Arthritis Awareness Month — May 2016

May is Arthritis Awareness Month. The 2016 theme for the observance is "See Arthritis" (http://www.cdc.gov/features/arthritisawareness/index.html). The theme is designed to raise awareness about the seriousness of arthritis by focusing on accounts from persons affected by the disease.

An estimated 52.5 million (22.7%) adults in the United States have self-reported doctor-diagnosed arthritis. Of those, 22.7 million (9.8% of U.S. adults) have arthritis-attributable activity limitation (AAAL) (1). Arthritis also commonly co-occurs with obesity, heart disease, and diabetes (1). The prevalence of arthritis is projected to increase 49% to 78.4 million (25.9% of U.S. adults) by 2040, and the number of adults with AAAL is projected to increase 52% to 34.6 million (11.4% of U.S. adults) (2). Arthritis and AAAL will remain large and growing problems for clinical and public health systems for many years to come. Clinicians and public health professionals might find these projections useful in planning for future clinical and public health needs, including health care utilization, workforce demands, and health policy development.

Information about arthritis and proven community-based programs that can help with managing arthritis is available at http://www.cdc.gov/arthritis and http://www.cdc.gov/arthritis/interventions.

References

1. CDC. Prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation—United States, 2010–2012. MMWR Morb Mortal Wkly Rep 2013;62:869–73.
2. Hootman JM, Helmick CG, Barbour KE, Theis KA, Boring MA. Updated projected prevalence of self-reported doctor-diagnosed arthritis and arthritis-attributable activity limitation among US adults, 2015-2040. Arthritis Rheumatol 2016. Epub March 25, 2016. http://dx.doi.org/10.1002/art.39692

Prevalence of Doctor-Diagnosed Arthritis at State and County Levels — United States, 2014

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Doctor-diagnosed arthritis is a common chronic condition that affects approximately 52.5 million (22.7%) adults in the United States and is a leading cause of disability (1,2). The prevalence of doctor-diagnosed arthritis has been well documented at the national level (1), but little has been published at the state level and the county level, where interventions are carried out and can have their greatest effect. To estimate the prevalence of doctor-diagnosed arthritis among adults at the state and county levels, CDC analyzed data from the 2014 Behavioral Risk Factor Surveillance System (BRFSS). This report summarizes the results of that analysis, which found that, for all 50 states and the District of Columbia (DC) overall, the age-standardized median prevalence of doctor-diagnosed arthritis was 24% (range = 18.8%–35.5%). The age-standardized model-predicted prevalence of doctor-diagnosed arthritis varied substantially by county, with estimates ranging from 15.8% to 38.6%. The high prevalence of arthritis in all counties, and the high frequency of arthritis-attributable limitations (1) among adults with arthritis, suggests that states and counties might benefit from expanding

Continuing Education examination available at http://www.cdc.gov/mmwr/cme/conted_info.html#weekly.

underused, evidence-based interventions for arthritis that can reduce arthritis symptoms and improve self-management.

BRFSS is an annual, random-digit–dialed landline and cell-phone survey representative of the noninstitutionalized adult population aged ≥18 years of the 50 states, DC, and the U.S. territories.* In 2014, a total of 464,664 interviews among adults were completed, and data from 50 states, DC, Puerto Rico, and Guam are included in this report. Response rates ranged from 25.1% to 60.1%, with a median of 47.0%.† 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?"

All analyses used sampling weights to account for the complex sample design, nonresponse, noncoverage, and cellphone-only households. Data were weighted using an iterative proportional weighting (raking) procedure.§ For the combined sample of 50 states and DC, unadjusted and age-standardized weighted prevalences with 95% confidence intervals (CIs) for doctor-diagnosed arthritis were estimated by age group (18–44, 45–64, and ≥65 years), sex, race (non-Hispanic

white, non-Hispanic black, Hispanic, American Indian/Alaska Native, Asian, Native Hawaiian/Pacific Islander, two or more races, and other non-Hispanic), and education level (less than high school, high school graduate or equivalent, more than high school). Estimates were age-standardized to the projected year 2000 U.S. standard population using three age-groups (18–44, 45–64, and ≥65 years) (3). For states and territories, unadjusted and age-standardized weighted prevalence with CIs for doctor-diagnosed arthritis were estimated, with medians and ranges based on all 50 states and DC; differences were considered statistically significant if the CIs of the age-standardized estimates did not overlap.

A multilevel regression and poststratification approach (4,5) was used to estimate model-predicted arthritis prevalence for counties in all 50 states and DC (3,142 counties). The multilevel regression model included 2014 BRFSS individual-level data on age group, sex, and race/ethnicity, and county-level poverty (percentage under 150% poverty level) from the American Community Survey 5-year estimates, and county-level and state-level random effects. Census Vintage 2014 county population estimates (http://www.census.gov/popest/data/counties/asrh/2014/index.html) were then used to generate final predicted county-level estimates of arthritis prevalence. These estimates were age-standardized to the projected 2000 U.S. standard population using 13 age groups for the population aged ≥18 years (3), and reported in quintiles based on data from all 3,142 counties in the 50 states and DC.

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* http://www.cdc.gov/nchs/nhis/quest_data_related_1997_forward.htm.
† The response rate was the number of respondents who completed the survey as a proportion of all eligible and likely eligible persons. Response rates for BRFSS were calculated using standards set by American Association of Public Opinion Research response rate formula no. 4. Additional information available at http://www.cdc.gov/brfss/annual_data/2014/2014_responserates.html.
§ http://www.cdc.gov/brfss/annual_data/2014/pdf/weighting-data.pdf.

For the combined sample of the 50 states and DC, the prevalence of arthritis ranged from 8.8% among those aged 18–44 years to 53.3 percent among those aged ≥65 years (Table 1). Age-standardized prevalences were higher for women than men and among persons with less compared with more education. Compared with white or black non-Hispanics, those who were American Indian/Alaska Native or identifying as multiracial had higher prevalences, and Hispanics and Asians had lower prevalences of doctor-diagnosed arthritis.

The estimated age-standardized prevalences of arthritis varied among states and counties. For states and territories, doctor-diagnosed arthritis ranged from 18.8% in Hawaii to 35.5% in West Virginia (median = 24.0%) (Table 2). In 2014, 47 states, DC, and Guam had an age-standardized prevalence of doctor-diagnosed arthritis of ≥20%, and four states had an age-standardized prevalence of arthritis of ≥30% (Table 2).

At the county level (Figure), counties along the Appalachian Mountains, the Mississippi River, and the Ohio River tended to be in the highest quintiles of age-standardized model-predicted arthritis prevalence. The majority of counties in Alabama, Kentucky, Michigan, Tennessee, and West Virginia also were in the highest quintile.

Discussion

In 2014 doctor-diagnosed arthritis was common in the 50 states and DC (age-standardized median prevalence = 24.0%), affecting at least one in five adults in 47 states, DC, and Guam and nearly one in three adults in four states. The estimated age-standardized, model-predicted prevalence of doctor-diagnosed arthritis among U.S. counties ranged from 15.8% to 38.6% in the 3,142 counties in 50 states and DC, indicating that it is a large problem in all counties.

The high prevalence of arthritis in all counties is particularly problematic because 43.2% of adults attribute activity limitations to their arthritis (1), and few are aware of interventions that have been shown to reduce their joint pain (e.g., physical activity) and help them better manage their arthritis (i.e., self-management education). Arthritis also is a common comorbidity. Half of adults with heart disease or diabetes and one third of adults with obesity have arthritis; adults with both arthritis and one of these conditions are less able to be physically active, which is important for managing the other three conditions (6–8).

For those with arthritis, physical activity reduces joint pain (9) and can be accomplished by walking, biking, swimming, and other low-impact activities. Community programs such as "EnhanceFitness" and "Walk With Ease" offer guidance on how to safely be physically active. In addition, adults can improve their confidence in managing their arthritis symptoms through community self-management education interventions.¶

¶ http://www.cdc.gov/arthritis/interventions/marketing-support/compendium/docs/pdf/compendium-2012.pdf.

TABLE 1. Weighted prevalence of doctor-diagnosed arthritis* among adults aged ≥18 years, by selected characteristics — 2014 Behavioral Risk Factor Surveillance System, 50 states and the District of Columbia

Characteristic	No.	Weighted no. in population (in 1,000s)†	Unadjusted % (95% CI)	Age-standardized§ % (95% CI)
Overall	161,814	63,283	25.6 (25.4–25.8)	23.7 (23.4–23.9)
Age group (yrs)				
18–44	12,486	10,155	8.8 (8.5–9.1)	— (—)
45–64	64,041	27,987	33.1 (32.7–33.6)	— (—)
≥65	85,287	25,141	53.3 (52.8–53.8)	— (—)
Sex				
Men	55,676	25,800	21.5 (21.1–21.8)	20.5 (20.2–20.8)
Women	106,138	37,483	29.5 (29.2–29.9)	26.5 (26.2–26.8)
Race/Ethnicity				
White, non-Hispanic	130,172	45,567	29.3 (29.0–29.6)	25.0 (24.8–25.3)
Black, non-Hispanic	12,707	7,156	25.3 (24.5–26.0)	25.0 (24.3–25.6)
Hispanic	8,163	6,064	15.2 (14.6–15.8)	18.9 (18.2–19.5)
American Indian/Alaska Native	2,476	743	30.8 (28.7–33.0)	29.6 (27.7–31.6)
Asian	1,373	1,449	12.2 (10.7–13.9)	15.6 (13.9–17.6)
Native Hawaiian/Pacific Islander	326	96	18.4 (14.5–23.2)	23.2 (18.9–28.2)
Multiracial	3,189	902	28.6 (26.9–30.5)	31.0 (29.4–32.7)
Other, non-Hispanic	668	218	21.0 (18.3–24.0)	22.0 (19.5–24.7)
Education level				
<High school	16,399	11,008	30.6 (29.8–31.4)	27.7 (26.9–28.4)
High school or equivalent	51,262	19,480	28.0 (27.6–28.5)	25.0 (24.6–25.4)
>High school	93,040	32,372	23.3 (23.0–23.6)	22.1 (21.8–22.3)

Abbreviation: CI = confidence interval.
* Doctor-diagnosed arthritis was defined as an affirmative response 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?"
† Weighted number of adults in the population with doctor-diagnosed arthritis.
§ Doctor-diagnosed arthritis prevalence estimates were adjusted to the projected 2000 U.S. standard population.

TABLE 2. Weighted unadjusted and age-standardized prevalence of doctor-diagnosed arthritis* among adults aged ≥18 years, by state/area — Behavioral Risk Factor Surveillance System, United States,[†] 2014

State/Area	No.	Weighted no. in population (in 1,000s)[§]	Unadjusted % (95% CI)	Age-standardized[¶] % (95% CI)	Prevalence level**
Alabama	3,914	1,266	34.0 (32.7–35.3)	31.1 (30.0–32.3)	High
Alaska	1,261	121	21.9 (20.4–23.5)	22.3 (20.9–23.7)	Low
Arizona	5,566	1,260	24.9 (23.9–25.9)	22.9 (22.0–23.8)	Intermediate
Arkansas	2,251	685	30.4 (28.7–32.2)	27.7 (26.1–29.3)	High
California	2,159	5,963	20.3 (19.3–21.4)	19.7 (18.8–20.6)	Low
Colorado	4,176	933	22.8 (22.0–23.6)	21.9 (21.2–22.6)	Low
Connecticut	2,520	675	24.0 (22.8–25.2)	21.1 (20.1–22.2)	Low
Delaware	1,577	193	26.6 (25.0–28.3)	23.5 (22.1–24.9)	Intermediate
DC	1,293	104	19.2 (17.5–21.0)	20.6 (19.0–22.3)	Low
Florida	3,614	4,241	27.0 (25.9–28.1)	22.9 (22.0–23.9)	Intermediate
Georgia	2,313	1,915	25.2 (23.9–26.5)	24.3 (23.2–25.5)	Intermediate
Hawaii	1,847	230	20.7 (19.5–22.0)	18.8 (17.7–20.1)	Low
Idaho	1,882	297	24.8 (23.3–26.3)	23.2 (21.9–24.6)	Intermediate
Illinois	1,628	2,476	25.1 (23.6–26.5)	23.4 (22.1–24.8)	Intermediate
Indiana	4,406	1,459	29.2 (28.1–30.2)	27.1 (26.2–28.1)	High
Iowa	2,798	617	25.9 (24.8–27.1)	23.3 (22.3–24.3)	Intermediate
Kansas	4,555	552	25.4 (24.6–26.2)	23.5 (22.8–24.2)	Intermediate
Kentucky	5,013	1,151	33.9 (32.6–35.3)	31.4 (30.0–32.7)	High
Louisiana	2,368	953	27.1 (25.9–28.3)	25.6 (24.5–26.7)	High
Maine	3,540	335	31.4 (30.2–32.7)	26.7 (25.6–27.8)	High
Maryland	4,732	1,181	25.6 (24.4–26.8)	23.7 (22.6–24.8)	Intermediate
Massachusetts	5,749	1,459	27.3 (26.3–28.4)	24.9 (24.0–25.9)	Intermediate
Michigan	3,373	2,438	31.9 (30.7–33.1)	28.7 (27.6–29.9)	High
Minnesota	4,447	911	21.8 (21.1–22.5)	20.0 (19.4–20.7)	Low
Mississippi	1,697	657	29.2 (27.5–31.0)	27.1 (25.6–28.6)	High
Missouri	2,844	1,304	28.0 (26.6–29.4)	25.3 (24.1–26.6)	Intermediate
Montana	2,657	208	26.0 (24.7–27.4)	22.8 (21.7–24.0)	Intermediate
Nebraska	7,459	347	24.6 (23.8–25.4)	22.6 (21.9–23.4)	Intermediate
Nevada	1,214	496	23.1 (21.2–25.1)	21.8 (20.0–23.6)	Low
New Hampshire	2,229	286	27.2 (25.7–28.6)	23.9 (22.7–25.3)	Intermediate
New Jersey	3,988	1,567	22.7 (21.7–23.7)	20.5 (19.6–21.3)	Low
New Mexico	2,888	407	25.8 (24.5–27.2)	23.8 (22.6–25.1)	Intermediate
New York	2,134	3,724	24.2 (23.0–25.4)	22.3 (21.2–23.3)	Low
North Carolina	2,513	2,116	27.7 (26.5–28.8)	25.5 (24.5–26.6)	Intermediate
North Dakota	2,677	145	25.0 (23.7–26.4)	23.2 (22.1–24.4)	Intermediate
Ohio	4,457	2,752	30.8 (29.6–32.1)	27.8 (26.7–29.0)	High
Oklahoma	3,130	806	27.5 (26.4–28.6)	25.6 (24.6–26.6)	High
Oregon	1,836	808	26.1 (24.7–27.6)	23.8 (22.5–25.1)	Intermediate
Pennsylvania	4,345	3,047	30.3 (29.2–31.5)	26.6 (25.6–27.7)	High
Rhode Island	2,358	228	27.4 (26.0–28.8)	24.5 (23.4–25.8)	Intermediate
South Carolina	4,237	1,117	30.0 (28.9–31.1)	27.3 (26.3–28.3)	High
South Dakota	2,467	168	26.0 (24.4–27.7)	23.4 (22.0–24.8)	Intermediate
Tennessee	2,204	1,643	32.6 (30.9–34.4)	30.1 (28.5–31.7)	High
Texas	4,598	3,843	19.4 (18.5–20.4)	19.3 (18.4–20.2)	Low
Utah	3,892	413	20.1 (19.3–20.8)	21.4 (20.7–22.1)	Low
Vermont	2,104	141	28.0 (26.7–29.2)	24.3 (23.2–25.4)	Intermediate
Virginia	3,255	1,690	26.2 (25.1–27.3)	24.4 (23.5–25.4)	Intermediate
Washington	3,576	1,402	25.7 (24.6–26.8)	24.1 (23.1–25.1)	Intermediate
West Virginia	2,879	586	40.0 (38.6–41.4)	35.5 (34.1–36.8)	High
Wisconsin	2,365	1,143	25.7 (24.4–27.1)	23.1 (22.0–24.3)	Intermediate
Wyoming	2,407	115	25.6 (24.0–27.2)	23.9 (22.4–25.4)	Intermediate
Median[††]			26.0	24.0	
Range			19.4–40.0	18.8–35.5	
Puerto Rico	432	17	15.7 (13.9–17.6)	18.0 (16.2–20.0)	
Guam	1,990	689	24.6 (23.3–25.8)	22.4 (21.3–23.5)	

Abbreviations: CI = confidence interval; DC = District of Columbia.
* Doctor-diagnosed arthritis was defined as an affirmative response 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?"
[†] Includes all 50 states, DC, Puerto Rico, and Guam.
[§] Weighted number of adults in the population with doctor-diagnosed arthritis.
[¶] Doctor-diagnosed arthritis prevalence estimates were adjusted to the projected 2000 U.S. standard population.
** For all 50 states and DC, age-standardized arthritis prevalence estimates in the lowest quartile were considered "low." Estimates in the two middle quartiles were considered "intermediate," and estimates in the top quartile were considered "high."
[††] Median calculation was based on all 50 states and DC.

The findings in this report are subject to at least four limitations. First, doctor-diagnosed arthritis was self-reported and not confirmed by a health care professional; however, this case definition has been shown to be sufficiently sensitive for public health surveillance (*10*). Second, the 2014 median survey response rate for all states and DC was 47.0% and ranged from 25.1% to 60.1%; lower response rates can result in nonresponse bias, although the application of sampling weights is expected to reduce some nonresponse bias. Third, the model used for county-level estimates did not account for potential geographic correlations between counties or states (i.e., observations for nearby counties and states might be clustered and therefore not independent). Finally, county-level estimates are predicted using a statistical modeling approach, and results can vary from those produced by other methods, although the methods used here have been validated against direct estimates for some other chronic conditions (*5*).

CDC currently funds arthritis programs in 12 states to disseminate arthritis-related information and implement evidence-based arthritis interventions in their communities.** Given the high prevalence of arthritis in all counties, health care providers and public health practitioners can address arthritis and other chronic conditions by prioritizing self-management education and appropriate physical activity interventions as an effective way to improve health outcomes.

** http://www.cdc.gov/arthritis/state_programs/programs.

FIGURE. Age-standardized, model-predicted estimates of the percentage of adults with doctor-diagnosed arthritis, by county — United States, 2014

Legend:
- 27.5–38.6
- 25.6–27.4
- 23.7–25.5
- 22.0–23.6
- 15.8–21.9
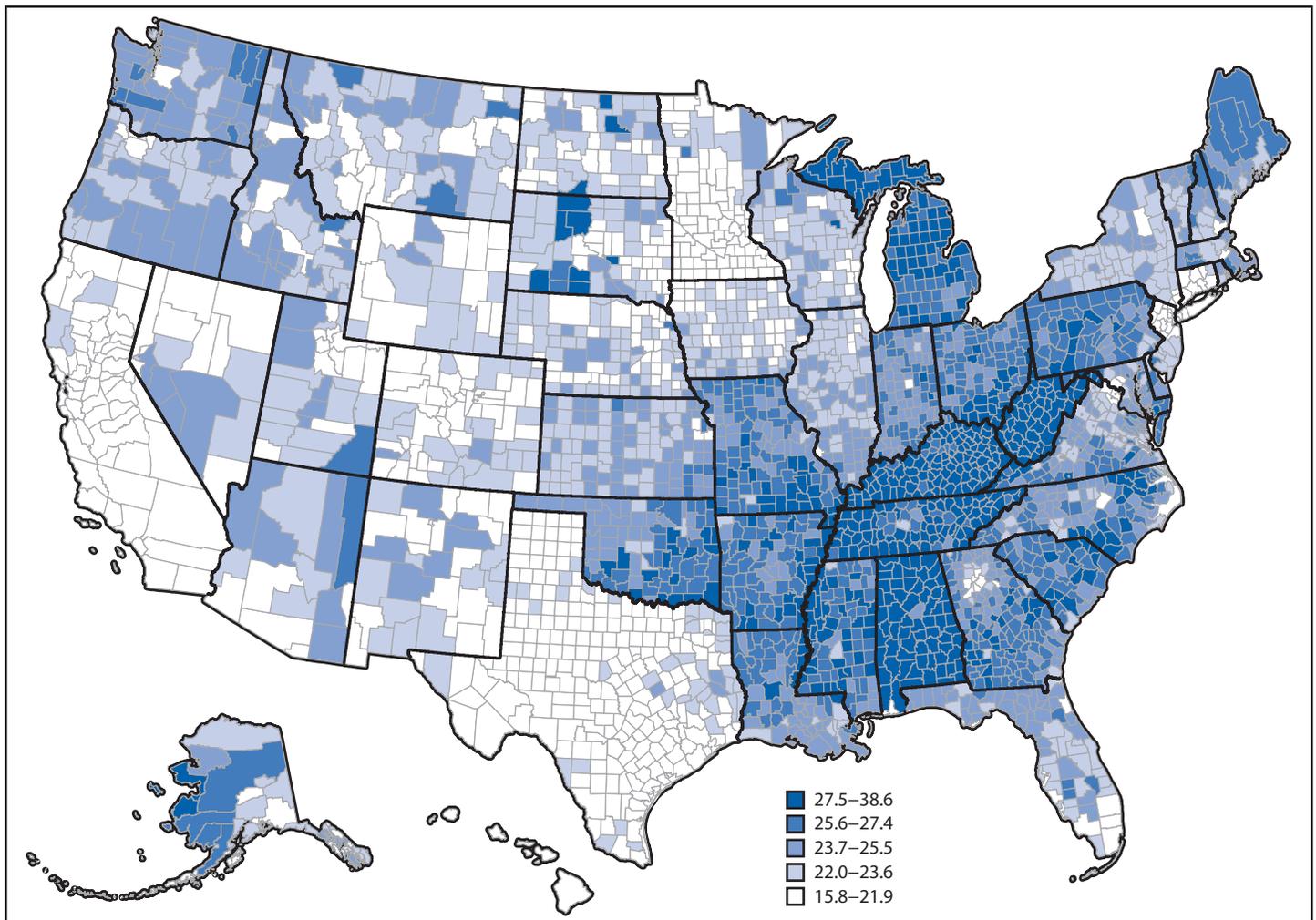
Sources: CDC. Behavioral Risk Factor Surveillance System, 2014. Census county characteristics: vintage 2014 population estimates. American Community Survey, 2010–2014.

Zhang X, Holt JB, Lu H, et al. Multilevel regression and poststratification for small-area estimation of population health outcomes: a case study of chronic obstructive pulmonary disease prevalence using the Behavioral Risk Factor Surveillance System. Am J Epidemiol 2014;179:1025–33.

Summary

What is already known about this topic?

Arthritis is a leading cause of disability that affected an estimated 52.5 million (22.7%) adults in 2012 and is expected to affect 78.4 million (25.9%) adults in 2040.

What is added by this report?

The prevalence of doctor-diagnosed arthritis has been well documented at the national level, but little has been published at the state level or county level, where interventions are carried out and can have their greatest effect. This analysis of 2014 Behavioral Risk Factor Surveillance System data found that the prevalence of arthritis ranged from 18.8% to 35.5% among states and from 15.8% to 38.6% among counties.

What are the implications for public health practice?

Given the high prevalence of arthritis, health care providers and public health professionals can address arthritis by prioritizing self-management education and appropriate physical activity interventions as effective ways to improve health outcomes.

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References

1. CDC. Prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation—United States, 2010–2012. MMWR Morb Mortal Wkly Rep 2013;62:869–73.
2. CDC. Prevalence and most common causes of disability among adults—United States, 2005. MMWR Morb Mortal Wkly Rep 2009;58:421–6.
3. Klein RJ, Schoenborn CA. Age adjustment using the 2000 projected U.S. population. Healthy people statistical notes, no. 20. Hyattsville, Maryland: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2001.
4. Zhang X, Holt JB, Lu H, et al. Multilevel regression and poststratification for small-area estimation of population health outcomes: a case study of chronic obstructive pulmonary disease prevalence using the behavioral risk factor surveillance system. Am J Epidemiol 2014;179:1025–33. http://dx.doi.org/10.1093/aje/kwu018
5. Zhang X, Holt JB, Yun S, Lu H, Greenlund KJ, Croft JB. Validation of multilevel regression and poststratification methodology for small area estimation of health indicators from the behavioral risk factor surveillance system. Am J Epidemiol 2015;182:127–37. http://dx.doi.org/10.1093/aje/kwv002
6. CDC. Arthritis as a potential barrier to physical activity among adults with obesity—United States, 2007 and 2009. MMWR Morb Mortal Wkly Rep 2011;60:614–8.
7. CDC. Arthritis as a potential barrier to physical activity among adults with heart disease—United States, 2005 and 2007. MMWR Morb Mortal Wkly Rep 2009;58:165–9.
8. CDC. Arthritis as a potential barrier to physical activity among adults with diabetes—United States, 2005 and 2007. MMWR Morb Mortal Wkly Rep 2008;57:486–9.
9. Brady TJ, Kruger J, Helmick CG, Callahan LF, Boutaugh ML. Intervention programs for arthritis and other rheumatic diseases. Health Educ Behav 2003;30:44–63. http://dx.doi.org/10.1177/1090198102239258
10. Sacks JJ, Harrold LR, Helmick CG, Gurwitz JH, Emani S, Yood RA. Validation of a surveillance case definition for arthritis. J Rheumatol 2005;32:340–7.