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Arthritis prevalence: which case definition should be used for surveillance? Comment on the article by Jafarzadeh and Felson

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To the Editor:

We read with interest the article by Jafarzadeh and Felson in which they presented an alternative estimate of arthritis prevalence (1). Specifically, using a new case definition for arthritis and applying Bayesian methods to correct misclassification, Jafarzadeh and Felson analyzed National Health Interview Survey (NHIS) data and estimated that in 2015, 91.2 million US adults had arthritis. In contrast, the Centers for Disease Control and Prevention (CDC) had estimated from the 2013–2015 NHIS that 54.4 million US adults had doctor-diagnosed arthritis (2). In this letter, we make 2 observations about their methods and discuss implications for the public health surveillance of arthritis.

We believe that the primary difference between the authors' and CDC's prevalence estimates is attributable to the use of different case definitions. Compared with use of different

case definitions, the effects of “correcting” for misclassification are quite minor. The CDC reported estimates for doctor-diagnosed arthritis based on the NHIS 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?” Jafarzadeh and Felson added 2 more elements to this case definition: recent joint symptoms (case finding question: “During the past 30 days, have you had any symptoms of pain, aching, or stiffness in or around a joint?”) and/or joint symptoms lasting more than 30 days (case finding question: “Did your joint symptoms first begin more than 3 months ago?”). An affirmative response to any of these 3 questions qualifies as a countable case of arthritis, according to Jafarzadeh and Felson. Whereas previous studies on case definitions that include joint symptoms (3–5) defined chronic joint symptoms as a positive response to both of the joint symptom questions above, the case definition used by the authors allows the inclusion of individuals with acute joint symptoms only (e.g., as a result of an acute injury).

Interestingly, when we simply, without any corrections, recalculated arthritis prevalence for 2015 from the NHIS using doctor-diagnosed arthritis and/or chronic joint symptoms based on positive responses to both joint symptom questions, the prevalence was 88.6 million (95% confidence interval [95% CI] 85.9–91.3) (2). The difference between this and Jafarzadeh and Felson’s estimate is just under 3% (2.6 million people).

The sensitivity and specificity estimates used to correct the NHIS estimates in the authors’ Bayesian analysis were obtained from a single validation study conducted in 2003, comprising 389 individuals from Massachusetts age ≥45 years who were predominantly white (97–98%) (4). This study’s ethnic and racial homogeneity does not reflect the diversity of the US population or those with arthritis (2). For example, a validation study of doctor-diagnosed arthritis and chronic joint symptoms by Bombard et al (5), in which 41% of the study population was black, showed racial differences in specificity: compared with white participants, the odds of a false-positive report of arthritis among black participants were 60% lower (odds ratio 0.4 [95% CI 0.2–0.9]). Thus, the correction factors used in Jafarzadeh and Felson’s study may be inappropriate when applied to a diverse population like that of the entire US.

The overarching purpose of public health surveillance is to facilitate the prevention or control of a health-related problem (6). For arthritis, a surveillance system should indicate the number of individuals in need of strategies to control arthritis and reduce adverse effects, such as pain, functional limitations, and depression.

The CDC Arthritis Program included chronic joint symptoms in its case definition of arthritis during its early years of surveillance. For example, the CDC reported that 69.9 million US adults had doctor-diagnosed arthritis and/or chronic joint symptoms in 2001 (7).

However, the CDC eliminated chronic joint symptoms from prevalence estimates after a series of studies showed that those with reported chronic joint symptoms only (i.e., without doctor-diagnosed arthritis), were unlikely to have arthritis or be a fruitful target group for arthritis control efforts. A study of adults age ≥45 years with chronic joint symptoms only showed that many individuals did not report an arthritis diagnosis because they had not

sought medical attention for symptoms that were mild and ignorable (Aeffect Inc.: personal communication). Another study indicated that individuals with arthritis took action (e.g., by seeking medical care and participating in interventions) only after arthritis symptoms began to affect their daily activities (8). While the validation study of a very homogeneous group by Sacks et al showed that 1 in 3 individuals age 45 years with chronic joint symptoms only have arthritis (4), a population-based study of adults age 18 years by the CDC showed something different (7). Among those who reported having seen their health care provider about their joint symptoms, only 6.3% of those with chronic joint symptoms only had been diagnosed by their health care provider as having arthritis (3).

These results, based on a larger, population-based, racially and ethnically diverse sample of adults of all ages, suggest that including those with chronic joint symptoms only in a surveillance case definition results in a dramatic overestimate of arthritis prevalence (many false-positives). Thus, the evidence that those with chronic joint symptoms only do not take action on their symptoms indicates that inclusion of this group in prevalence estimates, which in turn is used to inform arthritis control efforts, would undermine the ability of the surveillance system to enumerate those ready for control efforts and potentially misdirect efforts and resources.

As of 2019, neither of the national and state surveillance surveys recommended for generating arthritis prevalence estimates will include questions about joint symptoms: the NHIS is eliminating the 2 questions related to joint symptoms starting in 2019 (9), and these questions were dropped from the state-level Behavioral Risk Factor Surveillance Survey (BRFSS) in 2005. Thus, Jafarzadeh and Felson's approach will not be possible in analyses of future BRFSS and NHIS data.

Jafarzadeh and Felson recommended that their methods be used for other studies, and specifically mentioned studies examining the cost of arthritis. While they did not provide details on how to implement these methods, we question their suggestion. A recent study of national medical expenditures and earnings losses for 2013 used multi-stage regression models and an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)-based arthritis definition, in which national estimates were the product of the number of individuals with arthritis and the average cost per person as ascertained from a single data source—the Medical Expenditure Panel Survey (MEPS) (10). Multiplying the average cost per person for those with ICD-9-CM-based arthritis from the MEPS by a prevalence estimate, derived from a different case definition and NHIS data, is likely to introduce its own biases (11).

Jafarzadeh and Felson also recommended changes to the doctor-diagnosed arthritis case-finding question. Specifically, they suggested that osteoarthritis (OA) be added to, and fibromyalgia be removed from, the list of conditions mentioned in the question. Evidence from studies examining the accuracy of self-reported OA suggests that most people with OA simply report what they have as arthritis, or misreport it as rheumatoid arthritis or a nonspecific type of arthritis (12,13). In 1994, the National Arthritis Data Workgroup expert panel recommended that fibromyalgia be included in standard arthritis surveillance because it is commonly treated by rheumatologists and its symptoms resemble those of arthritis (14).

We agree with Jafarzadeh and Felson that the CDC's NHIS-based estimate of 54.4 million US adults with arthritis is likely conservative (2). Individuals may be more likely to recall their arthritis diagnosis with increasing inquiries and/or if they are symptomatic at the time of the survey (4,15). The annual prevalence of arthritis in the 2011–12 MEPS was 26.1% (99% CI 25.0–27.2), compared with 23.5% (99% CI 22.9–24.1) in the 2011–12 NHIS (15). One reason for this difference may be that MEPS respondents were asked whether they had been diagnosed as having arthritis multiple times over a year, compared with only once in NHIS.

In conclusion, the crux of the issue seems to be how we define a case of arthritis for surveillance (i.e., whether to include joint symptoms), and not correction for misclassification. For all the reasons described above, we believe that the case definition and approach used by Jafarzadeh and Felson are not appropriate for the public health surveillance of arthritis. The CDC estimate, based on a conservative yet credible case definition, is more defensible than a broader definition whose estimate captures an additional 36.8 million individuals about whom little is known, including whether they have arthritis. Nevertheless, we share the desire expressed by Jafarzadeh and Felson and by Katz, in an editorial accompanying their article (16), to increase awareness of the prevalence and impact of arthritis. Despite the different perspectives on how to conduct arthritis surveillance, we believe there is a consensus that there is a very large number of adults with arthritis in the US who require strategies to reduce its adverse effects and improve their quality of life in a meaningful way.

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References

1. Jafarzadeh SR, Felson DT. Updated estimates suggest a much higher prevalence of arthritis in United States adults than previous ones. *Arthritis Rheumatol* 2018;70:185–92. [PubMed: 29178176]
2. Barbour KE, Helmick CG, Boring M, Brady TJ. Vital signs: prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation—United States, 2013–2015. *MMWR Morb Mortal Wkly Rep* 2017;66:246–53. [PubMed: 28278145]
3. Bolen J, Helmick CG, Sacks JJ, Gizlice Z, Potter C. Should people who have joint symptoms, but no diagnosis of arthritis from a doctor, be included in surveillance efforts? *Arthritis Care Res (Hoboken)* 2011;63:150–4. [PubMed: 20665738]
4. 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. [PubMed: 15693097]
5. Bombard JM, Powell KE, Martin LM, Helmick CG, Wilson WH. Validity and reliability of self-reported arthritis: Georgia senior centers, 2000–2001. *Am J Prev Med* 2005;28:251–8. [PubMed: 15766612]
6. Centers for Disease Control and Prevention. Lesson 5: public health surveillance: Section 7: evaluating and improving surveillance 2012. URL: <https://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson5/section7.html>.
7. Centers for Disease Control and Prevention. Prevalence of self-reported arthritis or chronic joint symptoms among adults—United States, 2001. *MMWR Morb Mortal Wkly Rep* 2002;51:948–50. [PubMed: 12437034]

8. Brady TJ. Moving from identifying to addressing health disparities: a public health perspective. *Arthritis Rheum* 2007;57:544–6. [PubMed: 17471550]
9. Centers for Disease Control and Prevention. 2019 Questionnaire Redesign, 2017. URL: https://www.cdc.gov/nchs/nhis/2019_quest_redesign.htm.
10. Murphy LB, Cisternas MG, Pasta DJ, Helmick CG, Yelin EH. Medical expenditures and earnings losses among US adults with arthritis in 2013. *Arthritis Care Res (Hoboken)* 2018;70:869–76. [PubMed: 28950426]
11. Honeycutt AA, Segel JE, Hoerger TJ, Finkelstein EA. Comparing cost-of-illness estimates from alternative approaches: an application to diabetes. *Health Serv Res* 2009;44:303–20. [PubMed: 19146569]
12. Cisternas MG, Murphy L, Sacks JJ, Solomon DH, Pasta DJ, Helmick CG. Alternative methods for defining osteoarthritis and the impact on estimating prevalence in a US population-based survey. *Arthritis Care Res (Hoboken)* 2016;68:574–80. [PubMed: 26315529]
13. Machlin S, Cohen J, Elixhauser A, Beauregard K, Steiner C. Sensitivity of household reported medical conditions in the medical expenditure panel survey. *Med Care* 2009;47:618–25. [PubMed: 19433993]
14. Helmick CG, Lawrence RC, Pollard RA, Lloyd E, Heyse SP, for the National Arthritis Data Workgroup. Arthritis and other rheumatic conditions: who is affected now, who will be affected later? *Arthritis Care Res* 1995;8:203–11. [PubMed: 8605258]
15. Murphy LB, Cisternas MG, Greenlund KJ, Giles W, Hannan C, Helmick CG. Defining arthritis for public health surveillance: methods and estimates in four US population health surveys. *Arthritis Care Res (Hoboken)* 2017;69:356–67. [PubMed: 27214851]
16. Katz JN. Prevalence of arthritis revisited [editorial]. *Arthritis Rheumatol* 2018;70:153–4. [PubMed: 29178378]