



# The Burden of Asthma in the Sooner State

Oklahoma State Department of Health  
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## Introduction

Asthma is a respiratory disease 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 (1). Symptoms of asthma can range from mild to severe and life-threatening (2).

In the United States:

- 14 million adults are estimated to have asthma (3).
- Asthma, affecting nearly 1 in 13 school-aged children, is the leading cause of school absenteeism due to chronic disease (2).
- The estimated cost of treating asthma in children under 18 years of age is \$3.2 billion per year (4).

The purpose of this report is to provide a means to examine the burden of asthma in Oklahoma by presenting a variety of asthma-related data including prevalence, risk factors, hospitalizations, and mortality.

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## Adult Asthma Prevalence

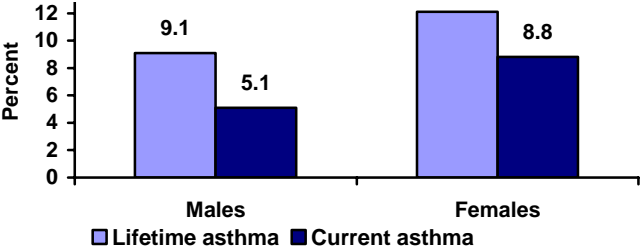
Adult asthma prevalence data was obtained from the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is maintained through a partnership between the Centers for Disease Control and Prevention and states and U.S. territories. Each state administers monthly random digit dialing (RDD) telephone survey of adults 18 years of age and older. The BRFSS consists of core questions, optional modules, and state-added questions. The core questions and optional modules are identical for each state, making comparisons between states and to national estimates possible (5). 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 completely be eliminated. Another limitation with the BRFSS data is that it is self-reported and cannot be verified.

Lifetime asthma prevalence is based on the BRFSS question “Have you ever been told by a doctor, nurse, or other health professional that you had asthma?” Current asthma prevalence is based on the BRFSS question “Do you still have asthma?” The Oklahoma BRFSS sample size was 4,550 in 2001 and 6,773 in 2002.

Lifetime and current asthma rates for 2001 and 2002 combined are presented in the following graphs. Detailed tables are listed in Appendix 1.

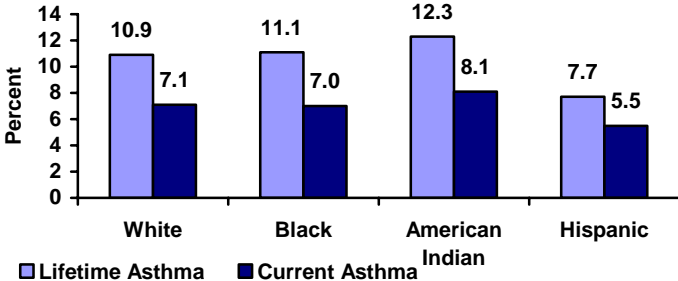
The prevalence rate of lifetime asthma in Oklahoma is 10.7% and the rate of current asthma is 7.0% compared to 10.4% and 7.2% in the U.S. (2000 BRFSS) Females are significantly more likely than males to have had asthma sometime during their lives and to currently have asthma.

Figure 1. Prevalence Rate of Lifetime and Current Asthma by Gender: Oklahoma BRFSS 2001 and 2002



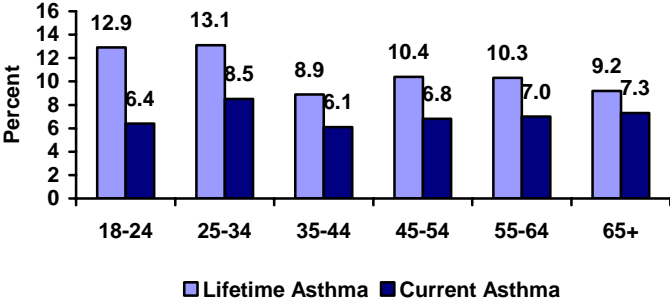
Although not significantly different from other racial/ethnic groups, American Indians have the highest rates of lifetime and current asthma.

Figure 2. Prevalence Rates of Lifetime and Current Asthma by Race/Ethnicity: Oklahoma BRFSS 2001 and 2002



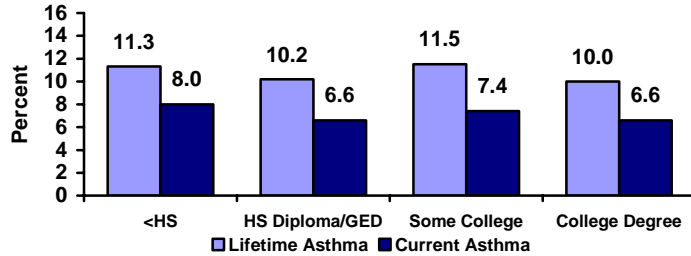
Those in the 25-34 year age group are significantly more likely to have asthma sometime in their lives than those 65 and older.

Figure 3. Prevalence Rates of Lifetime and Current Asthma by Age Group: Oklahoma 2001 and 2002 BRFSS



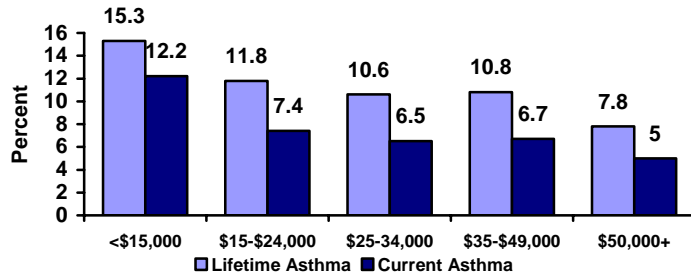
There is no significant difference in lifetime or current asthma by level of education.

Figure 4. Prevalence Rates of Lifetime and Current Asthma by Level of Education: Oklahoma BRFSS 2001 and 2002



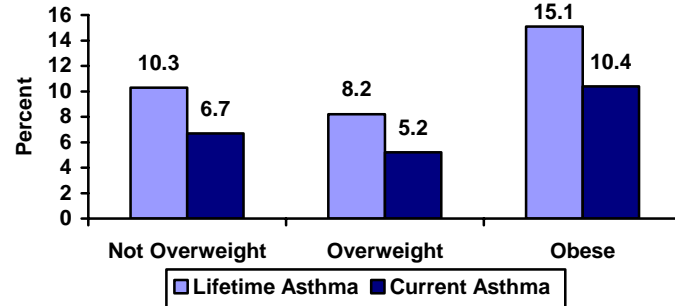
Those making <\$15,000 per year are significantly more likely to have had asthma sometime in their lives than most of the other income groups and more likely to currently have asthma than those in all of the other income groups.

Figure 5. Prevalence Rates of Lifetime and Current Asthma by Level of Income: Oklahoma BRFSS 2001 and 2002



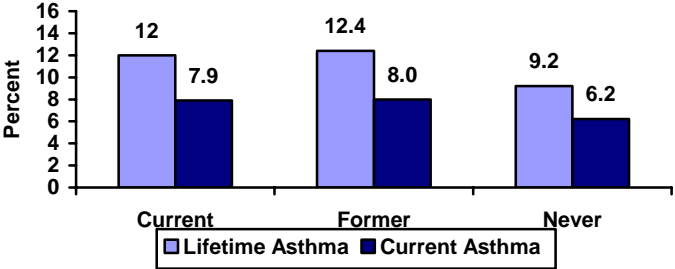
Those who are obese are significantly more likely to have had lifetime asthma and to currently have asthma than those who are not obese; and those who are overweight are significantly less likely to have had asthma sometime in their lives than those who are not overweight or who are obese.

Figure 6. Prevalence Rates of Lifetime and Current Asthma by BMI Category: Oklahoma BRFSS 2001 and 2002



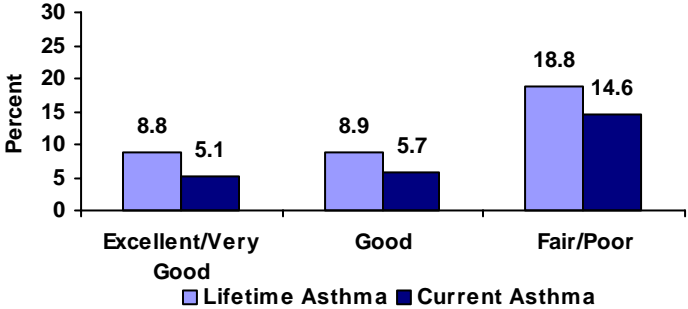
Those who are current or former smokers are more likely to have lifetime asthma than those who have never smoked.

Figure 7. Prevalence Rates of Lifetime and Current Asthma by Smoking Status: Oklahoma BRFSS 2001 and 2002



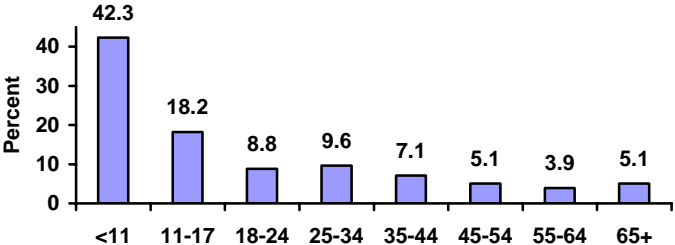
Those who report that their general health is fair/poor are significantly more likely to have had lifetime asthma or to currently have asthma than those who report that their general health was good or very good/excellent.

Figure 8. Prevalence Rates of Lifetime and Current Asthma by General Health Status: Oklahoma BRFSS 2000 and 2001



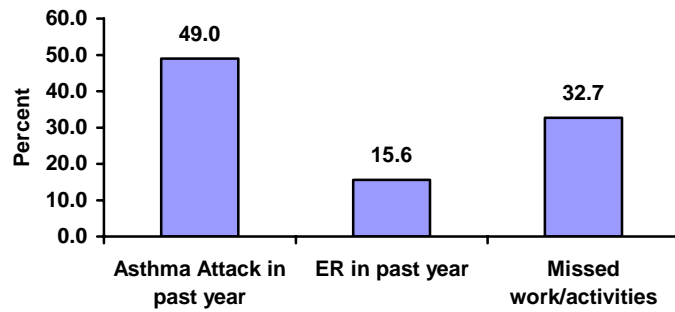
Over 40% of adults with asthma were diagnosed prior to the age of 11.

Figure 9. Age Diagnosed with Asthma Among Adults Ever Diagnosed with Asthma: Oklahoma BRFSS 2002



Nearly 50% of Oklahoma adults with asthma reported having an asthma attack in the past year, 16% reported going to the ER in the past year because of their asthma, and 33% reported missing at least one day of work or other usual activities in the past year because of their asthma.

Figure 10. Measures of Asthma Severity: Oklahoma 2002 BRFSS



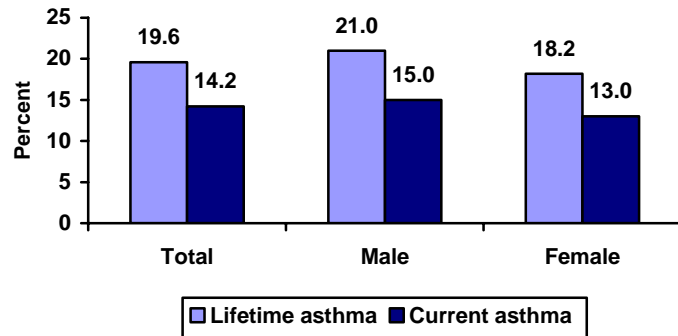
### Asthma Prevalence Among Children

Oklahoma is 1 of 40 states that participate in the Youth Tobacco Survey (YTS). The YTS is a comprehensive tobacco survey administered to a sample of middle and high school students.

In 2002, two asthma questions similar to the BRFSS questions were asked: “Have you ever been told by a doctor or other health care provider that you had asthma?” and “Do you still have asthma?” Data are from 1,901 students from 49 high schools and 2,043 students from 49 middle schools. The data have been weighted to provide estimates generalizable to the population of Oklahoma middle school and high school students. Detailed tables are presented in Appendix 2.

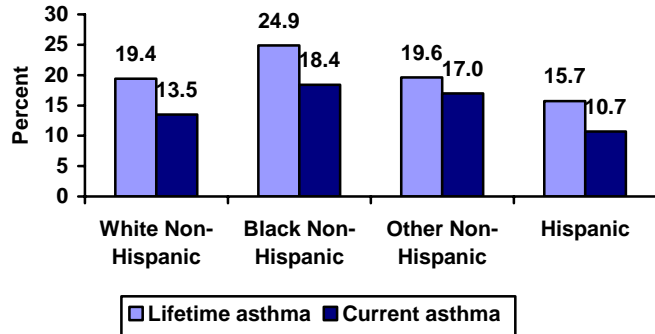
Approximately 20% of middle school students in Oklahoma report ever having asthma and over 14% report currently having asthma. While more males report ever having and currently having asthma than females, this difference is not statistically significant.

Figure 11. Prevalence Rate of Middle School Students with Lifetime and Current Asthma by Gender: Oklahoma YTS 2002



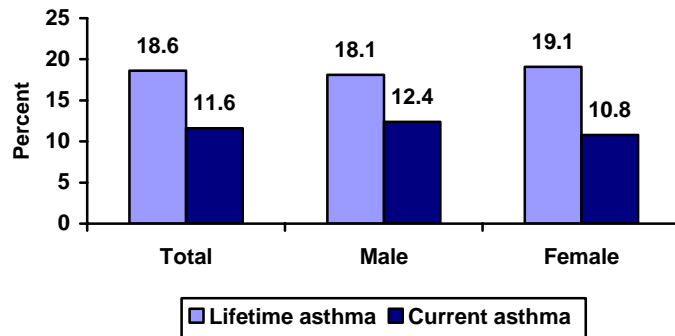
While more Black middle school students report ever having asthma and currently having asthma than other racial/ethnic groups, this difference is not statistically significant.

Figure 12. Prevalence Rate of Middle School Students with Lifetime and Current Asthma by Race: Oklahoma YTS 2002



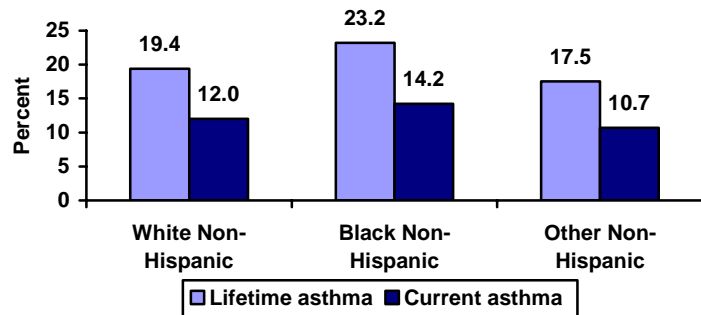
Almost 19% of high school students report ever having asthma and nearly 12% report currently having asthma. As with middle school students, a statistically non-significant difference in lifetime and current asthma by gender is seen.

Figure 13. Lifetime and Current Asthma by Gender Among High School Students: Oklahoma YTS 2002



As with middle school students, a statistically non-significant difference in lifetime and current asthma is seen with more Black students reporting ever having asthma or currently having asthma than White students or students of other races.

Figure 14. Lifetime and Current Asthma by Race Among High School Students: Oklahoma YTS 2002



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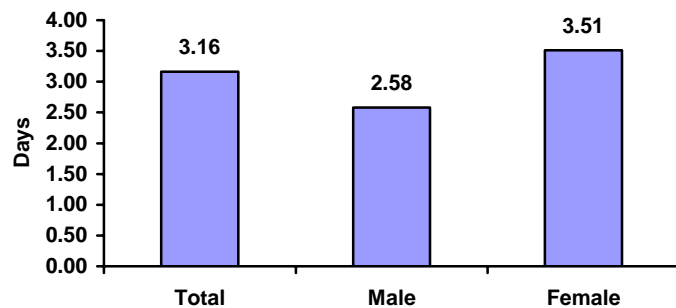
## Hospitalizations

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. One limitation of this data is that it reflects encounters rather than individuals. Another limitation is that data from Indian Health Service hospitals and military and veteran hospitals are not collected (6). Oklahoma hospital discharges from 1998-2000 with asthma as the primary and asthma as any diagnosis are presented in Appendix 3. The total number of hospital discharges decreased from 1998 to 2000 because of a decrease in the number of hospitals that reported their data to the Oklahoma State Department of Health.

There were 2,709 hospital discharges with asthma as the primary diagnosis, accounting for approximately 1% of all hospital discharges in 2000. The hospital charges for accounted for approximately \$20 million. Females accounted for nearly two-thirds of the hospitalizations and those in the 5-34 year age group accounted for one-third of the hospitalizations.

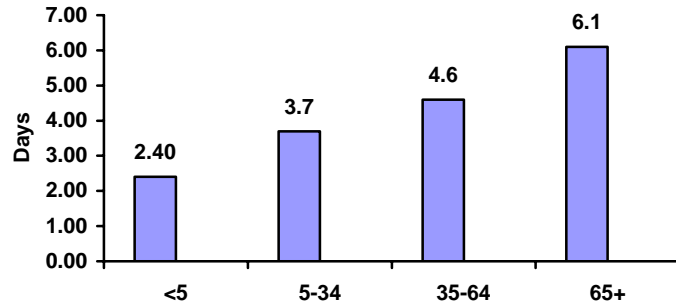
**The average length of stay for patients hospitalized with primary diagnoses of asthma was over three days with females being hospitalized longer than males.**

**Figure 15: Average Length of Stay Among Oklahomans with Asthma as the Principal Diagnosis, 2000**



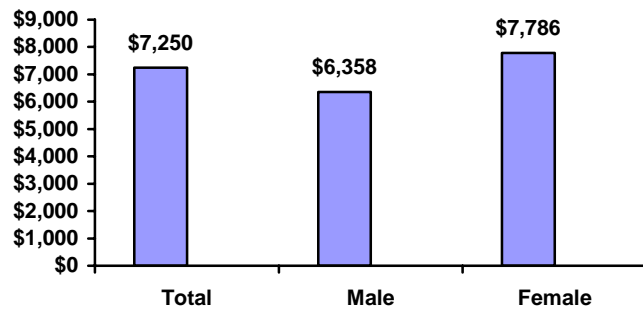
The average length of stay for hospitalizations with asthma as the primary diagnosis increased with increasing age group.

Figure 12: Average Length of Stay with Asthma as the Primary Diagnosis by Age Group, 2000



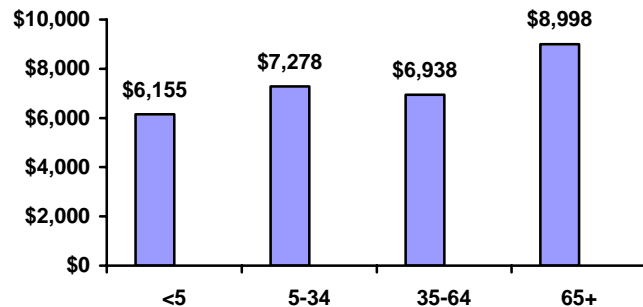
The average hospital stay was over \$7,000 with females accounting for more charges than males.

Figure 13: Average Hospital Charges with Asthma as the Primary Diagnosis by Gender, 2000



Persons 65 years and older accounted for more hospital charges than those in younger age groups.

Figure 14: Average Hospital Charges with Asthma as the Primary Diagnosis by Age Group



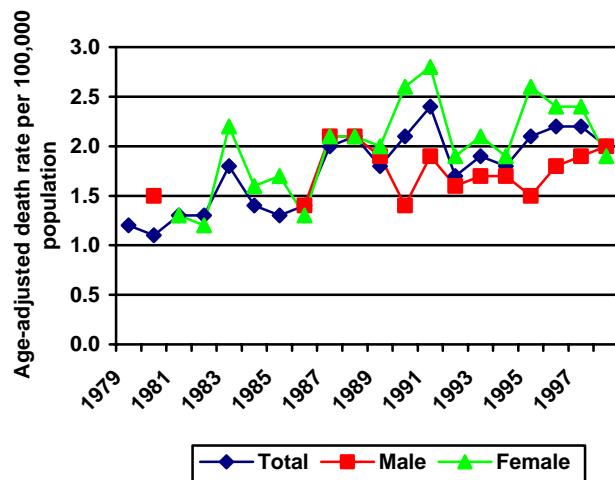
## Mortality

In 1999, the Tenth Revision of the International Classification of Diseases (ICD-10) was implemented on mortality statistics. The comparability ratio for asthma from the ICD-10 to the ICD-9 is 0.89, meaning approximately 11% fewer deaths are coded as caused by asthma in the ICD-10 revision than in the ICD-9 revision (7). Therefore 1999-2001 rates are not presented in the graph. The rates presented are only those in which asthma was the underlying cause of death. Indian Health Service-linked race categories were used for obtaining mortality rates by race.

The Oklahoma and U.S. age-adjusted mortality asthma rates in 1999 were both 1.5/100,000. In 2001, there were 49 deaths from asthma as the primary diagnosis and the age-adjusted mortality rate was 1.4/100,000 population.

**The age-adjusted mortality rate for asthma increased by 67% from 1979 to 1998.**

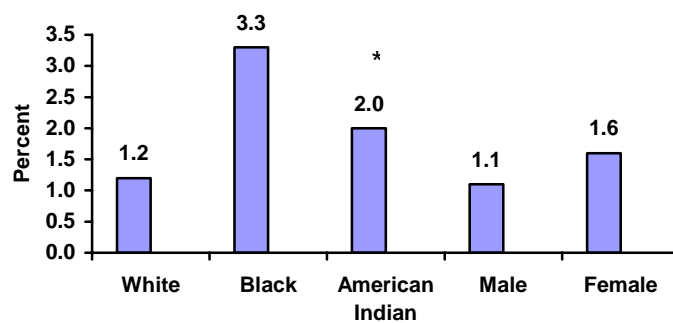
**Figure 15. Oklahoma Age-Adjusted Mortality Rate Trend for Asthma as the Underlying Cause of Death: 1979-1998**



Source: CDC Wonder

**Age-adjusted mortality rates were three times higher among Blacks than among Whites, 67% higher among American Indians than Whites, and 50% higher among females than males.**

**Figure 16. Oklahoma Age-adjusted Mortality Rates with Asthma as the Underlying Cause of Death by Race and Gender: 1999-2001**



Source: Oklahoma Vital Statistics  
Age-adjusted to the US 2000 population  
\*Number of deaths less than 20

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## References

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2. Environmental Protection Agency. Asthma Frequent Questions. Available from: <http://www.epa.gov/faq/asthma/introduction.html>
3. 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.htm>
4. Centers for Disease Control and Prevention. Asthma's Impact on Children and Adolescents. Available from: <http://www.cdc.gov/nceh/airpollution/asthma/children.htm>
5. 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.
6. Oklahoma State Department of Health. Health Care Information. 2000 Annual Report.
7. Anderson RN, et al. Comparability of cause of death between ICD-0 and ICD-10: preliminary estimates. National Vital Statistics Reports, 2001; 49.

## Appendix 1: BRFSS Supplemental Tables

**Table 1. Prevalence of lifetime and current asthma by age, race/ethnicity, and gender: Oklahoma BRFSS 2001-2002**

	Lifetime Asthma		Current Asthma	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	10.7%	9.9%-11.4%	7.0%	6.4%-7.6%
<b>Gender</b>				
Males	9.1%	8.0%-10.2%	5.1%	4.3%-5.9%
Females	12.1%	11.2%-13.1%	8.8%	8.0%-9.6%
<b>Race</b>				
White	10.9%	10.0%-11.7%	7.1%	6.5%-7.8%
Black	11.1%	7.8%-14.3%	7.0%	4.8%-9/2%
American Indian	12.3%	9.3%-15.3%	8.1%	5.8%-10.4%
Hispanic	7.7%	5.0%-10.3%	5.5%	3.3%-7.7%
<b>Age Group</b>				
18-24	12.9%	10.3%-15.6%	6.4%	4.6%-8.2%
25-34	13.1%	11.2%-15.0%	8.5%	7.0%-10.0%
35-44	8.9%	7.5%-10.3%	6.1%	4.9%-7.3%
45-54	10.4%	8.8%-11.9%	6.8%	5.5%-8.0%
55-64	10.3%	8.3%-12.2%	7.0%	5.3%-8.6%
65+	9.2%	7.9%-10.5%	7.3%	6.1%-8.5%

Source: Oklahoma 2001 and 2002 BRFSS

**Table 2. Prevalence of lifetime and current asthma by selected characteristics: Oklahoma BRFSS 2001 and 2002**

	Lifetime Asthma		Current Asthma	
	Percent	95% CI	Percent	95% CI
<b>Education</b>				
< High School	11.3%	9.3%-13.2%	8.0%	6.5%-9.6%
HS Diploma/GED	10.2%	9.0%-11.4%	6.6%	5.6%-7.5%
Some College	11.5%	10.0%-12.9%	7.4%	6.2%-8.6%
College Degree	10.0%	8.5%-11.4%	6.6%	5.4%-7.7%
<b>Income</b>				
<\$15,000	15.3%	12.9%-17.7%	12.2%	10.1%-14.3%
15,000-24,000	11.8%	10.2%-13.4%	7.4%	6.2%-8.5%
25,000-34,000	10.6%	8.8%-12.4%	6.5%	5.1%-7.9%
35,000-49,000	10.8%	8.8%-12.8%	6.7%	5.1%-8.3%
50,000+	7.8%	6.5%-9.1%	5.0%	3.9%-6.0%
<b>BMI Group</b>				
Not overweight	10.3%	9.2%-11.5%	6.7%	5.8%-7.6%
Overweight	8.2%	7.2%-9.1%	5.2%	4.5%-6.0%
Obese	15.1%	13.2%-17.0%	10.4%	8.8%-11.9%
<b>Smoking Status</b>				
Current	12.0%	10.6%-13.5%	7.9%	6.8%-9.0%
Former	12.4%	10.7%-14.1%	8.0%	6.6%-9.4%
Never	9.2%	8.3%-10.1%	6.2%	5.4%-6.9%
<b>General Health</b>				
Fair/Poor	18.8%	16.8%-20.9%	14.6%	12.8%-16.3%
Good	8.9%	7.8%-10.0%	5.7%	4.8%-6.6%
Excellent/Very Good	8.8%	7.8%-9.7%	5.1%	4.3%-5.8%

## Appendix 2: Youth Tobacco Survey Supplemental Tables

**Table 3. Lifetime and Current Asthma Among Oklahoma Middle School Students**

	Lifetime Asthma		Current Asthma	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	19.6%	17.2%-22.0%	14.2%	12.4%-16%
<b>Gender</b>				
Female	18.2%	15.4%-21.0%	13.0%	10.3%-15.7%
Male	21.0%	17.6%-24.4%	15.0%	12.8%-17.2%
<b>Grade</b>				
6 <sup>th</sup>	17.8%	14.3%-21.3%	13.7%	10.6%-16.8%
7 <sup>th</sup>	20.4%	16.9%-23.9%	15.3%	12.3%-18.3%
8 <sup>th</sup>	20.9%	17.0%-24.8%	13.5%	11.1%-15.9%
<b>Race/Ethnicity</b>				
White	19.4%	16.7%-22.1%	13.5%	11.1%-15.9%
Black	24.9%	15.6%-34.2%	18.4%	13.6%-23.2%
Hispanic	15.7%	8.1%-23.3%	10.7%	4.5%-16.9%
Other	19.6%	13.2%-26.0%	17.0%	11.6%-22.4%

Source: 2002 Oklahoma Youth Tobacco Survey

**Table 4. Lifetime and Current Asthma Among Oklahoma High School Students**

	Lifetime Asthma		Current Asthma	
	Percent	95% CI	Percent	95% CI
<b>Total</b>	18.6	16.3-20.9	11.6	10.2-14.0
<b>Gender</b>				
Female	19.1	16.0-22.2	10.8	8.5-13.1
Male	18.1	15.7-20.5	12.4	10.6-14.2
<b>Grade</b>				
9 <sup>th</sup>	19.8	17.3-22.3	11.4	9.1-13.7
10 <sup>th</sup>	22.0	17.9-26.1	14.0	10.1-17.9
11 <sup>th</sup>	16.7	13.0-20.4	10.0	6.6-13.4
12 <sup>th</sup>	15.4	11.4-19.4	9.6	6.2-13.0
<b>Race</b>				
White	19.4	16.4-22.4	12.0	10.2-13.8
Black	23.2	18.2-28.2	14.2	8.4-20.0
Other	17.5	12.2-22.8	10.7	6.6-14.8

Source: 2002 Oklahoma Youth Tobacco Survey

## Appendix 3: Hospital Discharges Supplemental Tables

**Table 3. Hospital discharges, length of stay, and charges with asthma as the principal diagnosis (ICD-9 code 493)**

	Discharges	Percent of Total Discharges	Avg. Length of Stay (Days)	Total Hospital Charges
<b>1998</b>	3635	0.89%	3.25	\$18,563,137
<b>1999</b>	4571	1.0%	3.04	\$24,311,952
<b>2000</b>	2709	0.89%	3.16	\$19,641,195

Source: Oklahoma State Department of Health, Health Care Information Center for Health Statistics

**Table 4. Hospital discharges, length of stay, and charges with asthma as any diagnosis (ICD-9 code 493)**

	Discharges	Percent of Total Discharges	Avg. Length of Stay (Days)	Total Hospital Charges
<b>1998</b>	13,046	3.2%	4.78	\$120,694,935
<b>1999</b>	15,403	3.5%	4.53	\$145,824, 223
<b>2000</b>	10,702	3.5%	4.60	\$121,222,194

Source: Oklahoma State Department of Health, Health Care Information Center for Health Statistics

**Table 5. Hospital discharges, total days, and total hospital charges with asthma (ICD-9 code 493) as the primary diagnosis by gender**

	Discharges	Total Days	Total Hospital Charges
<b>1998</b>			
Male	1417	3762	\$6,134,483
Female	2218	8049	\$12,428,654
<b>1999</b>			
Missing	9	12	\$39,115
Male	1760	4416	\$8,202,960
Female	2802	9447	\$16,069,877
<b>2000</b>			
Male	1016	2619	\$6,459,693
Female	1693	5941	\$13,181,502

Source: Oklahoma State Department of Health, Health Care Information Center for Health Statistics

**Table 6. Hospital discharges, total days, and total charges with asthma (ICD-9 code 493) as any diagnosis by gender**

	Discharges	Total Days	Total Hospital Charges
<b>1998</b>			
Missing	16	52	\$59,146
Male	4,466	19,681	\$41,202,612
Female	8,564	42,660	\$79,433,177
<b>1999</b>			
Missing	23	54	\$275,374
Male	5,214	21,582	\$47,573,759
Female	10,166	48,080	\$97,975,090
<b>2000</b>			
Male	3,451	14,964	\$39,422,588
Female	7,251	34,268	\$81,779,606

Source: Oklahoma State Department of Health, Health Care Information Center for Health Statistics

**Table 7. Hospital discharges, total days, and total charges with asthma as the primary diagnosis (ICD-9 code 493) by age group**

	<b>Discharges</b>	<b>Total Days</b>	<b>Total Hospital Charges</b>
<b>1998</b>			
< 5	630	1421	\$2,232,168
5-34	1290	3330	\$5,554,744
35-64	1161	4160	\$6,587,013
65+	554	2900	\$4,189,212
<b>1999</b>			
< 5	903	1798	\$3,243,030
5-34	1615	4036	\$7,712,288
35-64	1416	5085	\$8,694,363
65+	637	2956	\$4,662,271
<b>2000</b>			
Missing	60	60	\$353,809
< 5	507	1048	\$3,120,409
5-34	860	2074	\$6,258,799
35-64	790	2875	\$5,481,335
65+	492	2503	\$4,426,843

Source: Oklahoma State Department of Health, Health Care Information Center for Health Statistics

**Table 8. Hospital discharges, total days, and total charges with asthma (ICD-9 code 493) as any diagnosis by age group**

	<b>Discharges</b>	<b>Total Days</b>	<b>Total Hospital Charges</b>
<b>1998</b>			
< 5	1,325	3,506	\$5,684,956
5-34	3,301	13,028	\$20,681,519
35-64	4,493	20,233	\$45,045,291
65+	3,927	25,626	\$49,283,169
<b>1999</b>			
Missing	1	2	\$2,217
< 5	1,780	4,735	\$9,117,666
5-34	3,896	14,290	\$25,267,331
35-64	5,312	23,266	\$54,539,368
65+	4,414	27,423	\$56,897,641
<b>2000</b>			
Missing	186	11	\$1,194,744
< 5	1,057	2,542	\$7,146,393
5-34	2,313	8,649	\$20,830,301
35-64	3,788	17,428	\$46,659,110
65+	3,358	20,602	\$45,391,646

Source: Oklahoma State Department of Health, Health Care Information Center for Health Statistics