

Insufficient health care access in American minorities with or at high risk for knee osteoarthritis: Data from the Osteoarthritis Initiative

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Abstract

Background: Access to health care (HC) in American minorities with or at high risk for knee osteoarthritis (OA) is indistinct. The current study aims to address this gap.

Methods: Data of Americans ($n = 4,674$) aged 45–79 years with or at elevated risk for knee OA were fetched from the Osteoarthritis Initiative. Participants were categorized into Caucasians and American minorities based on their racial and ethnic background.

Results: American minorities had insufficient access to HC than did Caucasians (9% vs. 2% were uninsured with no health care coverage (HCC), $p < .0001$, while 6% vs. 9% had only HCC, $p < .0001$). A multinomial regression analysis shows that less than <50,000 American dollar annual income was more likely associated with insufficient access to HC (odds ratio [OR] = 3.82, 95% confidence interval [CI] = 2.25–6.51) in American minorities than Caucasians (OR = 1.93, 95% CI = 1.50–2.48).

Conclusion: American minorities had insufficient access to HC than did Caucasians. The less annual income was highly influenced by insufficient access to HC in this population.

Background

A 17-member commission of experts from the Institute of Medicine (IOM) in the United States specified access to health care (HC) as a "timely use of personal health services to achieve the best possible health outcomes" [1]. This committee was chosen for the Access Monitoring Project to develop a set of indicators to monitor access to personal HC services at the national level over time. The commission believes that no or inadequate health care coverage (HCC) is one of the signs of failure to obtain timely and appropriate care, which makes a difference in the state of one's health. Insufficient health insurance and low incomes are probably more common among American minorities—such as African Americans, Asians, and other non-whites—than among Caucasians. These differences have been steadily growing over the past two decades due to the increased prevalence and incidence of chronic diseases [1].

However, chronic conditions like osteoarthritis (OA), particularly knee OA, which induces significant long-term pain and disability, are one of the reasons many people use medical care [2]. Usually, knee OA is not self-limiting, but its prevalence in the United States has continued to increase over the past several decades along with the aging population and the growing obesity epidemic that is expected to be the fourth leading reason of disability by 2020 [3, 4]. It accelerates a significant economic burden that increases the lifetime cost of patients with knee OA from onset until death who undergo total knee arthroplasty (TKA) [5], which is an expensive procedure [6]. In addition, adverse consequences can occur after TKA if regular medical care is absent [7]. Thus, access to HC can donate to enhance functioning after TKA in a patient with knee OA and can minimize disability even when life cannot be extended [1].

Racial and ethnic disparities in those with onset or at high risk of knee OA have been significant and persistent in the United States [3]. American minorities are more likely to suffer from knee OA than Caucasians [3]. However, the rate of TKA is higher in Caucasians than among American minorities [8]. As a result, one of the Healthy People 2020 objectives call for emerging issues in access to health services to be addressed [1].

Around 20 million adults have gained health insurance coverage over the first half of this decade because of the Patient Protection and Affordable Care Act of 2010 [9]. However, millions of Americans still lack coverage [10]. Having both a regular source of care and insurance are essential indicators of access to HC [11]. However, studies have been reported that the presence of a usual source of concern more critical in predicting access to HC than insurance status [12]. Data from the Healthy People Midcourse Review also demonstrate that uninsured American minorities fare worse than uninsured Caucasians in obtaining access to HC, which corresponds with a previous report [13]. This may be attributed to the fact that American minorities are less likely to have a regular source of care than do Caucasians [14]. A review provides compelling evidence from the findings of four studies showing that health insurance accounts for much of the variation in racial and ethnic differences in access to a regular source of care [14]. These disparities endure with all levels of passage to HC, including health and dental insurance, having an ongoing source of care, and access to primary care.

The noted influence from the studies mentioned above on access to HC in American minorities with or at high risk for knee OA is vague. Thus, the present study aims to address this limitation in the literature by comparing Caucasians who had the same condition. The hypothesis is that there would be insufficient access to HC in American minorities with or at high risk for knee OA compared to Caucasians.

Methods

A secondary analysis was performed using data from the Osteoarthritis Initiative (OAI). The OAI is a publicly and privately funded multicenter, longitudinal study to examine the onset and progression of knee OA. A total of 4,796 participants in the OAI study were recruited from four clinical sites in the United States (US) (Baltimore, Maryland; Pittsburgh, Pennsylvania; Pawtucket, Rhode Island; and Columbus, Ohio) between February 2004 and May 2006. An overview of the OAI is provided elsewhere [15]. The Institutional Review Board of the University of California (Coordinating Center), San Francisco has approved the OAI protocol. Each participant was instructed about the objectives and procedures of the study by the investigator at each site. All the participants were provided with informed consent forms, which they signed before enrollment in the OAI study.

In the present cross-sectional study, data of 4,674 participants aged 45–79 years with or at high risk for knee OA were included. Based on the racial and ethnic background, all participants were classified as Caucasians and American minorities, such as African Americans, Asians, and other non-whites. Participants ($n = 122$) who had no pain, aching, or stiffness in either knee in the past year; no radiographic finding of OA; and no eligibility risk factor of OA were excluded from the analysis.

Access to HC was defined by asking the self-reported question: "Where do you usually go for health care or advice about your health care?" Answers included "private doctor," "public clinic," "health maintenance organization (HMO)," "hospital clinic," "emergency room," and "other." Similar questions were posed in the 2001–2003 Medicare Current Beneficiaries Survey and the 2002 Area Resource File [16]. The HCC statuses of participants were determined by asking the self-reported question: "Do you currently have any kind of health care coverage?" The answers to this question included private health insurance (such as Blue Cross), prepaid plans (such as those of Health Maintenance Organizations [HMOs]), and Preferred Provider Organizations (PPOs) or any government-sponsored plans such as Medicare, Medicaid, or Veterans' Affairs (VA) coverage. Participants' insurance statuses were determined by asking the self-reported question: "Do you have any health insurance plan that pays for all or part of the cost of prescription medicines?" Similar questions were posed in a previous study [17]. Based on the presence or absence of HCC and insurance, access to HC has been classified into four levels: 1) presence of both HCC and insurance, 2) presence of HCC and absence of insurance, 3) the absence of HCC and presence of insurance, and 4) absence of both HCC and insurance.

Participants' sociodemographic and smoking status, as well as body mass index (BMI), were collected. Based on self-reports, participants' gender (male or female), household composition (living alone or with others), and income per year in United States dollars (<50,000 or ≥50,000) were also recorded. Education was categorized into three levels: primary school or less, college graduate, and graduate or beyond. Age was used as continuous to show the age difference and also stratified by a five-year gap (<50, 50–54, 55–59, 60–64, and ≥65) to show the presence or absence of HCC and insurance between both groups. Data on marital (married and unmarried/divorced/widow) and smoking (none- and current or former smoker) status were included. BMI was calculated using participants' measured weight in kilograms divided by height in square meters. According to the World Health Organization [18], BMI was classified into three levels: normal weight (18.5–24.9), overweight (25–29.9), and obese (30 or above).

The sample characteristics were described using means and standard deviation (SD) for the continuous variables and frequencies for the categorical variables. The significant difference between Caucasians and American minorities was determined by utilizing a t-test for the continuous variables and a chi-square test for the categorical variables. For Caucasians and American minorities, the distribution of sociodemographic data by age group, gender, educational level, income per year, household composition, marital status, smoking status, and BMI according to the presence and absence of HCC and insurance were provided in the count (percentages). The significance between the sociodemographic, HCC, and insurance statuses was examined using a chi-square test in both groups. A multinomial regression model was used to identify the factors behind insufficient access to HC in Caucasians and American minorities. All the analyses were performed using the Statistical Analysis Software (SAS) for Windows version 9.4 (SAS Institute, Inc., Cary, NC, US).

Results

Table 1 shows the sociodemographic characteristics of all, Caucasians, and American minorities. Of the 4,674 participants, 79% were Caucasians (n =3,677), and 21% were American minorities (n =997) with an average age of 60.5 years. American minorities were three years younger than Caucasians. Women of American minorities (68% of all the participants) formed the dominant gender, and most participants (57%) had lower annual incomes. The majority of Caucasians were married (72%), living with a spouse or other family members (80%), and with a greater HCC (98%). Most of the American minorities were current smokers (13%) and obese (BMI >30 kg/m²). Most of the Caucasians had both HCC and insurance (89%) with a private doctor as an HC provider (89%).

Table 1
The sociodemographic characteristics of all the study sample, Caucasians, and American minorities

Characteristics	All <i>n</i> =4,674	Caucasians <i>n</i> =3,677 (79%)	American minorities <i>n</i> =997 (21%)	<i>P</i> -value
Age (years), mean (SD)	60.5 (9)	61.9 (9.3)	59.1 (8.4)	<.0001
Age groups				<.0001
<50	511 (12.5)	388 (12.1)	123 (14.2)	
50-54	123 (3)	81 (2.5)	42 (4.8)	
55-59	847 (20.7)	615 (19.2)	232 (26.8)	
60-64	891 (19.4)	600 (18.7)	191 (22.1)	
≥65	1803 (44.4)	1525 (47.5)	278 (32.1)	
Gender				<.0001
Men	1,945 (42)	1625 (44)	320 (32)	
Women	2,729 (58)	2052 (56)	677 (68)	
Education				<.0001
Primary school or less	770 (16)	493 (13)	277 (28)	
College graduate	2101 (45)	1628 (44)	473 (47)	
Some graduate	1803 (39)	1556 (43)	247 (25)	
The income per year, USD				<.0001
<50,000	1758 (38)	1193 (32)	566 (57)	
≥50,000	2916 (62)	2484 (68)	432 (43)	
Marital status				<.0001
Married	3078 (65.8)	2663 (72.4)	415 (41.6)	
Unmarried/divorced/widow	1596 (34.2)	1014 (27.6)	582 (58.4)	
Smoking status				<.0001
Nonsmoker	4359 (93.3)	3495 (95)	864 (86.7)	
Current or former smoker	315 (7)	182 (5)	133 (13)	
Household composition				<.0001
Single	1043 (22)	723 (20)	320 (32)	
With others	3631 (78)	2954 (80)	677 (68)	
Body mass index (BMI), kg/m ²				<.0001
Normal weight (18.5–24.9)	1068 (22.9)	950 (25.9)	118 (11.9)	
Overweight (25–29.9)	1832 (39.3)	1508 (41.1)	324 (32.7)	
Obese (≥30)	1761 (37.8)	1211 (33)	550 (55.4)	
Access to health care factors				<.0001
HCC & insurance present	4018 (87)	3218 (89)	800 (83)	
HCC present & insurance absent	412 (9)	350 (9)	62 (7)	
HCC absent & insurance present	13 (0.3)	3 (0.08)	10 (1)	
HCC & insurance absent	153 (3.3)	65 (1.8)	88 (9)	
Health care provider				<.0001
Private doctor	3907 (84)	3277 (89)	630 (63)	
Public clinic	131 (3)	50 (2)	81 (8)	

SOURCE Authors' analysis of baseline data from Osteoarthritis Initiative, 2004-6. **NOTES** There were statistically significant differences in all sociodemographic characteristics between Caucasians and American minorities. HCC, health care coverage; HMO, health maintenance organization; BMI, body mass index; USD=the United States dollars. Values are present mean (SD) or n (%).

Characteristics	All <i>n =4,674</i>	Caucasians <i>n =3,677 (79%)</i>	American minorities <i>n =997 (21%)</i>	<i>P-value</i>
HMO	318 (7)	196 (5)	122 (12)	
Hospital clinic	114 (2)	43 (1)	71 (7)	
Emergency room	31 (0.6)	12 (0.3)	19 (2)	
Others	173 (3.4)	99 (2.7)	74 (8)	
SOURCE Authors' analysis of baseline data from Osteoarthritis Initiative, 2004-6. NOTES There were statistically significant differences in all sociodemographic characteristics between Caucasians and American minorities. HCC, health care coverage; HMO, health maintenance organization; BMI, body mass index; USD=the United States dollars. Values are present mean (SD) or n (%).				

Table 2 presents the distribution of sociodemographic status according to the presence or absence of HCC and insurance in Caucasians and American minorities. Among all participants, access to HC (presence or absence of HCC and insurance) was significantly associated with age, education, annual income, and marital and current smoking statuses. In terms of access to HC, there were significant differences between Caucasians and American minorities. The majority of Caucasians aged 65 years and above (38%) had both HCC and insurance for access to HC ($p < .0001$), while only 28% of American minorities of a similar age had both HCC and insurance for access to HC ($p < .0001$). There were significant differences between Caucasians and American minorities in terms of sociodemographic characteristics, as well. American minorities who had both HCC and insurance for access to HC ($p < .0001$) had lower education (41%), and annual income (43%), and fewer were married (38%) compared to Caucasians ($p < .0001$) who had higher education (39%) and annual income (63%) and most of whom were married (66%). There were also significant differences in terms of those who smoked and lived at home. Most American minorities ($p = 0.003$) were current smokers (10%), while only 56% of them were living with family members compared to Caucasians ($p < .0001$) among whom there were fewer current smokers (4%), with 72% of them living with family members.

Table 2

Distribution of sociodemographic characteristics according to the presence or absence of health care coverage and insurance in Caucasians and American minorities

Variable	Caucasians (n = 3677)				American minorities (n = 997)					
	Health care coverage status, n %				P-value	Present both HCC & Insurance (n = 693)	Present HCC & Insurance absent (n = 56)	HCC absent & Insurance present (n = 8)	Both HCC & Insurance absent (n = 75)	P-value
	Present both HCC & Insurance (n = 2,775)	Present HCC & Insurance absent (n = 338)	HCC absent & Insurance present (n = 3)	Both HCC & Insurance absent (n = 56)						
Age in years					<.0001					<.0001
<50	388 (12)	16 (0.5)	1 (0.03)	12 (0.4)		93 (11)	6 (0.7)	1 (0.1)	19 (2)	
50-54	78 (3)	4 (0.1)	0 (0.0)	2 (0.06)		28 (3.3)	1 (0.1)	1 (0.1)	8 (0.9)	
55-59	592 (18)	18 (0.5)	1 (0.03)	25 (0.8)		180 (21)	12 (0.4)	3 (0.4)	31 (4)	
60-64	565 (17)	29 (0.9)	1 (0.03)	18 (0.5)		161 (19)	8 (0.9)	3 (0.4)	15 (2)	
≥65	1251 (38)	275 (8)	0 (0.0)	0 (0.0)		238 (28)	29 (3)	0 (0.0)	3 (0.3)	
Gender					0.32					0.55
Men	1466 (39)	143 (3.8)	2 (0.05)	32 (0.85)		256 (26)	19 (2)	5 (0.5)	32 (3.3)	
Women	1858 (56)	211 (5.6)	1 (0.03)	34 (0.91)		551 (57)	43 (5)	5 (0.5)	57 (6)	
Education					<.0001					0.0002
Primary school or less	420 (11)	53 (1.4)	1 (0.03)	18 (0.48)		202 (21)	29 (3)	6 (0.6)	33 (3.4)	
College graduate	1444 (38)	180 (4.8)	2 (0.05)	30 (0.8)		402 (41)	24 (2)	4 (0.4)	42 (4.3)	
Some graduate	1460 (39)	121 (3.2)	0 (0.0)	18 (0.5)		203 (21)	9 (0.9)	0 (0.0)	14 (1.4)	
The income per year					<.0001					<.0001
<\$50,000	976 (26)	164 (4.3)	2 (0.05)	52 (1.4)		422 (43)	49 (5)	8 (0.8)	80 (8)	
>\$50,000	2348 (63)	190 (5)	1 (0.03)	14 (0.4)		385 (40)	13 (1.3)	2 (0.2)	9 (0.9)	
Marital status										
Married	2386 (66)	240 (6.6)	2 (0.06)	21 (0.6)	<.0001	368 (38)	20 (2)	2 (0.2)	20 (2)	<.0001
Unmarried/divorced/widow	832 (22.9)	110 (3)	1 (0.03)	44 (1.2)		432 (45)	42 (4.4)	8 (0.8)	68 (7)	
Smoking status										
None smoker	3067 (84.3)	340 (9.3)	3 (0.08)	50 (1.4)	<.0001	704 (73.3)	55 (5.7)	8 (0.8)	63 (6.6)	0.0003
Current or former smoker	157 (4)	10 (0.2)	0 (0.0)	15 (0.4)		96 (10)	7 (0.7)	2 (0.2)	25 (2)	
Household composition					<.0001					0.92
Single	608 (16)	91 (2)	0 (0.0)	27 (0.7)		262 (27)	22 (2)	4 (0.4)	29 (3)	
With others	2716 (72)	263 (7)	3 (0.08)	39 (1.0)		545 (56)	40 (4)	6 (0.6)	60 (6)	
Body mass index (BMI), kg/m ²										
Normal weight (18.5–24.9)	828 (22.8)	92 (2.5)	0 (0.0)	17 (0.47)	0.095	94 (9.8)	9 (0.9)	1 (0.10)	11 (1.1)	0.533
Overweight (25–29.9)	1320 (36.4)	153 (4.2)	2 (0.06)	17 (0.47)		273 (28.6)	17 (1.8)	3 (0.31)	21 (2.2)	
Obese (≥30)	1063 (33.1)	104 (2.9)	1 (0.03)	31 (0.85)		429 (44.9)	35 (3.7)	6 (0.63)	56 (5.9)	

SOURCE Authors' analysis of baseline data from Osteoarthritis Initiative, 2004-6. **NOTES** There were statistically significant differences in the distribution of sociodemographic characteristics according to the presence or absence of health care coverage and insurance in Caucasians and American minorities, except gender (Caucasians, p=0.34 and American minorities, p=0.55). HCC, Health care coverage; HMO, health maintenance organization; BMI, body mass index

Table 3 shows factors associated with more insufficient access to HC in Caucasians and American minorities. In American minorities, less than <50,000 American dollar income per annum was more likely associated significantly with insufficient access to HC (odds ratio [OR] = 3.82, 95% confidence interval [CI] = 2.25–6.51) compared with Caucasians (OR = 1.93, 95% CI = 1.50–2.48). Other factors, such as age 65 years or above and current or former smoking status were more likely associated significantly with insufficient access to HC among Caucasians (OR = 2.34, 95% CI = 1.52–3.62; OR = 1.58, 95% CI = 1.00–2.50, respectively), whereas unmarried/divorced/widow status was associated significantly among American minorities (OR = 2.19, 95% CI = 1.33–3.62).

Table 3
Factors associated with more inadequate access to health care in Caucasians and American minorities with or at high risk for knee osteoarthritis

Variable	Caucasians		American minorities	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age in years				
<50	1.00		1.00	
50-54	1.01 (0.40–2.52)	0.983	1.69 (0.69–4.11)	0.246
55-59	0.99 (0.61–1.61)	0.963	1.01 (0.56–1.80)	0.976
60-64	1.05 (0.65–1.71)	0.842	0.53 (0.28–1.02)	0.057
≥65	2.34 (1.52–3.62)	0.0001	0.37 (0.19–0.73)	0.059
Gender				
Men	1.00		1.00	
Women	0.88 (0.69–1.11)	0.274	0.69 (0.45–1.05)	0.084
Education				
Primary school or less	1.00		1.00	
College graduate	1.14 (0.83–1.56)	0.395	0.61 (0.40–0.94)	0.257
Some graduate	0.95 (0.74–1.21)	0.565	0.55 (0.28–1.05)	0.072
Income per year				
>\$50,000	1.00		1.00	
<\$50,000	1.93 (1.50–2.48)	<.0001	3.82 (2.25–6.51)	<.0001
Marital status				
Married	1.00		1.00	
Unmarried/divorced/widow	1.36 (0.92–2.00)	0.113	2.19 (1.33–3.62)	0.002
Smoking status				
Nonsmoker	1.00		1.00	
Current or former smoker	1.58 (1.00–2.50)	0.049	1.43 (0.89–2.32)	0.139
Household composition				
Single	1.00		1.00	
With others	0.99 (0.66–1.49)	0.984	1.31 (0.82–2.01)	0.255
Body mass index (BMI), kg/m ²				
Normal weight (18.5–24.9)	1.00		1.00	
Overweight (25–29.9)	0.92 (0.70–1.22)	0.580	0.62 (0.31–1.21)	0.158
Obese (≥30)	0.99 (0.74–1.32)	0.946	0.97 (0.53–1.79)	0.923
SOURCE Authors' analysis of baseline data from Osteoarthritis Initiative, 2004-6. NOTES Data are adjusted for the covariates mentioned in the text. Significance is determined based on a threshold of p <0.05. OR, odds ratio; CI = confidence interval				

Discussion

The current study aimed to evaluate HC access in American minorities with or at high risk for knee OA compared to Caucasians with the same condition. In line with the hypothesis, American minorities had more insufficient access to HC than did Caucasians. The majority of older American minorities were less likely to have both HCC and insurance for access to HC than were Caucasians of a similar age. Compared to Caucasians, American minorities who had both HCC and insurance for access to HC had a lower level of education and annual income; although fewer American minorities were married or living with a

family member, most were current smokers or obese. Concerning access to HC, Caucasians with HCC were more likely to use a private doctor, whereas American minorities with no HCC were more likely to visit a private doctor and private clinic followed by the emergency room and "other" options.

Our findings are among the first to provide evidence of access to HC in explaining racial differences in persons with or at high risk for knee OA above and beyond socioeconomic, lifestyle, and clinical factors. Several studies have explored possible explanations for racial and ethnic differences in access to HC [1, 14, 17, 19–24]. A previous study found that access to HC can be explained according to the presence or absence of HCC [25]. Our study incorporated a broader definition of access to HC, which is supported by research demonstrating that the presence of HCC and insurance is associated with the improved timely receipt of HC [26, 27].

Access to HC in Caucasians and American minorities has been associated with different age groups, education, annual income, household composition, marital, and current smoking status in persons with or at high risk for knee OA. The findings of this study showed that persons aged 65 years and above had both HCC and insurance irrespective of race and ethnicity. Among Caucasians, access to HC was associated with higher education and annual income and fewer current smokers than among American minorities. The findings of the current study are similar to those of Dominick and Baker [28], who suggested that "American minorities (African Americans, Asians, and other non-whites) were at risk for poorer HC or poorly understood compared to Caucasians with OA". It has been well established that age, having a lower income and education, and an uninsured status limits the access to HC in American minorities compared to Caucasians [11, 17, 29–32]. The current study's findings that demonstrate a more indigent association with access to HC among American minorities support this hypothesis.

Racial and ethnic differences in the presence of access to HC may have contributed to our findings on those with or at high risk for knee OA. Results from the present study showed that American minorities were less likely to have HCC or a usual source of HC. American minorities with no HCC were likely utilizing a different source of access to HC. In addition, the distribution of the types of routine care significantly differed between Caucasians and American minorities. Therefore, disparities in the quality of care were possibly more influential than the absence of usual care in persons with or at high risk for knee OA. For example, American minorities were less likely to have HCC or insurance and report seeing a private doctor than were Caucasians even among those with HCC. These results are consistent with the findings on access to HC in other studies [33–37]. However, findings from the National Health Interview Survey (NHIS) showed that the uninsured status decreased from 2013 to 2014 among all race/ethnic groups aged 18–64 years in the United States [38]. According to the NHIS's findings, the changes in the percentage of uninsured individuals between 2013 and 2014 are Hispanics 41.1–34.1%, non-Hispanic whites 14.5–11.5%, non-Hispanic blacks 24.7–17.6%, and non-Hispanic Asians 16.1–12.1%.

Strengths and limitations

The present study has several strengths. To our knowledge, it is the first to evaluate access to HC in American minorities with or at high risk for knee OA in comparison to Caucasians using well-established and validated measures of HCC, insurance, and the usual source of HC. The results of the current study provide significant evidence regarding the influences of access to HC in explaining Caucasians and American minorities with or at high risk for knee OA. This article was prepared to utilize data from a publicly and privately funded large, multicenter prospective longitudinal study (OAI) that examines the onset or at high risk of knee OA. Considering the effects of HCC and insurance on the access to HC outcomes is unique and contributes to a broader understanding of persons with onset or at high risk of knee OA. In addition to the big sample size, data were used in this study came from the four clinical sites across the country. Therefore, the results of this study are generalizable to this population in the whole country.

The limitations of the present study included the cross-sectional design, which hinders comparisons between data over time or prevents establishing causality. The self-report nature of the critical variables—HCC and insurance— might decrease the generalizability of the current findings. The present study participants with onset or at high risk of knee OA were not representative of a person's onset or those at high risk of knee OA in the US general population. Access to HC among this study's participants differed from that of the United States' general population. These differences may reflect temporal changes in HC that occurred after the OAI baseline data was collected and may limit the generalizability of these findings. Further research will be needed to assess recent changes in a health insurance policy in the US by race and ethnicity-based on the onset or at high risk for knee OA. However, it is also possible that the participants' level of access to HC may have changed during follow-up, possibly introducing a misclassification bias. Another limitation, we were not performed a sub-cohort analysis between the cohorts (established and high risk for knee OA) to see the race/ethnicity difference in access to HC.

Recommendations of the expert committee from the IOM Access Monitoring Project should be implemented through policy to improve the state of measuring access problems in Americans with or at high risk for knee OA at both national and regional levels.¹ Specialized surveys should focus on minorities to accomplish the implementation of policy in populations with knee OA status. In this survey, factors that play an important role other than the lack of HCC and insurance should be explained to identify the disparities in access to HC. HCC, to a great extent, is a good proxy for access, and insurance plays a role in influencing not only HC use but also outcomes. A well-established survey at the national and regional levels is required to flesh out these relationships.

Conclusion

American minorities had insufficient access to HC than did Caucasians. In American minorities, sociodemographic factors such as age, education, annual income, household composition, and marital and smoking statuses were influenced by lower access to HC even if individuals had both HCC and insurance. Most of the uninsured American minorities with no HCC were more likely to visit private doctors followed by the emergency room and "other" options to access HC. The research will need to continue documenting racial and ethnic variation in access to HC to better inform policymakers and HC professionals for a solution that would allow American minorities with or at high risk for knee OA to access HC. Further studies are also needed to determine what types of differences in HCC ([such as Blue Cross], prepaid plans [such as HMOs], PPOs or any government-sponsored programs, such as Medicare, Medicaid, or VA

coverage), insurance (e.g., part or full prescription medication coverage) and source of care (e.g. private doctor, public clinic, HMO, etc.) most strongly impact persons with or at high risk for knee OA.

Abbreviations

OA

osteoarthritis

HC

health care

IOM

institute of medicine

HCC

health care coverage

TKA

total knee arthroplasty

OAI

osteoarthritis initiative

HMO

health maintenance organization

VA

veteran affairs

PPO

preferred provider organizations

US

United States

BMI

body mass index

SAS

statistical analysis software

NHIS

National Health Interview Survey

Declarations

Ethics approval and consent to participate

The study has been performed as per the Declaration of Helsinki. The Institutional Review Board of the University of California, San Francisco, and its affiliates approved the study. Written informed consent was obtained from individual participants before enrollment into the study.

Consent for publication

Not Applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are publicly available in the National Institutes of Health repository, <https://oai.nih.gov>.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Conceptualization: VV, SMB Data curation: VV, SMB Formal analysis: VV Funding acquisition: SMB Investigation: VV, SMB Methodology: VV, SMB, TAA Project administration: SMB Resources: SMB Supervision: SMB Validation: VV, AMA Writing ± original draft: VV Writing ± review & editing: VV, SMB, TAA, AMA. The author(s) read and approved the final manuscript.

Not Applicable.

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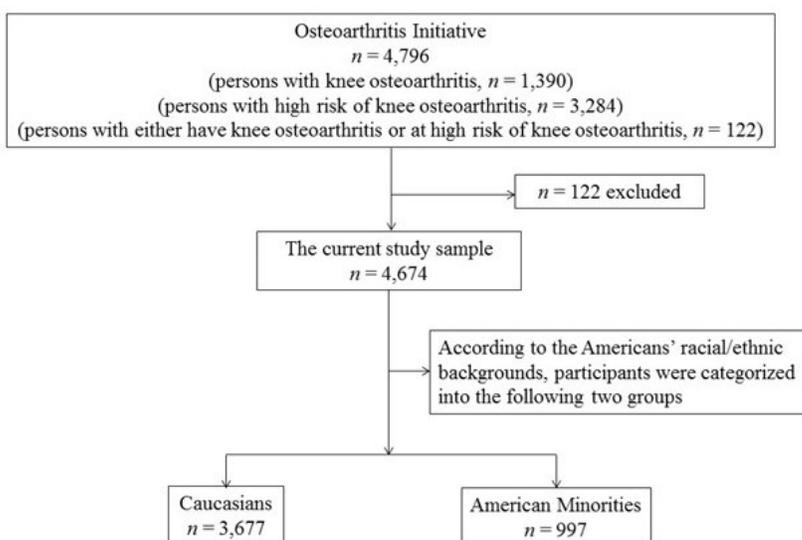
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Figures

Figure 1: The flow of the study sample.

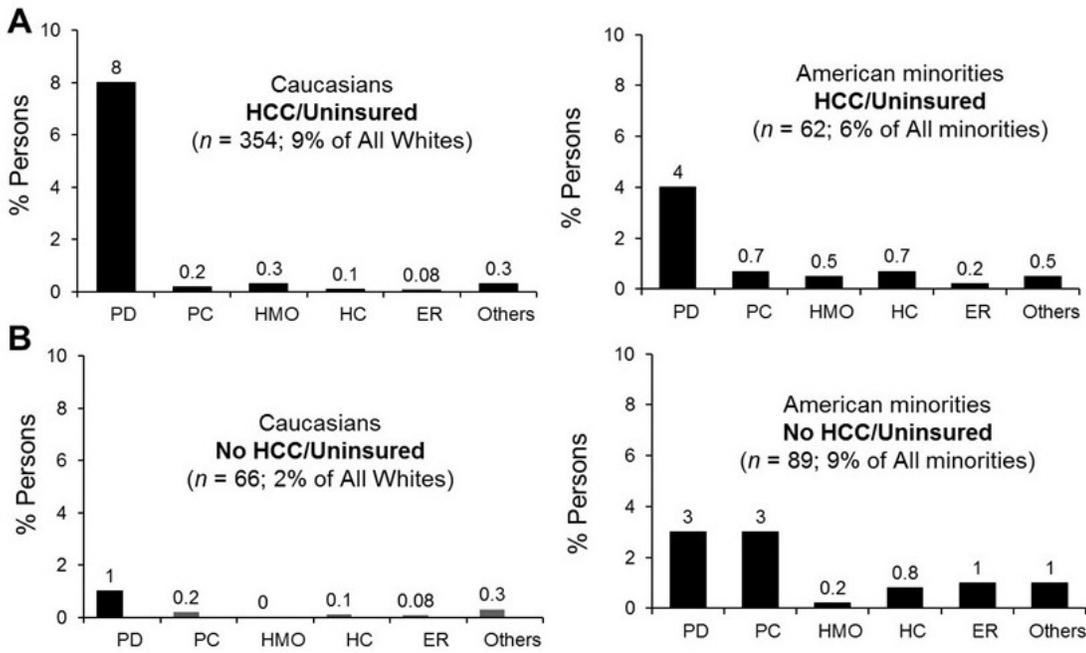


SOURCE Authors' analysis of baseline data from Osteoarthritis Initiative, 2004–6. **NOTES** The exhibit shows flow of the current study sample through the Osteoarthritis Initiative. The exhibit also presents the classification of participants according to their racial and ethnic background as Caucasians and American minorities.

Figure 1

See image above for figure legend

Figure 2: Self-reported (A) healthcare coverage and (B) no health care coverage in Caucasians and American minorities.



SOURCE Authors' analysis of baseline data from Osteoarthritis Initiative, 2004-6. **NOTES** The exhibit shows the status of HCC in Caucasians and American minorities. Both, but most Caucasians who had only HCC visited PD. However, majority American minorities who did not have both HCC and insurance visited both PD and PC. PD = private doctor; PC = public clinic; HMO = health maintenance organization; HC = hospital clinic; ER = emergency room. HCC = health care coverage. Statistical significance between Caucasians and American minorities, $p < .0001$.

Figure 2

See image above for figure legend