 30 days
	ER visits in past year
	Urgent care visits in past year
	Activity limitation days in past year

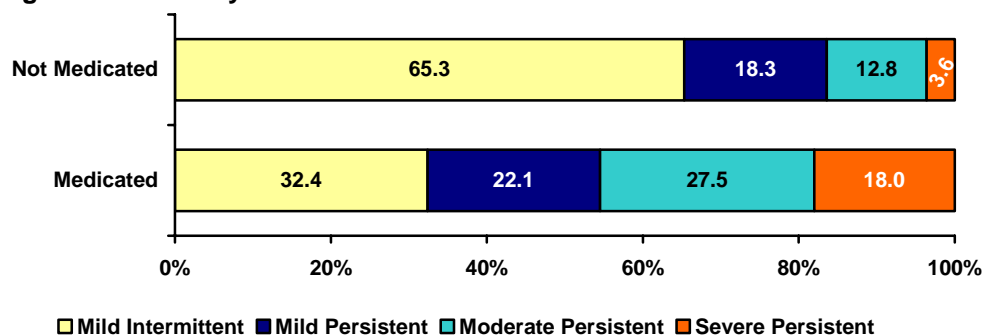
With the classification by two questions in BRFSS concerning the symptoms in past 30 days and the sleep disturbance in past 30 days (**simple method**), among adults with current asthma and reported taking medications, half of them had mild intermittent asthma, 12.7% had mild persistent asthma, 18.5% had moderate persistent asthma, and 16.2% had severe persistent asthma (Figure 9). While the majority (82.4%) of adults with current asthma but not taking medication for treatment reported mild intermittent asthma, there were more than 10% of them had either moderate or severe persistent asthma (Figure 9).

**Figure 9. Severity of Adult Current Asthma: Simple Method Oklahoma BRFSS 2006-2007**



Considering ER and urgent care visits and activity limitations in the asthma severity classification (**detailed method**), proportions of mild intermittent asthma decreased while proportions of those in other classes (higher steps of classifications) increased among adults with current asthma, no matter whether they were taking medication or not (Figure 10). Among adults with current asthma but not taking medications for treatment, more than 15% of them had either moderate or severe persistent asthma.

**Figure 10. Severity of Adult Current Asthma: Detailed Method Oklahoma BRFSS 2006-2007**

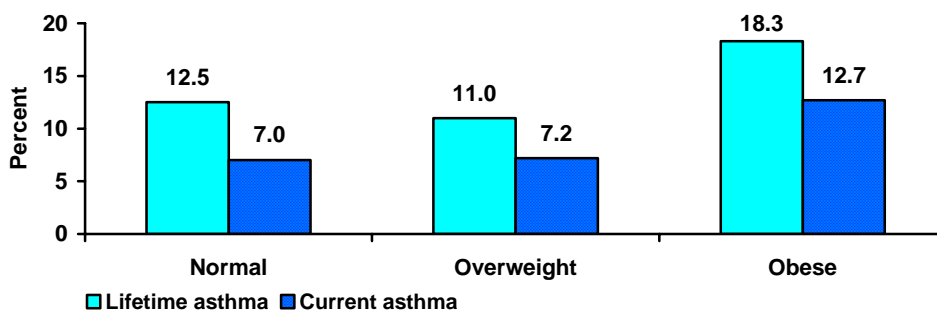


## RISK BEHAVIORS FOR ASTHMA

### Overweight and Obese

For adults, overweight and obesity ranges are determined by using weight and height to calculate a number called the “body mass index” (BMI, see Glossary of Terms for details). The results from 2007 BRFSS data indicated that adults who were obese (BMI  $\geq 30$ ) reported significantly higher prevalence of lifetime and current asthma than those who were normal (BMI  $< 25$ ) or overweight ( $25 \leq \text{BMI} < 30$ ) (Figure 11, Table 3). Since BRFSS could only obtain cross-sectional data, these results could not identify if obesity or asthma came first.

**Figure 11. Prevalence of Lifetime and Current Asthma by BMI Category: Oklahoma BRFSS 2007**



**Table 3. Prevalence of Asthma Among Adult Oklahomans by BMI and Smoking Status: Oklahoma BRFSS 2007**

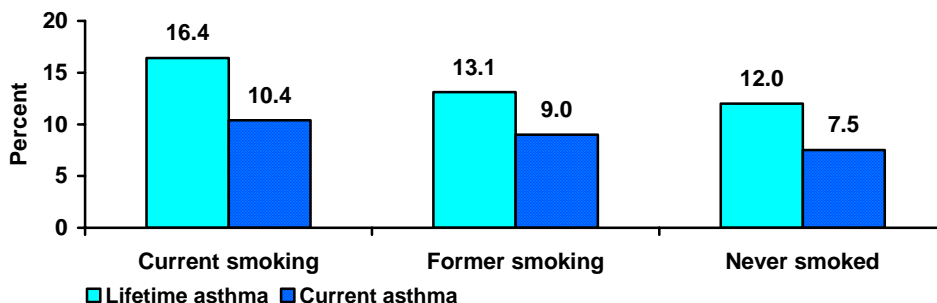
	Lifetime Asthma		Current Asthma	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	13.3	12.3-14.3	8.5	7.7-9.3
<b>BMI</b>				
<25	12.5	10.5-14.6	7.0	5.7-8.3
25-29.9	11.0	9.5-12.5	7.2	5.9-8.5
30+	18.3	16.1-20.5	12.7	10.9-14.6
<b>Smoking Status</b>				
Current	16.4	13.9-18.9	10.4	8.5-12.3
Former	13.1	11.3-14.9	9.0	7.5-10.5
Never	12.0	10.6-13.5	7.5	6.4-8.6

## Tobacco Smoking

There is sufficient evidence to conclude that exposure to tobacco smoke increases asthma symptoms and attacks both for smokers and for non-smokers. Tobacco smoke is an exceptionally aggravating trigger that can worsen asthma symptoms. People with asthma have very sensitive airways. Breathing in cigarette smoke, a powerful trigger, is especially difficult for them, and can often bring on an asthma attack. For smokers with asthma, the symptoms are usually difficult to control.

Oklahoma adults who are current or former smokers are more likely to report higher prevalence of lifetime and current asthma, compared to those who have never smoked (Figure 12).

**Figure 12. Prevalence of Lifetime and Current Asthma by Smoking Status: Oklahoma BRFSS 2007**



Oklahoma 2007 BRFSS data indicated prevalence of smoking among adults with current asthma was slightly higher than that among general adult Oklahomans. As many as 31.3% of Oklahoma adults with current asthma reported they were currently smoking, compared with 25.8% in general adult population ( $p>0.05$ ). Another 24.3% of Oklahoma adults with current asthma said they were former smokers (data not shown).

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# ASTHMA IN OKLAHOMA CHILDREN

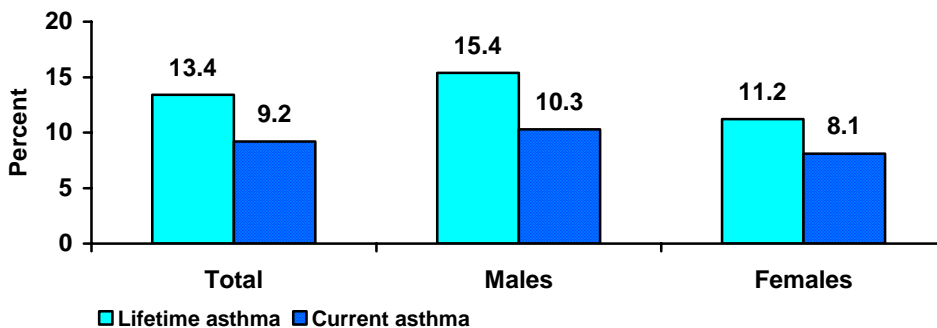
There are several different data sources available to estimate prevalence of childhood asthma. Data from the National Survey of Children’s Health (NSCH) provided the opportunity to estimate the indicators of physical and emotional health of children ages 0-17 years of age; the respondents of Youth Risk Behavior Survey (YRBS) are those adolescents in grade 9<sup>th</sup> –12<sup>th</sup>; and Youth Tobacco Survey (YTS) is a school-based survey of 6<sup>th</sup> –12<sup>th</sup> graders statewide. Because of the survey methods, sample populations are different from each other, therefore, results from one survey should only be considered to represent the correspondent population and may not be used to compare with others. Details about each survey could be found in Data Sources and Methods.

## DATA FROM NATIONAL SURVEY OF CHILDREN’S HEALTH

### Prevalence

Data from National Survey of Children’s Health (2003) provided the prevalence of asthma among children younger than 18 years of age. In Oklahoma, 13.4% of children younger than 18 years of age (116,800 children) have ever been told by a health professional that he/she had asthma (lifetime asthma). And 9.2% of children under age 18 years old (80,200 children) had current asthma (Figure 13).

**Figure 13. Prevalence of Lifetime and Current Asthma for Children <18 Years Old in Oklahoma NSCH Data**



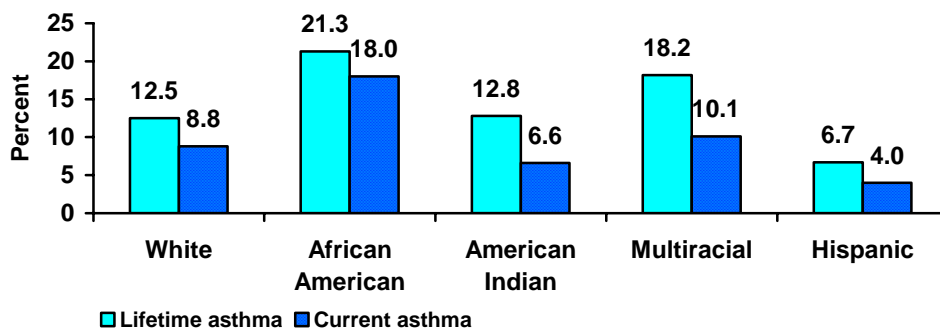
Date source: NCHS, CDC. State and Local Area Integrated Telephone Survey, National Survey of Children’s Health, 2003.

The prevalence of lifetime and current asthma in Oklahoma is a slightly higher than the nationwide prevalence (12.5% and 8.9%, respectfully,  $p>0.05$ , Table 4,5). Unlike adults, boys tended to have higher prevalence of lifetime and current asthma than girls did. While there is no statistical significance between boys and girls in Oklahoma, The nationwide data indicated that boys had significantly higher prevalence of lifetime and current asthma than girls (Table 4,5).

In Oklahoma, Hispanic children had significantly lower prevalence for both lifetime and current asthma ( $p<0.05$ ). African American and Multiracial children tended to have a higher prevalence of lifetime and current asthma than White children ( $p>0.05$ , Figure 14).

Nationwide, prevalence for both lifetime and current asthma were lower among Hispanic children, but not significantly different from other racial/ethnic groups. African American and multiracial children reported significantly higher prevalence of lifetime and current asthma than White children (Table 4,5)

**Figure 14. Prevalence of Lifetime and Current Asthma for Children <18 Years Old by Race/ethnicity in Oklahoma NSCH Data**

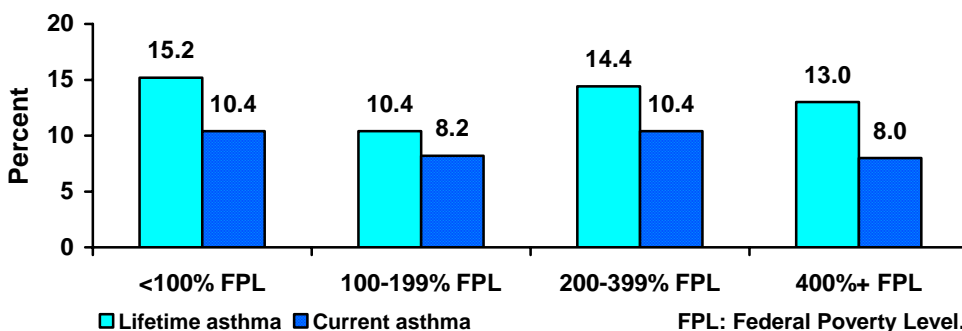


Date source: NCHS, CDC. State and Local Area Integrated Telephone Survey, National Survey of Children’s Health, 2003.

In Oklahoma, children 6-11 years old reported slightly higher prevalence of both lifetime and current asthma than children in other age groups ( $p>0.05$ ). While nationwide, the prevalence increased with age and the 0-5 years old group reported significantly lower prevalence (Table 4,5).

While nationwide data indicated that prevalence of both lifetime and current asthma decreased among children with higher household income ( $p<0.05$ , Table 4,5), the relationship between childhood asthma prevalence and household incomes in Oklahoma was not clear (Figure 15). This might be because of the small sample size in subgroups.

**Figure 15. Prevalence of Lifetime and Current Asthma for Children <18 Years Old by Household Income in Oklahoma NSCH Data**



Date source: NCHS, CDC. State and Local Area Integrated Telephone Survey, National Survey of Children’s Health, 2003.

**Table 4. Prevalence of Childhood Lifetime Asthma in Oklahoma (Data from NSCH 2003)**

	Oklahoma		Nationwide	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	13.4	11.6-15.2	12.5	12.1-12.8
<b>Gender</b>				
Males	15.4	12.7-18.2	14.6	14.0-15.1
Females	11.2	8.9-13.5	10.3	9.8-10.7
<b>Race/Ethnicity*</b>				
NH-White	12.5	10.3-14.6	11.5	11.1-11.9
NH-Black	21.3	13.1-29.4	18.0	16.7-19.3
NH-American Indian	12.8	6.7-18.9	15.0 †	11.0-19.0 †
NH-Multiracial	18.2	10.9-25.4	15.1	13.1-17.2
Hispanic	6.7	3.2-10.2	10.7	9.7-11.6
<b>Age (years)</b>				
0-5	10.2	7.1-13.3	8.9	8.3-9.5
6-11	16.2	12.7-19.6	13.6	12.9-14.2
12-17	13.8	10.9-16.7	14.8	14.2-15.4
<b>Income</b>				
<100% FPL**	15.2	10.3-20.1	14.3	13.2-15.4
100-199% FPL**	10.4	7.2-13.5	13.2	12.3-14.1
200-399% FPL**	14.4	11.4-17.4	12.4	11.8-13.0
400%+ FPL**	13.0	8.9-17.1	11.3	10.7-11.9

\*: NH: Non Hispanic. \*\*: FPL: Federal Poverty Level. †: Race classification for select states

**Table 5. Prevalence of Childhood Current Asthma in Oklahoma (Data from NSCH 2003)**

	Oklahoma		Nationwide	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	9.2	7.6-10.8	8.9	8.6-9.2
<b>Gender</b>				
Males	10.3	7.9-12.7	10.3	9.8-10.7
Females	8.1	6.1-10.1	7.4	7.0-7.9
<b>Race/Ethnicity*</b>				
NH-White	8.8	6.9-10.6	8.1	7.8-8.4
NH-Black	18.0	10.3-25.8	13.9	12.8-15.0
NH-American Indian	6.6	1.6-11.5	9.5 †	6.1-12.8 †
NH-Multiracial	10.1	4.2-16.0	12.2	10.2-14.1
Hispanic	4.0	1.4-6.6	7.1	6.3-7.9
<b>Age (years)</b>				
0-5	7.3	4.5-10.0	6.7	6.1-7.2
6-11	12.1	9.0-15.2	9.9	9.3-10.4
12-17	8.3	6.0-10.7	10.1	9.5-10.6
<b>Income</b>				
<100% FPL**	10.4	6.0-14.8	11.2	10.2-12.2
100-199% FPL**	8.2	5.3-11.1	9.5	8.7-10.3
200-399% FPL**	10.4	7.7-13.1	8.8	8.2-9.3
400%+ FPL**	8.0	4.6-11.4	7.6	7.1-8.1

\*: NH: Non Hispanic. \*\*: FPL: Federal Poverty Level. †: Race classification for select states

## Asthma attack

Among Oklahoma children younger than 18 years old that have ever been told they had asthma, 51.5% experienced an episode of asthma or asthma attack during the past 12 months (57.0% in girls, and 47.8% in boys,  $p > 0.05$ ).

On the other hand, among children with current asthma, 71.9% experienced episode of asthma or asthma attack during the past 12 months, significantly higher than that among adults (58.2%, BRFSS 2003-2004).

## Asthma hospitalization

Among Oklahoma children <18 years old that have ever been diagnosed with asthma, 3.9% stayed overnight in a hospital because of asthma during the past 12 months.

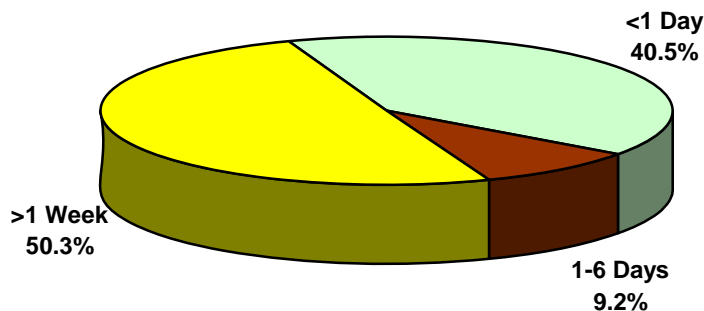
For those children with current asthma, 5.1% reported that they had stayed overnight in a hospital because of asthma during the past 12 months.

For children having an asthma episode or attack, 6.4% had to stay overnight in a hospital.

## Medication for asthma

For the question “How long has it been since last took asthma medication”, 40.5% of children with current asthma took asthma medication within 24 hours. Another 50.3% of children with current asthma took asthma medication more than a week ago (Figure 16).

**Figure 16. Asthma Medication Usage for Children <18 Years Old with Current Asthma in Oklahoma, NSCH 2003 Data**



Date source: NCHS, CDC. State and Local Area Integrated Telephone Survey, National Survey of Children’s Health, 2003.

For families having children with current asthma, 32.8% indicated the health difficulty caused by asthma was moderate; another 2.4% indicated the difficulty is severe. Meanwhile, 16.8% of the families having children with current asthma reported that the asthma put a medium amount or great deal of burden on the family.

# DATA FROM OKLAHOMA YOUTH RISK BEHAVIOR SURVEY (YRBS)

The YRBS was developed in 1990 to monitor priority health risk behaviors that contribute markedly to the leading causes of death, disability, and social problems among youth and adults in the United States. These behaviors, often established during childhood and early adolescence, include tobacco use, unhealthy dietary behaviors, inadequate physical activity, alcohol and other drug use, sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection, and behaviors that contribute to unintentional injuries and violence.

The CDC random sample YRBS is usually administered to selected schools and classrooms during a given class period. Often, the self-selected YRBS is administered to the entire school population, which requires advance coordination so that all students are given the survey on the same day and preferably at the same time.

The CDC random sample YRBS is often administered by the staff of the Oklahoma State Department of Health, Maternal and Child Health Service, Child and Adolescent Health Division and local County Health Department. The County Health Department personnel may administer the self-selected YRBS, or if the school population is large, school staff may administer the survey. Mandatory training will be provided to all staff, including school staff involved with administering the YRBS at their site. The way in which both the CDC random sample and self-selected survey is presented can make a tremendous difference in the validity and reliability of the data collected. Any bias (intentional or unintentional) introduced during YRBS preparation or administration can affect how students respond to the survey. To ensure both survey results are as valid and as reliable as possible, all survey administrators are given specific guidelines about the survey atmosphere, confidentiality procedures and safeguards, and recommendations about how to handle student questions during the YRBS.

The 2007 YRBS collected asthma information based on the following questions, "Has a doctor or nurse ever told you that you have asthma?" and "Do you still have asthma?"

Students who had ever been told by a doctor or nurse that they had asthma were considered having lifetime asthma. Students who have ever been told by a doctor or nurse that they had asthma and still have asthma were considered having current asthma.

Overall, 20.0% students in Oklahoma reported that they have ever been told by a health professional that they had asthma (lifetime asthma). Males reported a similar prevalence with females (Figure 17, Table 6).

**Table 6. Prevalence of Lifetime Asthma Among Students, Oklahoma and US (YRBS 2007 Data)**

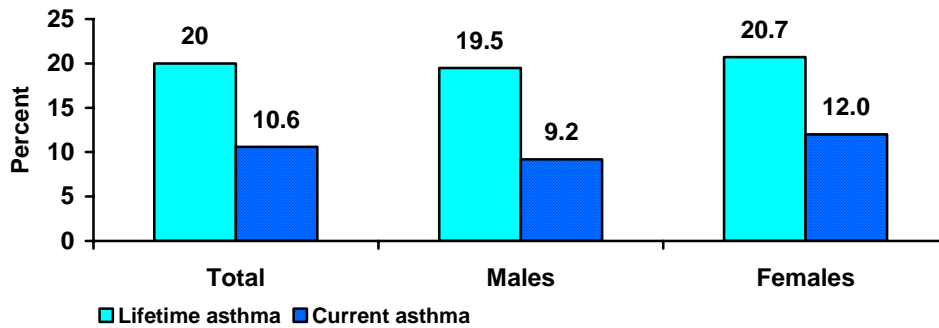
	Oklahoma		Nationwide	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	20.0	18.3-21.9	20.3	19.2-21.4
<b>Gender</b>				
Male	19.5	16.4-23.0	19.9	18.6-21.3
Female	20.7	18.5-23.0	20.7	19.2-22.2
<b>Race</b>				
White	19.9	17.9-22.0	19.6	18.4-20.9
African American	21.4	14.4-30.6	24.0	21.6-26.5
Hispanic	15.3	11.0-20.9	18.5	16.0-21.2
Other	21.4	17.7-25.7	21.1	18.1-24.5
<b>Grade</b>				
9 <sup>th</sup>	22.9	19.9-26.2	19.8	18.3-21.5
10 <sup>th</sup>	19.5	16.3-23.0	20.9	19.0-23.0
11 <sup>th</sup>	17.4	13.0-22.9	20.9	19.3-22.6
12 <sup>th</sup>	19.9	16.1-24.3	19.2	17.0-21.6

About 10.6% of all Oklahoma students reported that they currently have asthma (Figure 17, Table 7). Males reported slightly lower prevalence than females ( $p>0.05$ ).

**Table 7. Prevalence of Current Asthma Among Students, Oklahoma and US (YRBS 2007 Data)**

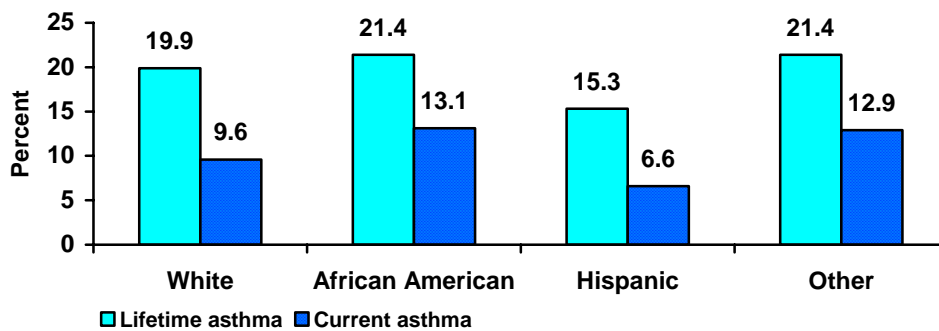
	Oklahoma		Nationwide	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	10.6	9.0-12.3	10.9	10.1-11.9
<b>Gender</b>				
Male	9.2	7.3-11.5	9.3	8.4-10.3
Female	12.0	9.8-14.6	12.5	11.3-13.8
<b>Race</b>				
White	9.6	7.8-11.9	10.5	9.4-11.8
African American	13.1	7.1-22.7	14.7	12.8-16.8
Hispanic	6.6	3.9-11.0	9.5	8.0-11.4
Other	12.9	9.8-16.9	9.7	7.4-12.5
<b>Grade</b>				
9 <sup>th</sup>	13.9	10.6-18.1	11.8	10.5-13.3
10 <sup>th</sup>	10.9	8.1-14.5	11.4	9.8-13.2
11 <sup>th</sup>	8.3	5.5-12.4	10.4	9.3-11.7
12 <sup>th</sup>	8.3	6.1-11.1	9.7	8.1-11.6

**Figure 17. Prevalence of Lifetime and Current Asthma by Gender: Oklahoma YRBS 2007**



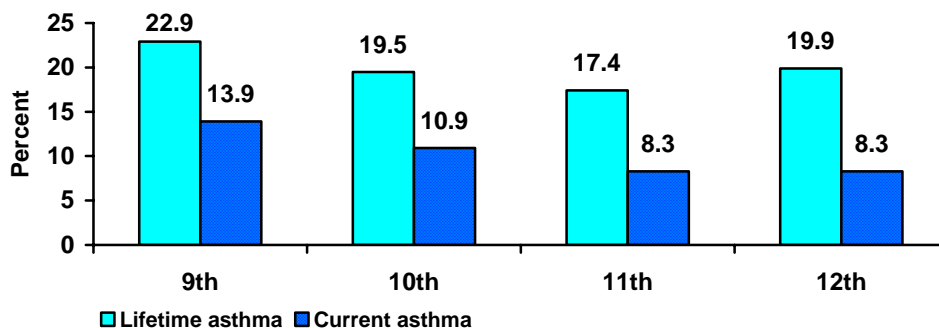
African American students and students of “Other” races reported slightly (not significantly) higher prevalence of lifetime asthma than White and Hispanic students (Figure 18, Table 6). Like lifetime asthma, African American students and students of “Other” races reported slightly (not significantly) higher prevalence of current asthma than the other two groups (Table 7).

**Figure 18. Prevalence of Lifetime and Current Asthma by Race/ethnicity: Oklahoma YRBS 2007**



Oklahoma students in the 11<sup>th</sup> and 12<sup>th</sup> grade reported slightly lower prevalence of current asthma, compared with those in the 9<sup>th</sup> and 10<sup>th</sup> graders ( $p > 0.05$ , Figure 19).

**Figure 19. Prevalence of Lifetime and Current Asthma by Grades: Oklahoma YRBS 2007**



## DATA FROM OKLAHOMA YOUTH TOBACCO SURVEY (YTS)

Oklahoma is one of the states that participate in the Youth Tobacco Survey (YTS), a comprehensive tobacco survey administered to a sample of middle and high school students. The 2007 YTS data was collected among 3,498 students from 55 middle schools and 3,008 students from 48 high schools. The data has been adjusted to the population of Oklahoma middle school and high school students.

### Asthma among middle school students in YTS

In Oklahoma, 22.4% of middle school students reported that they have ever been diagnosed with asthma by health professionals, and 13.3% reported currently having asthma (Figure 20, Table 8).

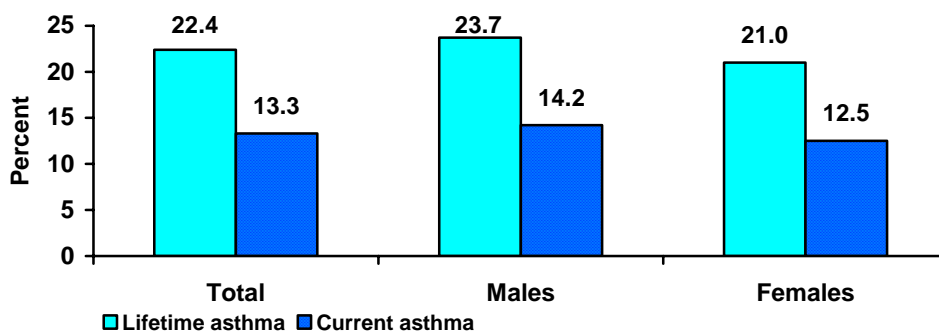
**Table 8. Prevalence of Lifetime and Current Asthma Among Oklahoma Middle School Students (Oklahoma Youth Tobacco Survey 2007)**

	Lifetime Asthma		Current Asthma	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	22.4	21.0-23.8	13.3	12.2-14.4
<b>Gender</b>				
Male	23.7	21.3-26.1	14.2	12.3-16.1
Female	21.0	18.7-23.3	12.5	10.9-14.1
<b>Grade</b>				
6 <sup>th</sup>	24.8	21.4-28.2	13.8	12.0-15.6
7 <sup>th</sup>	20.1	18.2-22.0	11.9	10.3-13.5
8 <sup>th</sup>	22.6	20.3-24.9	14.7	12.5-16.9
<b>Race/Ethnicity</b>				
White	21.8	20.0-23.6	12.7	11.5-13.9
African American	29.7	24.1-35.3	21.5	16.9-26.1
Hispanic	19.7	14.6-24.8	11.9	7.6-16.2
Other	21.4	17.8-25.0	11.8	8.6-15.0

Source: 2007 Oklahoma Youth Tobacco Survey

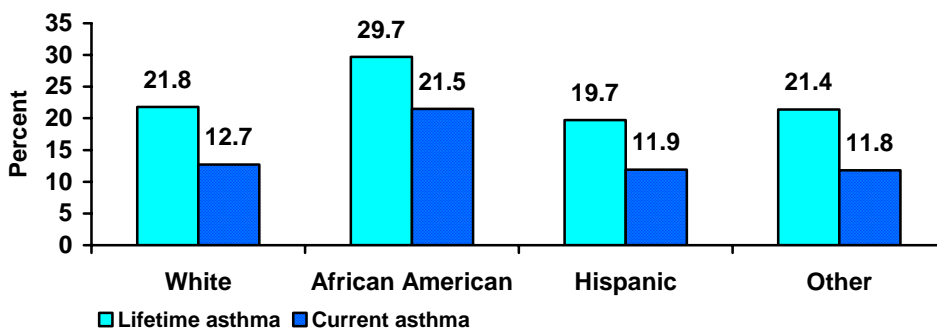
Slightly more males reported ever having and currently having asthma than females without statistical significant difference (Figure 20, Table 8).

**Figure 20. Prevalence of Lifetime and Current Asthma in Middle School Students by Gender: Oklahoma YTS 2007**



Without statistical significance, African American middle school students reported lower percentages of lifetime asthma and students in the “Other” racial/ethnic group reported higher prevalence of current asthma (Figure 21, Table 8).

**Figure 21. Prevalence of Lifetime and Current Asthma in Middle School Students by Race/ethnicity: Oklahoma YTS 2007**



## Asthma among high school students in YTS

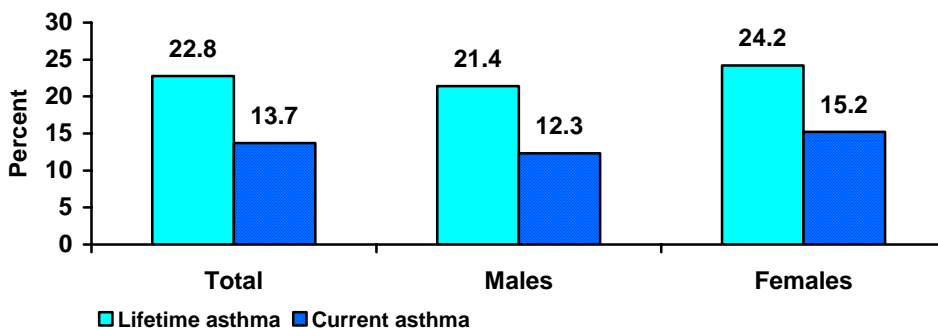
Approximately 22.8% of high school students reported ever been diagnosed with asthma and about 13.7% reported currently having asthma. Similar to middle school students, there was no statistically significant difference in lifetime and current asthma by gender, although female students tend to report slightly higher prevalence of asthma (Table 9, Figure 22).

**Table 9. Prevalence of Lifetime and Current Asthma Among Oklahoma High School Students (Oklahoma Youth Tobacco Survey 2007)**

	Lifetime Asthma		Current Asthma	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	22.8	21.0-24.6	13.7	12.3-15.1
<b>Gender</b>				
Male	21.4	19.0-23.8	12.3	10.5-14.1
Female	24.2	21.4-27.0	15.2	13.2-17.2
<b>Grade</b>				
9 <sup>th</sup>	23.2	20.5-25.9	13.9	11.3-16.5
10 <sup>th</sup>	21.6	18.5-24.7	14.5	11.2-17.8
11 <sup>th</sup>	20.7	17.9-23.5	11.8	9.5-14.1
12 <sup>th</sup>	24.5	19.7-29.3	14.4	11.1-17.7
<b>Race</b>				
White	21.2	19.0-23.4	13.3	11.3-15.3
African American	28.4	23.3-33.5	15.2	10.9-19.5
Hispanic	21.3	15.4-27.2	13.9	9.1-18.7
Other	25.2	21.3-29.1	14.2	10.9-17.5

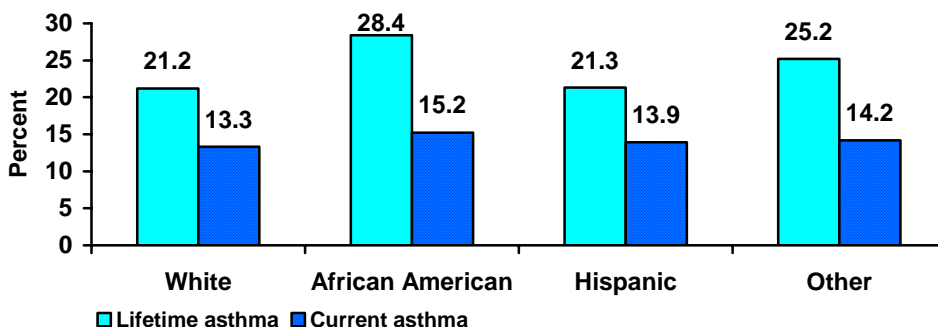
Source: 2007 Oklahoma Youth Tobacco Survey

**Figure 22. Prevalence of Lifetime and Current Asthma in High School Students in Oklahoma, by Gender, YTS 2007**



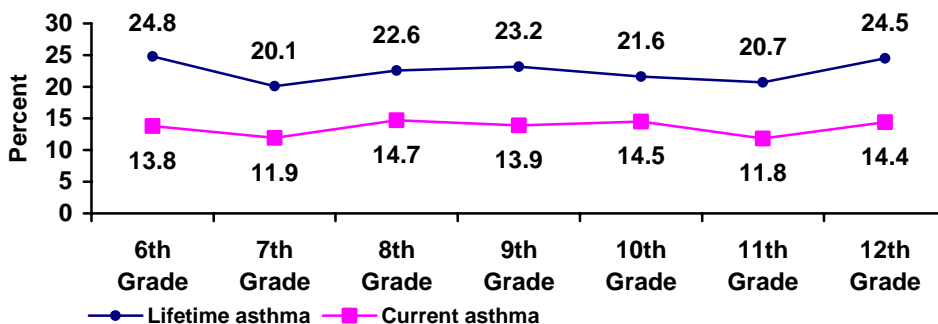
African American high school students in Oklahoma reported significantly higher prevalence of current asthma than White. For lifetime asthma, African American high school students reported a higher (but not significantly) prevalence than White (Figure 23, Table 9).

**Figure 23. Prevalence of Lifetime and Current Asthma in High School Students in Oklahoma, by Race/ethnicity, YTS 2007**



Prevalence of lifetime and current asthma by grade indicated that students in 12th grade reported lower prevalence than those in 6<sup>th</sup> grade ( $p > 0.05$ , Figure 24, Table 8,9).

**Figure 24. Prevalence of Lifetime and Current Asthma in Oklahoma, by Grade, YTS 2007**



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# HEALTH CARE UTILIZATIONS FOR ASTHMA IN OKLAHOMA

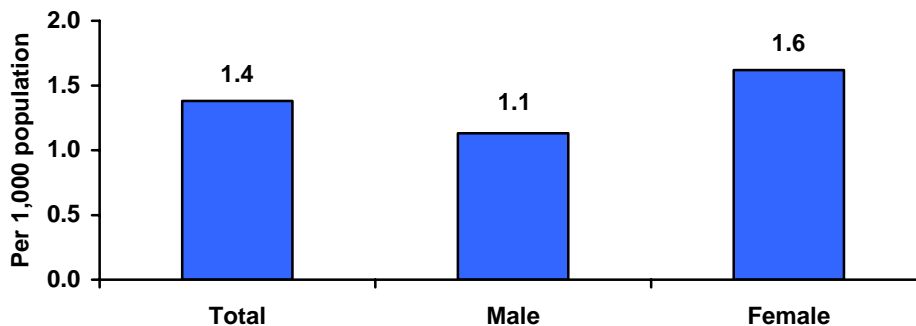
This section will highlight asthma-related healthcare utilization, including hospitalization due to asthma (Oklahoma inpatient hospital discharges data), medication use (BRFSS data and NCHS data), emergency room and/or urgent care visit, routine physician office visits, and preventive interventions, such as influenza vaccinations (BRFSS data).

## HOSPITALIZED PATIENTS WITH ASTHMA AS THE PRIMARY DIAGNOSIS

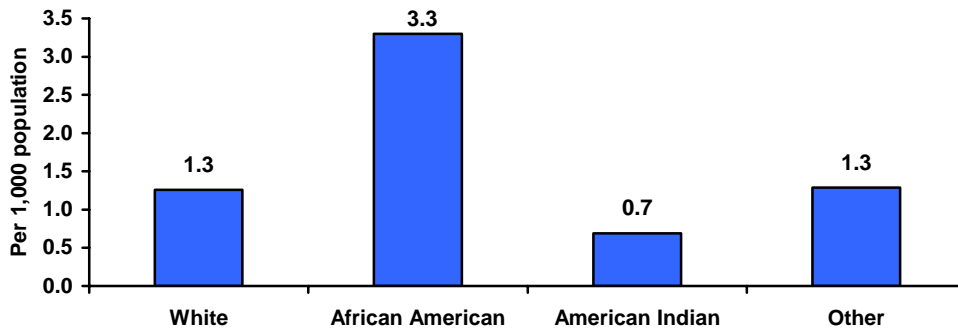
In the calendar year 2007, there were 4,983 hospital admissions in Oklahoma with asthma as the primary diagnosis, accounted for about one percent of all the hospital admissions. Females and males had similar proportions of admitted to hospital with asthma as the primary diagnosis among all hospitalizations. Race-specific results indicated that 2.3% of hospital admissions in African Americans had asthma as the primary diagnosis, significantly higher than the proportions in other racial groups ( $p < 0.05$ ).

The overall hospitalization rate for asthma was 1.4 per 1,000 people. Females had higher hospitalization rate than males (Figure 25). The hospitalization rates for African Americans were much higher than other racial groups (Figure 26).

**Figure 25. Oklahoma Hospitalization Rate with Asthma as the Principal Diagnosis by Gender 2007**

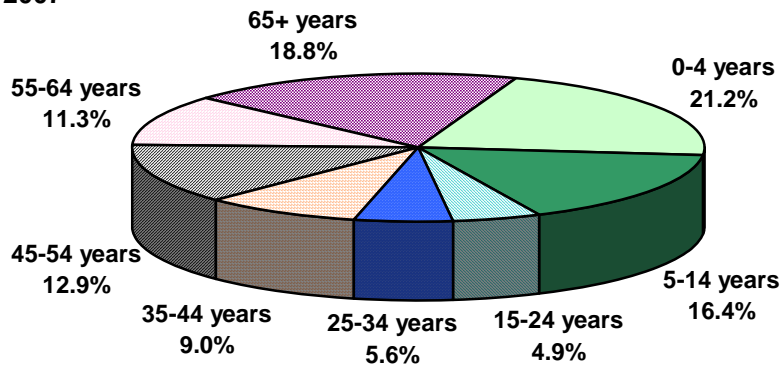


**Figure 26. Oklahoma Hospitalization Rate with Asthma as the Principal Diagnosis by Race, 2007**



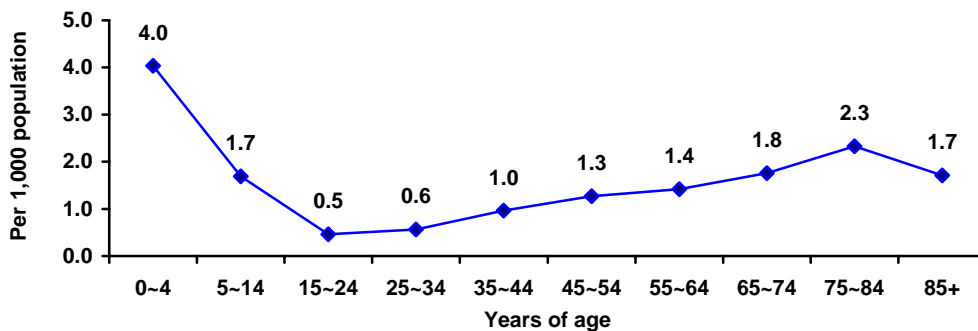
Children and adolescents (<15 years old) accounted for about 37% of admissions due to asthma. Children younger than 5 years accounted for 21.2% of the admissions, and those 5-14 years old accounted for another 16.4%. Seniors are also at higher risk of asthma hospitalization. About 18.8% of admissions with asthma as the primary diagnosis were among persons 65 years and over.

**Figure 27. Proportions of Oklahoma Hospitalization with Asthma as the Principal Diagnosis by Age, 2007**



The hospitalization rate was the highest among those 0-4 years old, then decreased to the overall lowest at 15-24 years old, and then increased with age (Figure 28).

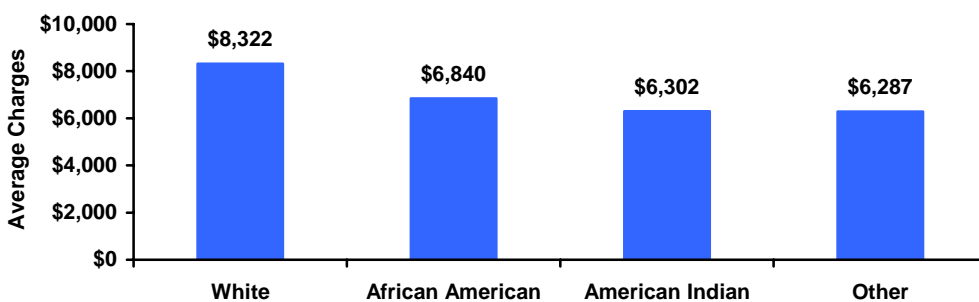
**Figure 28. Hospitalization Rate with Asthma as the Principal Diagnosis in Oklahoma, by Age, 2007**



In 2007, the total charges for hospital admissions with asthma as principle diagnosis were approximately \$57.9 million, which is an increase from \$48.8 million in 2005. Females accounted for 67.7% of the total charges. There were more charges among those patients aged 65 years and over.

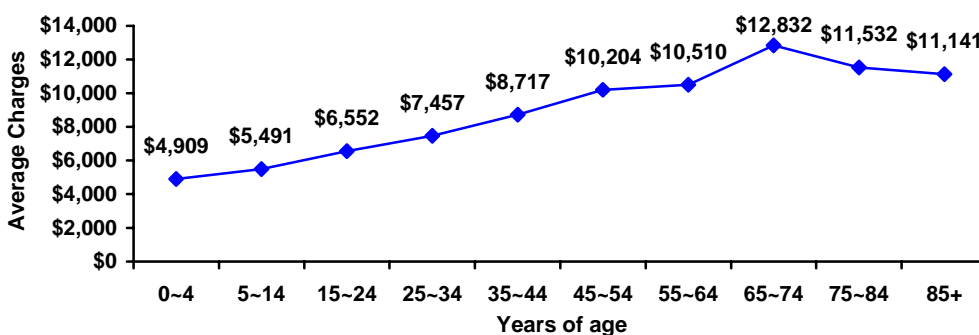
The average charge of hospital admissions with asthma as principle diagnosis was \$7,783. Females had a higher average of charges than males (\$8,926 vs. \$6,418, respectively,  $p < 0.05$ ). The average charge was slightly higher among White than that among minority groups (Figure 29).

**Figure 29. Average Charges of Hospitalization with Asthma as the Principal Diagnosis by Race, Oklahoma 2007**



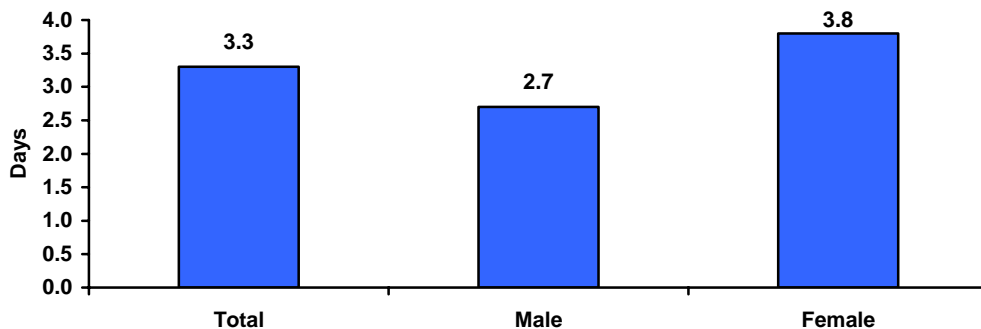
The average charge increased with patients' age (Figure 30). Although only about one in every five (18.8%) hospital admissions with asthma as principle diagnosis was a person 65 years and over, the total charges accounted for 27.2%.

**Figure 30. Average Charges of Hospitalization with Asthma as the Principal Diagnosis by Age, Oklahoma 2007**

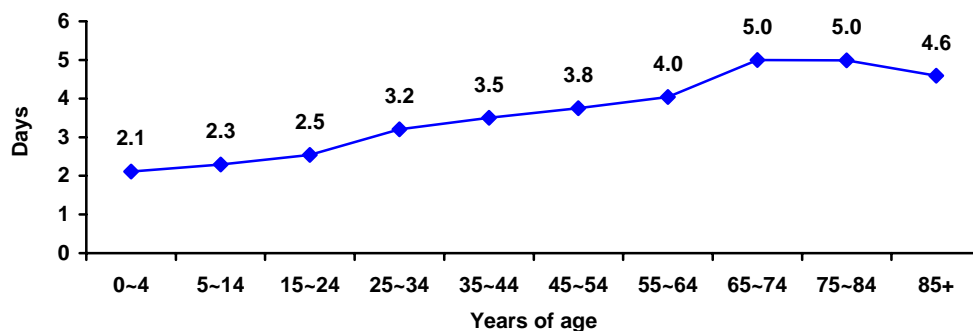


The total length of stay for asthma hospitalizations was 16,487 days in 2007, with an average of 3.3 days. Females stayed in the hospital due to asthma longer than males ( $p < 0.05$ , Figure 31). There was no racial difference for patients to stay in the hospital because of asthma. The average length of stay increased with age (Figure 32).

**Figure 31. Average Length of Stay for Oklahoma Hospitalizations with Asthma as the Principal Diagnosis, by Gender, 2007**



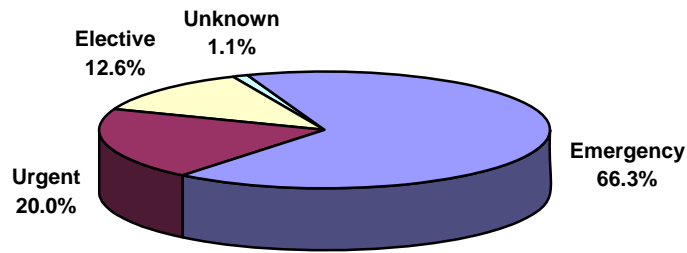
**Figure 32. Average Length of Stay for Oklahoma Hospitalizations with Asthma as the Principal Diagnosis by Age, 2007**



Among patients hospitalized with asthma as the principle diagnosis:

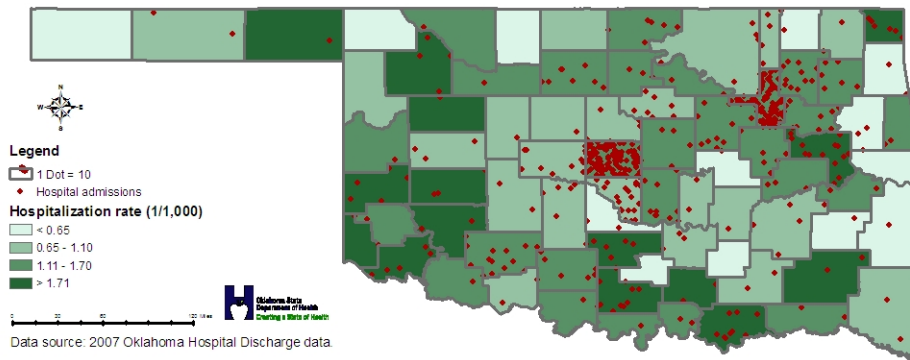
- About two in every three hospitalizations with asthma as the principle diagnosis were admitted from the emergency room (Figure 33).
- 88.6% were discharged to home or self-care, and another 8.9% were discharged to home under care of organized home health service organization.
- The most common secondary diagnoses were diseases of the respiratory system (27.2%), followed by diseases of the circulatory system (16.5%).

**Figure 33. Oklahoma Hospital Admissions with Asthma as the Principal Diagnosis, Source and Type of Admissions, 2007**



Although most asthma hospital admission cases came from Oklahoma City and Tulsa counties, counties in southern and western Oklahoma had higher hospitalization rates (Figure 34).

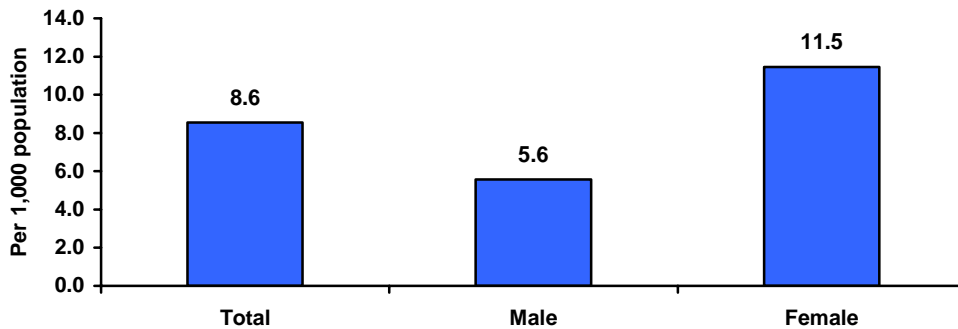
**Figure 34. Hospital Admissions with Asthma as the Principal Diagnosis, by County, 2007**



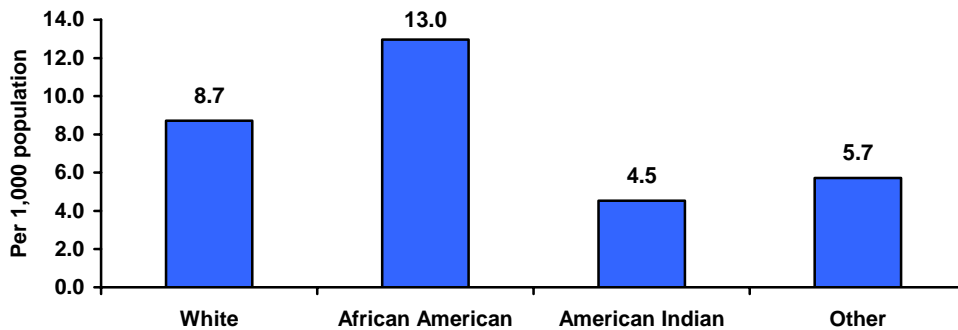
# HOSPITALIZED PATIENTS WITH ASTHMA AS ANY DIAGNOSIS

In 2007, there were 30,933 hospital admissions with asthma as any diagnosis. Females accounted for 67.8% of the admissions and doubled the hospitalization rate of males (Figure 35). Although White patients accounted for 79.9% of hospital admissions with asthma as any diagnosis, the hospitalization rate of African Americans was much higher (Figure 36).

**Figure 35. Oklahoma Hospitalization Rate with Asthma as the Any Diagnosis by Gender, 2007**

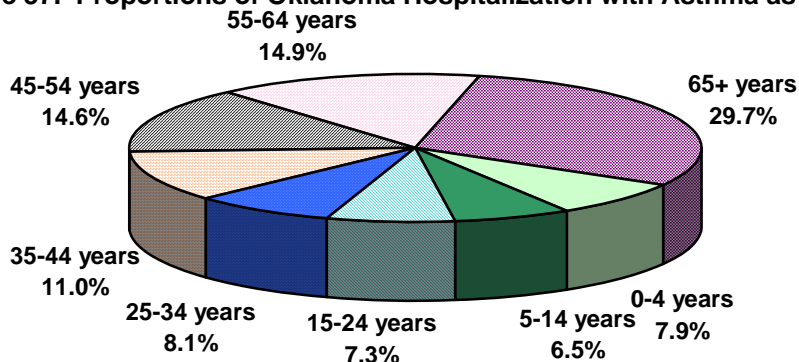


**Figure 36. Oklahoma Hospitalization Rate with Asthma as Any Diagnosis by Races, 2007**



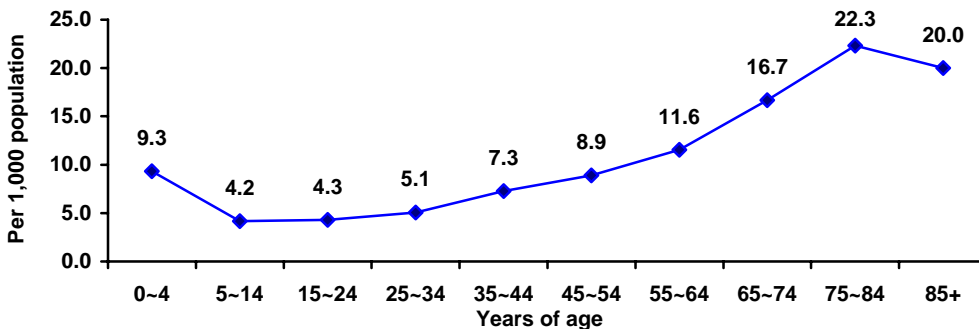
Hospitalizations with asthma as any diagnosis tend to be more frequent among adults. Patients younger than 15 years accounted for less than 15% of the admissions, while those patients 65 years and over accounted for 29.7% of all admissions (Figure 37).

**Figure 37. Proportions of Oklahoma Hospitalization with Asthma as Any Diagnosis by Age, 2007**



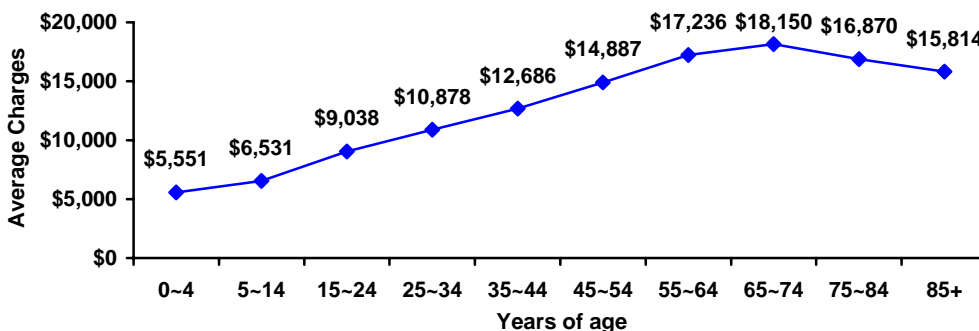
The age-specific hospitalization rate was higher in the 0-4 years old group than that in the 5-14 years old group, and then getting higher with age (Figure 38).

**Figure 38. Oklahoma Hospitalization Rate with Asthma as Any Diagnosis by Age, 2007**



The average charge for admissions with asthma as any diagnosis was about \$12,936. The average charge was higher in females than in males (\$13,461 vs. \$11,586, respectful). The average charges were similar among the racial groups and increased with age (Figure 39).

**Figure 39. Average Charges of Hospitalization with Asthma as Any Diagnosis by Age, Oklahoma 2007**



Among patients admitted to the hospitals with asthma as any diagnosis, 49.5% were admitted from the emergency room, 29.7% from physician referral with elective date, and 19.2% from urgent care. About 75.9% of these hospitalizations with asthma as any diagnosis were discharged to home or self-care, 17.0% were discharged to home under care of organized home health service organization.

The most common primary diagnoses for these hospitalizations were diseases of the respiratory system, and followed by diseases of the circulatory system.

# MEDICATIONS FOR ASTHMA

## Asthma medication usage among adults

About adults with current asthma, taking medication to control their asthma has been reported evenly divided into three groups: About 38.4% of did not take any medicine for their asthma during past 30 days, another 34.6% took medication to control asthma about 25-30 days in a month; And the rest of the people were taking medicines in some days in the month (Table 10).

People with current asthma in order age groups (55 years and over) were more likely to take asthma medications 25-30 days in a month, compared with people younger than 35 years old ( $p < 0.05$ ). People with health coverage were more likely to take asthma medications 25-30 days in a month, compared with those without coverage ( $p < 0.05$ , Table 10).

**Table 10. Medication Usages Among Adult with Current Asthma: Oklahoma BRFSS 2006-2007\***

	1-14 days/month		15-24 days/month		25-30 days/month		No Medication	
	Percent	95% CI	Percent	95% CI	Percent	95% CI	Percent	95% CI
<b>Total</b>	23.0	19.7-26.2	2.9	1.9-4.0	34.6	31.4-37.8	38.4	34.9-41.9
<b>Gender</b>								
Males	25.4	18.6-32.2	1.8	0.4-3.2	31.4	25.5-37.3	40.9	34.0-47.7
Females	21.7	18.3-25.0	3.6	2.1-5.0	36.4	32.7-40.1	37.1	33.2-41.0
<b>Race/Ethnicity</b>								
White	21.2	17.4-24.9	2.8	1.5-4.1	34.4	30.8-38.1	40.6	36.5-44.7
African Americans	14.7	5.1-24.4	7.3	0.6-13.9	N/A	---	N/A	---
American Indians	N/A	---	N/A	---	N/A	---	N/A	---
Hispanic	N/A	---	N/A	---	N/A	---	N/A	---
<b>Age (years)</b>								
18-24	N/A	---	N/A	---	15.2	6.8-23.6	N/A	---
25-34	27.3	17.9-36.6	2.4	0-4.9	26.5	17.8-35.3	42.4	32.8-52.0
35-44	19.7	13.9-25.6	3.2	0.6-5.8	27.4	20.6-34.3	49.7	42.0-57.4
45-54	19.5	13.8-25.1	5.5	2.3-8.6	41.3	34.3-48.2	32.1	25.6-38.7
55-64	20.7	14.6-26.8	1.5	0.2-2.9	47.2	39.9-54.4	29.6	22.9-36.4
65+	15.3	10.0-20.5	2.5	0.6-4.4	47.3	41.1-53.6	32.9	27.3-38.4
<b>Education</b>								
<High School	N/A	---	1.3	0-2.9	31.4	24.0-38.8	40.9	32.5-49.4
High School	24.1	18.1-30.1	2.2	0.7-3.7	34.0	28.1-39.9	38.9	32.5-45.4
Some College	25.1	19.1-31.1	3.8	1.2-6.4	36.8	30.7-42.9	34.1	27.9-40.4
College Degree	18.8	12.5-25.2	4.1	1.7-6.5	35.0	28.5-41.5	41.1	34.0-48.2
<b>Income</b>								
<\$15,000	22.9	16.0-29.9	2.1	0.2-3.9	36.4	29.2-43.6	37.6	29.8-45.3
\$15,000-24,999	25.2	17.6-32.7	4.3	1.5-7.0	32.7	25.5-40.0	36.7	29.0-44.5
\$ 25,000-34,999	14.2	6.6-21.7	3.5	0.1-6.8	N/A	---	39.7	28.0-51.3
\$35,000-49,999	18.6	10.5-26.6	2.4	0-5.4	38.8	29.6-48.0	40.2	30.8-49.7
\$50,000+	24.3	17.9-30.6	2.8	0.9-4.6	32.4	26.3-38.4	39.8	33.0-46.6
<b>Health plan</b>								
Covered	21.7	18.2-25.2	2.9	1.7-4.1	37.2	33.6-40.8	36.9	33.2-40.5
No coverage	28.5	20.1-36.9	2.9	0.4-5.4	23.1	16.4-29.8	45.3	35.9-54.7

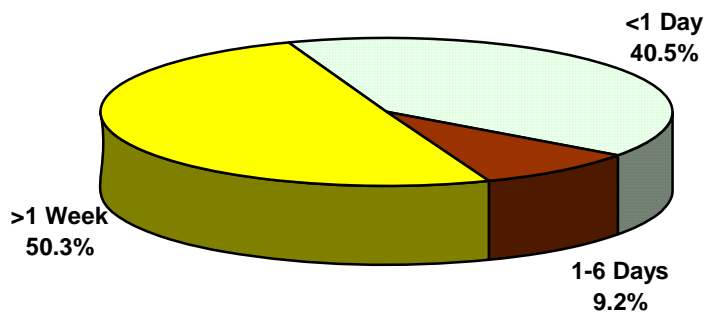
Prevalence is not available if respondents <50 in the county or the half of the Confidence Interval >10 to ensure the stable results. The total of row percent might not be 100% due to rounding.

Oklahoma BRFSS data indicated that the majority of adults with current asthma who did not take any medications during the past 30 days were classified as “mild intermittent” category, according to the guideline from The National Asthma Education and Prevention Program (NAEPP).

## Asthma medication usage among children

The National Survey of Children’s Health (NSCH) data provided the information of medication usages among children younger than 18 years of age with asthma. The question in the NSCH about asthma medication was “How long has it been since [he/she] last took asthma medication?” The results from NSCH indicated that 40.5% of children with current asthma took asthma medication within 24 hours. However, for about half of children with current asthma, the last time they took asthma medication was more than a week ago (Figure 40).

**Figure 40. Asthma Medication Usage for Children <18 Years Old with Current Asthma in Oklahoma, NSCH Data**



Date source: NCHS, CDC. State and Local Area Integrated Telephone Survey, National Survey of Children’s Health, 2003.

# ASTHMA ATTACK

## Asthma attack among adults

Among adults currently with asthma, 58.1% reported that they had an asthma attack during the past 12 months. Females had a slightly higher percentage of asthma attacks than males. Adults with current asthma and without healthcare coverage reported significantly higher percentages of having asthma attack during the past 12 months, compared with those with healthcare coverage ( $p < 0.05$ , Table 11).

**Table 11. Percent of Having Asthma Attacks in Past 12 Months Among Adult with Current Asthma: Oklahoma BRFSS 2006-2007**

	Percent	95% CI
<b>Total</b>	58.1	54.6-61.6
<b>Gender</b>		
Males	52.4	45.5-59.3
Females	61.2	57.3-65.0
<b>Race/Ethnicity</b>		
NH-White	57.6	53.5-61.6
NH-African Americans	N/A	---
NH-American Indians	N/A	---
Hispanic	N/A	---
<b>Age (years)</b>		
18-24	N/A	---
25-34	57.3	47.5-67.1
35-44	57.9	50.3-65.5
45-54	62.0	55.2-68.8
55-64	58.0	50.9-65.2
65+	46.6	40.5-52.8
<b>Education</b>		
<High School	55.0	46.5-63.5
High School Diploma/GED	57.2	50.8-63.5
Some College	60.4	54.0-66.8
College Degree	58.5	51.6-65.4
<b>Income</b>		
<\$15,000	64.6	57.6-71.6
\$15,000-24,999	60.6	52.6-68.6
\$ 25,000-34,999	69.4	59.5-79.3
\$35,000-49,999	53.8	44.2-63.4
\$50,000+	54.2	47.3-61.0
<b>Health plan</b>		
Covered	55.6	51.9-59.4
No coverage	69.2	60.7-77.8

Percentage not available if respondents <50 in subgroup or the half of the 95% CI >10 to ensure the stable results.

There is no information collected by BRFSS to indicate whether those persons had an asthma attack during the past 12 months because of having hard-to-control asthma or the inappropriate treatment/medications.

## **Episode of asthma or asthma attack among children**

Among Oklahoma children and youth <18 years old with lifetime asthma, 51.5% experienced an episode of asthma or asthma attack during the past 12 months (NSCH 2003). Females had a slightly higher percentage of episode of or asthma or asthma attack than males (57.0% vs. 47.8%, respectful,  $p>0.05$ ). Due to the small sample size, results by age, race/ethnicity, and incomes are not available.

Among children and youth with current asthma, 71.9% experienced an episode of asthma or asthma attack during the past 12 months (NSCH 2003). And 6.4% of those children had an episode or attack of asthma had to stay overnight in a hospital.

## EMERGENCY ROOM AND URGENT CARE FOR ASTHMA

2006-2007 Oklahoma BRFSS data showed 16.6% of adults with current asthma visited the emergency room (ER) or urgent care center because of their asthma during the past 12 months. Females were more like to use the emergency and urgent care than males ( $p < 0.05$ , Table 12). Patients with annual household incomes  $< \$15,000$  were used ER visits significantly more than patients with annual household incomes  $\$50,000$  and over ( $p < 0.05$ ).

**Table 12. Percent of Having Emergency Room or Urgent Care Visits in Past 12 Months Among Adults with Current Asthma: Oklahoma BRFSS 2006-2007**

	Percent	95% CI
<b>Total</b>	16.6	13.9-19.3
<b>Gender</b>		
Males	11.4	6.7-16.0
Females	19.4	16.2-22.7
<b>Race/Ethnicity*</b>		
NH-White	13.0	10.3-15.7
NH-African Americans	N/A	---
NH-American Indians	N/A	---
Hispanic	N/A	---
<b>Age (years)</b>		
18-24	N/A	---
25-34	15.2	7.9-22.4
35-44	15.0	9.3-20.7
45-54	21.7	15.9-27.6
55-64	12.8	8.0-17.6
65+	13.1	8.0-18.2
<b>Education</b>		
<High School	18.9	12.5-25.3
High School Diploma/GED	21.2	15.4-27.0
Some College	16.4	12.0-20.8
College Degree	8.8	5.2-12.4
<b>Income</b>		
<\$15,000	23.8	17.4-30.2
\$15,000-24,999	20.1	13.2-26.9
\$ 25,000-34,999	N/A	---
\$35,000-49,999	13.1	6.3-20.0
\$50,000+	10.2	6.5-13.9
<b>Health plan</b>		
Covered	16.3	13.4-19.1
No coverage	18.0	10.8-25.2

Prevalence is not available if respondents  $< 50$  in subgroup or the half of the 95% CI  $> 10$  to ensure the stable results.

# PHYSICIAN OFFICE VISIT FOR URGENT TREATMENT OF ASTHMA

The Oklahoma BRFSS 2006-2007 data indicated that 24.1% of adults with current asthma visited a physician or nurse for urgent treatment of worsening asthma symptoms during the past 12 months. Females reported significantly higher percentage of using physician office or nurse for urgent treatment than males ( $p < 0.05$ , Table 13).

**Table 13. Percent of Having Physician Visits for Urgent Treatment in Past 12 Months Among Adults with Current Asthma: Oklahoma BRFSS 2006-2007**

	Percent	95% CI
<b>Total</b>	24.1	21.2-27.0
<b>Gender</b>		
Males	16.2	11.5-20.9
Females	28.4	24.8-31.9
<b>Race/Ethnicity*</b>		
NH-White	22.4	19.3-25.6
NH-African Americans	N/A	---
NH-American Indians	N/A	---
Hispanic	N/A	---
<b>Age (years)</b>		
18-24	13.9	5.6-22.2
25-34	25.4	17.1-33.8
35-44	20.2	14.1-26.3
45-54	37.7	30.8-44.6
55-64	22.6	16.9-28.4
65+	20.8	15.4-26.2
<b>Education</b>		
<High School	20.8	14.5-27.2
High School Diploma/GED	25.7	20.1-31.3
Some College	25.7	20.4-31.0
College Degree	22.2	16.6-27.8
<b>Income</b>		
<\$15,000	25.8	19.6-32.1
\$15,000-24,999	26.4	19.4-33.5
\$ 25,000-34,999	N/A	---
\$35,000-49,999	23.8	15.9-31.7
\$50,000+	19.5	14.5-24.4
<b>Health plan</b>		
Covered	24.4	21.2-27.6
No coverage	22.7	15.8-29.6

Prevalence is not available if respondents <50 in the county or the half of the Confidence Interval >10 to ensure the stable results.

## ROUTINE PHYSICIAN OFFICE VISIT WITH ASTHMA

Among Oklahoma adults with current asthma, 47.3% of them went to see their physician for a routine checkup of asthma during the past 12 months (Table 14). While adults 45 years and older who have current asthma were more likely to see their doctors than those 25-34 years old ( $p < 0.05$ ). Adults with current asthma who have health care coverage reported much higher proportions of checkups than those without health care coverage (Table 14,  $p < 0.05$ ).

**Table 14. Percent of Having Routine Physician Visits in Past 12 Months Among Adult with Current Asthma: Oklahoma BRFSS 2006-2007**

	Percent	95% CI
<b>Total</b>	47.3	43.8-50.8
<b>Gender</b>		
Males	43.8	37.0-50.6
Females	49.2	45.2-53.1
<b>Race/Ethnicity*</b>		
NH-White	45.0	41.0-49.1
NH-African Americans	N/A	---
NH-American Indians	N/A	---
Hispanic	N/A	---
<b>Age (years)</b>		
18-24	N/A	---
25-34	45.0	35.2-54.8
35-44	36.0	28.6-43.4
45-54	58.6	51.7-65.6
55-64	56.1	48.9-63.3
65+	52.7	46.5-58.9
<b>Education</b>		
<High School	39.0	31.0-47.0
High School Diploma/GED	45.2	38.8-51.6
Some College	49.8	43.3-56.3
College Degree	53.1	45.9-60.3
<b>Income</b>		
<\$15,000	42.5	34.8-50.1
\$15,000-24,999	50.1	42.0-58.1
\$ 25,000-34,999	N/A	---
\$35,000-49,999	49.0	39.4-58.7
\$50,000+	49.9	43.1-56.8
<b>Health plan</b>		
Covered	50.7	46.9-54.5
No coverage	32.0	23.7-40.4

Percentage is not available if respondents <50 in subgroup or the half of the 95% CI >10 to ensure the stable results.

## ACTIVITY LIMITATIONS DUE TO ASTHMA

Among Oklahoma adults with current asthma, 27.8% reported activity limitations, including unable to work or carry out their usual activities due to asthma. People with lower household incomes, or without health coverage reported slightly higher percentages of having activity limitation due to asthma ( $p>0.05$ , Table 15).

**Table 15. Prevalence of Activity Limitation in Past 12 Months Among Adults with Current Asthma: Oklahoma BRFSS 2006-2007**

	Percent	95% CI
<b>Total</b>	27.8	24.6-31.1
<b>Gender</b>		
Males	27.2	20.7-33.8
Females	28.2	24.6-31.7
<b>Race/Ethnicity*</b>		
NH-White	26.4	22.9-30.0
NH-African Americans	N/A	---
NH-American Indians	N/A	---
Hispanic	N/A	---
<b>Age (years)</b>		
18-24	N/A	---
25-34	26.9	18.0-35.7
35-44	26.6	19.6-33.5
45-54	33.0	26.3-39.7
55-64	25.5	19.4-31.6
65+	22.6	17.1-28.1
<b>Education</b>		
<High School	30.1	22.7-37.6
High School Diploma/GED	26.4	20.4-32.4
Some College	32.8	26.3-39.3
College Degree	22.1	16.5-27.8
<b>Income</b>		
<\$15,000	35.5	28.2-42.9
\$15,000-24,999	31.3	23.8-38.7
\$25,000-34,999	28.3	16.8-39.7
\$35,000-49,999	23.1	14.9-31.4
\$50,000+	23.9	17.7-30.0
<b>Health plan</b>		
Covered	26.7	23.2-30.2
No coverage	32.9	24.3-41.5

Percentage is not available if respondents <50 in subgroup or the half of the 95% CI >10 to ensure the stable results.

## VACCINATION AMONG PERSONS WITH ASTHMA

Vaccination of influenza might prevent hospitalization and death among persons at increased risk, and might also reduce influenza-related respiratory illnesses and physician visits among all age groups. CDC recommends annual influenza vaccination to people 65 years and over or people who have chronic disorder of pulmonary systems, including asthma.

According to 2005-2007 Oklahoma BRFSS, among adults with current asthma, 48.7% reported that they received influenza vaccination during the past year, while 42.6% reported that they have ever received pneumococcal vaccine (Table 16).

Significantly higher proportions of receiving vaccine could be seen among those aged 65 years and over, or those with health coverage ( $p < 0.05$ , Table 16).

**Table 16. Prevalence of Influenza and Pneumococcal Vaccination in the Past 12 Months Among Adults with Current Asthma: Oklahoma BRFSS 2005-2007**

	Influenza vaccination		Pneumococcal Vaccination	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	48.7	45.9-51.5	42.6	39.9-45.3
<b>Gender</b>				
Males	49.6	44.0-55.2	40.1	34.8-45.4
Females	48.2	45.1-51.3	43.9	40.9-46.9
<b>Race/Ethnicity*</b>				
NH-White	48.3	45.0-51.5	42.8	39.7-45.9
NH-African Americans	N/A	---	N/A	---
NH-American Indians	N/A	---	N/A	---
Hispanic	N/A	---	14.9	6.1-23.8
<b>Age (years)</b>				
18-24	28.3	18.3-38.2	14.0	6.9-21.1
25-34	30.7	23.6-37.8	19.2	12.6-25.8
35-44	36.9	30.7-43.1	27.8	21.7-33.9
45-54	51.9	46.3-57.5	45.1	39.5-50.7
55-64	59.9	54.6-65.2	57.7	52.2-63.2
65+	80.9	77.2-84.6	86.6	83.4-89.9
<b>Education</b>				
<High School	53.8	47.2-60.5	42.6	36.4-48.9
High School Diploma/GED	44.7	39.7-49.7	42.8	37.9-47.7
Some College	45.7	40.7-50.7	43.3	38.4-48.2
College Degree	54.8	48.8-60.8	41.4	35.6-47.1
<b>Income</b>				
<\$15,000	45.3	39.3-51.4	45.5	39.4-51.5
\$15,000-24,999	52.2	46.2-58.3	54.3	48.2-60.4
\$ 25,000-34,999	47.5	39.2-55.8	43.4	35.4-51.4
\$35,000-49,999	47.9	40.1-55.7	41.6	34.1-49.2
\$50,000+	49.7	43.8-55.6	34.9	29.5-40.3
<b>Health plan</b>				
Covered	53.3	50.2-56.4	47.2	44.2-50.2
No coverage	27.7	21.4-34.0	21.7	16.7-26.7

Percentage is not available if respondents <50 in subgroup or the half of the 95% CI >10 to ensure the stable results.

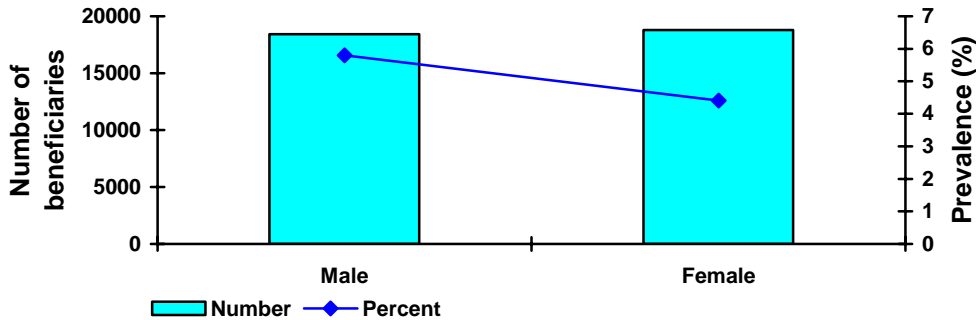
# ASTHMA IN OKLAHOMA MEDICAID BENEFICIARIES

The asthma prevalence data of Oklahoma Medicaid beneficiaries comes from Oklahoma Health Care Authority (OHCA) administrative data, which includes paid claims/encounters only and for recipients eligible at any time during the given year. When calculating the prevalence, the numerators were defined as the number of eligible Medicaid recipients with a defined diagnosis code. The denominators were defined as the total number of people that were Medicaid eligible at any point during the given year and within the defined category (e.g. age, race, gender).

## MEDICAID BENEFICIARIES WITH ASTHMA AS PRIMARY DIAGNOSIS

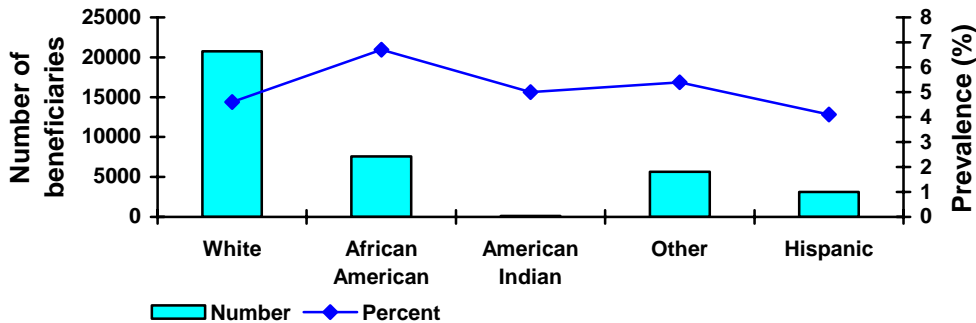
During the calendar year (CY) 2007, there were 37,221 Medicaid beneficiaries that received paid claims with asthma as the primary diagnosis. With the definition of numerator and denominator in the above paragraph, the overall prevalence was 5.0%. The prevalence was higher in males, although the numbers of beneficiaries were close between males and females (Figure 41).

**Figure 41. Oklahoma Medicaid Beneficiaries Received Paid Claims with Asthma as the Primary Diagnosis by Gender, CY2007**



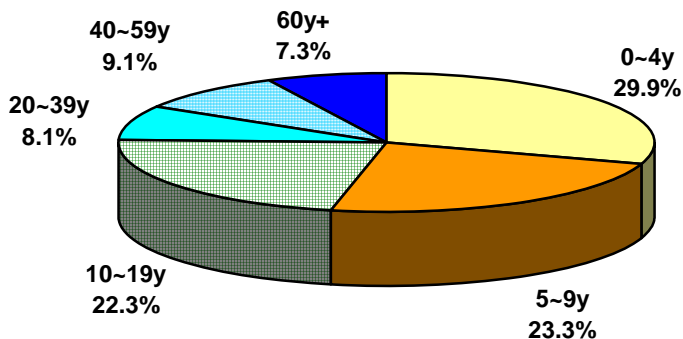
Among beneficiaries with asthma as the primary diagnosis, 55.7% of were Non-Hispanic White, followed by African American. However, the prevalence was higher in African Americans (Figure 42).

**Figure 42. Oklahoma Medicaid Beneficiaries Received Paid Claims with Asthma as the Primary Diagnosis by Race/ethnicity, CY2007**



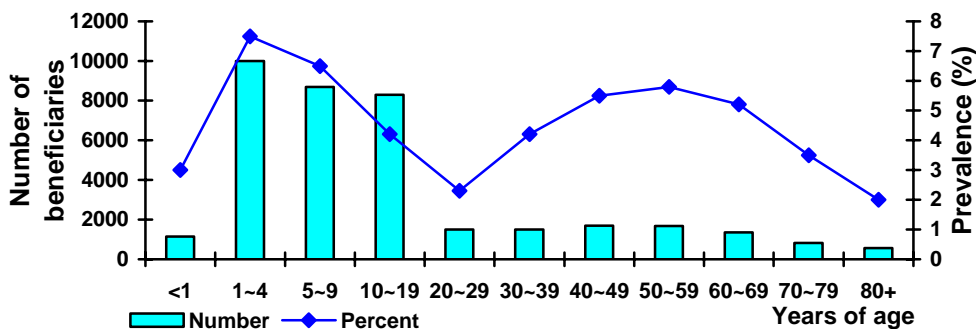
Among Oklahoma Medicaid beneficiaries with asthma as the primary diagnosis, about half (53.3%) of them were kids younger than 10 years of age, in which, more than half were in 1-4 years old. Children and young adults between 10-19 years old accounted for another 22.3% of all Medicaid beneficiaries with asthma as the primary diagnosis (Figure 43).

**Figure 43. Oklahoma Medicaid Beneficiaries Received Paid Claims with Asthma as the Primary Diagnosis by Age, CY2007**



The prevalence of asthma for children 1-4 years old was the highest among all age groups. The prevalence decreased from 7.5% in the 1-4 years old age group to 2.3% in the 20-29 years old age group, then increased to 5.8% in the 50-59 years old age group, then started decreasing as beneficiaries' age increased (Figure 44).

**Figure 44. Oklahoma Medicaid Beneficiaries Received Paid Claims with Asthma as the Primary Diagnosis by Age, CY2007**



There is no area that has significant higher or lower prevalence for Medicaid beneficiaries that received paid claims with asthma as the primary diagnosis, although more than one third of those beneficiaries were located in the Oklahoma City and Tulsa areas.

The total amount paid by OHCA for claims with a primary diagnosis of asthma was increased from \$40.6 million in CY 2006 to \$47.8 million in CY 2007. These amounts did not include pharmacy claims because of no diagnoses information in pharmacy data.

**Table 17. Oklahoma Medicaid Paid Claim with Asthma as the Primary Diagnosis, CY 2007**

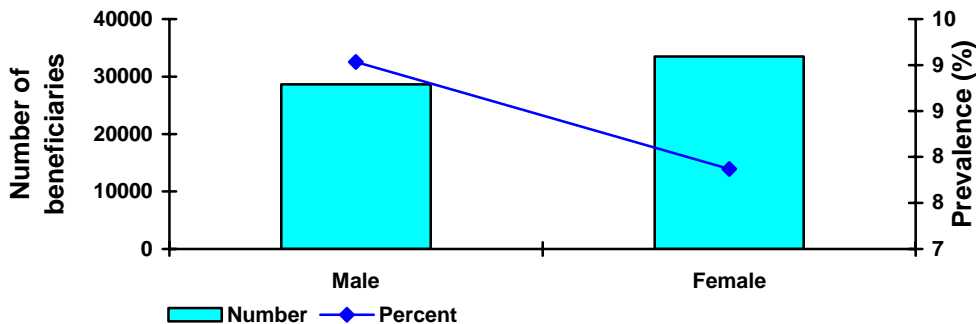
	<b>Number</b>	<b>Rate (per 100 Eligibles)</b>
<b>Total</b>	37,221	5,009.95
<b>Age*</b>		
<10	19,823	6,501.48
10-19	8,293	4,155.68
20-29	1,494	2,271.97
30-39	1,504	4,186.27
40-49	1,691	5,483.32
50-59	1,685	5,810.75
60-69	1,353	5,247.03
70-79	817	3,544.01
80+	561	1,994.88
< 1	1,144	3,030.38
1-4	9,993	7,512.97
5-9	8,686	6,475.37
65+	2,000	3,107.18
<b>Race/Ethnicity</b>		
White NH**	20,747	4,648.76
Black NH	7,569	6,673.96
Am Indian NH	138	4,960.46
Other NH	5,635	5,448.18
Hispanic***	3,132	4,066.05
<b>Gender</b>		
Male	18,423	5,810.48
Female	18,798	4,413.96
<b>Planning Districts</b>		
ACOG	10020	5,064.62
ASCOG	2783	4,888.72
COEDD	2857	5,463.97
EODD	4476	5,847.62
GGEDA	2421	4,296.36
INCOG	6040	4,720.56
KEDDO	2492	4,925.29
NODA	1485	4,641.93
OEDA	455	3,930.55
SODA	2784	5,115.86
SWODA	1213	5,139.83
Unknown	195	6,834.91

\*: Age as of the end of the calendar year. \*\*NH: Non-Hispanic; \*\*\*: Hispanic may be of any race.

# MEDICAID BENEFICIARIES WITH ASTHMA AS ANY DIAGNOSIS

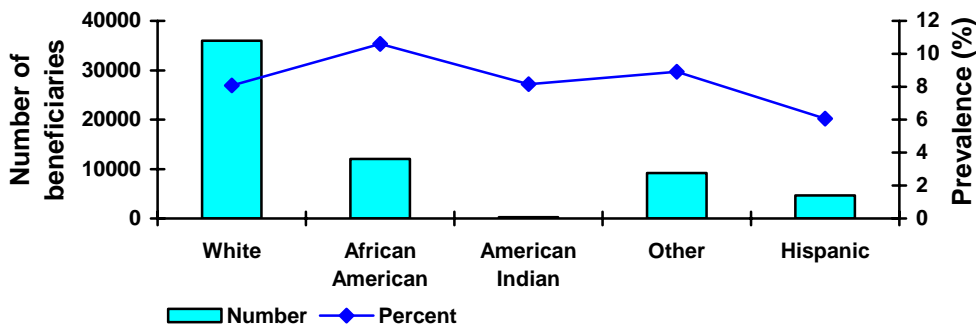
During calendar year 2007, there were 62,156 Medicaid beneficiaries that received paid claims with asthma as any diagnosis from OHCA. The overall prevalence was 8.4%. While slightly more female beneficiaries received the paid claims than males, the prevalence was higher in males (Figure 45).

**Figure 45. Oklahoma Medicaid Beneficiaries Received Paid Claims with Asthma as Any Diagnosis by Gender, CY2007**



Although Non-Hispanic White accounted for 57.9% of the number of beneficiaries with asthma as any diagnosis, the prevalence for White were similar to that of African Americans and American Indians (Figure 46).

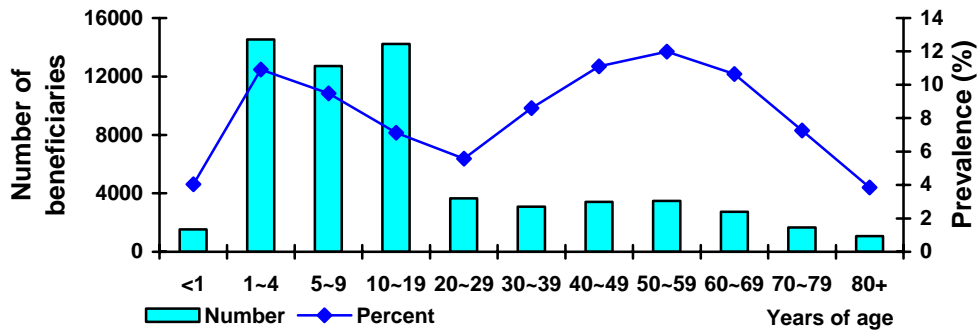
**Figure 46. Oklahoma Medicaid Beneficiaries Received Paid Claims with Asthma as Any Diagnosis by Race/ethnicity, CY2007**



Beneficiaries younger than 10 years of age accounted for 46.3% of those with asthma as any diagnosis, in which, about half (50.5%) were in 1-4 years old age group.

The prevalence decreased from 10.9% in the 1-4 years old age group to 5.6% in the 20-29 years old age group, then increased to 12.0% in the 50-59 years old age group, then decrease again (Figure 47).

**Figure 47. Oklahoma Medicaid Beneficiaries Received Paid Claims with Asthma as Any Diagnosis by Age, CY2007**



Medicaid beneficiaries in east central Oklahoma had higher prevalence of receiving paid claims with asthma as any diagnosis (data not shown). Nearly half (44.3%) of Medicaid beneficiaries received paid claims with asthma as any diagnosis were located in the Oklahoma City and Tulsa areas.

**Table 18. Oklahoma Medicaid Paid Claim with Asthma as Any Diagnosis, CY 2007**

	Number	Rate per 100,000 Eligibles
<b>Total</b>	62,156	8,366.21
<b>Age*</b>		
<10	28,775	9,437.52
10-19	14,231	7,131.26
20-29	3,663	5,570.42
30-39	3,087	8,592.42
40-49	3,423	11,099.58
50-59	3,479	11,997.38
60-69	2,744	10,641.43
70-79	1,674	7,261.53
80+	1,080	3,840.41
< 1	1,527	4,044.93
1-4	14,527	10,921.74
5-9	12,721	9,483.45
65+	3,981	6,184.85
<b>Race/Ethnicity</b>		
White NH**	36,019	8,070.74
Black NH	12,031	10,608.32
Am Indian NH	227	8,159.60
Other NH	9,215	8,909.49
Hispanic***	4,664	6,054.94
<b>Gender</b>		
Male	28,647	9,035.06
Female	33,509	7,868.25
<b>Planning Districts</b>		
ACOG	17540	8,865.62
ASCOG	4630	8,133.22
COEDD	4706	9,000.15
EODD	7181	9,381.53
GGEDA	4086	7,251.11
INCOG	9995	7,811.58
KEDDO	3840	7,589.53
NODA	2552	7,977.24
OEDA	755	6,522.11
SODA	4438	8,155.24
SWODA	2131	9,029.66
Unknown	302	10,585.55

\*: Age as of the end of the calendar year. \*\*NH: Non-Hispanic; \*\*\*: Hispanic may be of any race.

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# ASTHMA MORTALITY IN OKLAHOMA

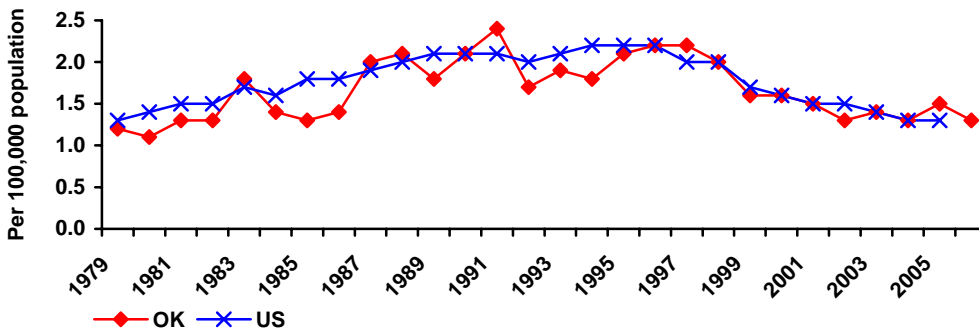
The mortality data from Oklahoma Vital Records are currently available through 2006. Nationwide 2005 mortality data are available from CDC WONDER. Deaths occurred before 1999 with ICD-9 code 493 as the underlying cause of death and deaths occurred from 1999 with ICD-10 code J45-J46 as the underlying cause of death were selected as asthma mortality cases.

To eliminate race misclassifications for American Indians, race-specific mortality rates in Oklahoma were calculated with the revised IHS (Indian Health Service) Racial Categories, which is an ongoing effort where Oklahoma Vital Records data are matched with IHS records. Those individuals that were in the IHS database are considered Native Americans, and those not matched are unchanged. The revised data is available for 1999-2003.

In 2006, 47 people died in Oklahoma with asthma as the underlying cause of death. Although half of the death cases were over 65 years old (20 cases, 42.6%), there were 11 cases (23.4%) that died before the age of 25 years old.

The age-adjusted asthma mortality rates in Oklahoma are close to the national average, and had similar trends as the US, which increased from the 1980's to the 1990's, then decreased in recent years (Figure 48).

**Figure 48. Age-Adjusted Mortality Rate for Asthma: Oklahoma and US**

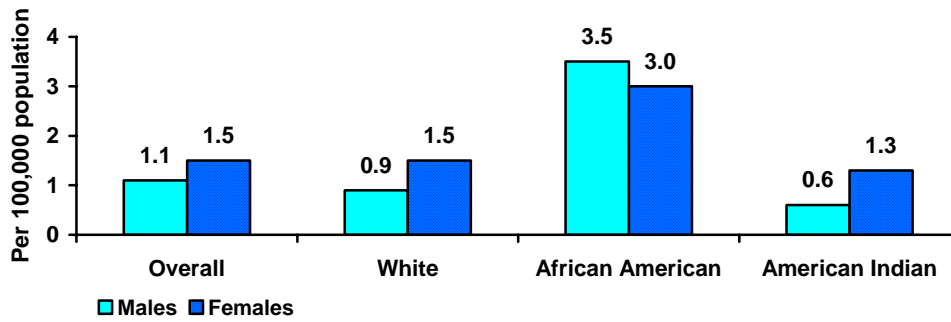


Source: CDC WONDER 1979-2005; Oklahoma Vital Statistics 1979-2006; Age-adjusted to the US 2000 standard population.

The age-adjusted mortality rates were higher among females in the overall population of Oklahoma, as well as in each racial subgroup, except in African Americans, the asthma mortality rate in females was lower than that in males (Figure 49).

The 2004-2006 Oklahoma age-adjusted asthma mortality rates was more than doubled among African Americans (3.4/100,000 population) than that among Whites (1.2/100,000 population), while American Indians have similar level of mortality rates of asthma compared to Whites (1.0/100,000 population).

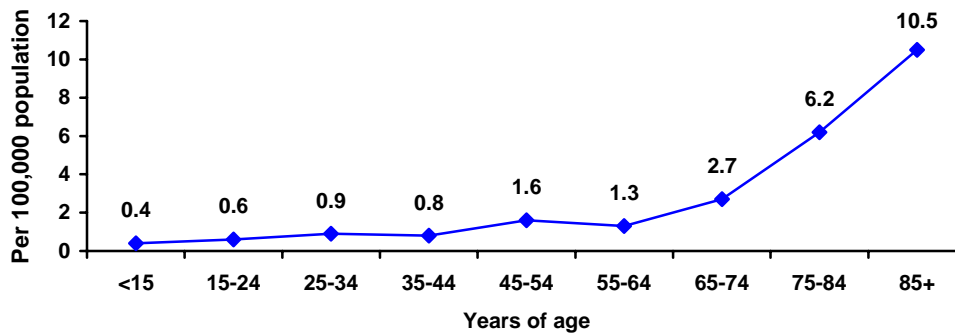
**Figure 49. Oklahoma Asthma Age-adjusted Mortality Rates by Gender and Race\*: 2004-2006**



Source: Oklahoma Vital Statistics. Age-adjusted to the US 2000 standard population.

Age-specific asthma mortality rates increased with age, and were significantly in the elderly population, especially for those aged 75 years and over (Figure 50).

**Figure 50. Oklahoma Asthma Age-specific Mortality Rates: 2004-2006**



Source: Oklahoma Vital Statistics.

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# ASTHMA AND ENVIRONMENTAL FACTORS IN OKLAHOMA

Environmental exposures such as allergens (animal and plant proteins), pollutants released into the environment, and workplace exposures have been linked to exacerbations of asthma. An environmental pollutant may affect asthma severity in the following ways:

- The pollutant might act as an inciter or trigger, leading to an asthma attack in an individual with hyperresponsive airways.
- The pollutant can exacerbate preexisting airway inflammation, leading to increased airway hyperresponsiveness, which may persist after cessation of exposure.
- The pollutant might augment or modify immune responses to inhaled antigens or intensify the impact of other pollutants in the respiratory tract.

## OUTDOOR AIR QUALITY

For the last several decades, high levels of outdoor air pollution have been associated with short-term increases in asthma morbidity and mortality. The National Ambient Air Quality Standards (NAAQS), required by the Clean Air Act (CAA), has been set for six criteria pollutants (O<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>, CO, lead, and PM<sub>10</sub> and PM<sub>2.5</sub>). The standards are designed to protect the health of all susceptible groups. For people with asthma, SO<sub>2</sub>, sulfuric acid aerosols, and NO<sub>2</sub> can exacerbate respiratory symptoms in the short term.

## INDOOR AIR QUALITY

In industrialized countries, adults and children might spend up to 75%-90% of their time indoors. The primary indoor air pollutants associated with asthma exacerbation include the following:

- Biologic allergens, such as those derived from dust mites, cockroaches, and animal dander. The allergen-containing secretions dry on fur, bedding, and clothes and become airborne
- Environmental tobacco smoke (ETS)
- Heating sources

## SECONDHAND SMOKE

Secondhand smoke is a known cause of cancer in humans and also causes heart disease and stroke. Passive smoking is estimated to cause more than 700 deaths in Oklahoma among nonsmokers each year. Persons with asthma could suffer symptoms ranging from discomfort to acute distress by exposure to second hand smoke. Major studies have concluded that parental smoking is associated with increased prevalence of asthma in children. Among those kids with established asthma, parental smoking is associated with more severe disease. Furthermore, there is substantial data confirming that infants whose mothers smoke during pregnancy have a higher risk of developing asthma and other respiratory illnesses including wheezing and coughing.

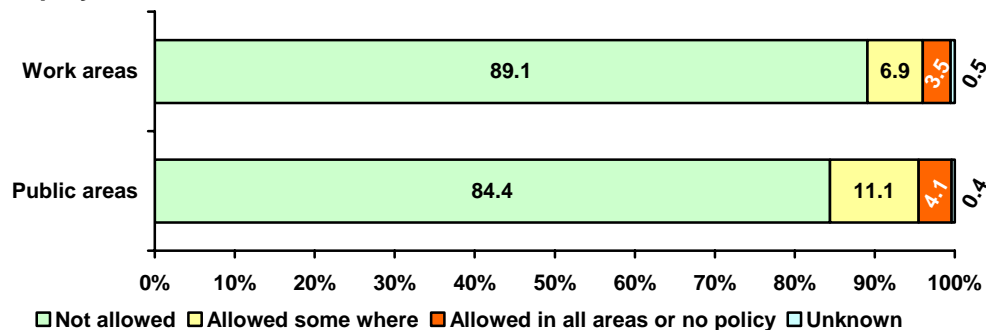
### Secondhand smoke in work place

Nonsmokers who exposed to secondhand smoke at work are at increased risk for adverse health effects. Oklahoma 2005-2006 BRFSS data indicated that among adult Oklahomans currently employed for wage or self-employed, 74.8% reported that they work indoors most of the time. Among those working mostly indoors, 75.5% do not currently smoking. Smoking policies for indoor public or common areas and work areas are important to protect these people.

81.4% of people currently employed and working indoors reported that smoking is not allowed in public or common areas, such as lobbies, rest rooms, and lunchrooms. And 86.8% of people currently employed and working indoors reported that smoking is not allowed in work areas.

Among non-smoking persons who are employed and working indoors, 84.4% reported that their place of work's official policy does not allow smoking in public areas; and 89.1% reported that smoking is not allowed in the working areas (Figure 51).

**Figure 51. Smoking Policy of Indoor Work Place Among Adults Who Were Non-smoking and Employed in Oklahoma, BRFSS 2005-2006**



Interestingly, non-smoking female adults who are employed and working indoors reported significantly more restricted smoking policies in their work place, both for public areas and work areas, compared with non-smoking male adults who are employed and working indoors (Table 19).

**Table 19. Smoking Policy of Indoor Work Place Among Adults Who Were Non-smoking and Employed, by Gender, Oklahoma BRFSS 2005-2006**

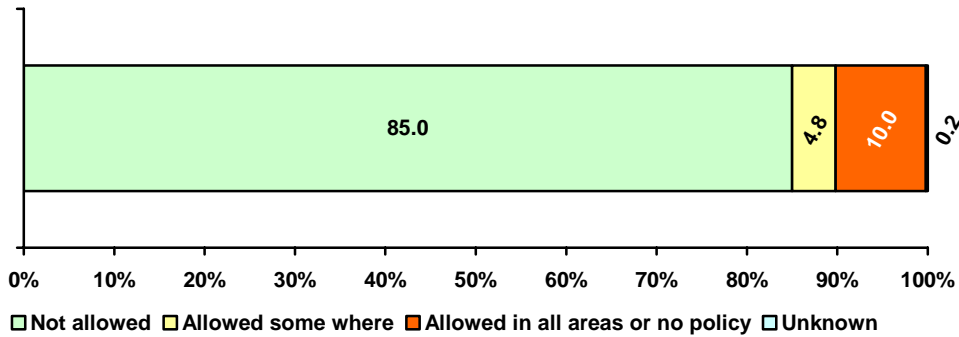
	Male		Female	
	Percent	95% CI	Percent	95% CI
<b>Smoking in public areas</b>				
Not allowed	80.1	77.5-82.7	88.0	86.6-89.4
Allowed in some areas	14.0	11.8-16.3	8.7	7.4-9.9
Allowed in all areas	0.9	0.3-1.4	0.5	0.3-0.8
No policy	4.7	3.3-6.1	2.4	1.7-3.0
Unknown	0.3	0.1-0.7	0.4	0.2-0.7
<b>Smoking in work areas</b>				
Not allowed	84.1	81.8-86.5	93.3	92.3-94.3
Allowed in some areas	10.4	8.4-12.4	4.1	3.3-4.9
Allowed in all areas	1.0	0.2-1.8	0.6	0.3-0.8
No policy	4.1	2.9-5.3	1.6	1.1-2.0
Unknown	0.4	0.1-0.8	0.4	0.2-0.7

Among non-smokers with current asthma and who work indoors, 5.6% reported that smoking is allowed either in all the public areas or no official policy to address smoking in public areas. On the other hand, 4.2% of non-smokers with current asthma and who work indoors reported that smoking is allowed all their working areas or there is no smoking policy (data not shown). These people may be exposed to second hand smoke in their working areas.

## Secondhand smoke at home

Oklahoma 2005-2006 BRFSS data indicated that 18.8% of Oklahomans reported that smoking is allowed anywhere in their home, despite whether the respondent smokes or not. Among people who are not current smokers, 85.0% would not allow smoking anywhere in their house, while about 10.0% would allow smoking anywhere in the house or there is no rule about it (Figure 52). Unfortunately, non-smoking adults with current asthma did not do any better to avoid the secondhand smoking in the household.

**Figure 52. Smoking Rule Inside the home Among Adults Who Were Non-smoking, Oklahoma BRFSS 2005-2006**



While smoking policy in work place would concern secondhand smoking related to working adults, rules about smoking inside the home might related to everyone, adults and children. In BRFSS survey, about 12.2% (95%CI: 11.1-13.4) respondents with children in their household reported that those children may expose to secondhand smoking because either smoking is allowed anywhere in the home or there is no rule about smoking.

However, having children younger than 18 years old living in the household might be a factor to influence the smoking rule at home. Among people who are not current smokers, those with children living in the household were very unlikely to allowed smoking anywhere in the home or without a rule about smoking in the home (7.5%, 95%CI: 6.3-8.6), compared with those households without children (15.9%, 95%CI: 14.8-17.0).

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# APPENDIX

## GLOSSARY OF TERMS

**Body Mass Index (BMI):** BMI is a number calculated from a person's weight and height. BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems. See <http://www.cdc.gov/nccdphp/dnpa/bmi/index.htm> for details.

**CI:** Confidence interval, a statistical range with a specified probability that a given parameter lies within the range.

**Current asthma:** is defined as those respondents of BRFSS who state that they still have asthma.

**Lifetime asthma:** is defined as respondents of BRFSS who have ever been told by a health professional that they had asthma.

**Hospitalization Rates:** The number of hospital discharges/episodes in a given year(s) divided by the population in a given region. This is usually expressed per 1000,

**Prevalence:** The proportion of the population with a particular condition or characteristic. To calculate prevalence you need to sum the number of individuals with a certain condition/characteristic and divide by the number of people in the population of interest over a specified time.

**Significance:** Statistical significance is the probability that percentages or mean scores observed in the sample are truly different from each other. One way to determine statistical significance is to check whether the confidence intervals around the percentages or scores overlap.

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## REFERENCES

1. EPR-3. Expert panel report 3: guidelines for the diagnosis and management of asthma (EPR-3 2007). NIH Publication No. 08-4051. Bethesda, MD: U.S. Department of Health and Human Services; National Institutes of Health; National Heart, Lung, and Blood Institute; National Asthma Education and Prevention Program, 2007.
2. Hannaway PJ. Asthma and Emerging Epidemic. Massachusetts: Paul J. Hannaway, M.D., 2002.
3. Environmental Protection Agency. Asthma Frequent Questions. Available from: <http://www.epa.gov/faq/asthma/introduction>
4. Centers for Disease Control and Prevention, National Center for Health Statistics. Asthma Prevalence, Health Care Use, and Mortality, 2000-2001. Available from: <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/asthma/asthma>
5. Centers for Disease Control and Prevention. Asthma's Impact on Children and Adolescents. Available from: <http://www.cdc.gov/nceh/airpollution/asthma/children>
6. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System User's Guide. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1998.
7. Moorman JE, Rudd RA, Johnson CA, et al. National Surveillance for Asthma -- United States, 1980-2004. MMWR 2007 / 56(SS08);1-14;18-54
8. Oklahoma State Department of Health. Health Care Information. 2007 County Health Profile.
9. Anderson RN, et al. Comparability of cause of death between ICD-0 and ICD-10: preliminary estimates. National Vital Statistics Reports, 2001; 49.
10. Child and Adolescent Health Measurement Initiative (2005). National Survey of Children's Health, Data Resource Center on Child and Adolescent Health website. Retrieved June 2006. Available from <http://www.nschdata.org>
11. Taras H, Potts-Datema W. Childhood Asthma and Student Performance at School. J Sch Health. 2005;75(8):296-312
12. Zeiger RS, Hay JW, Contreras R, et al, Asthma costs and utilization in a managed care organization. J Allergy Clin Immunol 2008;121: 885-92
13. Akinbami LJ. The State of childhood asthma, United States, 1980–2005. Advance data from vital and health statistics; no 381, Hyattsville, MD: National Center for Health Statistics. 2006.

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