

## Prevalence of Severe Joint Pain Among Adults with Doctor-Diagnosed Arthritis — United States, 2002–2014

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In the United States, arthritis is a leading cause of disability (1,2); arthritis affected an estimated 52.5 million (22.7%) adults in 2010–2012 and has been projected to affect 78.4 million adults by 2040 (3). Severe joint pain (SJP) can limit function and seriously compromise quality of life (4,5). To determine the prevalence of SJP among adults with doctor-diagnosed arthritis, and the trend in SJP from 2002 to 2014, CDC analyzed data from the National Health Interview Survey. In 2014, approximately one fourth of adults with arthritis had SJP (27.2%). Within selected groups, the age-standardized prevalence of SJP was higher among women (29.2%), non-Hispanic blacks (42.3%), Hispanics (35.8%), and persons with a disability (45.6%), and those who were unable to work (51.9%); prevalence also was higher among those who had fair or poor health (49.1%), obesity (31.7%), heart disease (34.1%), diabetes (40.9%), or serious psychological distress (56.3%). From 2002 to 2014, the age-standardized prevalence of SJP among adults with arthritis did not change ( $p = 0.14$ ); however, the number of adults with SJP was significantly higher in 2014 (14.6 million) than in 2002 (10.5 million). A strategy to improve pain management (e.g., the 2016 National Pain Strategy\*) has been developed, and more widespread dissemination of evidence-based interventions that reduce joint pain in adults with arthritis might reduce the prevalence of SJP.

CDC used data from the National Health Interview Survey, an annual, nationally representative, in-person survey of health status and behaviors of the noninstitutionalized civilian U.S. adult population. Sampling weights were applied so that estimates were representative of the civilian noninstitutionalized U.S. population. These weights adjusted for household non-response and oversampling of blacks, Hispanics, and Asians. Poststratification adjustments were based on 1990 U.S. Census estimates for 2002 data, 2000 U.S. Census estimates for 2003, 2006, and 2009 data, and 2010 U.S. Census estimates for 2014 data. Analyses were conducted using statistical software to account for the complex sampling design. Total unweighted sample sizes and final response rates were 31,044 and 74.3% in 2002; 30,852 and 74.2% in 2003; 24,275 and 70.8% in 2006; 27,731 and 65.4% in 2009; and 36,697 and 58.9% in 2014.†

Respondents were classified as having doctor-diagnosed arthritis if they answered “yes” to the question, “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?” Among adults reporting joint pain, respondents were asked to “please think about the past 30 days, keeping in mind all of your joint pain or aching and whether or not you have taken medication. During the past 30 days, how bad was your joint pain on average? Please answer on a scale of 0 to 10, where 0 is no pain or aching and 10 is pain and aching as bad as it can be.” SJP was defined as a response  $\geq 7$ .

For 2014, unadjusted and age-standardized SJP prevalence were estimated for adults with arthritis, both overall and by selected demographic (sex, age group, race/ethnicity [non-Hispanic whites, non-Hispanic blacks, and Hispanics], disability status,<sup>§</sup> education level, and employment status) and health (smoking status, body mass index,<sup>¶</sup> leisure-time physical activity level,\*\* overall health status, heart disease and diabetes,<sup>††</sup> and serious psychological distress status<sup>§§</sup>) characteristics. Estimates were age-standardized to the 2000 U.S. standard population using three age groups (18–44, 45–64, and  $\geq 65$  years) (6). Unadjusted prevalence estimates

<sup>§</sup> Adults were considered to have a disability if they answered “yes” to any of the following six questions: “Are you deaf or have serious difficulty hearing? Are you blind or have serious difficulty seeing even when wearing glasses? Because of a physical, mental, or emotional condition, do you have serious difficulty concentrating, remembering, or making decisions? Do you have serious difficulty walking or climbing stairs? Do you have difficulty dressing or bathing? Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone such as visiting a doctor’s office or shopping?”

<sup>¶</sup> Body mass index = weight (kg) / (height [m])<sup>2</sup>. Categorized as follows: underweight/normal weight (<25.0), overweight (25.0 to <30.0), obese ( $\geq 30.0$ ).

\*\* Determined from responses to six questions regarding frequency and duration of participation in leisure-time activities of moderate or vigorous intensity and categorized according to the U.S. Department of Health and Human Services 2008 *Physical Activity Guidelines for Americans*. Participants were considered active if they reported  $\geq 150$  minutes of moderate equivalent minutes per week. Those with some aerobic activity, but not enough to meet the active definition were classified as insufficiently active. Inactive adults were those with no moderate or vigorous intensity aerobic activity lasting at least 10 minutes.

<sup>††</sup> Adults were considered to have doctor-diagnosed heart disease if they answered “yes” to any of the following four questions: “Have you ever been told by a doctor or other health professional that you had coronary heart disease? Angina, also called angina pectoris? A heart attack (also called myocardial infarction)? Any kind of heart condition or heart disease (other than the ones I just asked about)?” Adults were considered to have doctor-diagnosed diabetes if they answered “yes” to the following question: “Have you ever been told by a doctor or other health professional that you had diabetes?”

<sup>§§</sup> Adults were considered to have serious psychological distress if they had a score of  $\geq 13$  on the Kessler 6 scale (0–24).

\* <https://iprcc.nih.gov/docs/DraftHHSNationalPainStrategy.pdf>.

† [http://www.cdc.gov/nchs/nhis/quest\\_data\\_related\\_1997\\_forward.htm](http://www.cdc.gov/nchs/nhis/quest_data_related_1997_forward.htm).

for SJP describe the absolute population burden in a specific year, whereas age-standardized prevalence estimates describe the relative population burden adjusting for age-distribution differences across years or population groups. To examine differences for demographic and health characteristics in 2014, nonoverlapping 95% confidence intervals (CIs) (for the age-standardized estimates) were considered statistically significant. To examine trends in the age-standardized prevalence of SJP among adults with arthritis, a linear orthogonal polynomial contrast for the age-standardized estimates was used.

In 2014, the age-standardized prevalence of arthritis was 20.8%. Among adults with arthritis, the unadjusted prevalence of SJP was 27.2% and the age-standardized prevalence of SJP was 26.5%, with the highest prevalence among persons aged 45–64 years (30.7%) (Table). Within selected demographic groups, the age-standardized prevalence of SJP was significantly higher among women (29.2%), non-Hispanic blacks (42.3%), Hispanics (35.8%), those with a disability (45.6%), those with less than a high school education (40.2%), and those unable to work (51.9%). Within selected health characteristics, prevalence of SJP was highest among those with fair/poor health (49.1%), obesity (31.7%), heart disease (34.1%), diabetes (40.9%), and serious psychological distress (56.3%) (Table).

For the 5 years studied, the age-standardized prevalence of SJP among adults with arthritis (range = 24.9%–26.5%) did not significantly change ( $p = 0.14$ ), but the estimated number of adults with SJP was significantly higher in 2014 (14.6 million, CI = 13.8–15.4 million) compared with 2002 (10.5 million, CI = 9.9–11.1 million) (Figure).

## Discussion

SJP affected more than one fourth of adults with arthritis in 2014 and was significantly higher among middle-aged adults. The age-adjusted prevalence of SJP was higher among women, non-Hispanic blacks, Hispanics, those with a disability, those with less than a high school education, and those unable to work. SJP also was higher among those with fair/poor health, obesity, diabetes, heart disease, and serious psychological distress. The age-standardized prevalence of SJP remained high (range = 24.9%–26.5%) and stable during 2002–2014, but the absolute numbers continued to grow significantly, and in 2014 reached 14.6 million.

SJP can limit a person's ability to perform basic functions and seriously compromise their quality of life. The *CDC Guideline for Prescribing Opioids for Chronic Pain* recommends use of exercise therapy, cognitive behavioral therapy, certain interventional procedures, acetaminophen, and nonsteroidal anti-inflammatory drugs for the treatment of arthritis (7); there is insufficient evidence for and serious risks associated with long-term use of opioid therapy to treat chronic pain.

## Summary

### What is already known about this topic?

Severe joint pain (SJP) is a common outcome among adults with arthritis that can limit a person's ability to perform basic functions and seriously compromise quality of life (e.g., resulting in more restricted social participation and more depression).

### What is added by this report?

The unadjusted prevalence of SJP in the preceding 30 days among adults with arthritis was 27.2% in 2014. The age-standardized prevalence of SJP remained high (range = 24.9%–26.5%) and stable during 2002–2014, but the absolute numbers continued to increase and in 2014 reached 14.6 million. Groups disproportionately affected by SJP included women, non-Hispanic blacks, Hispanics, those with a disability, those unable to work, and those with less than a high school education, fair/poor health, obesity, heart disease, diabetes, or serious psychological distress.

### What are the implications for public health practice?

Two major objectives of the 2016 National Pain Strategy are 1) to take steps to reduce barriers to pain care, and 2) to increase patient knowledge of treatment options and risks. The *CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016*, offers additional guidance on managing pain from arthritis. Health care providers and public health practitioners can begin implement the recommendations and improve pain care among adults with arthritis by prioritizing self-management education and appropriate physical activity interventions as effective, nonpharmacologic ways to reduce pain and improve health outcomes.

Medications can help, but low-impact physical activity (e.g., walking, biking, and swimming) is a nonpharmacologic and underused way of reducing joint pain (8). For those concerned about safely increasing physical activity without worsening their joint pain or their arthritis, community-based programs<sup>¶¶</sup> (e.g., EnhanceFitness and Walk with Ease) are available. In addition, participation in self-management education interventions (e.g., the Chronic Disease Self-Management Program) has been shown to improve health-related quality of life and confidence in managing symptoms of arthritis and other health conditions (9). Targeting specific subgroups with a high prevalence of SJP (e.g., non-Hispanic blacks, Hispanics, those unable to work, and those with poor health or chronic conditions) might help reduce the large disparities in SJP burden.

The findings in this report are subject to at least seven limitations. First, all of the data were self-reported. However, the doctor-diagnosed arthritis case definition has been shown to be acceptable for public health surveillance (10). Other characteristics are subject to information bias (e.g., recall bias or social desirability bias); for example, it is likely that weight was

<sup>¶¶</sup> <http://www.cdc.gov/arthritis/interventions.htm>.

TABLE. Number and percentage of adults with doctor-diagnosed arthritis who reported severe joint pain in the preceding 30 days, by selected characteristics — National Health Interview Survey, United States, 2014

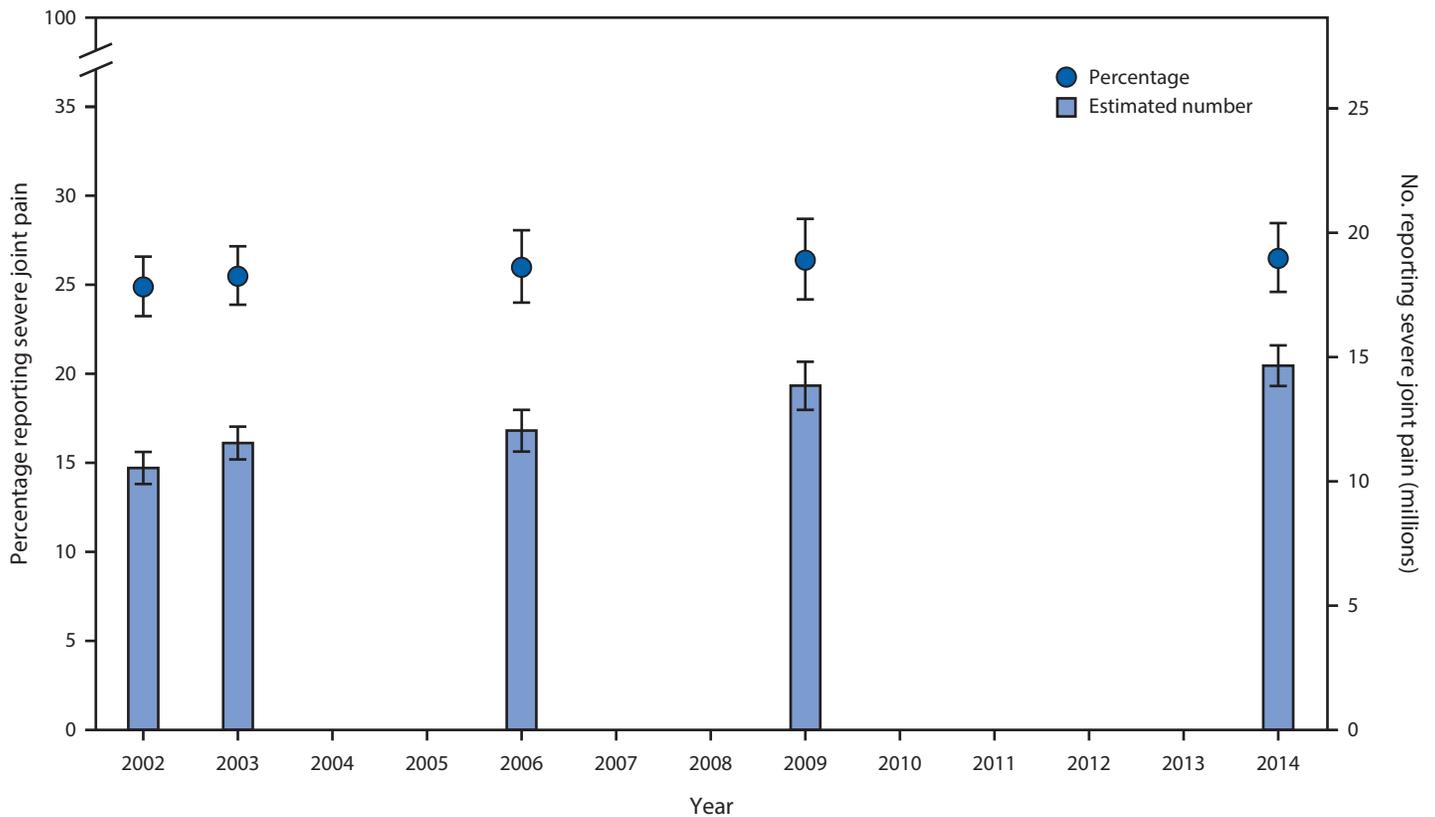
Characteristic	No. in sample reporting severe joint pain	Weighted no. (thousands)*	Unadjusted % (95% CI)	Age-standardized % <sup>†</sup> with SJP (95% CI)
<b>Overall</b>	<b>2,548</b>	<b>14,622</b>	<b>27.2 (26.0–28.6)</b>	<b>26.5 (24.6–28.5)</b>
<b>Demographics</b>				
<b>Age group (yrs)</b>				
18–44	304	1,978	24.9 (21.6–28.5)	—
45–64	1,199	7,361	30.7 (28.6–32.9)	—
≥65	1,045	5,283	24.3 (22.6–26.1)	—
<b>Sex</b>				
Men	783	5,198	24.1 (22.2–26.2)	22.7 (20.3–25.2)
Women	1,765	9,423	29.3 (27.8–30.9)	29.2 (26.7–31.9)
<b>Race/Ethnicity</b>				
White, non-Hispanic	1,544	9,822	23.9 (22.5–25.4)	23.1 (21.0–25.4)
Black, non-Hispanic	575	2,640	42.8 (39.5–46.2)	42.3 (37.6–47.2)
Hispanic	342	1,758	38.2 (33.9–42.6)	35.8 (31.1–40.8)
<b>Disability status<sup>§</sup></b>				
Disabled	797	4,436	39.9 (37.3–42.6)	45.6 (39.5–51.8)
Not disabled	448	2,613	17.5 (15.8–19.4)	23.1 (21.1–25.1)
<b>Education level</b>				
Less than high school diploma	675	3,563	42.2 (38.8–45.8)	40.2 (34.4–46.4)
High school diploma or equivalent	751	4,267	27.8 (25.5–30.3)	27.4 (23.9–31.3)
Some college	488	2,891	28.8 (26.0–31.8)	29.1 (25.1–33.3)
College and above	623	3,816	19.5 (17.7–21.3)	19.3 (16.6–22.2)
<b>Employment status</b>				
Employed/Self-employed	702	4,590	20.7 (18.8–22.9)	20.1 (17.8–22.6)
Unemployed	105	694	31.6 (25.2–38.9)	29.8 (22.6–38.2)
Unable to work	834	4,367	53.1 (49.5–56.7)	51.9 (46.7–57.1)
Other	905	4,967	23.5 (21.7–25.5)	29.2 (22.5–37.0)
<b>Health characteristics</b>				
<b>Smoking status</b>				
Current smoker	597	3,397	35.4 (32.2–38.8)	32.9 (29.4–36.7)
Former smoker	794	4,766	27.9 (25.7–30.1)	26.6 (22.6–31.0)
Never smoker	1,127	6,305	23.7 (22.1–25.4)	22.9 (20.4–25.5)
<b>Leisure-time physical activity</b>				
Inactive	1,309	7,426	36.7 (34.4–39.1)	36.5 (32.6–40.5)
Insufficiently active	523	3,049	25.3 (22.7–28.1)	27.9 (23.2–33.0)
Active	649	3,788	18.7 (16.9–20.6)	18.1 (15.9–20.5)
<b>Overall health status</b>				
Excellent/Very good	495	3,174	15.1 (13.5–16.8)	15.6 (13.1–18.5)
Good	743	4,193	23.7 (21.7–25.8)	22.8 (19.8–26.2)
Fair/Poor	1,310	7,255	48.8 (46.3–51.4)	49.1 (44.7–53.5)
<b>Body mass index</b>				
Underweight/Normal weight	512	2,912	21.4 (19.2–23.7)	21.2 (18.2–24.6)
Overweight	734	4,182	23.6 (21.5–25.8)	23.5 (19.9–27.6)
Obese	1,187	6,849	34.1 (32.0–36.4)	31.7 (28.8–34.7)
<b>Heart disease status</b>				
Yes	794	4,440	34.3 (31.6–37.1)	34.1 (28.7–40.0)
No	1,746	10,157	25.0 (23.5–26.6)	24.8 (22.7–26.9)
<b>Diabetes status</b>				
Yes	681	3,884	37.9 (34.8–41.1)	40.9 (33.7–48.5)
No	1,867	10,737	24.7 (23.4–26.1)	24.5 (22.6–26.5)
<b>Serious psychological distress status</b>				
Yes	331	1,798	58.6 (53.5–63.6)	56.3 (48.9–63.3)
No	2,100	12,211	25.0 (23.7–26.4)	23.9 (22.0–26.0)

\* Weighted number of adults with severe joint pain among those with doctor-diagnosed arthritis.

† Percentages were age-standardized to the 2000 U.S. Census population.

§ Estimates were generated from questions in the survey's family disability file.

FIGURE. Age-standardized percentage and estimated number\* of adults with doctor-diagnosed arthritis who reported severe joint pain in the preceding 30 days — National Health Interview Survey, United States, 2002–2014



\* With 95% confidence intervals.

underreported and height and leisure-time physical activity levels were overreported. Second, assessment of joint pain on average over the preceding 30 days might be overly influenced by recent or severe episodes. Third, because the SJP question was asked before the arthritis question in the survey, it cannot be certain that the SJP reported was related to doctor-diagnosed arthritis, although it seems reasonable to assume that it was. Fourth, these data are cross-sectional; therefore, causal inferences cannot be made. This might be especially relevant for characteristics such as serious psychological distress, which can be both a risk factor for and a result of SJP. Fifth, there is no information on individual or clinical treatment for pain to assess the prevalence of SJP among those with and without treatment. Sixth, because final response rates ranged from 74.3% in 2002 to 58.9% in 2014, the findings might reflect some response bias, although the application of sampling weights is expected to considerably reduce nonresponse bias. Finally, it was not possible to show individual estimates for certain racial/ethnic populations (e.g., Asians, American Indian/Alaska Natives, Native Hawaiian/Pacific Islanders, and multiracial) because they did not meet the minimum criterion for precision of relative standard error  $\leq 30.0\%$ .

Strengths of this study include using a large, nationally representative survey with information on arthritis, joint pain, and important demographic and health characteristics over several years, which allowed evaluation of changes over time.

The 2016 National Pain Strategy, the first broad federal effort to develop strategies to reduce pain, has strategies and objectives in six categories (population research, prevention and care, disparities, service delivery and payment, professional education and training, and public education and communication) aimed at reducing the burden of pain for persons and the nation. Two major objectives are to 1) take steps to reduce barriers to pain care, and 2) to increase patient knowledge of treatment options and risks. CDC currently funds arthritis programs in 12 states.<sup>\*\*\*</sup> Health care providers and public health practitioners can begin to implement the recommendations and improve pain care among adults with arthritis and SJP by prioritizing self-management education and appropriate physical activity interventions as effective nonpharmacologic ways to reduce pain and improve health outcomes.

<sup>\*\*\*</sup> [http://www.cdc.gov/arthritis/state\\_programs/programs](http://www.cdc.gov/arthritis/state_programs/programs).

<sup>1</sup>Division of Population Health, National Center for Chronic Disease Prevention and Health Promotion, CDC; <sup>2</sup>Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, CDC.

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