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**HSC Statistical Brief No. 22**  
**Asthma Hospitalizations, 1996-2006**

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Asthma is a chronic lung disease. People with asthma have overly sensitive airways that become inflamed when exposed to certain triggers (1,2,3). Exposure to triggers causes recurrent and intermittent episodes or attacks in which the linings of the airways swell, mucus blocks the airways, and the muscles around the airways tighten. During an episode, people with asthma experience tightness in the chest, difficulty breathing, wheezing, and coughing. Although experts do not know how to cure asthma, they do agree that asthma symptoms can be adequately controlled through appropriate use of medication and avoidance of identified triggers. With proper management, people with asthma can lead healthy and active lives.

Access to health care and routine check-ups are essential to proper asthma management. In fact, the National Asthma Education and Prevention Program recommends primary care visits at least every six months to assess and monitor asthma symptoms and modify management plans as needed (4). These routine visits are intended to promote proper asthma management and to reduce symptoms and complications that may require acute care. With appropriate care and management, asthma-related acute care visits, such as hospitalizations, are often preventable and are therefore considered to be indicators of poorly controlled asthma.

This brief summarizes data obtained from the West Virginia Health Care Authority and the National Hospital Discharge Survey (NHDS) on asthma hospitalizations in West Virginia and the United States. Asthma hospitalizations are defined as hospital discharges with a primary, or first-listed, diagnosis of asthma (i.e., hospitalizations assigned a primary ICD-9-CM code of 493). See the Appendix for additional information about the data sources cited in this brief and a listing of the ICD-9-CM asthma codes. The Appendix also includes detailed tables which present the data summarized in the figures and text.

The West Virginia Bureau for Public Health's Asthma Education and Prevention Program (WV-AEPP) maintains an asthma surveillance system, promotes statewide partnerships, and implements interventions to reduce the burden of asthma in West Virginia. As a member of the Centers for Disease Control and Prevention's National Asthma Control Program, WV-AEPP has a priority goal of decreasing hospitalizations due to asthma complications. For more information about WV-AEPP and the West Virginia Asthma Coalition visit [www.wvasthma.org](http://www.wvasthma.org).

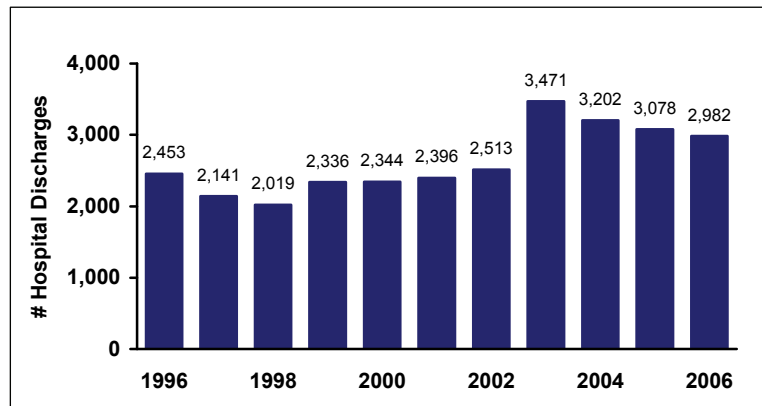
# ASTHMA HOSPITALIZATIONS

In 2006, approximately 8.5% of West Virginians, including 123,000 adults and 31,000 children, currently had asthma. During the same year, there were nearly 3,000 hospitalizations for asthma in West Virginia (see Figure 1). This equals 16.4 asthma hospitalizations per 10,000 West Virginia residents and 193.6 hospitalizations per 10,000 West Virginians with asthma.

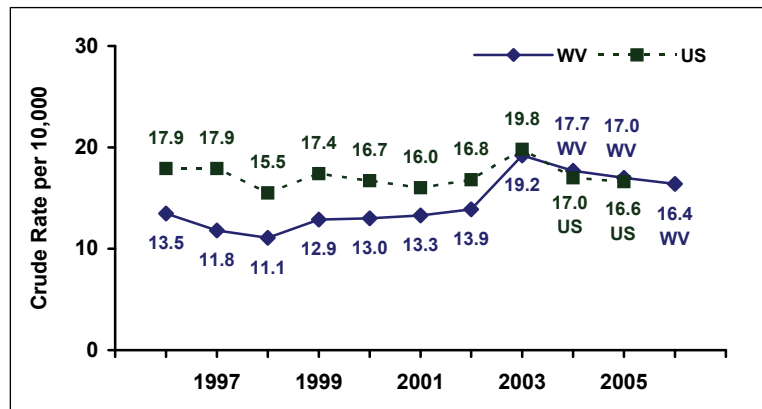
Between 1996 and 2002, the number and rate of asthma hospitalizations were relatively stable. However, in 2003 asthma hospitalizations increased sharply in the United States and in West Virginia. Although asthma hospitalizations have declined since 2003, recent rates in West Virginia remain well above those in the years 1996-2002 (see Figure 2).

Between 1996 and 2003, the asthma hospitalization rate was higher in the United States than in West Virginia (see Figure 2). However, asthma hospitalization rates nationwide have recovered from the 2003 spike and are now slightly lower than the rates in West Virginia. In 2005, there were 17.0 asthma hospitalizations per 10,000 West Virginia residents, compared with 16.6 hospitalizations per 10,000 people nationwide.

**Figure 1. West Virginia Asthma Hospitalizations, 1996-2006**



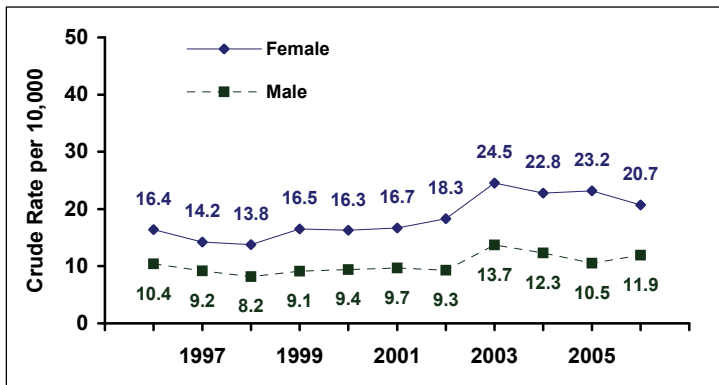
**Figure 2. Asthma Hospitalization Rates, 1996-2006\***



\* US 2006 NHDS asthma hospitalization rates are not yet available.

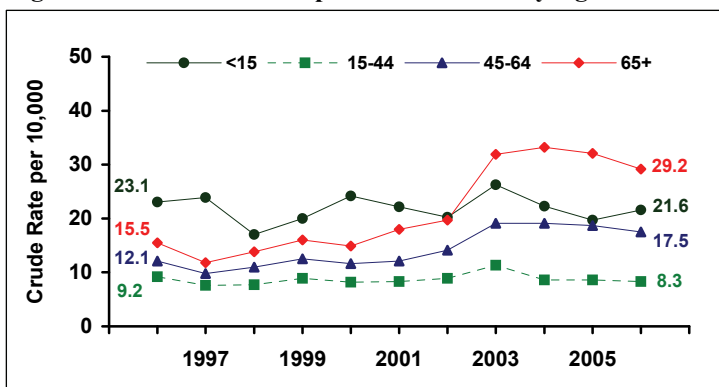
# ASTHMA HOSPITALIZATION RATES BY GENDER & AGE

**Figure 3. WV Asthma Hospitalization Rates by Gender**



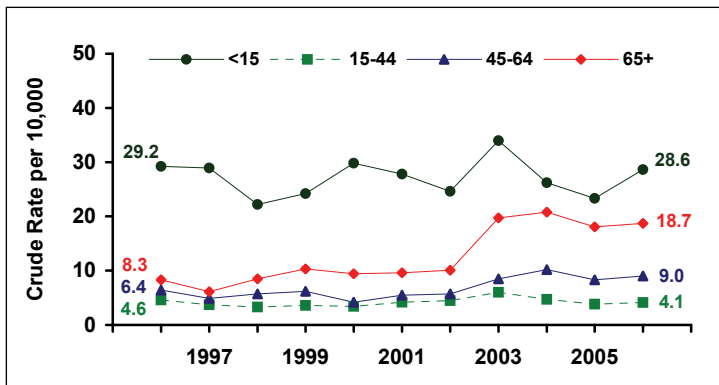
In the United States and West Virginia, the asthma hospitalization rate is higher among females than males. In 2006, 20.7 asthma hospitalizations occurred per 10,000 West Virginia females, compared with 11.9 per 10,000 males (see Figure 3 and Appendix Table A2).

**Figure 4. WV Asthma Hospitalization Rates by Age**



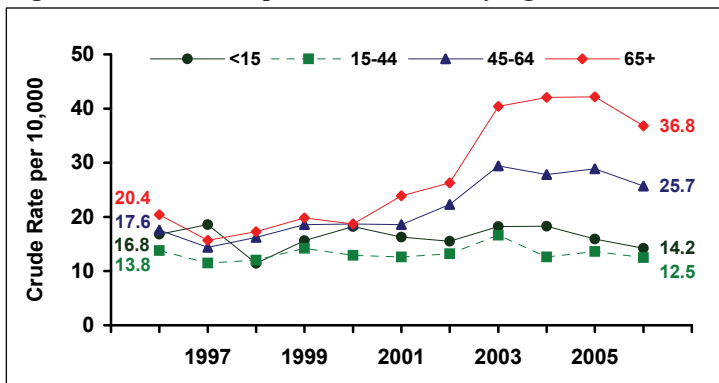
Over the past decade, the gender gap in asthma hospitalizations increased in West Virginia but not nationwide. In 1996, the asthma hospitalization rate was 58% higher among West Virginia females than males (see Figure 3). Since 1999, females have had an asthma hospitalization rate 72% (2001) to 121% (2005) higher than males.

**Figure 5. Asthma Hospitalization Rates by Age, WV Males**



Asthma hospitalizations also differ by age. Historically, asthma hospitalization rates have been highest among children under the age of 15 and lowest among those aged 15-44. However, since 2003, adults aged 65 and older have had the highest asthma hospitalization rate in West Virginia (see Figure 4). Nationwide, seniors have had the highest asthma hospitalization rate since 2005 (see Appendix Table A4 for US data).

**Figure 6. Asthma Hospitalization Rates by Age, WV Females**



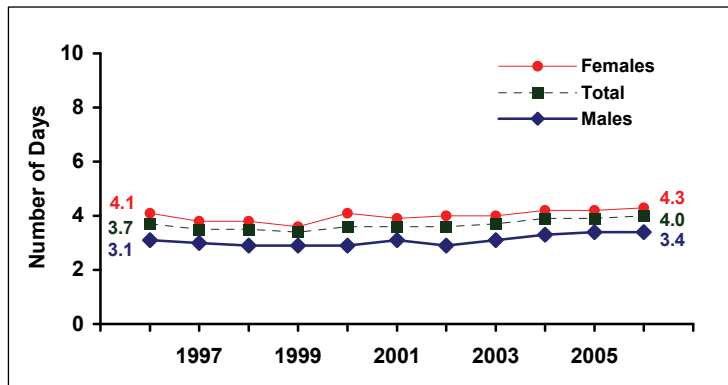
Between 1996 and 2004, the asthma hospitalization rate more than doubled among West Virginia seniors, but remained relatively stable among younger age groups (see Figure 5). In fact, the 2003 spike in asthma hospitalizations in West Virginia occurred primarily among adults aged 65 and older.

The age trend in asthma hospitalizations differs by gender. Whereas the asthma hospitalization rate is highest among females at age 65 and older, the rate is highest among males in childhood (see Figures 5 and 6). In fact, childhood is the only age at which males have a higher asthma hospitalization rate than females.

## LENGTH OF STAY, CHARGES & PRIMARY PAYORS

Length of stay is an indicator of disease severity at time of hospital admission and throughout a hospital stay. In 2006, West Virginians spent nearly 12,000 days in the hospital due to asthma, an average of 4.0 days per hospitalization (see Figure 7). Average length of stay (ALOS) for asthma hospitalizations has remained stable since 1996, when West Virginians averaged 3.7 days per asthma hospitalization (a total of 9,108 days).

**Figure 7. Avg. Length of Stay of WV Asthma Hospitalizations**

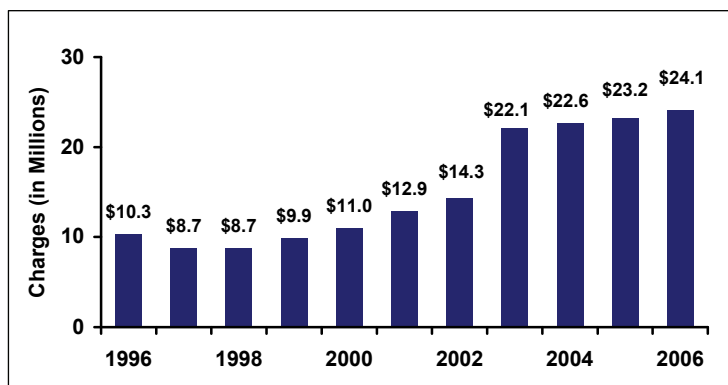


In the years 1996-2005<sup>1</sup>, the ALOS for asthma hospitalizations was slightly higher in West Virginia than the United States. For example, in 2005 the ALOS was 3.9 days in West Virginia compared with 3.3 days nationwide. In West Virginia and the United States, the average length of asthma hospital stays is higher among females than males (see Figure 7 and Table A5).

Charges for asthma hospitalizations in West Virginia increased from \$10.3 million in 1996 to \$24.1 million in 2006 (see Figure 8). In 2006, asthma hospitalization charges averaged \$8,091 per discharge and \$2,028 per day, compared with \$4,241 per discharge and \$1,136 per day in 1996.

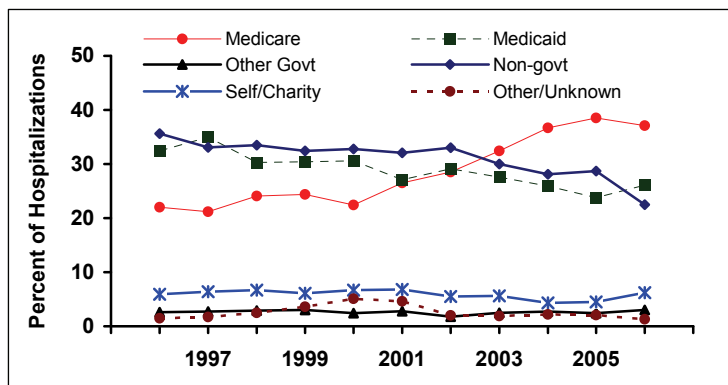
A primary payor is the expected main source of payment for a hospitalization. In the years 1996-2002, Medicaid and non-government insurers were the two most common payors for asthma hospitalizations in West Virginia (see Figure 9). Since 2003, Medicare has been charged for more than one-third of asthma hospitalizations, making it the most common payor in this state. In 2006, 37.1% of the 2,982 asthma hospitalizations were charged to Medicare, 26.1% were charged to Medicaid, and 22.5% were charged to non-government insurers.

**Figure 8. WV Asthma Hospitalization Charges**



Medicare was charged \$11.2 million for asthma hospitalizations in 2006, nearly half (46.6%) of the \$24.1 million charged that year; Medicaid was charged \$5.5 million; and non-government insurers were charged \$5.2 million. More than \$1.1 million was charged to individuals without health insurance.

**Figure 9. Asthma Hospitalizations by Primary Payor**

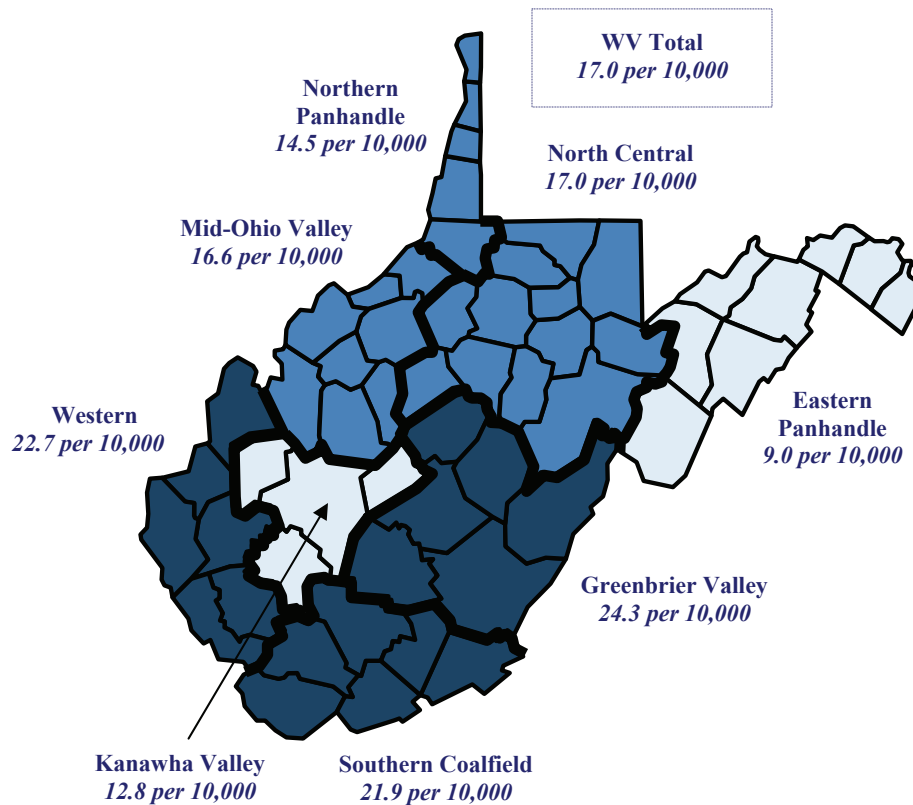


<sup>1</sup> US 2006 ALOS estimates from the NHDS are not yet available.

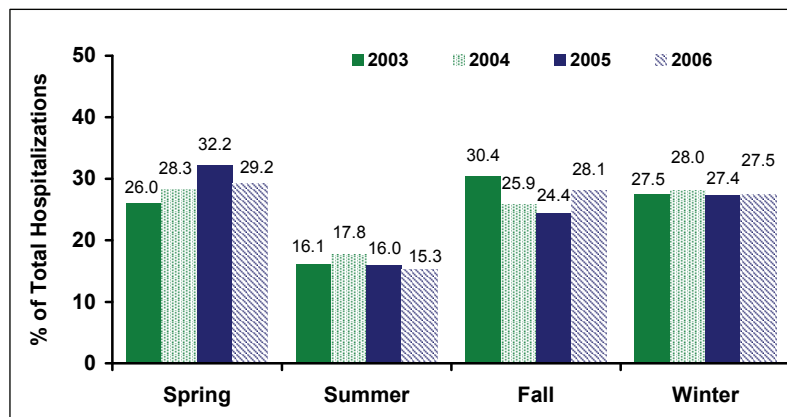
## ASTHMA HOSPITALIZATIONS BY REGION & SEASON

In West Virginia there are regional and seasonal variations in asthma hospitalizations. In the years 2004-2006, there was an average of 17.0 asthma hospitalizations per 10,000 West Virginians each year. During this time period, the average annual asthma hospitalization rate was highest in the Greenbrier Valley region (24.3 per 10,000) and lowest in the Eastern Panhandle region (9.0 per 10,000) (see Figure 10). Statewide, asthma hospitalizations are least common in the summer. Only 15% of the asthma hospitalizations in 2006 occurred in the summer months (see Figure 11). In each of the years 2004-2006, the highest number of asthma hospitalizations occurred in March.

**Figure 10. Asthma Hospitalizations by Region**  
Average Annual Crude Rates, 2004-2006



**Figure 11. Asthma Hospitalizations by Season\* of Discharge**



\* Spring = March, April, May; Summer = June, July, August; Fall = September, October, November; Winter = December, January, February.

## CONCLUSION

Asthma hospitalizations are an indicator of poorly controlled asthma because with proper management, they are often preventable. The West Virginia Asthma Education and Prevention Program, funded by the Centers for Disease Control and Prevention, has a primary goal of reducing asthma hospitalizations.

In 2003, the number and rate of asthma hospitalizations increased sharply in West Virginia and the United States. In recent years, the asthma hospitalization rate has declined, but in West Virginia the rate remains well above rates from the years 1996-2002. In 2006, there were 16.4 hospitalizations per 10,000 West Virginia residents, compared with 13.5 per 10,000 in 1996. West Virginia now has a higher rate of asthma hospitalizations than the United States. In 2006, charges for West Virginia asthma hospitalizations totaled \$24.1 million. Nearly half of this total (\$11.2 million) was charged to Medicare.

Asthma hospitalizations differ by demographic characteristics. In West Virginia and the United States, the asthma hospitalization rate is higher among the elderly (age 65 and older) than younger age groups. In West Virginia, the 2003 increase in asthma hospitalizations occurred primarily among adults aged 65 and older. In fact, before 2003, the rate of asthma hospitalizations was highest among children under the age of 15. Overall, the asthma hospitalization rate is higher among females than males. However, in West Virginia, males have a higher rate of asthma hospitalizations than females in childhood (ages 0-14). Whereas the asthma hospitalization rate is highest among females at age 65 and older, males have the highest rates in childhood.

Geographic and seasonal variations in asthma hospitalizations also exist. In the years 2004-2006, the asthma hospitalization rate was highest in West Virginia in the Greenbrier Valley region (24.3 per 10,000) and lowest in the Eastern Panhandle region (9.0 per 10,000). Asthma hospitalizations are least common in the summer months (June, July, and August).

Further analysis is needed to better understand asthma hospitalizations in West Virginia. Future work should focus on explaining the recent increases in asthma hospitalizations among adults aged 65 and older and identifying regional factors that contribute to geographic disparities in hospitalizations. This work will provide information that can be used to guide public health activities to reduce the burden of asthma in West Virginia.

## REFERENCES

1. Asthma and Allergy Foundation of America. Asthma Overview. Available online at <http://www.aafa.org/display.cfm?id=8&cont=5>. Accessed January 2008.
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4. Centers for Disease Control and Prevention. *Key Clinical Activities for Quality Asthma Care: Recommendations of the National Asthma Education and Prevention Program*. MMWR; 52(RR-6). 2003.
5. National Center for Health Statistics, Centers for Disease Control and Prevention. National Hospital Discharge Survey: Annual Summaries with Detailed Diagnosis and Procedure Data. Available online at <http://www.cdc.gov/nchs/about/major/hdasd/listpubs.htm>. Accessed January 2008.

# APPENDIX

## METHODOLOGY

The results in this brief are based on data obtained from the West Virginia Health Care Authority (WVHCA) and the National Hospital Discharge Survey (NHDS). WVHCA collects data on hospital discharges from all non-federal hospitals in the state. Information collected includes admittance and discharge dates; patient characteristics such as age, gender, marital status, and county of residence; diagnosis codes; length of stay; facility; and payor. Although the report of this information is mandated by state code and multiple quality checks are conducted by WVHCA to ensure accuracy, it is important to note that these data are self-reported by hospitals, and therefore may contain errors not known by WVHCA.

The NHDS, which has been conducted annually since 1965, is a national probability survey of non-federal short-stay hospitals in the United States. The NHDS collects data from a sample of approximately 270,000 inpatient records acquired from a national sample of about 500 hospitals. Since the NHDS is a sample of all hospitalizations that occurred, there is error associated with the estimated rates calculated from the survey. The NHDS is conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics. Results of this survey are summarized in annual reports released by the Centers for Disease Control and Prevention (5).

Crude asthma hospitalization rates are presented in the text and figures of this brief. The detailed tables in the Appendix present available age-adjusted rates. Age adjustment is a method for standardizing rates to eliminate differences in rates that are due to variations in the age composition of the populations. Crude rates are a more accurate indicator of the total burden of disease and a better method for identifying groups and regions most affected by asthma, regardless of age. The West Virginia results in this brief exclude hospitalizations to out-of-state residents and newborns. West Virginia rates were calculated based on counts obtained from WVHCA and population estimates obtained from the US Census Bureau.

The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) is the official system of assigning codes to diagnoses and procedures associated with hospital utilization. Asthma hospitalizations are defined as those with a primary diagnosis of ICD-9-CM codes 493.0-493.9.

**Table A1. ICD-9-CM Asthma Codes**

Code	Description
493.0	<b>Extrinsic asthma:</b> <i>Asthma: allergic with stated cause, atopic, childhood, hay, platinum;</i> <i>Hay fever with asthma</i>
493.1	<b>Intrinsic asthma:</b> <i>Late-onset asthma</i>
493.2	<b>Chronic obstructive asthma:</b> <i>Asthma with chronic obstructive pulmonary disease (COPD);</i> <i>Chronic asthmatic bronchitis</i>
493.8	<b>Other forms of asthma</b>
493.81	<b>Exercise induced bronchospasm</b>
493.82	<b>Cough variant asthma</b>
493.9	<b>Asthma, unspecified:</b> <i>Asthma (bronchial) (allergic NOS); Bronchitis: allergic, asthmatic</i>

Note: The following fifth-digit subclassification is for use with categories 493.0-493.2, 493.9: 0=unspecified, 1=with status asthmaticus, 2=with (acute) exacerbation. Source: <http://icd9cm.chrisendres.com/index.php>.

## DETAILED TABLES

**Table A2. Asthma Hospitalization Rates by Gender**

WEST VIRGINIA									
Year	Total			Male			Female		
	Number <sup>a</sup>	Crude <sup>b</sup>	Age-Adj. <sup>c</sup>	Number <sup>a</sup>	Crude <sup>b</sup>	Age-Adj. <sup>c</sup>	Number <sup>a</sup>	Crude <sup>b</sup>	Age-Adj. <sup>c</sup>
1996	2,453	13.5	13.7	915	10.4	10.9	1,538	16.4	16.1
1997	2,141	11.8	12.2	814	9.2	9.9	1,327	14.2	14.2
1998	2,019	11.1	11.2	724	8.2	8.6	1,295	13.8	13.5
1999	2,336	12.9	13.1	798	9.1	9.6	1,538	16.5	16.2
2000	2,344	13.0	13.3	830	9.4	10.2	1,514	16.3	16.1
2001	2,396	13.3	13.5	849	9.7	10.4	1,547	16.7	16.2
2002	2,513	13.9	13.9	820	9.3	9.9	1,693	18.3	17.5
2003	3,471	19.2	18.9	1,207	13.7	14.4	2,264	24.5	22.9
2004	3,202	17.7	17.1	1,087	12.3	12.7	2,115	22.8	21.0
2005	3,078	17.0	16.2	931	10.5	10.8	2,147	23.2	21.1
2006	2,982	16.4	15.8	1,058	11.9	12.4	1,924	20.7	18.9
UNITED STATES*									
Year	Total			Male			Female		
	Number <sup>a</sup>	Crude <sup>b</sup>	Age-Adj. <sup>c</sup>	Number <sup>a</sup>	Crude <sup>b</sup>	Age-Adj. <sup>c</sup>	Number <sup>a</sup>	Crude <sup>b</sup>	Age-Adj. <sup>c</sup>
1996	474,000	17.9	NA	195,000	15.1	NA	279,000	20.6	NA
1997	484,000	17.9	NA	204,000	15.4	NA	279,000	20.2	NA
1998	423,000	15.5	NA	168,000	12.6	NA	255,000	18.3	NA
1999	478,000	17.4	NA	190,000	14.1	NA	288,000	20.5	NA
2000	465,000	16.7	NA	198,000	14.5	NA	267,000	18.8	NA
2001	454,000	16.0	NA	186,000	13.4	NA	268,000	18.5	NA
2002	484,000	16.8	NA	196,000	13.9	NA	288,000	19.7	NA
2003	574,000	19.8	NA	232,000	16.3	NA	342,000	23.2	NA
2004	497,000	17.0	NA	207,000	14.5	NA	290,000	19.4	NA
2005	489,000	16.6	NA	192,000	13.3	NA	296,000	19.7	NA

a. Number = Discharges of inpatients from non-federal hospitals with a primary diagnosis of asthma (ICD-9-CM 493.xx); excludes newborn infants. West Virginia counts exclude discharges to out-of-state residents.

b. Crude rate per 10,000 population

c. Age-adjusted rate per 10,000 population. Age-adjusted to the 2000 US Standard Population. US age-adjusted rates not available in the National Hospital Discharge Survey Reports.

\* 2006 US data not yet available.

Note: The following US Census Bureau population estimates were used to calculate West Virginia rates: 1996-1999 intercensal resident estimates, April 1, 2000 census resident counts, 2001-2006 vintage 2006 postcensal resident estimates.

Data Sources: West Virginia Health Care Authority, UB-92 data; West Virginia Health Statistics Center. National Hospital Discharge Survey Reports.

**Table A3. Asthma Hospitalization Rates by Gender and Age, West Virginia**

TOTAL								
Year	< 15 years		15-44 years		45-64 years		≥ 65 years	
	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>
1996	787	23.1	728	9.2	505	12.1	433	15.5
1997	805	23.9	590	7.6	416	9.8	330	11.8
1998	567	17.0	589	7.7	481	11.0	382	13.8
1999	663	20.0	672	8.9	559	12.5	442	16.0
2000	795	24.2	610	8.2	526	11.6	413	14.9
2001	719	22.2	614	8.3	565	12.1	498	18.0
2002	650	20.2	646	8.9	673	14.1	544	19.7
2003	845	26.3	816	11.3	927	19.1	883	31.9
2004	716	22.3	622	8.6	943	19.1	921	33.2
2005	627	19.7	619	8.6	939	18.7	893	32.1
2006	686	21.6	589	8.3	892	17.5	815	29.2
MALE								
Year	< 15 years		15-44 years		45-64 years		≥ 65 years	
	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>
1996	510	29.2	182	4.6	130	6.4	93	8.3
1997	500	28.9	143	3.7	102	4.9	69	6.1
1998	381	22.2	127	3.3	121	5.7	95	8.5
1999	412	24.2	135	3.6	136	6.2	115	10.3
2000	503	29.8	126	3.4	95	4.2	106	9.4
2001	462	27.8	153	4.2	126	5.5	108	9.6
2002	406	24.6	165	4.5	134	5.7	115	10.1
2003	560	34.0	218	6.0	204	8.5	225	19.7
2004	430	26.2	171	4.7	247	10.2	239	20.8
2005	380	23.3	136	3.8	205	8.3	210	18.1
2006	466	28.6	147	4.1	226	9.0	219	18.7
FEMALE								
Year	< 15 years		15-44 years		45-64 years		≥ 65 years	
	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>
1996	277	16.8	546	13.8	375	17.6	340	20.4
1997	305	18.6	447	11.5	314	14.4	261	15.7
1998	186	11.4	462	12.0	360	16.2	287	17.3
1999	251	15.6	537	14.2	423	18.6	327	19.8
2000	292	18.2	484	12.9	431	18.7	307	18.7
2001	257	16.3	461	12.6	439	18.6	390	23.9
2002	244	15.5	481	13.2	539	22.3	429	26.3
2003	285	18.2	598	16.6	723	29.4	658	40.4
2004	286	18.3	451	12.6	696	27.8	682	42.1
2005	247	15.9	483	13.6	734	28.9	683	42.2
2006	220	14.2	442	12.5	666	25.7	596	36.8

a. Number = Discharges of inpatients from non-federal hospitals with a primary diagnosis of asthma (ICD-9-CM 493.xx) among West Virginia residents; excludes newborn infants.

b. Crude rate per 10,000 population

Note: The following US Census Bureau population estimates were used to calculate West Virginia rates: 1996-1999 intercensal resident estimates, April 1, 2000 census resident counts, 2001-2006 vintage 2006 postcensal resident estimates.

Data Sources: West Virginia Health Care Authority, UB-92 data; West Virginia Health Statistics Center.

**Table A4. Asthma Hospitalization Rates by Age, United States**

Year	< 15 years		15-44 years		45-64 years		≥ 65 years	
	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>	Number <sup>a</sup>	Rate <sup>b</sup>
1996	195,000	33.8	132,000	11.1	88,000	16.4	59,000	17.4
1997	214,000	35.8	117,000	9.6	88,000	15.9	65,000	19.2
1998	166,000	27.7	104,000	8.6	92,000	16.2	60,000	17.7
1999	190,000	31.5	122,000	10.0	94,000	15.9	73,000	21.2
2000	203,000	33.6	111,000	9.1	84,000	13.7	68,000	19.6
2001	182,000	30.1	104,000	8.4	92,000	14.3	76,000	21.4
2002	187,000	30.8	109,000	8.7	109,000	16.3	80,000	22.5
2003	213,000	35.0	127,000	10.2	125,000	18.3	109,000	30.5
2004	190,000	31.2	91,000	7.3	112,000	15.9	104,000	28.7
2005	159,000	26.2	98,000	7.8	119,000	16.4	112,000	30.5

a. Number = Discharges of inpatients from non-federal hospitals with a primary diagnosis of asthma (ICD-9-CM 493.xx); excludes newborn infants.

b. Crude rate per 10,000 population

Note: 2006 data not yet available.

Data Source: National Hospital Discharge Survey Reports.

**Table A5. Average Length of Stay\* of Asthma Hospitalizations**

Year	WEST VIRGINIA			UNITED STATES		
	Total	Male	Female	Total	Male	Female
1996	3.7	3.1	4.1	3.6	3.2	3.9
1997	3.5	3.0	3.8	3.4	3.0	3.7
1998	3.5	2.9	3.8	3.3	2.7	3.7
1999	3.4	2.9	3.6	3.2	2.8	3.5
2000	3.6	2.9	4.1	3.0	2.6	3.4
2001	3.6	3.1	3.9	3.2	2.7	3.6
2002	3.6	2.9	4.0	3.2	2.7	3.5
2003	3.7	3.1	4.0	3.3	2.8	3.6
2004	3.9	3.3	4.2	3.2	2.8	3.5
2005	3.9	3.4	4.2	3.3	2.8	3.7
2006	4.0	3.4	4.3	NA	NA	NA

\* Average Length of Stay = Average number of days hospitalized with a primary diagnosis of asthma (ICD-9-CM 493.xx).

Note: 2006 US data not yet available.

Data Source: West Virginia Health Care Authority, UB-92 data; West Virginia Health Statistics Center. National Hospital Discharge Survey Reports.

**Table A6. West Virginia Asthma Hospitalizations by Primary Payor<sup>a</sup>**

Year	Total		Medicare		Medicaid		Other Govt.		Non-govt.		Self/Charity		Other/Unknown	
	#	% <sup>b</sup>	#	% <sup>b</sup>	#	% <sup>b</sup>	#	% <sup>b</sup>	#	% <sup>b</sup>	#	% <sup>b</sup>	#	% <sup>b</sup>
1996	2,453		540	22.0	795	32.4	64	2.6	874	35.6	144	5.9	36	1.5
1997	2,141		453	21.2	750	35.0	57	2.7	708	33.1	137	6.4	36	1.7
1998	2,019		486	24.1	612	30.3	58	2.9	677	33.5	135	6.7	51	2.5
1999	2,336		571	24.4	710	30.4	70	3.0	758	32.4	143	6.1	84	3.6
2000	2,344		525	22.4	717	30.6	57	2.4	768	32.8	157	6.7	120	5.1
2001	2,396		636	26.5	649	27.1	68	2.8	769	32.1	164	6.8	110	4.6
2002	2,513		717	28.5	732	29.1	46	1.8	830	33.0	138	5.5	50	2.0
2003	3,471		1,124	32.4	958	27.6	86	2.5	1,042	30.0	196	5.6	65	1.9
2004	3,202		1,175	36.7	829	25.9	88	2.7	901	28.1	139	4.3	70	2.2
2005	3,078		1,184	38.5	732	23.8	74	2.4	884	28.7	139	4.5	65	2.1
2006	2,982		1,105	37.1	777	26.1	88	3.0	672	22.5	185	6.2	38	1.3

a. Primary Payor = Expected main source of payment for hospitalizations with a primary diagnosis of asthma (ICD-9-CM 493.xx) among West Virginia residents; excludes newborn infants.

b. Percent of total yearly hospitalizations.

Data Source: West Virginia Health Care Authority, UB-92 data; West Virginia Health Statistics Center.

**Table A7. Charges for West Virginia Asthma Hospitalizations by Primary Payor<sup>\*</sup>**

Year	Total	Medicare	Medicaid	Other Govt.	Non-govt.	Self/Charity	Other/Unknown
1996	10,348,464	3,275,776	3,040,813	266,144	3,148,428	463,221	154,081
1997	8,718,798	2,567,347	2,839,069	199,015	2,542,982	449,550	120,837
1998	8,660,564	3,032,602	2,295,653	272,456	2,421,907	459,949	177,997
1999	9,883,111	3,335,884	2,636,625	299,798	2,736,186	504,130	370,488
2000	10,997,596	3,359,491	3,078,229	251,515	2,981,749	753,158	573,454
2001	12,861,403	4,574,037	3,144,665	475,365	3,413,427	777,430	476,479
2002	14,297,357	5,532,715	3,908,580	228,814	3,728,819	650,312	248,117
2003	22,137,123	9,784,805	5,033,653	496,415	5,434,556	1,009,490	378,204
2004	22,598,387	10,716,927	4,960,472	661,893	5,099,213	767,864	392,018
2005	23,224,513	11,232,727	4,812,686	519,206	5,373,510	897,639	388,745
2006	24,127,141	11,240,955	5,520,300	590,859	5,242,212	1,154,649	378,165

\* Primary Payor = Expected main source of payment for hospitalizations with a primary diagnosis of asthma (ICD-9-CM 493.xx) among West Virginia residents. Excludes hospitalizations of newborn infants.

Data Source: West Virginia Health Care Authority, UB-92 data; West Virginia Health Statistics Center.

**Table A8. Average Annual Asthma Hospitalization Rates by Region, West Virginia 2004-2006**

Region	Number <sup>a</sup>	Crude Rate <sup>b</sup>	Age-Adj. <sup>c</sup>
<b>Eastern Panhandle</b> Berkeley, Grant, Hampshire, Hardy, Jefferson, Mineral, Morgan, Pendleton	652	9.0	8.9
<b>Greenbrier Valley</b> Braxton, Fayette, Greenbrier, Nicholas, Pocahontas, Webster	1,031	24.3	23.1
<b>Kanawha Valley</b> Boone, Clay, Kanawha, Putnam	1,092	12.8	11.9
<b>Mid-Ohio Valley</b> Calhoun, Jackson, Pleasants, Ritchie, Roane, Tyler, Wirt, Wood	850	16.6	15.3
<b>North Central:</b> Barbour, Doddridge, Gilmer, Harrison, Lewis, Marion, Monongalia, Preston, Randolph, Taylor, Tucker, Upshur	1,850	17.0	16.7
<b>Northern Panhandle</b> Brooke, Hancock, Marshall, Ohio, Wetzel	659	14.5	14.0
<b>Southern Coalfield</b> McDowell, Mercer, Monroe, Raleigh, Summers, Wyoming	1,421	21.9	21.4
<b>Western</b> Cabell, Lincoln, Logan, Mason, Mingo, Wayne	1,689	22.7	22.3
<b>TOTAL</b>	<b>9,262</b>	<b>17.0</b>	<b>16.4</b>

a. Number = Discharges of inpatients from non-federal hospitals with a primary diagnosis of asthma (ICD-9-CM 493.xx) among West Virginia residents; excludes newborn infants.

b. Crude rate per 10,000 population [(Number of hospitalizations / 2004-2006 average West Virginia resident population estimate)\*10,000].

c. Age-adjusted rate per 10,000 population. Age-adjusted to the 2000 US Standard Population.

Note: US Census Bureau vintage 2006 population estimates were used to calculate rates.

Data Source: West Virginia Health Care Authority, UB-92 data; West Virginia Health Statistics Center.



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*The Health Statistics Center (HSC) maintains West Virginia vital records and conducts the Behavioral Risk Factor Survey. The HSC can do customized reports and data analysis for grants, formal research, agency use, or specific community health planning activities. For additional information call the HSC and ask for a Statistical Services staff member. Visit the HSC website for electronic access to HSC reports and statistical briefs. This publication was supported by the Cooperative Agreement number U59/CCU324180-04 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention. It was produced in collaboration with the West Virginia Asthma Coalition.*