

THE BURDEN OF ARTHRITIS IN WEST VIRGINIA

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EXECUTIVE SUMMARY

General Facts

- Arthritis, the leading cause of disability in the United States, actually comprises more than 100 diseases that involve the joints, the tissues that surround the joints, and other connective tissue.
- Arthritis affects approximately 43 million Americans, including 300,000 children.
- The Arthritis Foundation estimates that arthritis costs society about \$125 billion annually, \$43 billion in direct medical costs and \$82 billion in indirect costs.
- The most common form of arthritis is osteoarthritis, or degenerative arthritis, which affects approximately 10% of Americans, rising to 70% to 90% of people older than 75. Other types of arthritis include rheumatoid arthritis, juvenile rheumatoid arthritis, lupus, gout, and fibromyalgia.
- Risk factors for arthritis include female gender, older age, obesity, physical inactivity, sports and other injuries to a joint, and occupational lifting.

West Virginia Statistics

- In 2003, 37% of West Virginia adults reported that they had been diagnosed with arthritis. This rate was the highest in the United States. Thirty-five percent (35%) of men and 39% of women reported having arthritis.
- The CDC estimates that a total of \$750 million was expended in West Virginia in 1997 on arthritis-related conditions.
- West Virginia adults with arthritis are significantly more likely than those without arthritis to be obese (34% vs. 24%, respectively) and physically inactive (36% vs. 23%, respectively).
- People with arthritis in West Virginia are also more likely to report high blood pressure, high cholesterol, diabetes, and asthma than are people without arthritis.
- Arthritis-related hospitalization charges for West Virginia residents in West Virginia hospitals increased 119% from 1996 to 2003.
- Average charges for 2003 arthritis-related hospitalizations were highest for rheumatoid arthritis, followed by osteoarthritis of the spine and lupus.

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THE WEST VIRGINIA ARTHRITIS COALITION

Arthritis is the leading cause of disability in the United States, affecting some 43 million people nationwide, including 300,000 children (1). Although arthritis affects people of all ages, the prevalence increases with age; thus, West Virginia, with its older population, faces a serious problem both in terms of individual suffering and societal and economic costs.

While the focus of the medical community is on treating arthritis in the individual patient, the public health approach targets the entire population. In order to impact the burden of arthritis in West Virginia, further definition of the problem in the state, i.e., identifying the needs of those residents who suffer from, or at risk for, arthritis, is of the highest priority. Awareness of the condition and the fact that prevention strategies do exist, e.g., weight control, exercise, injury prevention in the workplace and in sports activities, and protection from tick bites and the potential for Lyme disease, must be emphasized, both to the general public and to health care providers. The importance of early diagnosis must also be stressed, for it is estimated that 2,000,000 people nationwide do not see a doctor even when arthritis is limiting their usual activities.

To this end, the West Virginia Bureau for Public Health and the Arthritis Foundation, Ohio River Valley Chapter, are collaborating in the

development of the **West Virginia Arthritis Coalition**. This statewide council, which held its first meeting in February 2005, is open to all organizations and individuals that are committed to improving the quality of life for people with arthritis. The coalition will initially focus on three primary areas: (1) public awareness of arthritis, (2) defining the burden of arthritis in the state, and (3) educating primary care practitioners.

This report describes the impact of arthritis in West Virginia and can educate both health care professionals and the public about the disease itself and the profound effects of arthritis upon the state's residents. As such, this report represents a significant step toward fulfilling each part of the Coalition's mission.

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THE PREVALENCE OF ARTHRITIS IN WEST VIRGINIA

Arthritis, one of the most common chronic conditions reported by the American population, actually comprises more than 100 diseases that involve the joints, the tissues that surround the joints, and other connective tissue. Affecting approximately 43 million Americans, including 300,000 children, it is the leading cause of disability in the United States, causing some level of activity limitation in nearly one in six affected, or more than 7 million people (1).

Arthritis affects people of all ages, but prevalence increases with age, striking nearly one-half of all people over the age of 65. Because of a decline in fertility and increases in life expectancy, the American population is aging, with a growing percentage of people in the upper age brackets, and this proportion will continue to grow during the twenty-first century. According to the U.S. Census Bureau, the proportion of people aged 65 and older in the United States is expected to increase from 12.4% in 2000 to 19.6% in 2030 (2). In West Virginia, the proportion of older residents is projected to be even larger, an increase from 15.3% to 24.8% (3). In fact, the Census Bureau has projected that West Virginia will rank 7th in 2030 among all 50 states and the District of Columbia in the proportion of its population that is 65 or older.

In a 2003 study, the U.S. Centers for Disease Control and Prevention (CDC) estimated that 61.4% of West

Virginia residents aged 65 and older will be affected by arthritis by 2025 (4).

More than 6 out of every 10 West Virginia residents aged 65 and older will be affected by arthritis by 2025.

U.S. Centers for Disease Control and Prevention

PREVALENCE. The current prevalence of arthritis in West Virginia was estimated using data from the Behavioral Risk Factor Surveillance System (BRFSS), a random sample telephone survey designed to measure selected behaviors and health problems in the adult population (18 years of age and older). The BRFSS is conducted in a total of 54 governmental entities, including all 50 states, the District of Columbia, and three U.S. territories.

The 2003 West Virginia BRFSS (WVBRFSS) survey included several questions on arthritis and other rheumatic conditions (AORC). Over half of the respondents (55.9%) reported that they had had symptoms of pain, aching, or stiffness in or around a joint (not including neck or back) during the previous 30 days. Of those, 84.5% reported that their symptoms had begun more than three months prior to the interview.

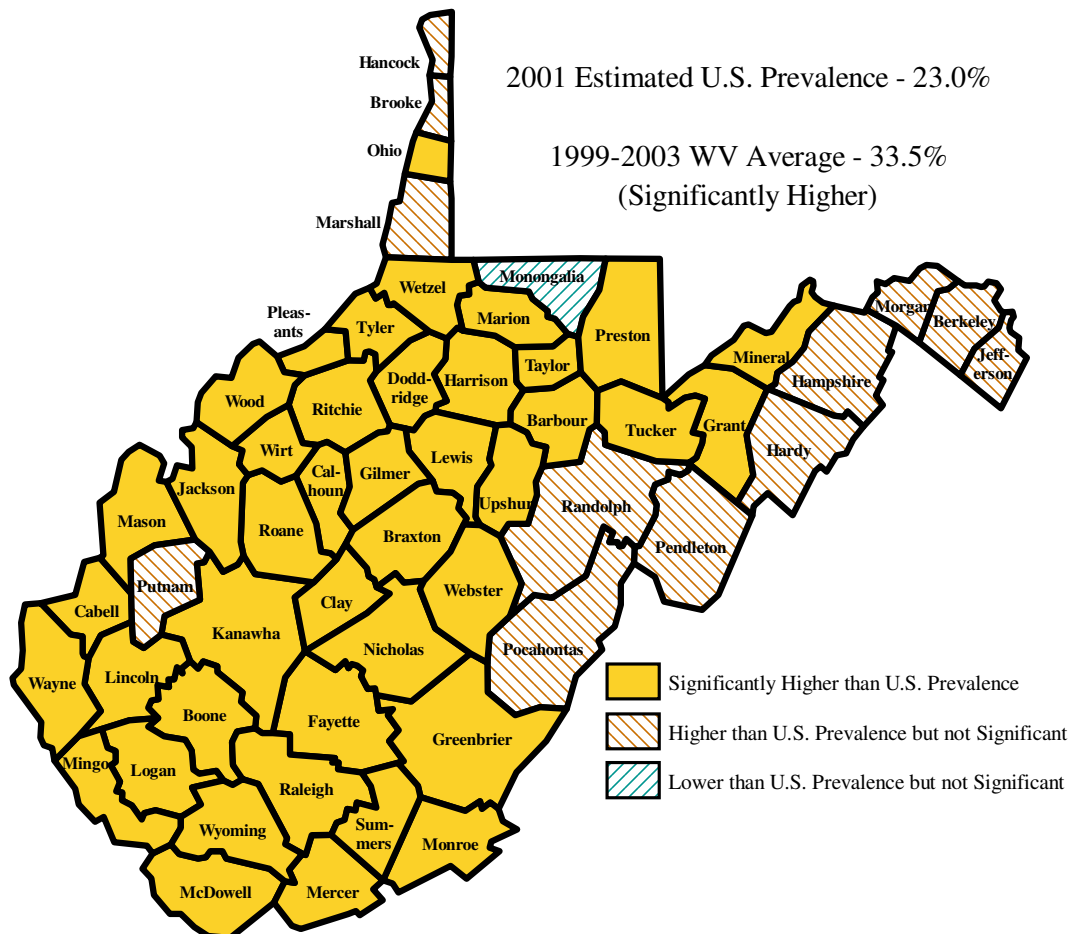
Respondents were then asked “Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?”

Thirty-seven percent (37.2%) of West Virginia adults (an estimated 529,169 individuals) answered “yes” to this question, the *highest rate* among the 54 participants in the 2003 BRFSS. The state rate was significantly higher than that for the United States as a whole

(27.1%; 95% CI: 26.8, 27.4). No significant difference was reported in the state by gender; 34.9% of men had AORC, compared with 39.3% of women. The rate of being diagnosed with AROC increased with age, from 7.4% of respondents aged 18-24 to 62.2% of those aged 65 and older. Adults with less education and lower incomes were more likely than others to have AORC. Table 1 below presents the prevalence of AORC by gender, age, education, and income.

Table 1. Prevalence (%) of Arthritis by Sex, Age, Education, and Income West Virginia Behavioral Risk Factor Surveillance System, 2003						
Characteristic	Men		Women		Total	
	% at risk	95% CI	% at risk	95% CI	% at risk	95% CI
Total	34.9	32.1-37.8	39.3	37.0-41.7	37.2	35.4-39.0
Age						
18-24	6.4	0.8-12.1	8.3	2.9-13.8	7.4	3.4-11.3
25-34	20.4	14.0-26.9	15.3	10.6-20.0	17.9	13.9-21.8
35-44	30.0	23.6-36.3	27.1	21.7-32.6	28.5	24.3-32.7
45-54	41.0	34.7-47.2	40.5	35.3-45.8	40.8	36.7-44.8
55-64	49.7	43.0-56.4	60.4	55.2-65.6	55.1	50.9-59.4
65+	56.3	50.0-62.6	66.3	61.9-70.7	62.2	58.6-65.9
Education						
Less than H.S.	46.0	38.7-53.3	55.0	49.5-60.5	50.6	46.0-55.2
H.S. or G.E.D.	34.4	30.0-38.8	40.0	36.2-43.7	37.3	34.4-40.2
Some Post-H.S.	31.0	25.0-37.0	35.0	30.3-39.8	33.3	29.5-37.0
College Grad.	29.1	23.5-34.8	27.3	22.4-32.1	28.2	24.5-32.0
Income						
< \$15,000	51.1	42.3-59.9	50.6	44.6-56.5	50.8	45.7-55.9
\$15,000-\$24,999	43.6	37.0-50.2	44.2	39.2-49.3	43.9	39.9-48.0
\$25,000-\$34,999	38.4	31.0-45.9	37.8	31.5-44.1	38.1	33.3-42.9
\$35,000-\$49,999	34.1	27.2-41.0	36.2	30.0-42.4	35.1	30.4-39.8
\$50,000-\$74,000	29.2	21.8-36.5	24.4	18.4-30.5	26.8	22.0-31.6
\$75,000+	21.6	15.0-28.2	21.5	14.8-28.3	21.6	16.7-26.4

other rheumatic conditions by county, showing how each county compares with the United States prevalence. (Individual county rates and ranks can be found in Appendix A.)



THE FINANCIAL AND SOCIETAL COSTS OF ARTHRITIS

In 2003, the Arthritis Foundation released new estimates of the economic impact of arthritis. The study, published in the February 2003 issue of *Arthritis Care & Research*, estimated the cost to society at \$124.8 billion annually in 2000 dollars (5). Of the total, \$42.6 billion were direct medical costs and \$82.2 billion represented indirect costs (lost productivity among persons aged 18-64).

A previous study by the Centers for Disease Control and Prevention (CDC) generated state-specific estimates of arthritis costs using 1995 dollars to estimate 1997 costs: **In West Virginia a total of \$750 million was expended in 1997 on arthritis and other rheumatic conditions, \$445 million in direct medical costs and \$305 million in indirect costs (6).** Arthritis-related inpatient hospitalization costs among West Virginia residents in West Virginia hospitals increased 119% from 1996 to 2003. Additional information on arthritis-related hospitalizations in West Virginia can be found on pages 21 through 24 of this report.

Researchers from Northwestern University used data from the 1999-2000 Medical Expenditure Panel Survey to generate expenditures for arthritis patients aged 45 and older. Overall, people with arthritis (all types) had over twice the total health care expenditures as did with people without arthritis (7). Rheumatoid arthritis (RA) incurred the highest costs among the different types of arthritis. Data from the same study, released at the Rheumatology Congress held in Vienna in 2004, indicated that

medical care for RA averaged \$7337 per year, compared with \$3250 among people without RA (8). Nearly 70% of the medical costs attributed to RA were for hospitalizations and home nursing care (9). It is estimated that RA patients account for more than nine million doctor visits and 250,000 hospitalizations annually.

Estimated Annual Costs of Arthritis in West Virginia, 1997

**Direct Medical Costs: \$445 million
Indirect Costs: \$305 million**

Total: \$750 million

Arthritis is the most commonly reported cause of disability in the United States (10), as well as being second only to heart disease as a cause of work disability (11). Labor force participation is lower among people with arthritis; according to the National Academy on an Aging Society, 1.8 million working-age people are not working because of arthritis-related limitations (12). Workers with arthritis earn less than those without arthritis, and premature retirement is more common among persons with arthritis (12). Again, RA results in the most serious limitations. Up to 85% of patients with RA are unable to work by the 11th year of the onset of their disease, with nearly 30% of these becoming disabled within 3 years (9). RA patients lose, on average, 50% of their potential earnings due to disability (9).

The *Chartbook on Work and Disability, 1998* released data showing that West Virginia ranked first among the 50 states in the overall percentage of working-age persons with disabilities (12.6%) (11).

The 2003 WVBRFSS survey included questions on arthritis-related activity limitations. Thirty-six percent (36.3%) of WVBRFSS respondents who reported having had joint pain for at least three months and/or having been diagnosed with arthritis by a health professional answered “yes” to the question “Are you now limited in any way in your usual activities because of arthritis or joint symptoms?” This was the fourth highest rate among the 54 BRFSS participants and significantly higher than the national rate of 29.7% (95% CI: 29.3, 30.2).

Thirty-two percent (31.6%) of WVBRFSS respondents who reported joint pain for at least three months and/or had been diagnosed with arthritis by a health professional and were aged 18 through 64 said “yes” when asked “Do arthritis or joint symptoms now affect where you work, the type of work you do, or the amount of work you do?” This rate was the fifth highest in the nation and again significantly higher than the national average of 26.0% (95% CI: 25.5, 26.6).

Thirty-five percent (35.0%) of state men reported activity limitation, compared with 37.5% of women; 32.4% of men had some work limitation, compared with 30.8% of women. These differences were not statistically

significant. Table 2 on the following page presents the prevalence of arthritis-related limitations by gender, age, education, and income level in the state.

In general, activity and work limitations increased with age and decreased with increasing education and income. Respondents with less than a high school education or its equivalent were significantly more likely to report activity and work limitations than were their better-educated peers. Persons with household incomes of less than \$25,000 were significantly more likely to report limitations than those with incomes of \$35,000 or greater.

West Virginians are significantly more likely to report arthritis-related activity and work limitations than the national average.

2003 BRFSS

Because people who have arthritis have more activity and work limitations than people who do not have arthritis, they have more concerns about health and financial issues. The National Academy on an Aging Society found that persons aged 51 to 61 surveyed in the *1992 Health and Retirement Study* (HRS) were markedly more likely to be dissatisfied with their health conditions and financial situations if they had arthritis (12). Nearly one-fourth (24%) of those surveyed with arthritis were dissatisfied with their health, compared with only 9% of their counterparts without arthritis; 31% of those with arthritis expressed dissatisfaction with their financial situation versus 20% of those without arthritis.

Nationally, one-third of the population with arthritis reported having only fair or poor health, compared with just 7% of people without arthritis, according to data from the HRS (12). West Virginia adults were asked to rate their health in the 2003 BRFSS. Among those with arthritis, 41.7% reported that their health was only fair or poor versus 15.5% of those without arthritis.

In West Virginia, only 58% of people with arthritis consider their health to be good, very good, or excellent, compared with 84% of people without arthritis.

2003 BRFSS

Table 2. Prevalence of Arthritis-Related Limitations among Adults West Virginia Behavioral Risk Factor Surveillance System, 2003				
Characteristic	Arthritis or joint symptoms limit usual activities*		Arthritis or joint symptoms affect place of work, type of work, or amount of work**	
	% at risk	95% CI	% at risk	95% CI
Total	36.3	34.0-38.7	31.6	28.8-34.3
Gender				
Male	35.0	31.1-38.7	32.4	28.2-36.7
Female	37.5	34.5-40.4	30.8	27.3-34.2
Age				
18-24	21.7	9.8-33.7	21.2	9.5-32.8
25-34	28.2	21.1-35.4	30.7	23.4-38.0
35-44	37.7	31.4-44.1	31.9	25.8-38.1
45-54	36.5	31.6-41.4	33.1	28.3-38.0
55-64	42.7	37.7-47.8	33.3	28.5-38.0
65+	37.8	33.6-42.1	--	--
Education				
Less than H.S.	49.7	44.5-55.0	50.3	43.0-57.6
H.S. or G.E.D.	36.0	32.3-39.7	34.3	29.9-38.7
Some Post-H.S.	30.3	25.5-35.0	23.0	18.1-28.0
College Graduate	26.0	20.8-31.2	16.9	11.9-21.9
Income				
<\$15,000	57.6	51.8-63.4	55.1	47.7-62.5
\$15,000-\$24,999	41.5	36.6-46.4	44.0	37.6-50.4
\$25,000-\$34,999	30.1	24.0-36.2	31.3	23.8-38.8
\$35,000-\$49,999	27.2	21.1-33.2	23.2	16.7-29.8
\$50,000-\$74,999	26.4	19.6-33.2	15.3	9.9-20.8
\$75,000+	17.6	11.2-24.0	11.9	6.2-17.5

*Among adults who reported three months of joint pain or diagnosis of arthritis by a doctor or health care professional

**Among adults aged 18 through 64

TYPES OF ARTHRITIS

There are more than 100 different diseases that fall under the umbrella of arthritis. State figures, however, are available only for those diseases targeted in the BRFSS survey, i.e., arthritis (osteoarthritis), rheumatoid arthritis, gout, lupus, and fibromyalgia. For this reason, only those types of AORC are described below.

The most common form of arthritis is **osteoarthritis** (OA), also known as “wear and tear” or degenerative arthritis. It is estimated that approximately 10% of people in the United States are affected by osteoarthritis, rising to 70% to 90% of people older than 75. OA is caused by the gradual degeneration of joint cartilage, which normally acts to cushion the bones in a joint. Healthy cartilage replaces itself, a process that is disrupted when osteoarthritis sets in. When the cushion of cartilage disappears, the bones can thicken and often produce bone spurs that protrude into the joint, causing inflammation and subsequent pain and stiffness. Osteoarthritis is most commonly found in the knees, hips, hands, and spine (spondylosis, or degeneration of the intervertebral disks).

The etiology of OA is multifactorial. Age is the greatest risk factor for OA, with scientists now also suggesting a genetic susceptibility to the disease. Women are more likely than men to report the disease overall, although men have a higher incidence under the age of 45. Obesity is a major risk factor, especially for OA in the hips and knees. A trauma to the joint,

through sports or other injuries, also increases the risk of arthritis in that joint.

Prolonged occupational stress can also increase the risk. Physical inactivity, or immobilization of a joint, can increase the likelihood of developing OA. In addition, arthritis can result from infections caused by bacteria (especially staph and strep), viruses, or fungi that migrate to a joint and cause inflammation. For example, Lyme disease, an infection caused by a bacterium spread by deer ticks, results in arthritis in about 60% of sufferers if left untreated.

Osteoarthritis Risk Factors

Age over 50
Female gender
Family history
Obesity
Sports injury
Occupational stress
Lyme disease and other infections

Rheumatoid arthritis (RA), the most common connective tissue disorder, is a chronic autoimmune disorder. It occurs in approximately 1% to 2% of the population and is two to three times more likely to be diagnosed in women than in men, often developing in women between the ages of 30 and 50. Among the elderly, men and women are equally likely to develop RA.

In RA, an individual's immune system goes awry, causing the body to attack its own healthy soft tissue, such as that found in joints. As RA is a systemic disease, several joints can be affected at once; in the early stages of the disease, the hands, wrists, feet, and knees are most commonly affected. As RA progresses, however, shoulders, elbows, hips, and neck can become involved. Unlike OA, RA can cause inflammation in the heart, lungs, eyes, and blood vessels. RA itself is not fatal, but complications from the disease can shorten an individual's life span from 4 to 10 years if not treated aggressively. The main symptoms of RA include joint pain, swelling, and stiffness, fever, and fatigue. The disease varies in severity among patients and may even go into remission for periods of time.

As with OA, there are believed to be several causes of rheumatoid arthritis. Some research suggests that RA is triggered by an infectious agent in those people with a genetic predisposition for the disease. Since premenopausal women are more likely to get RA than men, other researchers believe a hormonal factor might play a role. Prolonged cigarette smoking has been linked to the development of RA in men in a study published in *Arthritis Research & Therapy* in 2003 (14). Further research is indicated on the link between smoking and RA.

Rheumatoid Arthritis Risk Factors

**Increased age
Female gender
Family history
Cigarette smoking**

Juvenile rheumatoid arthritis (JRA) accounts for up to 70% of arthritis diagnosed in children. JRA has a prevalence rate of approximately 1.1 cases per 1,000 children. There are three subtypes of JRA: (a) pauciarticular, involving pain and inflammation in less than five joints within three months of onset; (b) polyarticular, involving five or more joints within three months of onset; and (c) systemic, involving a high-grade fever and other non-joint-related symptoms at the onset, but with major joint involvement as the disease progresses.

JRA typically presents between the ages of six months and 16 years. Pauciarticular JRA, which accounts for about 50% of all cases, occurs more frequently among girls than boys; girls under the age of eight are the most likely to be diagnosed with this type of JRA. It most often affects the large joints, such as the knees. Some children outgrow pauciarticular disease, but symptoms can recur.

Polyarticular JRA accounts for approximately 30% of cases and is also diagnosed more frequently in girls than in boys. This type of JRA most commonly affects the small joints, such as those in the hands and feet.

Systemic JRA can affect internal organs such as the heart and liver as well as the joints in the same way as adult RA. It is diagnosed equally among boys and girls.

Juvenile rheumatoid arthritis is an autoimmune disease, as is rheumatoid arthritis among adults. The immune system attacks healthy cells and tissues, resulting in pain, swelling, and heat

around the joints. Scientists suspect a genetic tendency toward the disease, triggered by a bacterial or viral infection. JRA onset has been linked to the rubella virus and enteric (intestinal) bacterial infections, among others, but research continues to investigate this relationship (15).

**Juvenile Rheumatoid Arthritis
Risk Factors**

**Female gender
Family history
Bacterial or viral infections**

Gout accounts for about 5% of all arthritis cases, affecting close to 1 in 30 Americans. It is one of the most painful of all rheumatic diseases. Gout results when deposits of uric acid crystals locate in different parts of the body, most frequently the joints. Uric acid crystals form when there is an excess of uric acid (hyperuricemia) built up in the body. This can result from the body producing too much uric acid or not excreting enough of the acid through the kidneys.

The big toe is the most common site of gout (about 75% of patients), but the ankle, knee, wrist, hand, elbow, and foot can also be affected. The crystal deposits cause inflammation in the joint, resulting in pain and swelling, often with sudden onset. Men are four times more likely to develop gout than women, with onset rare before age 30 and most frequently between 40 and 50. Women are more likely to develop gout after the age of 60.

Acute gout attacks can be triggered by such traumatic events as surgery or heart attacks. Gout often runs in families, suggesting a genetic predisposition to the condition. Up to 18% of individuals who have gout have a family history of the disease. Certain medications, particularly those used to treat high blood pressure such as diuretics, can cause a gout attack, as can alcohol use. Animal-based foods high in a substance called purine, e.g., red meat and seafood, can trigger gout. Gout is more prevalent in countries with a high standard of living, perhaps because of diet. Obesity is also a risk factor for developing gout. In addition, exposure to lead in the environment has been suggested as a risk factor for gout by the Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Resources (16). All these factors are thought to interfere with the ability of the body to adequately excrete uric acid.

In many cases, gout can be controlled through proper treatment. Early attacks usually subside after 3 to 10 days, even with no treatment, and subsequent attacks may not occur for months or years. However, later attacks may last longer and occur more often.

Gout Risk Factors

**Family history
Male gender
Age 30-50
Obesity
Certain medications
Purine-rich foods
Lead exposure**

The **Lupus** Foundation of American estimates that about 1.5 million Americans have a form of lupus, or approximately 1 in every 2,000 people. It is estimated that more than 16,000 new cases are diagnosed each year (17). Lupus is an autoimmune disease in which the immune system attacks healthy cells and tissues in various parts of the body, most particularly the joints, skin, blood, and kidneys.

The most common form of lupus is systemic lupus erythematosus (SLE), which accounts for about 70% of all cases. This is the type of lupus that affects the joints; 90% of people diagnosed with SLE will suffer joint pain during the active periods of the illness. Discoid lupus, the second most common form, affects only the skin, but nearly 10% of discoid lupus cases will eventually progress to SLE.

SLE causes a wide variety of symptoms in addition to joint inflammation and pain, including fever, fatigue, skin rashes, loss of hair, loss of appetite, high blood pressure, and swelling of the feet and legs. Symptoms vary among individuals, as does the severity of the disease. In some people, lupus will go into remission for periods of time, while other people have symptoms continuously.

SLE is 8 to 10 times more likely to develop in women than in men, occurring most frequently during the childbearing years. It is 3 times more prevalent among African Americans and also more likely to occur among Hispanics, Asians, and Native Americans than among Caucasians (18). Twenty percent (20%) of people

diagnosed with lupus have a parent or sibling with the disorder (18). As with other forms of arthritis, scientists suggest that a viral or bacterial infection might trigger the onset of the disease in individuals with a genetic susceptibility. Pregnancy can sometimes trigger the onset of lupus, or cause a flare-up in women who have the disease.

Lupus Risk Factors

African American, Asian, Native American, or Hispanic race/ethnicity
Female gender
Family history
Pregnancy

Fibromyalgia (FM) is characterized by pain, stiffness, and tenderness in the joints, muscles, and tendons. These symptoms are accompanied by sleep problems, fatigue, and anxiety. Patients suffer generalized aching and pain and have multiple tender points (areas of localized pain when pressure is applied) located in the neck, spine, shoulders, hips, and knees. A diagnosis of FM is made when pain has persisted for longer than three months and the patient has pain in 11 of the 18 specific tender point areas. The National Institute of Arthritis and Musculoskeletal and Skin Diseases estimates that approximately 3.7 million Americans have FM, but other estimates run as high as 8 million (19).

Fibromyalgia does not cause the inflammation found in the other types of arthritis discussed above. Because of this, damage to the joints or internal organs of the body and/or joint deformities are not part of this disease.

Researchers have found a higher incidence of sleep apnea and restless leg syndrome in fibromyalgia patients, suggesting that inadequate sleep may be a possible contributor to the condition. Other studies suggest that low levels of the stress hormone cortisol are associated with fibromyalgia.

Fibromyalgia is diagnosed most frequently in women of childbearing age

but can also occur among men and younger and older women. The disease is more common among people who have a family history of fibromyalgia or other pain-related disorders.

Fibromyalgia Risk Factors

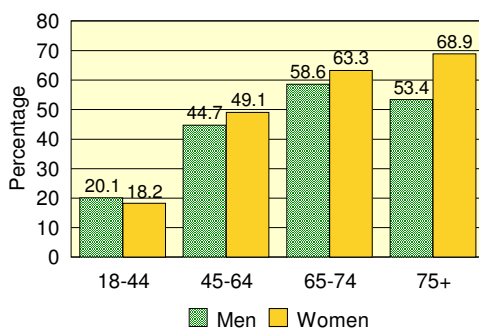
Female gender
Family history

RISK FACTORS FOR ARTHRITIS

There are two types of risk factors for arthritis: (1) those that are nonmodifiable, such as gender, age, race,¹ and genetic susceptibility, and (2) those that are modifiable, such as weight, exercise, occupation, infections such as Lyme disease, and sports and other injuries.

Figure 2 illustrates the relationship between **gender and age** and arthritis in West Virginia in 2003. While men are somewhat more likely to have arthritis under the age of 45, perhaps the result of sports or occupation-related injuries, women are diagnosed more frequently after the age of 45. These differences are not statistically significant, however.

Figure 2. Prevalence of Arthritis by Age and Gender WVBRFSS, 2003



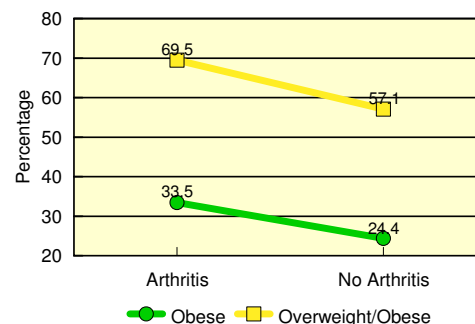
Obesity is a major risk factor in the development of osteoarthritis. A 2003 study published in *Obesity Research* by researchers at Johns

¹ At this point in the West Virginia BRFSS, sample numbers reflecting arthritis among African American, Asian, and Hispanic residents are too small to allow valid comparisons.

Hopkins University used data from the Third National Health and Nutrition Examination Survey to examine BMI and joint pain. They found that, among adults aged 60 and older, the prevalence of pain in the knee, hip, and back increased significantly with increased levels of body mass index (BMI) (20). A meta-analysis of the literature published in *Obesity Research* in 2005 confirmed the positive relationship between obesity and knee cartilage defects, especially among women (21); a paper in *Rheumatology* in 2002 presented evidence of a moderate positive relationship between obesity and the osteoarthritis in the hip (22).

Figure 3 presents 2003 BRFSS data showing that West Virginia adults with arthritis are significantly more likely than those without arthritis to be either obese (BMI 30+) or overweight or obese (BMI 25+).

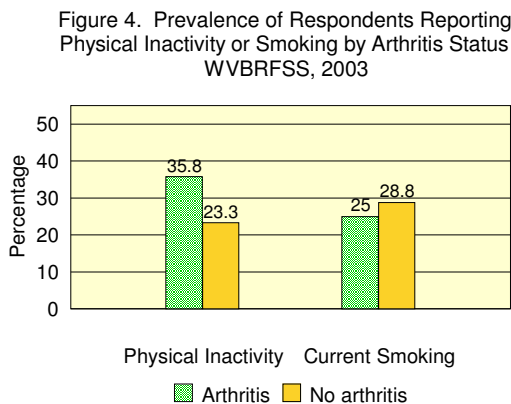
Figure 3. Arthritis Prevalence among Respondents Who Are Obese or Overweight/Obese WVBRFSS, 2003



Researchers at the Orthopaedic Hospital in Los Angeles have concluded that obesity is not a result of arthritis (23). Their results, presented at the 2005

meeting of the American Academy of Orthopaedic Surgeons showed that arthritis patients actually tend to gain weight after joint replacement surgery, instead of becoming more active and losing weight. To quote the study's lead author, Dr. Thomas Schmalzried, inactivity is not a result of arthritis for most patients but is instead "a manifestation of a lifestyle" (23).

In 2003, the overall prevalence of **physical inactivity** (i. e., participation in no leisure-time physical activity during the 30 days prior to the interview) among West Virginia adults was 28.0%. Among respondents with arthritis, however, the prevalence was 35.8%, significantly higher than the rate of 23.3% reported by people without arthritis. Figure 4 illustrates this difference.



Swedish researchers have reported that people who have a genetic susceptibility for rheumatoid arthritis are more likely to get the disease if they are **current smokers** (24). The study, which was published in *Arthritis & Rheumatism* in 2004, found that, compared with people who never smoked, current smokers who had a

genetic marker that predisposed them to RA were 7.5 times more likely to have the disease. Smokers without the genetic marker were 2.4 times more likely than nonsmokers to have RA.

According to data from the BRFSS, West Virginians have traditionally had higher smoking rates than the rest of the country. In 2003, 27.3% of all adult residents smoked, compared with the national average of 22.2%, a statistically significant difference, and 3rd highest among the 54 BRFSS participants. As shown in Figure 4, respondents with arthritis were somewhat less likely in 2003 to report current smoking than those without arthritis; however, this difference was not statistically significant.

A study conducted in England, the results of which were published in the *American Journal of Epidemiology* in 1998, examined the association between **occupational lifting** and osteoarthritis of the hip (25). The researchers found that the risk in men increased directly with the duration and weight of occupational lifting. Compared with men who had limited experience with occupational lifting, those men who regularly lifted weights in excess of 110 pounds for 10 or more years were 3.2 times more likely to have hip OA.

When osteoarthritis develops as a result of a **sports or other injury**, it is called "secondary arthritis." Scientists at Johns Hopkins University followed 1,321 former medical students for 36 years to examine the relationship between osteoarthritis and joint injury (26). The incidence of knee osteoarthritis over that time was 13.9% of participants

who had had a knee injury during adolescence or young adulthood, compared with 6.0% of those who had no injury. Joint injury increased the risk of osteoarthritis in the knee by fivefold, a statistically significant difference. Increased osteoarthritis in the hip was also found to occur following injury, but these findings were not statistically significant.

The Arthritis Foundation stresses the importance of injury prevention during sports activities, emphasizing the need for adequate safety equipment. To quote John H. Klippel, MD, the Foundation's medical director, "Today's young athletes may become tomorrow's osteoarthritis patients, unless parents and coaches take an active role in sports injury prevention" (27).

Certain nutrients have been linked to the progression of OA and the development and progression of RA. An analysis of data from the Framingham Study looked at participants with osteoarthritis of the knee between 1983 and 1993 (28). The results showed that those participants who had low intakes of **Vitamin D** showed a threefold greater risk of disease progression than those participants with higher levels of Vitamin D intake. Low serum levels of Vitamin D also predicted cartilage loss and osteophyte growth. These differences were statistically significant.

An Italian study used data from the 1993 Italian Household Multipurpose Survey of 46,693 subjects aged 15 and older to examine the relationship

between **vegetable consumption** and chronic disease. Their findings, published in *Epidemiology* in 1998, suggested a strong inverse association between vegetable consumption and the development of arthritis (29).

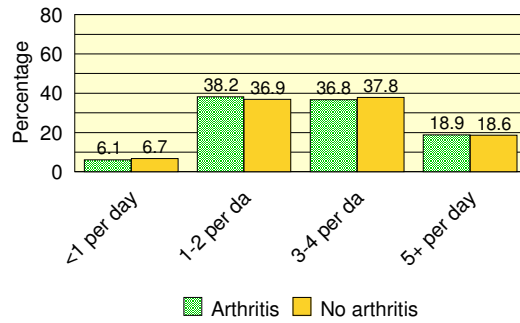
Diets high in citrus fruits and cruciferous vegetables such as broccoli and cauliflower may protect against the development of rheumatoid arthritis.

The Arthritis Foundation

Free oxygen radicals have been found in excess in the joints of patients with RA and are thought by many scientists to contribute to joint damage. A recent study supported by the Arthritis Foundation examined if certain **antioxidants** (such as vitamins C and E and selenium) found in fruits and vegetables could help protect the joints from this damage (30). The researchers, affiliated with the University of Alabama and the University of California, followed 29,368 older women from 1986 to 1997. They found that diets high in citrus fruits and cruciferous vegetables such as broccoli and cabbage may protect against the development of RA. According to James R. Cerhan, MD, the study's lead author, "This may be yet another health benefit of a diet rich in fruits, vegetables, and antioxidant vitamins."

According to the 2003 WVBRFSS, no significant differences were found in fruit and vegetable consumption among people with or without arthritis. Only 18.9% and 18.6% of respondents with and without arthritis, respectively, reported consuming the USDA recommended five or more servings of fruits and vegetables each day. Figure 5 illustrates fruit and vegetable consumption by West Virginia adults by arthritis status. Even though diets high in antioxidants may protect against the progression of certain types of arthritis, those persons with the

Figure 5. Prevalence of Fruit/Vegetable Consumption by Arthritis Status WVBRFSS, 2003



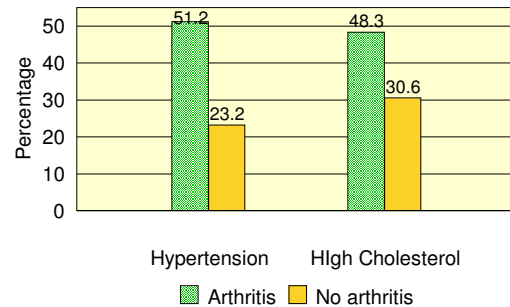
disease eat no more servings of fruits and vegetables, on average, than those who do not have the disease.

ARTHRITIS AND COMORBIDITIES

Many people who have arthritis also have other chronic conditions, or comorbidities. On average, an individual who has arthritis has 3.4 other chronic conditions, according to Partnership for Solutions, an initiative led by Johns Hopkins University and the Robert Wood Johnson Foundation to study the problems faced by people with chronic health conditions (31). Using data from the 2000 Medical Expenditure Panel Survey, the researchers found the most common comorbidity to be hypertension; 44% of all people with arthritis also have high blood pressure. Following hypertension are heart disease (20%), high cholesterol (18%), and diabetes (16%). While not in the top four comorbidities, people with arthritis are also more likely to have asthma than people who do not have arthritis. In fact, arthritis is the fourth most common comorbidity among people with asthma (9%) (32).

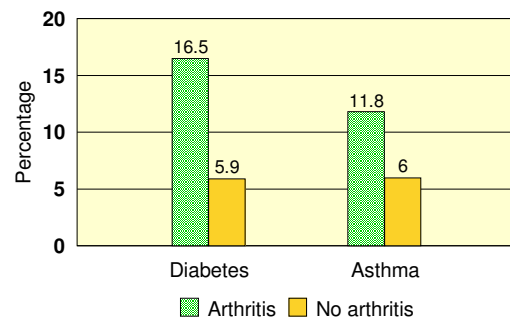
WVBRFSS data from 2003 were used to determine the prevalence of certain of these comorbidities among state adults with arthritis. In West Virginia in 2003, 51.2% of adults who had been diagnosed with arthritis reported having been told by a health professional that they had **high blood pressure**, compared with 23.2% of adults without arthritis. Nearly one-half (48.3%) of respondents with arthritis also reported **high cholesterol** versus 30.6% of those without arthritis, and 16.5% had been diagnosed with **diabetes**, compared with 5.9% of other respondents. Respondents with arthritis

Figure 6. Prevalence of Respondents Reporting Hypertension or High Cholesterol by Arthritis Status WVBRFSS, 2003



reported current **asthma** nearly twice as often as those without arthritis (11.8% vs. 6.0%). (All of the differences noted on this page are statistically significant.) Figures 6 and 7 illustrate the differences in prevalence of these conditions among respondents with and without arthritis.

Figure 7. Prevalence of Respondents Reporting Diabetes or Asthma by Arthritis Status WVBRFSS, 2003



Scientists have been studying the role of low-grade inflammation in all these conditions, seeking a common thread among them. Research has suggested that uncontrolled inflammation underlies many of these illnesses, making an individual more susceptible to an array of chronic conditions (33).

TREATING ARTHRITIS

Treatment for the different forms of arthritis falls into three major categories: medications, exercise, and surgery. Finding the best treatment regimen can take time, because arthritis patients can have different types of the disease, different symptoms within the same disease, and different reactions to medications.

Drug therapy is usually aimed at reducing pain and inflammation. Often the first medications, or first-line drugs, recommended for all types of arthritis are over-the-counter drugs such as acetaminophen (Tylenol) and NSAIDs (nonsteroidal anti-inflammatory drugs), i.e., aspirin, ibuprofen (e.g., Motrin or Advil), naproxen (Aleve), and ketoprofen (Orudis). Acetaminophen does not treat inflammation, however, while NSAIDs are known to cause stomach bleeding in large doses.

COX-2 Specific Inhibitors (coxibs) are a class of prescription drugs that reduce pain and inflammation with fewer gastrointestinal side effects but have been associated with an increased risk of heart attack and stroke, with certain ones, i.e., Vioxx and Bextra, having been recalled by 2005. A study presented at the Annual European Congress of Rheumatology in 2005 showed that even the traditional over-the-counter NSAIDs carry an increased risk of heart attack of about 12% (34). While further investigation continues, individual risks must be assessed by patients and health care providers when choosing a treatment option.

Corticosteroids are a kind of steroid made naturally by the adrenal glands that work by suppressing the immune system, thereby reducing inflammation. They are more powerful than NSAIDs but have harmful side effects, including osteoporosis, cataracts, and elevated blood sugar, if taken in high doses or for long periods of time. They can be very useful, however, when administered properly.

First-line medications used to treat the pain and inflammation of arthritis are often over-the-counter drugs such as Tylenol, aspirin, Motrin, and Advil.

Intra-articular corticosteroids are injected directly into an affected joint and are used to treat OA and, less frequently, gout. Although single joints can be treated intra-articularly in RA, JRA, and lupus, oral corticosteroids are usually prescribed.

Corticosteroids are often used as a temporary, or “bridge,” drug for RA, JRA, and lupus patients after second-line drugs, or disease-modifying anti-rheumatic drugs (DMARDs) are prescribed, to provide relief until the DMARD takes effect. DMARDs are slower-acting medicines that can take weeks to months to become effective, but then can be used for long periods of time. If they are effective, DMARDs can actually promote remission, retarding additional joint damage. DMARDs include Plaquenil (an anti-malarial drug), Methotrexate (an immune suppression drug), Azuulfidine

(a sulfa medication used to treat inflammatory bowel disease), as well as biological response modifiers (such as Enbrel and Remicade), which intercept a protein in the joints that causes inflammation and have a more rapid onset than traditional DMARDs. Often these biologic drugs will be used in combination with other DMARDs, depending on the patient's response.

Corticosteroids can either be injected directly into a joint, as in OA, or taken orally, as in RA, for relief from pain and inflammation.

A study published in the July 2005 issue of *Arthritis & Rheumatism* reported that a tetracycline antibiotic called doxycycline may slow the progression of OA, particularly in the knee (35). Doxycycline was found to decrease cartilage loss in the knee, thus slowing the progression of the disease. Some doctors also recommend antibiotic therapy for their patients with RA (35).

Glucosamine and chondroitin are dietary supplements that have been reported to offer pain relief for persons with mild to moderate OA. The National Institutes for Health are currently conducting an in-depth study on the effects of these supplements.

Hyaluronic acid injections are also sometimes used in treating OA of the knee. Hyaluronic acid is a natural component in joint fluid, which gets thinner in arthritis patients. Adding additional lubrication through hyaluronic acid injections has been shown by some studies to give more and longer-lasting

pain relief than other treatments. This option is still under study.

Exercise is an important part of arthritis treatment. Researchers at the CDC examined the association between physical activity level and health-related quality of life among people with arthritis or chronic joint symptoms using BRFSS data from 2001. They concluded that, among respondents with arthritis, those who were inactive were 1.2-2.4 times more likely to have an impaired quality of life compared with those who were active (36).

The American College of Rheumatology recommends three major types of exercise to reduce arthritis-related pain and disability. Stretching or flexibility exercises improve range of motion and improve joint function. Strengthening, or muscle conditioning, exercises, strengthen the muscles around the joints, decreasing joint pain for longer periods of time. These exercises together improve a person's balance, reducing the risk of falling and injury. Aerobic exercise improves heart, lung, and large muscle function and increases overall fitness while controlling weight.

A British study published in 2005 found that both aerobic exercise such as walking and home-based quadriceps (thigh) strengthening exercises reduced pain and disability from OA of the knee, with no significant difference between them (37). Data from the Fitness Arthritis and Seniors Trial (FAST), an 18-month clinical trial involving 365 participants aged 60 and older, suggested that disabled persons with OA of the knee showed improvement in disability and pain after either type of exercise (38).

Three types of exercise are recommended for arthritis patients: stretching, strengthening, and aerobic.

Amer. Coll. of Rheumatology

Exercise is also an important component of treatment for other forms of arthritis. Stretching, strengthening, and aerobic exercises are all recommended for people with fibromyalgia. People with lupus need to balance their need for rest with regular exercise to improve overall fitness, as do RA and JRA patients. Regular exercise benefits gout patients by controlling weight and improving fitness.

When medications and exercise do not provide sufficient pain relief, **surgical procedures** are an option. There are a variety of procedures available to treat OA. Among them is arthroscopy, performed on more than 650,000 patients each year, in which bone and cartilage fragments are removed from the knee.² Osteotomy is performed to remove debris and reshape the deformed bone in the knee when only a section of the knee is damaged. Cartilage transplantation is a relatively new procedure that is being used in knees damaged by injuries. In addition to arthroscopy and osteotomy, synovectomy is used to provide pain relief for RA and JRA patients. In this procedure, the inflamed tissue that surrounds the joint (synovium) is removed.

² The effectiveness of arthroscopy has recently been called into question, however, following a 2002 study in which the procedure was found to be no more effective than sham surgery (39).

Arthroplasty refers to joint replacement surgery, used in both OA and RA. Knee and hip replacements are the most common procedures, although shoulder, wrist, elbow, and finger replacements are also possible. In arthroplasty, the person's joint is replaced by a prosthetic joint made of metal, ceramic, and/or plastic. While joint replacement can relieve pain and greatly improve mobility, certain patients are less likely to receive the procedure. Women are three times less likely to have arthroplasty even though they have a higher prevalence of OA of the knee and hip; African Americans are also less likely to have the procedure although the risk for arthritis in the knee is greater in African Americans, especially women (40). The reasons for the disparities are unclear.

When medications and exercise do not provide adequate relief, surgical procedures, including joint replacement, are an option.

A potential treatment for arthritis currently being tested is **gene therapy**. Scientists at the University of Pittsburgh released the results of a preliminary trial in which genetically modified cells were injected into the knuckles of nine women with advanced RA (41). They found that the modified genes produced significantly lower levels of the chemicals that cause inflammation. Many years of research are necessary before the treatment would be available; according to Dr. Madeleine Devey of the Arthritis Research Campaign, however, "This looks like a really promising advance – which is very good news for patients with arthritis" (42).

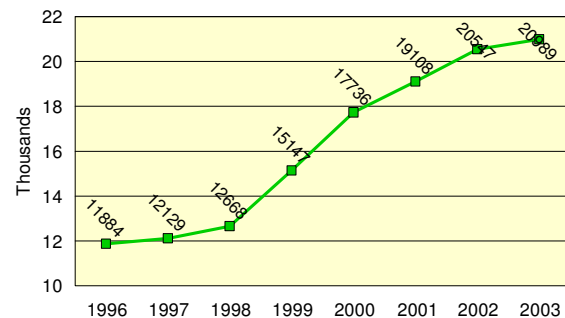
ARTHRITIS HOSPITALIZATIONS

Hospital discharge data provide an additional source of information on the prevalence of disease and the financial burden on the state. The West Virginia Health Care Authority (WVHCA) collects inpatient data from all nonfederal licensed hospitals in the state. Up to nine diagnoses (one principal and eight secondary) are recorded and coded according to the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM).

Trends in Arthritis-Related Hospitalizations. WVHCA data from 1996 through 2003 were analyzed to determine trends in the number of hospitalizations and charges due to arthritis diagnoses among West Virginia residents. Over the eight-year span, the number of discharges for patients having either a principal or secondary diagnosis of arthritis increased 75.8%, from 11,884 to 20,989. During that same period, charges for patients with a principal diagnosis of arthritis increased 119.0%, from a total of approximately \$4.4 million in 1996 to \$9.6 million in 2003.³ While discharges having a diagnosis of arthritis (either principal or secondary) accounted for 4.9% of all discharges in 1996, this had increased to 7.6% of all discharges by 2003. Figures 8 and 9 illustrate the marked increase in both the number of discharges and charges.

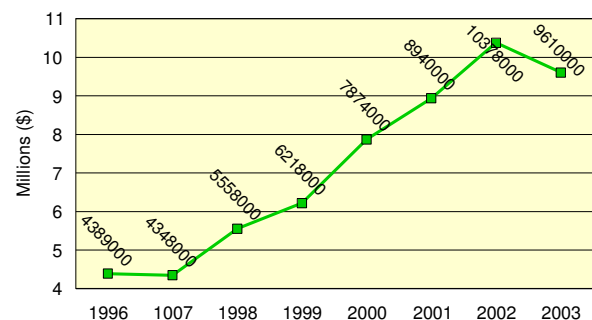
Arthritis-related inpatient charges for West Virginia residents in West Virginia hospitals increased 119% from 1996 to 2003.

Figure 8. Number of Hospital Discharges Having a Principal or Secondary Diagnosis of Arthritis
West Virginia Residents, 1996-2003



Source: WV Health Care Authority

Figure 9. Estimated Charges for Hospital Discharges Having a Principal Diagnosis of Arthritis
West Virginia Residents, 1996-2003



Source: WV Health Care Authority

³ The number of total discharges of West Virginia residents from West Virginia hospitals increased by 14.1% between 1996 and 2003, while total charges increased 74.3%.

2003 Hospitalization Rates. In 2003, the overall rate of West Virginia residents discharged from West Virginia hospitals who had a principal or secondary diagnosis of arthritis was 122.3 per 10,000 discharges. The rate among men was 75.9 per 10,000; the rate among women was 166.3. By age group, the rates ranged from a low of 0.7 per 10,000 discharges among patients less than 20 years old to a high of 526.3 among patients aged 65 and older. Patients with OA of the spine had the highest rate of discharges (112.4) while those with lupus had the lowest rate (3.7). Table 3 below presents these data.

Table 3. Inpatient Hospitalization Discharge Rates* by Gender, Age, and Type of Arthritis Diagnosis** WV Residents in WV Hospitals, 2003	
Gender	
Men	75.9
Women	166.3
Age	
<20	0.7
20-44	23.8
45-64	132.7
65+	526.3
Type	
OA	70.6
Spinal OA	112.4
RA	15.7
Lupus	3.7
FM	9.7
Gout	11.4
Total	122.3
*Rates per 10,000 discharges	
**Includes principal and secondary diagnoses	

County rates of 2003 hospitalizations having either a principal or secondary diagnosis of arthritis are illustrated in Figure 10 on the following page. The highest rate (212.0 per 10,000 discharges) was found in Logan County, the lowest (22.8) in Pendleton County. (Individual county rates and ranks are found in Appendix B.)

Figure 11. Average Charge (\$) per Inpatient Discharge* Selected Types of Arthritis WV Residents in WV Hospitals, 2003

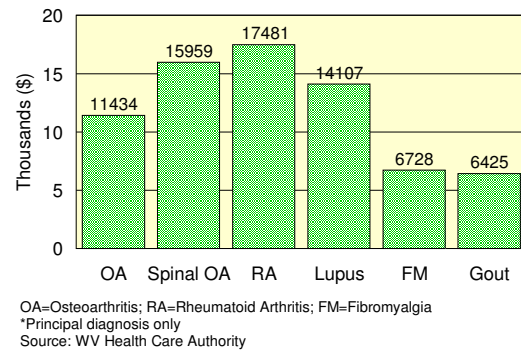


Figure 11 presents average charges per inpatient discharge by type of arthritis in 2003, using principal diagnosis only. A principal diagnosis of RA incurred the highest average charge at \$17,481, followed by OA of the spine (\$15,959). A principal diagnosis of gout resulted in the lowest average charge per discharge at \$6,425.

Joint Replacement Surgeries. WVHCA data on the two most common joint replacement surgeries, i.e., hip and knee, were also examined over the eight years from 1996 through 2003. The number of total hip replacements performed on West Virginia residents increased 30.7%, from 693 in 1996 to 906 in 2003; total knee replacements increased 53.4%, from 1,221 to 1,873 (Figure 12).

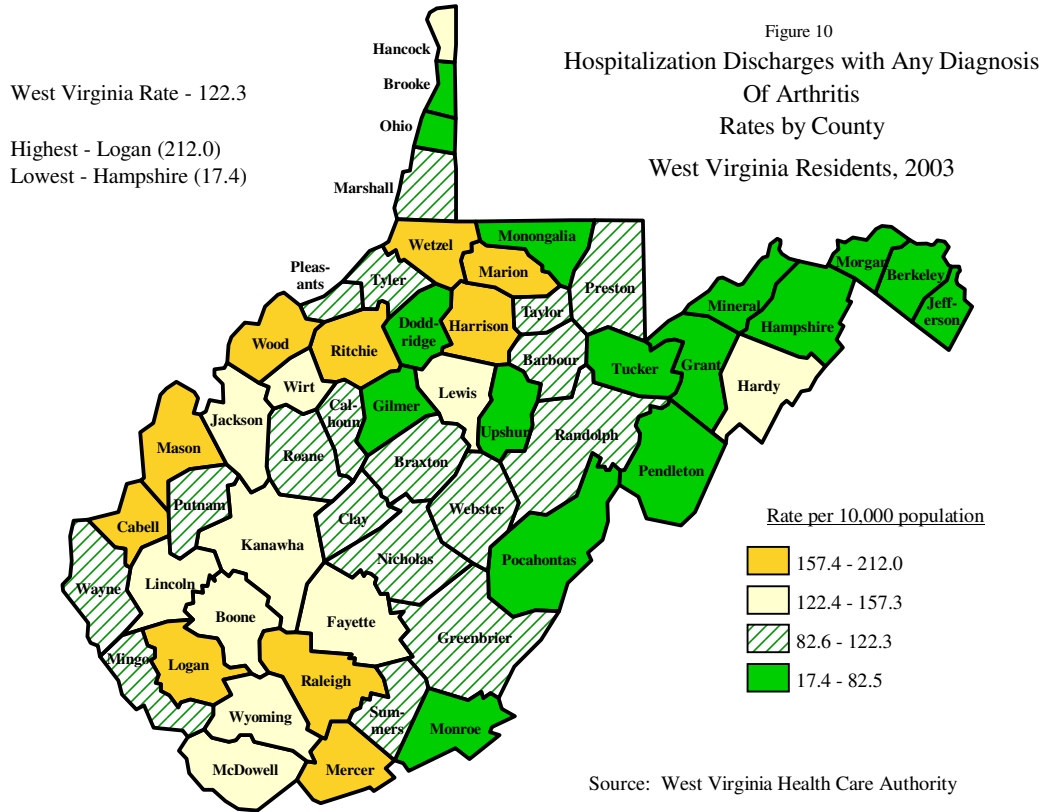
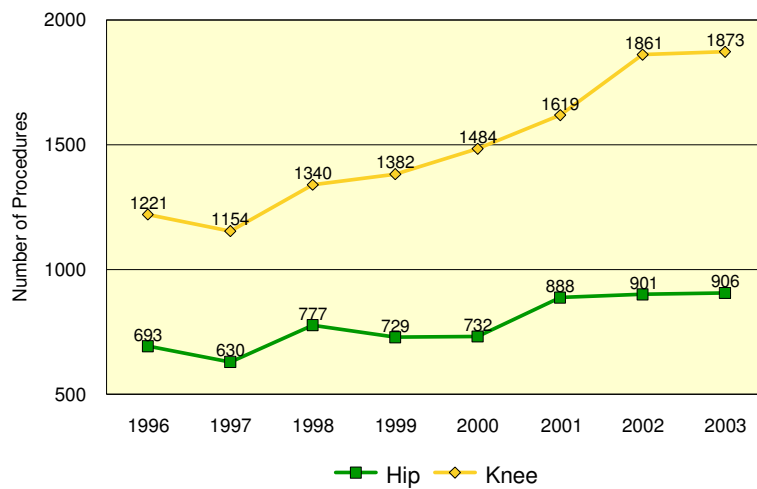


Figure 12. Number of Hip and Knee Replacements
Performed on WV Residents in WV Hospitals
1996-2003

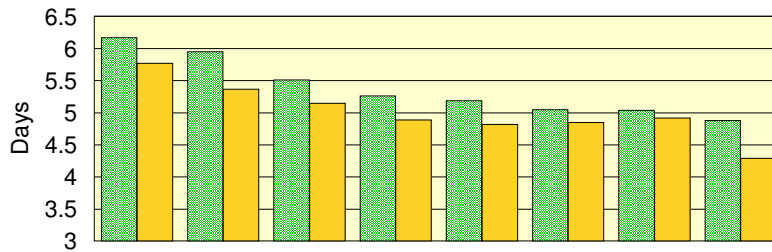


*Total replacements only
Source: WV Health Care Authority

Figures 13 and 14 illustrate changes in the average length of stay and average charge per procedure for hip and knee replacements from 1996 through

2003. While the average length of stay for both procedures decreased over the time period, the average charges increased.

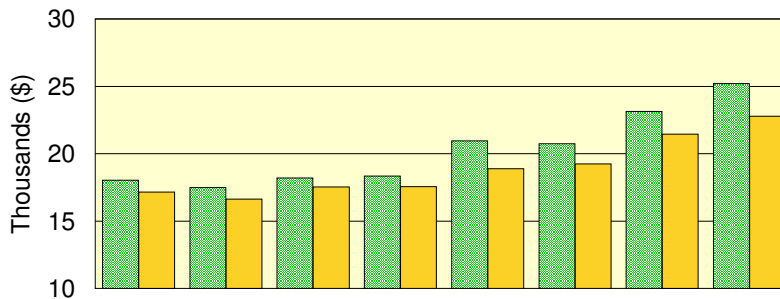
Figure 13. Average Length of Stay for Patients Having Hip and Knee Replacement Surgery WV Residents in WV Hospitals, 1996-2003



	1996	1997	1998	1999	2000	2001	2002	2003
Hip	6.17	5.95	5.51	5.26	5.19	5.05	5.04	4.88
Knee	5.77	5.37	5.15	4.89	4.82	4.85	4.92	4.29

Source: WV Health Care Authority

Figure 14. Average Charges (\$) for Patients Having Hip and Knee Replacement Surgery WV Residents in WV Hospitals, 1996-2003



	1996	1997	1998	1999	2000	2001	2002	2003
Hip	18032	17502	18214	18347	20955	20735	23136	25203
Knee	17158	16648	17553	17559	18891	19240	21446	22774

Source: WV Health Care Authority

ARTHRITIS SELF-MANAGEMENT

The appropriate management of arthritis involves self-help activities such as weight control and participation in exercise programs. Arthritis-intervention programs can allow people with the illness to stay productive longer and function better in their daily activities.

The Arthritis Foundation. The Arthritis Foundation sponsors several programs designed to help patients manage their arthritis more effectively, including the Arthritis Self-Help Course (ASHC). ASHC is a standardized six-week course that covers such topics as pain management, exercise, nutrition, stress and depression, medications, and relaxation techniques, as well as understanding the disease process itself. An evaluation of ASHC in terms of cost-effectiveness published in the *Archives of Internal Medicine* in 1998 found the course further reduced pain among patients receiving conventional medical therapies and saved \$267 annually in reduced physician visits (43).

Exercise programs sponsored by the Arthritis Foundation include the People with Arthritis Can Exercise (PACE) program, which can improve muscle strength, range of motion, and endurance and reduce stiffness. The Arthritis Foundation Aquatics Program provides activities and exercises in warm water that can improve flexibility and range of motion and decrease pain.

Most of the counties in West Virginia form part of the Ohio River Valley Chapter of the Arthritis Foundation. To find out more about the

programs and activities offered, contact this chapter at:

**Ohio River Valley Chapter
Arthritis Foundation
7124 Miami Avenue
Cincinnati, Ohio 45243
Tel (513) 271-4545
Fax (513) 271-4703
Toll-free 1-800-383-6843**

The Eastern Panhandle counties of West Virginia are served by the Maryland Chapter of the Arthritis Foundation. For information on events and programs in this region, contact:

**Maryland Chapter
Arthritis Foundation
22 South Market Street
Frederick, MD 21701
Tel (301) 663-0303
Fax (301) 663-4295
Toll-free 1-800-750-9078**

Rheumatologists. As of 2005, there were 15 licensed rheumatologists in the state of West Virginia, located in Morgantown (3), Charleston (3), Huntington (3), Parkersburg (1), Clarksburg (1), Princeton (1), Wheeling (1), Martinsburg (1), and Beckley (1). The names and address of these physicians are listed in Appendix C.

NATIONAL RESOURCES

Arthritis Foundation

1330 West Peachtree Street
Atlanta, GA 30309
(800) 283-7800
www.arthritis.org

Lupus Foundation of America

2000 L Street NW, Suite 710
Washington, DC 20036
(202) 349-1155
(800) 558-0121
www.lupus.org

American College of Rheumatology

1800 Century Place, Suite 250
Atlanta, GA 30345-4300
(404) 633-3777
Fax (404) 633-1870
www.rheumatology.org

**National Institutes of Arthritis &
Musculoskeletal and Skin Diseases**

National Institutes of Health
Bldg. 31, Room 4C02
31 Center Drive, MSC
Bethesda, MD 20892
(301) 496-8190
Fax (301) 480-2814
www.nih.gov/niams

National Institute on Aging

National Institutes of Health
Bldg. 31, Room 5C27
31 Center Drive, MSC
Bethesda, MD 20892
(301) 496-1752
Fax (301) 496-1072
www.nih.gov/nia

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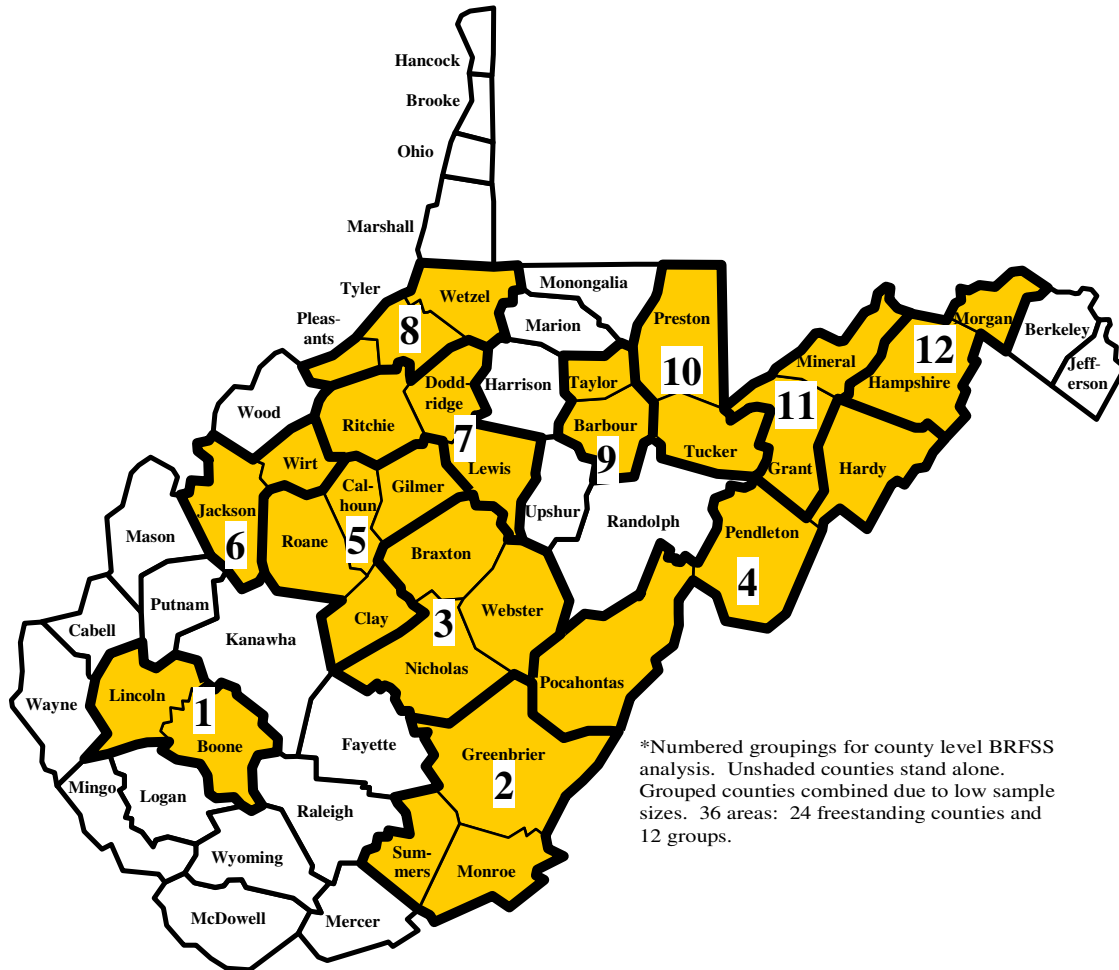
APPENDIX A
Arthritis Prevalence by County
WVBRFSS: 1999, 2001, 2003

County	%	Rank	County	%	Rank
Barbour	37.5	15	Monongalia	20.2	55
Berkeley	27.1	52	Monroe	38.4	7
Boone	38.3	12	Morgan	30.0	44
Braxton	32.4	38	Nicholas	32.4	38
Brooke	31.8	42	Ohio	32.9	36
Cabell	36.0	21	Pendleton	27.4	49
Calhoun	35.6	24	Pleasants	36.8	18
Clay	35.6	24	Pocahontas	27.4	49
Doddridge	39.3	4	Preston	38.4	10
Fayette	35.2	28	Putnam	24.4	54
Gilmer	35.6	24	Raleigh	37.2	17
Grant	31.9	31	Randolph	32.2	41
Greenbrier	38.4	7	Ritchie	39.3	4
Hampshire	30.0	44	Roane	35.6	24
Hancock	25.5	53	Summers	38.4	7
Hardy	27.4	49	Taylor	37.5	15
Harrison	33.5	35	Tucker	38.4	10
Jackson	35.0	29	Tyler	36.8	18
Jefferson	29.2	47	Upshur	32.7	37
Kanawha	27.9	48	Wayne	31.5	43
Lewis	39.3	4	Webster	32.4	38
Lincoln	38.3	12	Wetzel	36.8	18
Logan	41.2	3	Wirt	35.0	29
McDowell	48.0	1	Wood	34.2	33
Marion	33.6	34	Wyoming	36.0	22
Marshall	29.9	46	Total WV	33.5	
Mason	37.5	14	Total US	23.0	
Mercer	35.7	23	(2001)		
Mineral	34.9	31			
Mingo	42.9	2			

Ranked highest (1) to lowest (55)

Note: As sample sizes were too small for 31 counties to stand alone, these counties were combined into 12 groupings. Each county in one of these groupings share a prevalence and a rank. Ranks are based on prevalence rates carried out to two decimal places. The 24 stand-alone counties and the 12 county groupings are shown on page 31.

Groupings for County Level Analysis **West Virginia Behavioral Risk Factor Surveillance System**



Group	Counties
1	Boone and Lincoln
2	Greenbrier, Summers, and Monroe
3	Braxton, Nicholas, and Webster
4	Hardy, Pendleton, and Pocahontas
5	Calhoun, Clay, Gilmer, and Roane
6	Jackson and Wirt
7	Doddridge, Lewis, and Ritchie
8	Pleasants, Tyler, and Wetzel
9	Barbour and Taylor
10	Preston and Tucker
11	Grant and Mineral
12	Hampshire and Morgan

APPENDIX B Rate* of Hospital Discharges Having a Principal or Secondary Diagnosis of Arthritis by Patient's County of Residence West Virginia, 2003					
County	Rate*	Rank	County	Rate*	Rank
Barbour	90.1	34	Monongalia	74.8	41
Berkeley	67.9	45	Monroe	76.3	40
Boone	126.8	19	Morgan	59.9	46
Braxton	112.3	27	Nicholas	89.9	35
Brooke	71.0	43	Ohio	56.5	48
Cabell	174.8	5	Pendleton	22.8	54
Calhoun	116.6	25	Pleasants	111.8	28
Clay	106.5	29	Pocahontas	69.3	44
Doddridge	77.5	39	Preston	83.8	36
Fayette	157.0	11	Putnam	114.6	26
Gilmer	73..9	42	Raleigh	182.4	2
Grant	35.0	50	Randolph	100.5	30
Greenbrier	96.4	32	Ritchie	173.1	8
Hampshire	17.4	55	Roane	122.3	21
Hancock	154.1	13	Summers	82.6	38
Hardy	25.4	52	Taylor	119.1	24
Harrison	173.4	6	Tucker	44.7	49
Jackson	151.3	14	Tyler	97.5	31
Jefferson	25.5	51	Upshur	57.4	47
Kanawha	141.1	16	Wayne	83.5	37
Lewis	140.6	17	Webster	119.4	23
Lincoln	142.5	15	Wetzel	157.4	10
Logan	212.0	1	Wirt	131.1	18
McDowell	125.5	20	Wood	175.9	4
Marion	173.1	7	Wyoming	156.7	12
Marshall	96.3	33	Total WV	122.3	
Mason	161.1	9			
Mercer	176.1	3			
Mineral	25.0	53			
Mingo	120.7	22			

*Rate per 10,000 discharges
Ranked highest (1) to lowest (55)
Source: WV Health Care Authority

APPENDIX C
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