

Depression as an Independent Predictor of Cost-Related Medication Nonadherence Among U.S. Adults

Oluwapelumi Odubunmi

odubunmipelumi@gmail.com

University of Nevada Reno

Adedapo Ogunlewe

University of Lagos

Idris Idenyi

Lagos State University

Abdullah Adeniji-Bello

Lagos State University

Research Article

Keywords: Cost-related medication nonadherence, depression, BRFSS, health disparities, medication affordability, health equity

Posted Date: July 3rd, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9808993/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

Cost-related medication nonadherence remains a significant public health challenge in the United States, disproportionately affecting low-income, uninsured, and marginalized populations. Depression, affecting an estimated 21 million U.S. adults annually, requires consistent pharmacological treatment, yet cost as a barrier to antidepressant adherence remains underexamined at the population level.

Methods

We conducted a cross-sectional analysis of 453,453 U.S. adults using 2024 Behavioral Risk Factor Surveillance System (BRFSS) data. The primary exposure was lifetime depression diagnosis (ADDEPEV3) and the outcome was missing prescribed medication due to cost in the past 12 months (MEDCOST1). Survey-weighted logistic regression (PROC SURVEYLOGISTIC, SAS 9.4) estimated unadjusted and adjusted odds ratios (ORs) with 95% confidence intervals (CIs), adjusting for age, sex, race/ethnicity, education, income, insurance status, and employment. All analyses accounted for the complex survey design using _LLCPWT, _STSTR, and _PSU.

Results

The weighted prevalence of missed medication due to cost was 21.1% (95% CI: 20.55–21.73) among adults with depression compared to 9.9% (95% CI: 9.67–10.15) among those without depression. After full adjustment, depression remained independently associated with cost-related nonadherence (aOR = 2.37, 95% CI: 2.25–2.50). Income showed the strongest gradient effect, with adults earning less than \$15,000 having over seven times the odds of nonadherence compared to those earning \$200,000 or more (aOR = 7.17, 95% CI: 5.96–8.63). Uninsured adults had nearly five times the odds (aOR = 4.81, 95% CI: 4.49–5.14). Women, racial and ethnic minority groups, and working-age adults also had significantly higher odds of nonadherence.

Conclusions

Depression independently doubles the odds of cost-related medication nonadherence beyond what is explained by socioeconomic factors alone. These findings underscore the need for integrated strategies addressing both mental health treatment and medication affordability, including enforcement of mental health parity laws, Medicaid expansion, and financial navigation support within depression care.

INTRODUCTION

Medication adherence is a cornerstone of chronic disease management, yet cost-related nonadherence – defined as skipping, reducing, or delaying prescribed medications due to financial constraints remains a persistent public health challenge in the United States. Nationally, one in four adults reports difficulty affording prescription medications [1], with disproportionate burden falling on low-income, uninsured, and racially marginalized populations. Cost-related nonadherence has been associated with 15% to 22% higher all-cause mortality among individuals with chronic conditions, as well as increased hospitalizations and avoidable healthcare expenditures [2–3]

Among individuals with mental health conditions, consistent medication use carries particular clinical significance. Interruptions in psychiatric treatment are associated with symptom relapse, hospitalization, and diminished quality of life [4]. Depression, affecting an estimated 21 million U.S. adults annually, is the leading cause of disability for adults aged 15 to 44 and imposes a substantial functional and economic burden [5]. The economic burden of US adults with MDD has increased considerably over time, rising from \$236 billion in 2010 to \$326 billion in 2018 [6]. Despite available pharmacological treatments, cost remains a major and underexamined barrier to antidepressant adherence [7].

The relationship between depression and cost-related nonadherence is likely bidirectional. Depressive symptoms, including low motivation, cognitive difficulty, and hopelessness, may impair individuals' ability to navigate insurance systems or prioritize refills, while the financial burden of managing a chronic mental health condition may independently limit medication access. These pathways suggest depression confers excess risk of nonadherence beyond socioeconomic disadvantage alone.

Despite legislative progress, structural gaps persist. The Inflation Reduction Act of 2022 introduced Medicare drug price negotiation and out-of-pocket caps, but these provisions primarily benefit older adults and do not extend to the working-age population [8]. The Mental Health Parity and Addiction Equity Act has faced persistent implementation failures, with research indicating minimal impact on treatment access and cost, compounded by the fact that only 4% of Americans are aware of its protections [9–10, 12]. Meanwhile, women, racial and ethnic minorities, and adults aged 55–64 groups who bear a disproportionate burden of both depression and financial barriers remain underserved [11, 13]

Using 2024 BRFSS data from 453,453 U.S. adults, this study examined the independent association between self-reported lifetime depression diagnosis and missing prescribed medication due to cost. Covariates were selected based on established associations with both depression and medication affordability in the literature, including age, sex, race/ethnicity, income, insurance status, education, and employment [14–15]. We hypothesized that adults with depression would have significantly higher odds of cost-related nonadherence, independent of these socioeconomic and demographic factors.

METHODS

Study Design and Data Source

This study used a cross-sectional design and analyzed data from the 2024 Behavioral Risk Factor Surveillance System (BRFSS), an annual state-based telephone survey administered by the Centers for Disease Control and Prevention (CDC). The BRFSS collects data on health behaviors, chronic conditions, and preventive health practices among non-institutionalized U.S. adults aged 18 years and older across all 50 states, the District of Columbia, and U.S. territories. The complex, multistage sampling design of the BRFSS requires the use of survey-weighted analytic procedures to produce nationally representative estimates [16]. All analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC) with appropriate survey procedures. Because this study used publicly available, de-identified data, institutional review board approval was not required.

Study Population

The analytic sample consisted of 453,453 adults with complete data on the primary exposure, outcome, and all covariates. Respondents with missing, refused, or "don't know" responses for the depression variable (ADDEPEV3) or the outcome variable (MEDCOST1) were excluded from the analysis.

Exposure Variable

The primary exposure was lifetime diagnosis of depression, ascertained using BRFSS item ADDEPEV3: *"Has a doctor, nurse, or other health professional ever told you that you have a depressive disorder, including depression, major depression, dysthymia, or minor depression?"* Responses were coded as 1 (yes) and 0 (no), with "don't know" and refused responses excluded.

Outcome Variable

The primary outcome was cost-related medication nonadherence, ascertained using BRFSS item MEDCOST1: *"Was there a time in the past 12 months when you needed prescription medication but could not afford it?"* Responses were coded as 1 (yes) and 0 (no), with "don't know" and refused responses excluded.

Covariates

Based on prior literature and theoretical relevance [14–15], the following covariates were included as potential confounders: age (18–24, 25–34, 35–44, 45–54, 55–64, ≥ 65 years), sex (male, female), race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic, Non-Hispanic Multiracial, Non-Hispanic Other), educational attainment (less than high school, high school graduate, some college, college graduate or more), annual household income (<\$15,000; \$15,000–<\$25,000; \$25,000–<\$35,000; \$35,000–<\$50,000; \$50,000–<\$100,000; \$100,000–<\$200,000; $\geq$ \$200,000), health insurance status (insured, uninsured), and employment status (employed, unemployed, unable to work, retired, other).

Statistical Analysis

Weighted prevalence estimates and 95% confidence intervals (CIs) for cost-related medication nonadherence were calculated stratified by depression status using PROC SURVEYFREQ. Unadjusted and adjusted odds ratios (ORs and aORs) with 95% CIs were estimated using PROC SURVEYLOGISTIC, with cost-related nonadherence as the binary outcome and depression status as the primary predictor. The adjusted model included all covariates listed above. All analyses incorporated the BRFSS survey weight variable (_LLCPWT), stratification variable (_STSTR), and primary sampling unit (_PSU) to account for the complex survey design and ensure nationally representative estimates. Statistical significance was defined as a two-sided p-value less than 0.05.

RESULTS

Sample Characteristics

The analytic sample consisted of 453,453 U.S. adults drawn from the 2024 BRFSS, representing a weighted population of approximately 261 million adults. The majority of respondents were female (50.9%), Non-Hispanic White (55.9%), and aged 65 years or older (23.5%). Approximately 21.0% of the sample reported a lifetime diagnosis of depression, and 91.4% reported having health insurance coverage. The largest income group was \$50,000–<\$100,000 (22.4%), while 4.9% reported annual household income below \$15,000. Educational attainment was distributed across ≤high school (38.3%), some college (29.5%), and college graduate or more (31.6%). The weighted distribution of the full analytic sample is presented in Table 1.

Table 1
Weighted sociodemographic characteristics of U.S. adults, BRFSS 2024 (N = 457,670)

Characteristic	Unweighted n	Weighted %	95% CI
Depression Status			
No depression	358,881	79.0	78.71–79.22
Depression	96,125	21.0	20.78–21.30
Missed Medication Due to Cost			
No	412,634	87.7	87.44–87.89
Yes	43,363	12.3	12.11–12.56
Sex			
Female	240,183	50.9	50.56–51.21
Male	217,487	49.2	48.79–49.44
Age Group (years)			
18–24	29,694	12.2	11.95–12.41
25–34	49,994	16.7	16.45–16.96
35–44	60,418	16.7	16.45–16.95
45–54	64,458	15.3	15.02–15.50
55–64	80,280	15.6	15.39–15.85
≥ 65	172,826	23.5	23.29–23.78
Race/Ethnicity			
Non-Hispanic White	329,346	55.9	55.67–56.31
Non-Hispanic Black	35,172	11.5	11.32–11.75
Hispanic	48,646	19.2	18.93–19.52
Non-Hispanic Multiracial	10,486	2.6	2.49–2.68
Non-Hispanic Other	24,917	8.6	8.35–8.83
Education			
≤High school	143,026	38.3	38.04–38.66
Some college	120,732	29.5	29.16–29.76
College graduate or more	191,549	31.6	31.33–31.88

Characteristic	Unweighted n	Weighted %	95% CI
Depression Status			
Annual Household Income			
<\$15,000	20,800	4.9	4.78–5.03
\$15,000–<\$25,000	33,503	7.2	7.02–7.36
\$25,000–<\$35,000	41,702	8.9	8.70–9.09
\$35,000–<\$50,000	49,686	10.6	9.88–10.25
\$50,000–<\$100,000	112,409	22.4	22.23–22.75
\$100,000–<\$200,000	82,453	18.1	17.82–18.31
≥\$200,000	29,694	7.6	7.39–7.75
Health Insurance Status			
Insured	413,720	91.4	91.22–91.63
Uninsured	25,406	8.6	8.37–8.78
Employment Status			
Employed	225,524	55.5	55.20–55.84
Unemployed	19,765	5.8	5.67–5.99
Unable to work	27,758	6.0	5.88–6.19
Retired	146,916	20.5	20.23–20.69
Student/Homemaker	29,305	9.8	9.56–10.00

CI confidence interval; NH Non-Hispanic. Percentages are weighted to represent the U.S. adult population. Missing values excluded from percentage calculations.

Prevalence of Cost-Related Medication Nonadherence by Depression Status

The overall weighted prevalence of missed medication due to cost was 12.3% (95% CI: 12.04–12.50). Among adults with a lifetime diagnosis of depression, the weighted prevalence of cost-related nonadherence was 21.1% (95% CI: 20.55–21.73), compared to 9.9% (95% CI: 9.67–10.15) among those without depression, representing a more than two-fold difference in prevalence. These findings are presented in Table 2.

Table 2
Weighted prevalence of missed medication due to cost by depression status, BRFSS 2024

Depression Status	Unweighted n	Weighted % a	95% CI
No Depression	26,472	9.9	9.67–10.15
Depression	16,417	21.1	20.55–21.73
Total	42,889	12.3	12.04–12.50

a Weighted prevalence estimates and 95% confidence intervals derived using PROC SURVEYFREQ accounting for complex survey design (_LLCPWT, _STSTR, _PSU). Analytic sample n = 453,453 after exclusion of missing values. CI confidence interval.

Unadjusted and Adjusted Associations Between Depression and Cost-Related Nonadherence

In unadjusted analysis, adults with depression had significantly higher odds of missing medication due to cost compared to those without depression (OR = 2.44, 95% CI: 2.33–2.55, $p < 0.0001$). After adjustment for age, sex, race/ethnicity, education, income, insurance status, and employment, depression remained independently and strongly associated with cost-related nonadherence (aOR = 2.37, 95% CI: 2.25–2.50, $p < 0.0001$).

Covariates Associated with Cost-Related Nonadherence

Several sociodemographic and economic factors were independently associated with cost-related nonadherence in the adjusted model. Income showed the strongest gradient effect: compared to adults with household incomes of \$200,000 or more, those earning \$15,000–<\$25,000 had the highest odds of missed medication (aOR = 7.57, 95% CI: 6.33–9.06), followed closely by those earning less than \$15,000 (aOR = 7.17, 95% CI: 5.96–8.63), \$25,000–<\$35,000 (aOR = 6.77, 95% CI: 5.69–8.06), and \$35,000–<\$50,000 (aOR = 6.11, 95% CI: 5.15–7.25). Adults earning \$50,000–<\$100,000 also had significantly higher odds compared to the highest income group (aOR = 4.45, 95% CI: 3.78–5.25). Even adults with incomes between \$100,000 and \$200,000 had more than twice the odds of cost-related nonadherence compared to the highest income group (aOR = 2.15, 95% CI: 1.81–2.55).

Lack of health insurance was strongly associated with cost-related nonadherence (aOR = 4.81, 95% CI: 4.49–5.14), as was unemployment compared to employed adults (aOR = 1.29, 95% CI: 1.18–1.40). Notably, retired adults had significantly lower odds of nonadherence compared to employed adults (aOR = 0.49, 95% CI: 0.43–0.55), likely reflecting Medicare coverage in this age group.

Female sex was associated with higher odds of cost-related nonadherence compared to male sex (aOR = 1.23, 95% CI: 1.17–1.29). All racial and ethnic minority groups had higher odds of nonadherence compared to Non-Hispanic White adults, with the largest effects observed among Multiracial Non-Hispanic adults (aOR = 1.48, 95% CI: 1.31–1.68), Hispanic adults (aOR = 1.33, 95% CI: 1.24–1.42), and Non-Hispanic Black adults (aOR = 1.31, 95% CI: 1.22–1.41).

Regarding age, adults aged 25–34 years had the highest odds of cost-related nonadherence compared to adults aged 65 years and older (aOR = 2.81, 95% CI: 2.52–3.14), followed by adults aged 35–44 (aOR = 2.66, 95% CI: 2.40–3.00), 45–54 (aOR = 2.27, 95% CI: 2.03–2.53), 18–24 (aOR = 2.14, 95% CI: 1.90–2.42), and 55–64 (aOR = 1.83, 95% CI: 1.64–2.04). Lower educational attainment was also associated with higher nonadherence, with adults with a high school education or less (aOR = 1.30, 95% CI: 1.21–1.39) and some college education (aOR = 1.37, 95% CI: 1.29–1.46) having higher odds compared to college graduates. Full adjusted model results are presented in Table 3.

Table 3
Unadjusted and adjusted odds ratios for cost-related medication
nonadherence among U.S. adults, BRFSS 2024 (N = 453,453)

Variable	Crude OR	aOR b	95% CI	p-value
Depression (ref: No)				
Yes	2.44	2.37	2.25–2.50	< 0.001
Sex (ref: Male)				
Female	—	1.23	1.17–1.29	< 0.001
Race/Ethnicity (ref: Non-Hispanic White)				
Non-Hispanic Black	—	1.31	1.22–1.41	< 0.001
Hispanic	—	1.33	1.24–1.42	< 0.001
Non-Hispanic Multiracial	—	1.48	1.31–1.68	< 0.001
Non-Hispanic Other	—	1.16	1.05–1.29	0.005
Education (ref: College Graduate)				
≤High school	—	1.30	1.21–1.39	< 0.001
Some college	—	1.37	1.29–1.46	< 0.001
Annual Household Income (ref: ≥\$200,000)				
<\$15,000	—	7.17	5.96–8.63	< 0.001
\$15,000–<\$25,000	—	7.57	6.33–9.06	< 0.001
\$25,000–<\$35,000	—	6.77	5.69–8.06	< 0.001
\$35,000–<\$50,000	—	6.11	5.15–7.25	< 0.001
\$50,000–<\$100,000	—	4.45	3.78–5.25	< 0.001
\$100,000–<\$200,000	—	2.15	1.81–2.55	< 0.001
Health Insurance (ref: Insured)				
Uninsured	—	4.81	4.49–5.14	< 0.001
Employment Status (ref: Employed)				
Unemployed	—	1.29	1.18–1.40	< 0.001
Unable to work	—	1.18	1.08–1.29	< 0.001
Retired	—	0.49	0.43–0.55	< 0.001
Student/Homemaker	—	0.78	0.71–0.85	< 0.001

Variable	Crude OR	aOR ^b	95% CI	p-value
Depression (ref: No)				
Age Group (ref: ≥65 years)				
18–24	—	2.14	1.90–2.42	< 0.001
25–34	—	2.81	2.52–3.14	< 0.001
35–44	—	2.66	2.40–3.00	< 0.001
45–54	—	2.27	2.03–2.53	< 0.001
55–64	—	1.83	1.64–2.04	< 0.001

aOR adjusted odds ratio; CI confidence interval; OR odds ratio. ^b Adjusted model includes all variables shown simultaneously. All analyses used survey-weighted procedures (PROC SURVEYLOGISTIC) with _LLCPWT, _STSTR, and _PSU to account for complex sampling design. Crude OR shown only for primary exposure (depression); dashes (—) indicate variable not included in unadjusted model. All p-values < 0.001 unless otherwise noted.

DISCUSSION

This study examined the association between self-reported lifetime depression diagnosis and cost-related medication nonadherence among 453,453 U.S. adults using 2024 BRFSS data. Adults with depression were more than twice as likely to report missing a prescribed medication due to cost compared to those without depression (aOR = 2.37, 95% CI: 2.25–2.50), even after adjusting for income, insurance, education, employment, age, sex, and race/ethnicity. These findings extend prior literature by demonstrating that depression confers independent risk of cost-related nonadherence beyond what is explained by socioeconomic disadvantage alone, and they highlight the need for integrated policy strategies that address mental health treatment and medication affordability simultaneously.

The persistence of the depression-nonadherence association after rigorous socioeconomic adjustment is a central finding of this study. Prior research has established that individuals with depression face elevated barriers to medication adherence, including motivational deficits, cognitive impairment, and reduced self-efficacy in navigating healthcare systems [4]. The present findings suggest these mechanisms operate independently of financial constraints, meaning that even among adults with comparable incomes and insurance coverage, those with depression remain at substantially elevated risk. This is consistent with conceptual models positing that the neurobiological and psychological features of depression — including anhedonia, executive dysfunction, and hopelessness — directly impair health-seeking behaviors and medication prioritization [17]. Clinically, these findings underscore the importance of screening for adherence barriers as a routine component of depression management, particularly cost-related barriers that patients may not spontaneously disclose.

Income and insurance status were the strongest predictors of cost-related nonadherence in the adjusted model, consistent with a large body of literature documenting the centrality of financial access to medication use [2–3]. Adults earning less than \$15,000 annually had more than seven times the odds of missing medication compared to those earning \$200,000 or more (aOR = 7.17), and uninsured adults had nearly five times the odds compared to insured adults (aOR = 4.81). Notably, the income gradient was steep and continuous — even adults earning \$100,000 to \$200,000 annually had more than twice the odds of nonadherence relative to the highest income group, suggesting that medication affordability stress extends well into middle-income households, likely reflecting high out-of-pocket costs, high-deductible health plans, and specialty medication pricing. These findings reinforce calls for broader insurance expansion, robust enforcement of cost-sharing protections, and targeted prescription assistance programs for low- and middle-income adults (Cubanski et al., 2023).

Several demographic patterns observed in this study warrant attention. Female sex was independently associated with higher odds of cost-related nonadherence (aOR = 1.23), a finding consistent with evidence that women bear disproportionate financial burden in healthcare due to income inequality, higher rates of chronic multimorbidity, and caregiving responsibilities that compete with personal health expenditures [11]. All racial and ethnic minority groups had higher odds of nonadherence compared to Non-Hispanic White adults, with the largest effects among Multiracial (aOR = 1.48) and Hispanic adults (aOR = 1.33). These disparities likely reflect the compounding effects of structural racism, lower wealth accumulation, reduced access to employer-sponsored insurance, and language barriers that limit awareness of available assistance programs [18–19]. The finding that adults aged 25 to 34 had the highest odds of nonadherence relative to adults aged 65 and older (aOR = 2.81) is consistent with the well-documented coverage gap for working-age adults who are too young for Medicare, may not qualify for Medicaid, and are more likely to be employed in jobs without comprehensive health benefits.

One notable finding was that retired adults had significantly lower odds of cost-related nonadherence compared to employed adults (aOR = 0.49), a counterintuitive result given that retirement is often associated with fixed incomes. This pattern likely reflects the near-universal Medicare coverage among adults aged 65 and older, which substantially reduces out-of-pocket medication costs compared to private insurance plans with higher deductibles and copayments [20]. This finding indirectly supports the argument that broader public insurance coverage, particularly for working-age adults, could meaningfully reduce cost-related nonadherence at the population level.

The findings of this study have several important policy implications. First, the independent association between depression and cost-related nonadherence suggests that addressing medication affordability alone may be insufficient for this population. Integrated care models that combine financial navigation support with mental health treatment may be necessary to reduce nonadherence among adults with depression. Second, the steep income gradient in nonadherence underscores the urgency of continued Medicaid expansion, strengthened cost-sharing subsidies, and enforcement of the Mental Health Parity and Addiction Equity Act, which has historically failed to ensure equitable cost-sharing for psychiatric medications [12]. Third, the disparate burden observed among racial and ethnic minority groups and

women suggests that targeted outreach and culturally competent financial assistance programs are needed, particularly in communities with historically low awareness of available resources

Several limitations should be considered when interpreting these findings. First, the cross-sectional design of the BRFSS precludes causal inference — it is not possible to determine whether depression causes cost-related nonadherence, whether nonadherence exacerbates depression, or whether unmeasured common causes drive both. Second, all measures were self-reported, introducing the potential for recall bias and social desirability bias, particularly for depression diagnosis and medication skipping. Third, the depression variable (ADDEPEV3) captures lifetime diagnosis rather than current depressive symptoms or severity, which may underestimate the association among individuals with active versus resolved depression. Fourth, the BRFSS does not capture the type of medication being missed, making it impossible to determine what proportion of missed medications were psychiatric versus non-psychiatric. Fifth, the substantial proportion of missing income data (20.8%) may introduce selection bias if missingness is not random with respect to financial hardship. Finally, BRFSS excludes institutionalized adults, which may result in underrepresentation of individuals with severe mental illness who are at particularly high risk of both depression and cost-related nonadherence.

CONCLUSION

This study demonstrates that depression is independently associated with a more than two-fold increase in cost-related medication nonadherence among U.S. adults, even after comprehensive adjustment for income, insurance status, and other socioeconomic factors. The minimal attenuation between unadjusted and adjusted estimates suggests that the mechanisms linking depression to nonadherence extend beyond financial hardship alone, implicating the cognitive and motivational dimensions of depression as independent barriers to medication access. Income and insurance remained the strongest structural predictors, with a steep and continuous gradient observed across all income levels, underscoring that medication affordability is not exclusively a problem of poverty. Compounding disparities among women, racial and ethnic minority groups, and working-age adults further highlight the need for targeted, equity-focused interventions.

These findings call for integrated policy strategies that address mental health and medication affordability as interconnected challenges rather than parallel concerns. Meaningful progress will require robust enforcement of the Mental Health Parity and Addiction Equity Act, continued expansion of insurance coverage for working-age adults, and the incorporation of financial navigation support into routine depression care. Future research should examine longitudinal pathways between depression onset, treatment interruption, and cost-related nonadherence, as well as the effectiveness of integrated care models in reducing this burden among high-risk populations.

Declarations

Conflicts of Interest:

None declared

Funding: This research received no specific funding

Ethical Approval

Not applicable. This study used publicly available, de-identified data from the 2024 Behavioral Risk Factor Surveillance System (BRFSS). No human subjects were directly involved, and institutional review board approval was not required.

Consent to Participate

Not applicable.

Consent to Publish

Not applicable.

Author Contribution

Oluwapelumi Odubunmi conceptualized the study, designed the methodology, conducted all data analysis, interpreted the results, and drafted the original manuscript. Adedapo Ogunlewe contributed to the interpretation of findings and critically revised the manuscript for important intellectual content. Idris Idenyi contributed to the literature review and critically revised the manuscript. Abdullah Adeniji-Bello contributed to the literature review and critically revised the manuscript. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Data Availability

The data that support the findings of this study are publicly available from the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System (BRFSS) website at https://www.cdc.gov/brfss/annual_data/annual_2024.html. No new data were generated in this study.

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