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Asthma on the Rise in Virginia and in the United States

Background

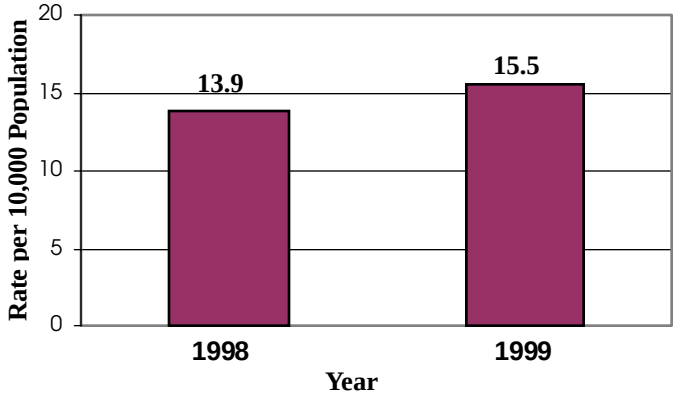
Asthma is a chronic inflammatory disorder of the airways characterized by variable airflow obstruction and airway hyper-responsiveness. The disease is manifested by acute exacerbations of wheezing, dry cough, and shortness of breath.

Triggers of asthma exacerbations include environmental factors, respiratory infections, cold, exercise and drugs. Cockroach antigens, animal dander, pollens, mold, chemical vapors, and tobacco smoke are common environmental triggers.

The underlying cause of asthma is unknown. It is believed that some people have a genetic predisposition for developing the disease. Individuals with two parents who have asthma have ten times the risk of developing asthma than those whose parents do not.[1]

Asthma affects nearly 17 million Americans, 6.4% of the U.S. population.[2] It is the most prevalent chronic childhood disease, resulting in 10 million days of school absenteeism annually.[3] In 1998, the estimated asthma prevalence rate in Virginia was 5.9% or 403,400 cases.[2]

Figure 1. Virginia Asthma Hospitalizations: 1998-1999



An asthma exacerbation can result in death if not adequately treated. The death rate from asthma has been increasing in the United States. In 1980, the rate was 11.5 per million population. In 1995, it had increased to 17.9, a 55% increase.[2] In 1998, 146 Virginians died from asthma. The rise in the rate of asthma deaths nationally is both perplexing and disturbing because the Allergy and Asthma Foundation of America estimates that 90% of asthma deaths can be prevented.[4]

A study by the Williamson Institute for Health Studies at Virginia Commonwealth University found that in Virginia, in 1994, asthma was the leading cause of hospitalization for ambulatory-sensitive conditions. These are conditions in which hospitalizations can be avoided with appropriate outpatient management. Asthma accounted for 53% of hospitalizations for these types of conditions.

A measure for monitoring how well asthma is managed in the outpatient setting is the rate of asthma hospitalizations. Between 1979-1980 and 1993-1994, the estimated number of asthma-related hospitalizations in the United States increased from 386,000 to 466,000. During this period, rates were consistently higher among blacks than among whites and highest among persons aged 0-4 years.[2]

An Analysis of Asthma Hospitalizations in Virginia, 1998-1999

Methods

We conducted a descriptive analysis of hospitalizations for asthma in 1998 and 1999 in Virginia. The database for this study was obtained from Virginia Health Information (VHI). Virginia hospitals have been mandated by the Virginia legislature to report all hospital dis-

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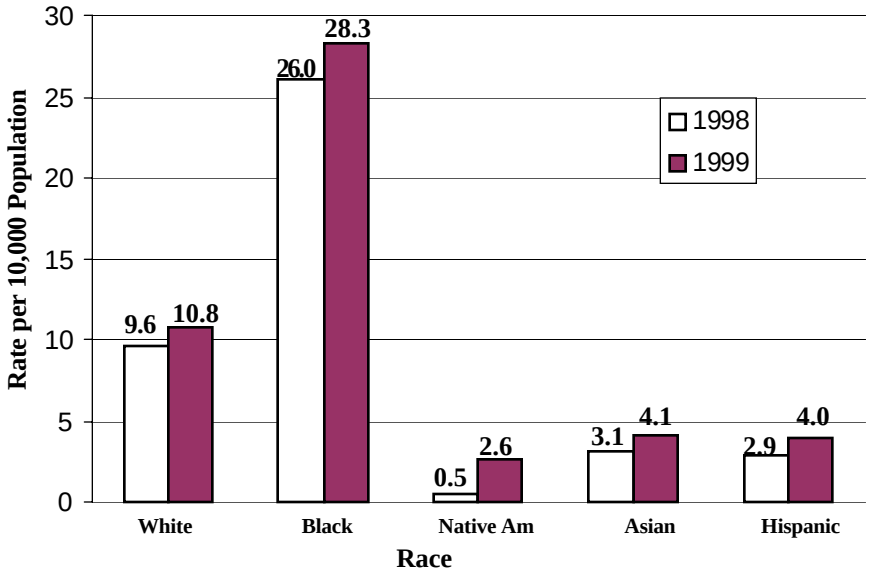
Figure 2. Virginia Asthma Hospitalizations by Race: 1998-1999



charge information since 1992. VHI compiles these data.

The database consisted of all hospital discharges coded ICD-9-CM: 493 as the primary diagnosis in 1998 and 1999. The hospital data were analyzed using the S.A.S. software system. This report captures only in-patient hospitalizations. It does not include emergency room or outpatient visits. It does not include hospitalizations of Virginians that occurred in other states.

In this report, rates are presented as the number of hospitalizations among a group of people during a one year period. That is, the unit of analysis for the numerator is a hospitalization, not an individual. If a person was hospitalized more than once in a year, he was counted more than once. Population data (the denominator) were based on U.S. Census Bureau projections for 1998 and 1999, based on the 1990 U.S. census.

Results

In 1998, there were 9,761 hospitalizations in Virginia for asthma. In 1999, the number increased to 11,035. The rate of asthma hospitalization in Virginia increased by 11.5% (Figure 1).

Rate of Hospitalization by Race and Gender

The rate of asthma hospitalization for black Virginians in 1999 was nearly three times as high as the rate for white Virginians, 28.3 per 10,000 population versus 10.8 per 10,000 population. The rate for blacks increased by 8.8% in 1999 compared to 1998, while the rate for whites increased by 12.5% (Figure 2).

In 1999, females were hospitalized for asthma at a rate of 18.0 per 10,000 population, while males were hospitalized at rate of 12.8 per 10,000. The rate for female hospitalizations in 1999 increased by 8.4% over 1998. The rate for males increased by 15.3% (Figure 3).

Rate of Hospitalization by Age

In 1999, children had a rate of hospitalization for asthma nearly twice that of adults. The age group with the highest rate of asthma hospitalization was pre-school children, age 0 to 4, at 47.1 per 10,000. This age group also had the largest increase in rate over 1998 (26.3%). Adults aged 20 to 59 had the lowest rate (10.4 per 10,000 population) and the smallest rate increase from 1998 (3.0%) (Figure 4).

Rate of Hospitalization by Locality

The four health districts with the highest rates of asthma hospitalization in 1999 were as follows:

- Richmond City Health District: 40.0 per 10,000, an increase of 22.7% over 1998
- Crater Health District (Petersburg, Hopewell, and Emporia cities and Dinwiddie, Prince George, Surry and Sussex counties): 37.8 per 10,000, an increase of 8.6%
- Piedmont Health District (Amelia, Buckingham, Charlotte, Cumberland, Lunenburg, Nottoway, and Prince Edward counties): 30.8 per 10,000, an increase of 31.6%
- Southside Health District (Brunswick, Mecklenburg and Halifax counties): 28.7 per 10,000, an increase of 27%.

Figure 3. Virginia Asthma Hospitalizations by Gender: 1998-1999

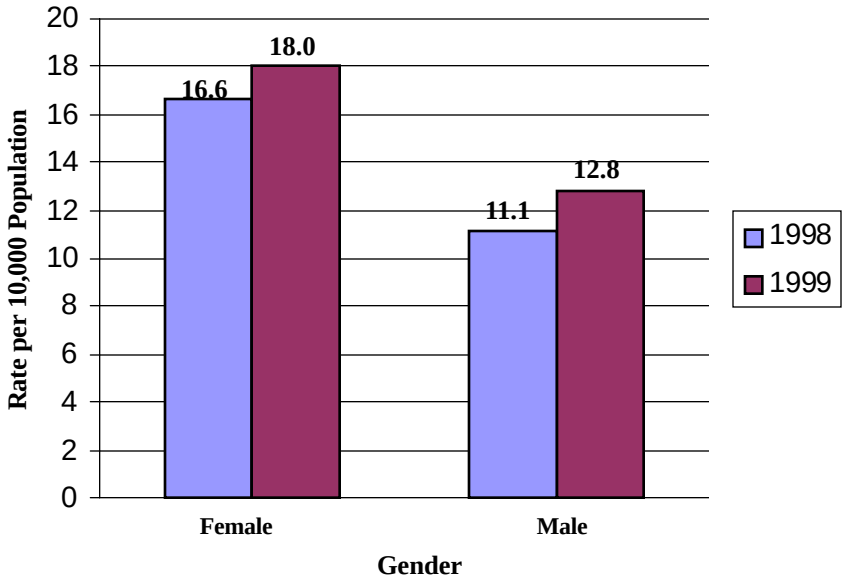
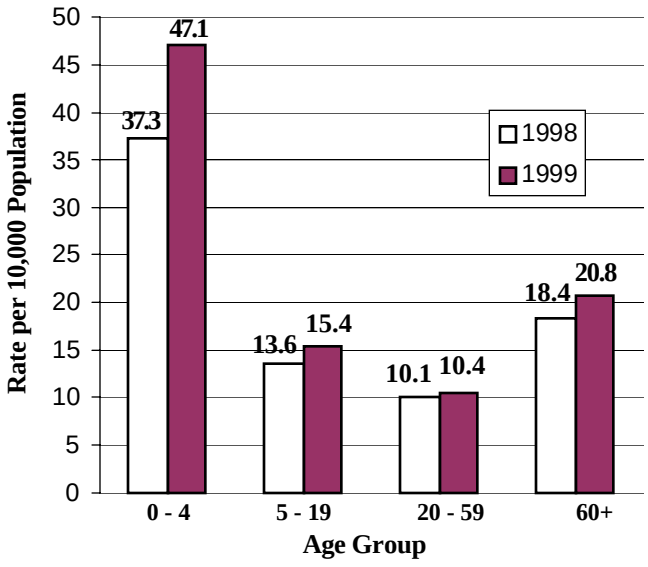


Figure 4. Virginia Asthma Hospitalizations by Age Group: 1998-1999



The four health districts with the lowest rates of asthma hospitalization in 1999 were as follows:

- Fairfax Health District: 7.1 per 10,000, an increase of 2.8% from 1998
- Arlington Health District: 7.5 per 10,000, an increase of 53.1%
- Virginia Beach Health District: 7.8 per 10,000, an increase of 11.4%
- Loudoun Health District: 11.0 per 10,000, an increase of 27.9%.

Direct Cost of Asthma Hospitalizations

Hospital charges for asthma increased by 16.4% over charges in 1998 to a total of $63,231,983. The average hospital charges per hospital stay increased with increasing age. They ranged from $3,188 for children aged 0-4 years to $8,770 for adults aged 60 and older (Figure 5).

Hospital charges correlated with length of stay. The average length of stay for an asthma hospitalization in 1999 increased with increasing age, ranging from 2.0 to 5.2 days (Figure 6).

Hospitalization by Month of Admission

In 1999, the number of hospitalizations increased dramatically in the fall to twice the number of hospitalizations during the summer months, 1,192 in September versus 536 in July. The number remained high throughout the winter months (Figure 7).

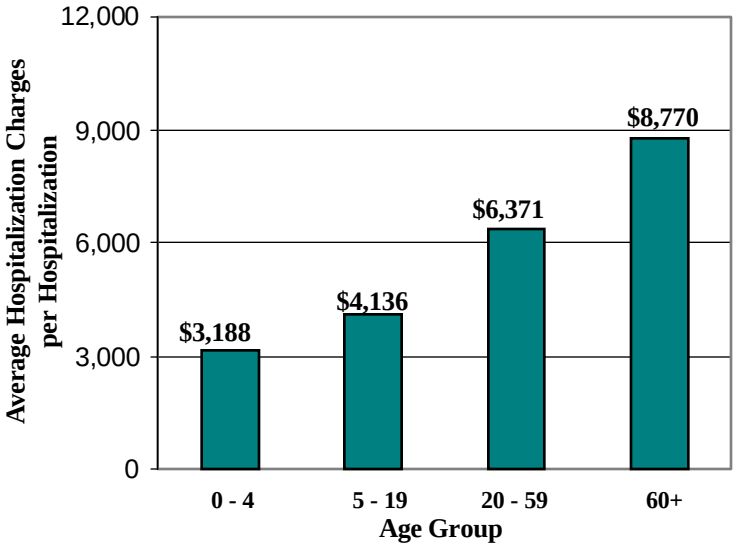
Discussion

The disparity in hospitalization rates among different races and localities points to the need for targeted interventions for those Virginians most at risk. There are striking differences between health districts with the highest rates of hospitalization and those with the lowest rates. First, in all of the health districts with high rates, the black population constitutes greater than 40% percent of the total population. In those with low rates, blacks constitute less than 16%. Second, all of the areas with high rates have median household incomes below the state's average. In contrast, all of the areas with low rates have median household incomes above the state's average. Third, in health districts with high rates, greater than 20% of children live below the poverty level, with some areas approaching 40%. In health districts with low rates, only 5 to 16% of children live in poverty.

Asthma hospitalizations can be prevented with appropriate outpatient management. A critical first step in prevention is educating asthma patients about their disease and about the importance of managing it effectively. Other vital measures include identifying asthma triggers for each individual patient, providing proper maintenance medication, and ensuring continuity of care.

Special programs and materials about asthma prevention are currently being prepared by local asthma coalitions across the state. Physicians who treat patients at higher

Figure 5. Average Direct Cost of Asthma Hospitalization by Age, Virginia, 1999



Asthma Resources

Virginia Asthma Coalition: ***http://www.virginiaasthmacoalition.org***

American Academy of Allergy, Asthma & Immunology: ***http://www.aaaai.org***

Lung Information for Health Care Professionals: ***http://rover.nhlbi.nih.gov (click on health information)***

Allergy & Asthma Network: ***http://www.aanma.org***

Allergy, Asthma & Immunology Online: ***http://www.allergy.mcg.edu***

American Lung Association: ***http://www.lungusa.org***

Current National Heart Lung and Blood Institute, NIH, Asthma Treatment Guidelines

Step 1 – Mild Intermittent Asthma – symptoms ≤ twice per week

- No daily medications needed
- Short-acting inhaled B_2-agonist PRN

Step 2 – Mild Persistent Asthma - symptoms > 2x per wk but not every day

- One daily medication needed – low-dose inhaled corticosteroid, inhaled non-steroidal anti-inflammatory OR leukotriene modifier
- Short-acting inhaled B_2-agonist PRN

Step 3 – Moderate Persistent Asthma – daily symptoms

- Daily medications needed –
  a. Low to medium dose inhaled corticosteroid
  b. Consider adding long-acting inhaled B_2-agonist
  c. Consider adding inhaled non-steroidal anti-inflammatory OR leukotriene modifier
- Short-acting inhaled B_2-agonist PRN

Step 4 – Severe Persistent Asthma – continual symptoms

- Daily medications needed –
  a. High-dose inhaled corticosteroid
  b. Long-acting inhaled B_2-agonist
  c. Long-term oral corticosteroids
  d. Consider adding inhaled non-steroidal anti-inflammatory OR leukotriene modifier
- Short-acting inhaled B_2-agonist PRN

Inhaled B_2-agonist = albuterol, pirbuterol acetate, terbutaline or bitolterol

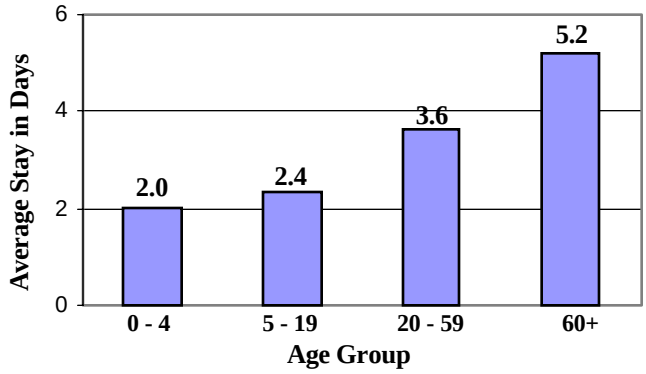
Inhaled corticosteroid = beclomethasone diproprionate, budesonide, flunisolide, fluticasone propionate, or triamcinolone acetonide

Inhaled non-steroidal anti-inflammatory = cromolyn sodium or nedrocromil sodium

Leukotriene modifier = montelukast sodium, zafirlukast or zileuton

Long-acting inhaled B_2-agonist = salmeterol or formoterol

Figure 6. Average Length of Stay per Asthma Hospitalization by Age, Virginia, 1999



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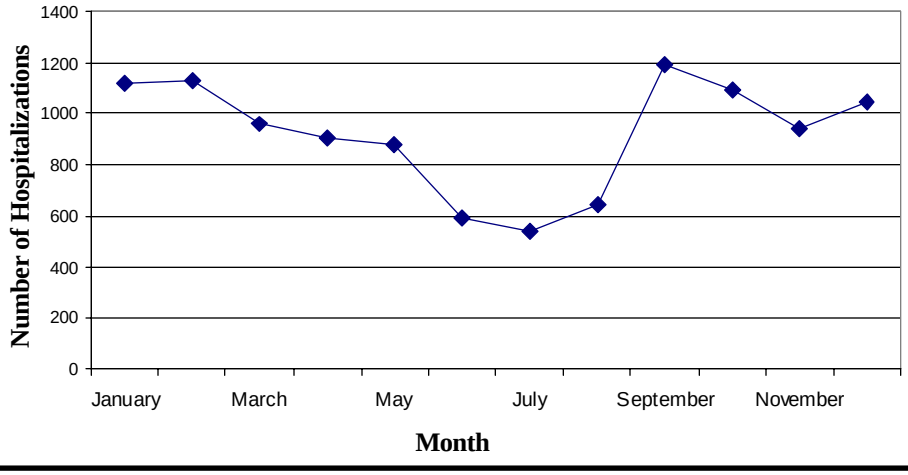
1. Sheffer Al, Taggert VS, The National Asthma Education Program, expert panel report guidelines for the diagnosis and management of asthma. *Med Care* 1993; 31 (suppl): MS20-MS28.
2. CDC. Forecasted State-Specific Estimates of Self-Reported Asthma Prevalence – United States, 1998. *MMWR* 1998;47.
3. Fact Sheet, National institute of Allergy and Infectious Diseases, National Institutes of Health, Public Health Service, U.S. Department of Health and Human Services, 1998.
4. Joint Commission on Health Care. Virginia Asthma Study for HJR 729. 1999.

Submitted by Lilian Peake, MD, MPH, Preventive Medicine Resident, Medical College of Virginia, Virginia Commonwealth University.

risk of hospitalization and death are encouraged to develop asthma educational programs within their practices and in conjunction with local community efforts. For more information about asthma programs in your area, contact the Virginia Asthma Coalition president, Donna Reynolds at (804) 267-1900.

Figure 7. Virginia Asthma Hospitalizations by Month of Admission, 1999



Cases of Selected Notifiable Diseases Reported in Virginia*

Disease	Total Cases Reported, February 2001: State	Regions: NW	N	SW	C	E	Total Cases Reported Statewide, January through February: This Year	Last Year	5 Yr Avg
AIDS	72	6	31	9	8	18	107	165	139
Campylobacteriosis	21	1	9	4	3	4	37	20	44
***E. coli* O157:H7**	2	1	0	1	0	0	2	3	2
Giardiasis	44	6	22	10	2	4	62	56	45
Gonorrhea	818	51	29	196	195	347	1618	1444	1480
Hepatitis A	11	0	4	1	1	5	20	28	20
B, acute	5	1	0	2	0	2	11	21	13
C/NANB, acute	0	0	0	0	0	0	0	0	2
HIV Infection	72	2	18	2	19	31	118	125	123
Lead in Children†	54	5	6	12	16	15	68	44	63
Legionellosis	1	0	1	0	0	0	2	3	2
Lyme Disease	1	0	0	1	0	0	2	1	0
Measles	0	0	0	0	0	0	0	0	0
Meningococcal Infection	7	2	1	3	1	0	10	11	9
Mumps	0	0	0	0	0	0	0	1	1
Pertussis	0	0	0	0	0	0	0	1	2
Rabies in Animals	24	6	5	4	3	6	43	71	66
Rocky Mountain Spotted Fever	0	0	0	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	0	0	0
Salmonellosis	45	6	16	8	9	6	76	48	80
Shigellosis	8	1	4	1	1	1	12	10	29
Syphilis, Early§	38	1	2	10	8	17	52	53	94
Tuberculosis	21	0	7	2	3	9	24	8	41

Localities Reporting Animal Rabies This Month: Accomack 3 raccoons; Alleghany 1 skunk; Amherst 1 raccoon; Fairfax 2 raccoons, 2 skunks; Fauquier 2 raccoons; Giles 1 raccoon; Loudoun 1 raccoon; Montgomery 1 raccoon; Newport News 1 raccoon; Norfolk 1 raccoon; Northampton 1 raccoon; Powhatan 1 raccoon; Prince Edward 1 raccoon; Rappahannock 1 raccoon; Richmond City 1 raccoon; Rockingham 1 cow, 2 raccoons.
Toxic Substance-Related Illnesses: Asbestosis 28; Lead Exposure 17; Pneumoconiosis 4.
*Data for 2001 are provisional.
†Elevated blood lead levels ≥10µg/dL.
§Includes primary, secondary, and early latent.

Attention Infection Control Professionals

The Association for Professionals in Infection Control and Epidemiology, Inc., Virginia Chapter, has announced the 26th Annual Education Conference.

Date: September 19-21, 2001

Location: Radisson Hotel, Lynchburg, VA

Contact: Kathy Bailey, RN, CIC
Centra Health, Infection Control
3300 Rivermont Avenue
Lynchburg, VA 24503
Phone: (804) 947-4674
Fax: (804) 947-5453
E-mail: kathy.bailey@centrahealth.com

Special Note: On September 18, a pre-conference certification / recertification review course will be offered.

Cases of Selected Notifiable Diseases Reported in Virginia*

Disease	Total Cases Reported, March 2001: State	Regions: NW	N	SW	C	E	Total Cases Reported Statewide, January through March: This Year	Last Year	5 Yr Avg
AIDS	104	12	29	7	14	42	211	252	240
Campylobacteriosis	34	7	9	8	2	8	71	49	82
***E. coli* O157:H7**	4	1	0	1	0	2	6	6	4
Giardiasis	44	8	7	10	13	6	105	94	74
Gonorrhea	787	41	65	103	253	325	2394	2431	2267
Hepatitis A	15	2	5	4	2	2	35	45	42
B, acute	18	2	6	2	6	2	29	34	27
C/NANB, acute	0	0	0	0	0	0	0	0	3
HIV Infection	85	7	12	9	22	35	202	189	209
Lead in Children†	43	3	4	7	21	8	112	64	99
Legionellosis	1	0	0	1	0	0	3	3	3
Lyme Disease	0	0	0	0	0	0	2	5	1
Measles	0	0	0	0	0	0	0	0	1
Meningococcal Infection	5	1	1	0	0	3	16	17	15
Mumps	1	0	0	1	0	0	1	1	2
Pertussis	5	1	2	0	0	2	6	5	5
Rabies in Animals	47	16	2	6	10	13	90	118	125
Rocky Mountain Spotted Fever	0	0	0	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	0	0	0
Salmonellosis	62	8	13	16	15	10	138	94	141
Shigellosis	15	0	5	10	0	0	27	14	53
Syphilis, Early§	36	1	3	10	10	12	85	88	152
Tuberculosis	25	0	15	0	1	9	47	46	72

Localities Reporting Animal Rabies This Month: Accomack 1 raccoon; Albemarle 1 skunk; Augusta 1 raccoon, 1 skunk; Bath 1 fox, 1 raccoon; Bedford 1 fox; Botetourt 1 raccoon; Caroline 1 skunk; Clarke 1 raccoon; Fauquier 1 raccoon, 1 skunk; Gloucester 3 raccoons; Halifax 1 raccoon; Hampton 1 raccoon; Hanover 2 raccoons; Henrico 1 raccoon; Henry 1 raccoon; Highland 1 skunk; Hopewell 1 raccoon; Loudoun 1 raccoon; Mecklenburg 1 bobcat; Nelson 1 raccoon; Newport News 1 raccoon; Northampton 1 raccoon; Nottoway 1 skunk; Orange 1 cow, 1 raccoon, 1 skunk; Pittsylvania 1 skunk; Prince George 2 raccoons; Prince William 1 raccoon; Richmond City 1 raccoon; Roanoke 1 skunk; Rockingham 1 fox; Shenandoah 1 raccoon; Southampton 1 raccoon; Virginia Beach 4 raccoons; Wythe 1 skunk; York 1 raccoon.

Toxic Substance-Related Illnesses: Asbestosis 35; Lead Exposure 12; Mesothelioma 1; Pneumoconiosis 10.

*Data for 2001 are provisional. †Elevated blood lead levels ≥10µg/dL. §Includes primary, secondary, and early latent.

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