IJSCIA

International Journal of Scientific Advances
ISSN: 2708-7972
Volume: 6 | Issue: 5 | Sep – Oct 2025 Available Online: www.ijscia.com
DOI: 10.51542/ijscia.v6i5.4

Racial and Socioeconomic Disparities in Access to Preventive Healthcare Services Among US Adults: An Analysis of NHANES Data (2009–2018)

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ABSTRACT

Background: Disparities in preventive healthcare access remain a persistent public health concern in the United States. ***Objective:*** This study examined racial and socioeconomic differences in routine healthcare utilization and cholesterol screening among U.S. adults from 2009 to 2018, using data from the National Health and Nutrition Examination Survey (NHANES). ***Methods:*** A complete-case analysis was conducted on 7,010 adults (unweighted sample). Survey weights were applied to generate nationally representative estimates of approximately 68.2 million adults. Weighted descriptive statistics and survey-adjusted F- and t-tests compared sociodemographic characteristics by healthcare utilization. Multivariable logistic regression models estimated associations between race/ethnicity, socioeconomic status, and preventive care outcomes, with results expressed as odds ratios (ORs) and 95% confidence intervals (CIs). ***Results:*** Having insurance (OR: 2.98; 95% CI: 2.30–3.87) and female sex (OR: 2.16; 95% CI: 1.75–2.68) were strong predictors of having a usual place for care. Cholesterol screening within the past year was associated with insurance (OR: 2.18; 95% CI: 1.73–2.75), older age, higher income-to-poverty ratio, and female sex. Non-Hispanic White adults were less likely than Mexican Americans to receive cholesterol screening (OR: 0.76; 95% CI: 0.63–0.93). ***Conclusion:*** Persistent disparities in preventive healthcare utilization by race and socioeconomic status underscore the need for targeted policies to improve equity in access and outcomes.

Keywords: preventive healthcare; disparities; socioeconomic status; race/ethnicity; cholesterol screening; NHANES.

INTRODUCTION

Access to preventive healthcare enhances population health and decreases the burden of chronic disease in the United States [1]. Preventive services such as cancer screenings, vaccinations, blood pressure checks, and lifestyle change counseling work to identify the conditions early, limit the risk factors, and improve the quality of life [2]. Inequality in access and utilization exists, even though they have proven effective, and disparities in access and utilization usually mirror common social inequality [3]. The difference is essential to achieving health equity and aligning with the national priorities, including those of the Healthy People 2030 plan, which focuses on eradicating health disparities and fostering well-being among all population groups [4, 5].

Disproportionate barriers to racial and ethnic minorities accessing preventive healthcare services still exist in the United States [6]. The African American, Hispanic/Latino, and Native American groups often face systemic barriers such as discrimination, poor provider access, language barriers, and low insurance coverage [7]. These barriers usually lead to reduced preventive screening rates, late diagnoses, and worse health outcomes than non-Hispanic White populations [8]. More so, cultural beliefs and past historical distrust of the healthcare system have been demonstrated to diminish the voluntary desire to prevent health conditions and worsen health disparities between races and ethnicities [9, 10].

Another dimension of the problem of healthcare disparities is socioeconomic status (SES), as poor healthcare access and use are associated with inadequate income, education, and job security [11]. The low SES also tend to be financially disadvantaged due to lack of insurance, excessive

out-of-pocket expenses, and competing demands on scarce resources [12]. Geography also contributes to this; underserved urban and rural locations might have no healthcare facilities and qualified providers, and preventative interventions are less likely to be timely [13]. Consequently, not only does the socioeconomic inequality restrict care access, but it also overlaps with the racial disparities to increase disadvantage [14].

The racial and socioeconomic gaps in receiving preventive healthcare persist and have grave social health consequences [15]. Absence of access to preventive care increases the risk of unmanaged chronic illnesses (asthma, heart diseases, cancer, etc.), and affects minority and low-income groups more than others [16]. These inequities affect health and productivity and result in high expenditure on health at the social level [17]. The answer to such inequities is thus required to improve a person's health, reduce healthcare funding, and achieve other social and economic development goals [18].

The National Health and Nutrition Examination Survey (NHANES) is an excellent chance to analyze healthcare utilization gaps among a nationally representative sample of adults in the United States [19]. NHANES is a hybrid of interviews and physical examinations that provides in-depth health, nutrition, and socioeconomic data, enabling the analysis of correlations between demographic variables and healthcare practices [20, 21]. The study aims to examine the relationships between race/ethnicity, socioeconomic status, and healthcare use among adults in the United States. Based on the findings of this analysis, some interventions and policy actions can be undertaken to mitigate disparities and enhance equity in care access and, ultimately, improve health outcomes of all population groups.

METHODOLOGY

Study Design and Data Source

This study employed a cross-sectional design utilizing data from the National Health and Nutrition Examination Survey (NHANES) for the years 2009–2018 [21]. NHANES is a nationally representative program conducted by the National Center for Health Statistics (NCHS) that collects data on the health and nutritional status of the U.S. civilian, noninstitutionalized population. The survey uses a multistage, stratified probability sampling design to ensure representativeness across demographic subgroups. Data collection involved in-home interviews, physical examinations, and laboratory assessments conducted at mobile examination centers. The present analysis integrated data from five consecutive two-year cycles to provide a sufficient sample size and robust statistical power.

Study Population

The analytic sample included adults aged 18 years and older who participated in NHANES between 2009 and 2018. Participants were eligible for inclusion if they completed both the household interview and the examination components of the survey. Individuals with incomplete demographic data, such as missing race/ethnicity or socioeconomic indicators, were excluded from the final analytic sample. Pregnant women were excluded due to differences in healthcare utilization patterns and preventive service needs. Applying NHANES sampling weights ensured that the results were generalizable to the U.S. adult population.

Variables/Measures

Healthcare utilization served as the primary dependent construct and was measured using self-reported indicators of access to and use of preventive healthcare services. Four binary outcomes were derived from the NHANES questionnaire data. First, access to care was assessed by whether participants reported having a routine place to go for healthcare (huq030). Second, utilization of care was measured by whether the most recent healthcare visit occurred within the past year (huq061). Preventive screening behaviors were captured through two cholesterol-related measures: whether the respondent had ever undergone a blood cholesterol test (bpq060) and whether the most recent cholesterol screening occurred within the past year (bpq070). Together, these outcomes reflect both healthcare access and engagement in preventive health services.

Independent variables of interest included race/ethnicity, socioeconomic status, and insurance coverage. Race/ethnicity was categorized using the NHANES race3 variable as Mexican American, Other Hispanic, Non-Hispanic White, and Non-Hispanic Black. Socioeconomic status was measured by education level (less than high school, high school/GED, some college or higher) and family income-to-poverty ratio (indfmpir, treated as a continuous measure). Health insurance coverage was coded as insured versus uninsured (hiq011). Covariates included age (continuous, in years) and sex (male or female).

Missing Data

Because NHANES is a complex, multistage survey, standard imputation methods were not applied. Instead, we relied on complete case analysis, which restricted the analytic sample to participants with valid data for all study variables. As a result, the final sample included 7,010 adults. Variables with substantial missingness were excluded before modeling. For instance, the measure of time since last healthcare visit had over 90% missingness and was therefore dropped, while the item on ever having cholesterol checked was excluded because all retained participants reported prior screening, leaving no variation in the outcome.

Minor differences in analytic population size were observed across variables due to this approach. For example, the weighted population estimate for the overall analytic sample was 68,212,517, while the insurance variable had a slightly smaller weighted population of 68,167,415 because of limited missing responses. Such discrepancies are expected in survey-weighted analyses and reflect the exclusion of participants with missing values on individual variables, without materially affecting the results.

Statistical Analysis

All analyses incorporated the NHANES complex survey design, including sample weights, clustering, and stratification, to ensure nationally representative estimates. Descriptive statistics were generated to summarize sample characteristics, stratified by each outcome. Because this analysis used complex survey design data, group differences for categorical variables were evaluated using survey-design-based F-tests (Rao–Scott adjusted F-tests), while continuous variables were compared using survey-adjusted t-tests.

Two multivariable logistic regression models were constructed to evaluate the associations between race/ethnicity, socioeconomic status, and preventive healthcare utilization outcomes: (1) having a routine place for healthcare, and (2) receiving a cholesterol screening within the past year. Each model was adjusted for age, sex, income-to-poverty ratio, education, and health insurance status.

Multicollinearity was assessed using the Variance Inflation Factor (VIF), with values ranging between 1.01 and 2.70 (mean VIF = 1.71), indicating no evidence of problematic multicollinearity. All analyses were conducted using Stata version 18 (StataCorp, College Station, TX).

Ethical Considerations

NHANES protocols are approved annually by the NCHS Research Ethics Review Board, and all participants provide informed consent prior to data collection. This secondary analysis of de-identified, publicly available data was deemed exempt from additional institutional review board oversight.

RESULTS

Table 1 presents the weighted baseline characteristics of participants according to whether they reported having a usual place of healthcare. A total of 7,010 adults were included in the analytic sample, corresponding to an estimated 68.2 million U.S. adults.

TABLE 1: Weighted Baseline Characteristics of U.S. Adults by Usual Place of Healthcare, NHANES 2009–2018 (Unweighted n = 7,010; Weighted N =68.2 million).

Characteristic	No usual place	Has usual place	t-test/ F-test	p-value
Age in years (mean ± SD)	38.49 ± 13.02	48.10 ± 16.19	t= -12.51	<0.001
Income-to-poverty ratio(mean ± SD)	2.71 ± 1.62	3.25 ± 1.62	t= -6.15	<0.001
Gender(%)	-	-	*F= 52.90*	*<0.001*
Male	5,372,516 (18%)	24,568,301 (82%)	-	-
Female	3,767,832 (10%)	34,503,867 (90%)	-	-
Education level(%)	-	-	*F= 3.09*	*0.06*
Less than high school	1,155,114 (17%)	5,594,820 (83%)	-	-
High school graduate/ GED	2,001,908 (14%)	12,183,801 (86%)	-	-
College+	5,983,327 (13%)	41,293,547 (87%)	-	-
Insurance cover(%)	-	-	*F= 148.37*	*<0.001*
No	2,732,604 (32%)	5,842,944(68%)	-	-
Yes	6,396,712 (11%)	53,195,154 (89%)	-	-
Race/Ethnicity(%)	-	-	*F= 7.49*	*<0.001*
Mexican American	947,457 (19%)	3,965,177 (81%)	-	-
Other Hispanic	759,205 (19%)	3,297,457 (81%)	-	-
Non-Hispanic White	6,273,256 (12%)	44,313,447 (88%)	-	-
Non-Hispanic Black	1,160,430(13%)	7,496,086 (87%)	-	-

Insurance had a total weighted estimate of 68,167,415, with 9,129,317 adults reporting no usual place and 59,038,098 reporting a usual place of healthcare. For the remaining categorical variables (education level, gender, and race/ethnicity), the total weighted estimate was slightly higher at 68,212,517, with 9,140,348 adults reporting no usual place and 59,072,168 reporting a usual place. These small differences arise from the complex NHANES survey design and the use of complete case analysis (unweighted sample n=7,010). Group comparisons were performed using survey design-based F statistics for categorical variables and design-based t tests for continuous variables. Relevant test statistics and p-values are shown in Table 1 as F-test/t-test and p-value. -: Intentionally left blank.

The findings above show that participants who reported having a usual place of healthcare were significantly older on average than those without a usual place (48.10 ± 16.19 years vs. 38.49 ± 13.02 years, p<0.001). Similarly, the mean income-to-poverty ratio was higher among those with a usual place of care (3.25 ± 1.62) compared with those without (2.71 ± 1.62, p<0.001).

Gender distributions also differed between groups (p<0.001). Among adults with a usual place of care, 24,568,301 (82%) were male and 34,503,867 (90%) were female, compared with 5,372,516 (18%) males and 3,767,832 (10%) females among those without a usual place.

Although differences by education level were not statistically significant (p=0.06), participants with higher education were somewhat more likely to report a usual place of healthcare. For example, 41,293,547 (87%) of adults with college education or higher reported a usual place compared with 5,594,820 (83%) with less than high school education.

Insurance status showed a strong association (p<0.001). Among insured adults, 53,195,154 (89%) reported having a usual place of care, whereas only 5,842,944 (68%) of the uninsured reported the same.

Finally, significant differences were observed across race/ethnicity groups (p<0.001). Non-Hispanic White adults were the most likely to report a usual place of care (44,313,447, 88%), while Mexican American and Other Hispanic groups were least likely [3,965,177 (81%), 3,297,457 (81%)], respectively.

Table 2 presents weighted descriptive characteristics of participants stratified by cholesterol screening status in the past year. Adults who reported being screened within the past year differed significantly in age, socioeconomic status, and insurance coverage compared to those who had not been screened. No meaningful differences were observed by education level or race/ethnicity.

TABLE 2: Weighted characteristics of adults by cholesterol screening status (NHANES 2009–2018(Unweighted n = 7,010; Weighted N =68.2 million).

Characteristic	Not within the past year (N = 52,727,861)	Within the past year (N=141,729,292)	t-test/ F-test	p-value
Age in years (mean ± SD)	43.11± 14.44	50.13 ± 16.90	t= -12.77	<0.001
Income-to-poverty ratio(mean ± SD)	3.04 ± 1.59	3.29 ± 1.66	t= -4.37	<0.001
Gender(%)	-	-	*F= 7.50*	*0.008*
Male	14,777,835 (49%)	15,162,983 (51%)	-	-
Female	17,443,789(46%)	20,827,911 (54%)	-	-
Education level(%)	-	-	*F= 0.65*	*0.506*
Less than high school	3,094,691 (46%)	3,655,243 (54%)	-	-
High school graduate/ GED	6,902,508 (49%)	7,283,201 (51%)	-	-
College+	22,224,424 (47%)	25,052,450 (53%)	-	-
Insurance cover(%)	-	-	*F= 68.74*	*<0.001*
No	5,740,407 (67%)	2,835,1401(33%)	-	-
Yes	26,468,045(44%)	33,123,821 (56%)	-	-
Race/Ethnicity(%)	-	-	*F= 2.44*	*0.08*
Mexican American	2,484,071 (51%)	2,428,564(49%)	-	-
Other Hispanic	1,913,889 (47%)	2,142,774(53%)	-	-
Non-Hispanic White	24,038,665(48%)	26,548,039 (52%)	-	-
Non-Hispanic Black	3,784,998 (44%)	4,871,517 (56%)	-	-

Insurance had a total weighted estimate of 68,167,415, with 32,208,451 adults reporting cholesterol screening not within the past year and 35,958,963 screened within the past year. For the remaining categorical variables (education level, gender, and race/ethnicity), the total weighted estimate was slightly higher at 68,212,517, with 32,221,623 adults not screened within the past year and 35,990,894 screened within the past year. These small discrepancies result from the NHANES complex survey design and the use of complete case analysis (unweighted sample n=7,010). Group comparisons were conducted using survey design-based F statistics for categorical variables and design-based t tests for continuous variables. Reported p-values and test statistics are shown in Table 2 as F-test/t-test and p-value. -: Intentionally left blank.

Table 1 indicates that participants screened within the past year were significantly older (50.13 ± 16.90 years) than those not screened (43.11 ± 14.44 years; t = −12.77, p < 0.001). Similarly, the mean income-to-poverty ratio was higher among the recently screened group (3.29 ± 1.66) compared to those not screened (3.04 ± 1.59; t = −4.37, p < 0.001). Women were more likely to have been screened (20,827,911; 54%) compared to men (15,162,983; 51%; F = 7.50, p = 0.008). Insurance coverage showed a strong positive association with screening: among those screened within the past year, 33,123,821 (56%) had health insurance compared to only 2,835,140 (33%) without coverage (F = 68.74, p < 0.001). Educational attainment and race/ethnicity did not show statistically significant differences between groups.

Table 3 summarizes the results of a multivariable logistic regression model assessing factors associated with having a routine place for healthcare. The model adjusted for age, sex, income-to-poverty ratio, race/ethnicity, education, and insurance status.

TABLE 3: Multivariable logistic regression of predictors of having a routine place for healthcare (NHANES 2009–2018).

Predictor	Odds Ratio (95% CI)	P-value
Age (years)	1.04 (1.03 – 1.05)	<0.001
Sex (Female vs Male)	2.16 (1.75 – 2.68)	<0.001
Income-to-poverty ratio (IPR)	1.12 (1.04 – 1.20)	0.002
Race/Ethnicity	–	–
Other Hispanic	0.86 (0.59 – 1.25)	0.418
Non-Hispanic White	0.93 (0.67 – 1.28)	0.633
Non-Hispanic Black	1.20 (0.87 – 1.68)	0.264
Education	–	–
High school/GED	1.19 (0.85 – 1.66)	0.304
College+	1.05 (0.77 – 1.42)	0.763
Insurance (Yes vs No)	2.98 (2.30 – 3.87)	<0.001

Odds ratios (OR) and 95% confidence intervals (CI) are reported. The model accounted for the NHANES complex survey design, including sampling weights, clustering, and stratification, to generate nationally representative estimates. Reference categories were male (gender), Mexican American (race/ethnicity), and less than high school (education). -: Intentionally left blank.

From the findings above, it's evident that older age was significantly associated with higher odds of having a routine place for healthcare (OR=1.04, 95% CI: 1.03–1.05, $p < 0.001$). Women were more than twice as likely as men to report a routine place (OR=2.16, 95% CI: 1.75–2.68, $p < 0.001$). Higher income-to-poverty ratio was also positively associated (OR=1.12, 95% CI: 1.04–1.20, $p = 0.002$). Insurance coverage was a strong predictor: insured individuals were nearly three times as likely to report having a routine place compared to those without coverage (OR=2.98, 95% CI: 2.30–3.87, $p < 0.001$). Race/ethnicity and education were not significantly associated with having a usual place of healthcare after adjusting for covariates.

Table 4 presents results from the multivariable logistic regression examining factors associated with cholesterol screening in the past year. The model adjusted for demographic, socioeconomic, and insurance-related factors while accounting for the complex survey design.

TABLE 4: Multivariable logistic regression of predictors of cholesterol screening in the past year (NHANES 2009–2018).

Predictor	Odds Ratio (95% CI)	P-value
Age (years)	1.03 (1.02 – 1.03)	<0.001
Sex (Female vs Male)	1.17 (1.04 – 1.32)	0.009
Income-to-poverty ratio (IPR)	1.06 (1.02 – 1.11)	0.009
Race/Ethnicity	–	–
Other Hispanic	1.04 (0.84 – 1.30)	0.689
Non-Hispanic White	0.76 (0.63 – 0.93)	0.008
Non-Hispanic Black	1.13 (0.92 – 1.40)	0.246
Education	–	–
High school/GED	0.89 (0.74 – 1.06)	0.186
College+	0.90 (0.73 – 1.09)	0.274
Insurance (Yes vs No)	2.18 (1.73 – 2.75)	<0.001

Odds ratios (OR) and 95% confidence intervals (CI) are reported. Estimates are weighted to represent the U.S. adult population. Reference categories were male (gender), Mexican American (race/ethnicity), and less than high school (education). –: Intentionally left blank.

Table 4 above reveals that older adults had significantly higher odds of cholesterol screening in the past year (OR=1.03, 95% CI: 1.02–1.03, $p < 0.001$). Women were also more likely than men to be screened (OR=1.17, 95% CI: 1.04–1.32, $p = 0.009$). A higher income-to-poverty ratio was positively associated with screening (OR=1.06, 95% CI: 1.02–1.11, $p = 0.009$). Insurance coverage remained the strongest predictor, with insured individuals having more than twice the odds of screening compared to the uninsured (OR=2.18, 95% CI: 1.73–2.75, $p < 0.001$). Importantly, Non-Hispanic White adults had significantly lower odds of cholesterol screening compared to Mexican Americans (OR=0.76, 95% CI: 0.63–0.93, $p = 0.008$). Other racial/ethnic groups and education level were not significantly associated with cholesterol screening after adjustment.

DISCUSSION

This study examined racial and socioeconomic disparities in preventive healthcare utilization among U.S. adults using nationally representative NHANES data from 2009–2018. Consistent with prior research, the findings show that socioeconomic factors, particularly insurance status, play a dominant role in shaping access to preventive services, while racial and ethnic disparities remain evident in specific outcomes [3, 6, 14].

Having a usual source of care is a cornerstone of preventive healthcare access. Our results demonstrate that adults with health insurance were nearly three times more likely to report having a regular place for healthcare compared to those without coverage. This strong association underscores the importance of insurance in facilitating continuity of care and lowering barriers to preventive services, findings aligned with previous analyses of national datasets [6, 11, 12]. Additionally, a higher income-to-poverty ratio and older age were associated with greater odds of having a routine healthcare place, suggesting that financial stability and perceived health needs may increase engagement with preventive care.

When examining cholesterol screening, a similar pattern emerged, with insurance again being the strongest predictor of utilization. Insured individuals were more than twice as likely to receive cholesterol screening compared to their uninsured counterparts, reinforcing the well-established role of coverage in enabling access to preventive services [1, 7, 14]. Older age, female sex, and higher income also increased the likelihood of screening, reflecting established demographic gradients in preventive care utilization [3, 11].

Importantly, this analysis highlights a significant racial disparity: Non-Hispanic White adults had lower odds of cholesterol screening compared with Mexican Americans, even after adjustment for socioeconomic factors. While most previous literature documents higher preventive care use among Non-Hispanic Whites [4, 6], our findings may suggest context-specific shifts in utilization patterns, possibly reflecting targeted screening efforts among Hispanic populations, cultural differences in healthcare-seeking behavior, or residual confounding by unmeasured factors such as nativity or healthcare access pathways.

Educational attainment did not show a statistically significant association with either outcome after adjusting for covariates. This is consistent with some prior studies suggesting that the effect of education on preventive service use may be mediated by income and insurance coverage, reducing its independent contribution in multivariable models [11, 12].

Strengths and Limitations

This study draws strength from the use of NHANES, a nationally representative dataset that combines interview data with physical assessments, allowing the findings to reflect the broader U.S. adult population. Applying survey weights and design-based methods also enhanced the validity of the results.

A major limitation was the reliance on complete-case analysis, which required dropping participants with missing data. This led to the exclusion of some key outcomes and may have reduced the representativeness of the sample. In addition, the cross-sectional design prevents drawing causal conclusions, and self-reported measures of healthcare use may be affected by recall bias. Finally, unmeasured factors such as immigration status, cultural health beliefs, and healthcare system-level barriers were not captured but may influence preventive service use.

Future research studies should explore longitudinal datasets to assess causal pathways linking socioeconomic status, race/ethnicity, and preventive service utilization. Mixed-methods approaches may also help uncover the cultural, behavioral, and structural mechanisms behind disparities, particularly the unexpectedly lower screening rates among Non-Hispanic Whites.

Rural-urban scarcity, fragmented healthcare systems, and pandemic disruptions have all contributed significantly to structural barriers preventing healthcare utilization in the United States. Patients are often faced with the tough decision to either travel long distances to access care or rely on already broken and overburdened clinics within their communities. To make matters worse, fragmentation across insurance networks and providers creates administrative and financial gaps that further disproportionately burden low-income and minority groups [7,13]. Furthermore, one of the effects of the COVID pandemic is the disruption of preventive service delivery, reducing routine screenings and visits, thus worsening the disparities that already exist in underserved populations [4]. The combined effects of these systemic challenges differentially reduced preventive use and reinforced pre-existing inequalities. Strategies that can eliminate distance-related barriers - especially in underserved communities- should be encouraged. These strategies may include, but are not limited to, the implementation of mobile health services as well as the use of tele-prevention platforms.

Both Table 3 and Table 4 show an increase in the use of preventive care in older-aged women as compared to other demographics, with twice the number of older women having a routine place for healthcare compared to older men. From Table 4, it can be deduced that women were more likely to have cholesterol screening compared to men, with insured people having twice the odds of cholesterol screening compared to their uninsured counterparts. Attributed to these observations could be possibilities of better Social Economic Status amongst older women, alleviation of burdens and stressors that can improve their healthcare use patterns and health outcomes.

CONCLUSION

This study highlights persistent racial and socioeconomic disparities in access to preventive healthcare services among U.S. adults. Older age, female sex, higher income, and having health insurance were consistently associated with better access to routine care and cholesterol screening. However, notable inequities remain, particularly by race and insurance coverage, underscoring systemic barriers that limit preventive care utilization. These findings reinforce the need for policies and targeted interventions aimed at reducing disparities and promoting equitable access to preventive healthcare.

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