

Public Awareness of Risks Associated with Alcohol Drinking in the US: A Population-Based Cross-Sectional Survey Study

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ABSTRACT

Introduction. Alcohol consumption is a leading preventable cause of morbidity and mortality in the United States, contributing to over 178,000 deaths annually. Despite known links to liver disease and cancer, few adults report receiving counseling on alcohol-related risks from health care professionals. Authors of this cross-sectional, population-based study assessed the prevalence of alcohol-related counseling among United States adults and identified sociodemographic and behavioral factors associated with receiving such advice.

Methods. Data were drawn from the 2022 Health Information National Trends Survey, a nationally representative sample of United States adults. The primary outcome was whether respondents reported receiving information from a health care professional about the negative health risks of alcohol use, including specific negative health consequences. Survey-weighted univariate, bivariate, and multivariable logistic regression analyses were used to identify predictors of receiving counseling.

Results. Only 26.1% of respondents reported receiving alcohol-related counseling, and just 10.9% specifically were informed about liver disease. Multivariable analysis showed higher odds of counseling among adults aged 18-34 (OR = 2.43; 95% CI, 1.84-3.21), non-Hispanic Black respondents (OR = 1.45; 95% CI, 1.20-1.75), those with income under \$20,000 (OR = 1.27; 95% CI, 1.02-1.59), and individuals consuming more than one alcoholic drink per week (OR = 1.40; 95% CI, 1.22-1.61). Lower odds were found among women (OR = 0.67; 95% CI, 0.59-0.77), and those worried about cancer (OR = 0.81; 95% CI, 0.67-0.96).

Conclusions. Findings highlight important gaps and disparities in alcohol-related counseling. Standardized interventions and improved outreach are needed to align prevention efforts with patient risk.

INTRODUCTION

Alcohol consumption is a leading preventable cause of morbidity and mortality in the United States, contributing to more than 178,000 deaths annually.¹ In 2010, alcohol consumption also cost the nation an estimated \$249 billion in economic losses.² Despite these substantial public health burdens, many patients report not receiving information about alcohol-related health risks from their health care professionals.³ Emerging evidence underscores the role of alcohol as a carcinogen.

Both the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) recognize alcohol use as a risk factor for at least seven types of cancer, including breast, liver, and colorectal cancers.⁴⁻⁶ While awareness of these associations is important, relying solely on cancer incidence as an indicator of alcohol-related harm has its challenges as cancer often develops over time. In contrast, clinical markers such as liver function often reveal more immediate signs of alcohol-related damage and can prompt earlier interventions.⁷ Hence the need to educate the public on all the harmful links associated with alcohol use.

Brief interventions by health care professionals, such as counseling patients about the risks of alcohol use, effectively can reduce consumption, especially when delivered consistently and empathetically.^{8,9} Yet national surveys have indicated that fewer than one in three adults report having such conversations with their health care professional, even among those who engage in risky drinking behaviors.^{9,10}

Notably, disparities exist in who receives this counseling. Older, White, and male patients are more likely to be advised about alcohol-related risks, while younger adults, women, and racial or ethnic minorities are less likely to receive evidence-based guidance.^{9,11,12} Understanding current patterns of alcohol risk communication and identifying underserved populations are needed to inform public health efforts and improve clinical practice.

The objective of this study was to assess the prevalence of adults in the United States receiving alcohol-related health counseling from health care professionals and to identify sociodemographic and behavioral factors associated with these discussions. By examining who receives such guidance, and who does not, findings from this study will help inform strategies that promote more equitable, effective communication about alcohol-related health risks in clinical settings.

METHODS

Sample Design and Target Population. Data for the 2022 Health Information National Trends Survey 6 (HINTS 6) were collected through a self-administered mail and web survey conducted between March 7 and November 8, 2022, from civilian, non-institutionalized adults aged 18 years and older in the United States. The survey used a two-stage, stratified design. First, a stratified sample of residential addresses was selected; second, one adult was chosen from each sampled household.¹³ The HINTS 6 design expanded the previous two strata (high-minority and low-minority) into four strata by further dividing them into rural and urban areas. The survey represented an estimated weighted population of 258,418,467 adults, with an unweighted total of 6,252 respondents and a response rate of 28.1%.¹³ No observations were deleted. Unweighted sample sizes for all weighted estimates are reported in Table 1.

Data Source and Study Population. This cross-sectional study used data from HINTS 6, a nationally representative survey of United States adults.¹⁴ We included respondents aged 18 years and older who answered the question on whether they had heard about the negative

health consequences of drinking alcohol from a doctor or other health professional in the past 12 months. The study followed the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology)¹⁵ and PRICSSA (Preferred Reporting Items for Complex Sample Survey Analysis)¹⁶ guidelines. Because the data were publicly available and de-identified, institutional review board (IRB) oversight was not required. HINTS 6 received a “Not Human Subjects Research” determination from the National Institutes of Health Office of IRB Operations on August 16, 2021 (iRIS reference number: 562715).¹⁷

Outcome Variables. The primary outcome was whether participants had heard about the negative health consequences of drinking alcohol, measured by the question: “*In the past 12 months, have you heard about the negative health consequences of drinking alcohol from doctors or other health care professionals?*” Response options were: “Yes,” “No,” or “*I have not had any medical appointments in the past 12 months.*”

The secondary outcome assessed the type of negative health consequences discussed, based on the question: “*Which of the following health consequences of alcohol did the doctor or other health care professional discuss...?*” Possible responses included: “*Alcoholism,*” “*Cancer,*” “*Diabetes,*” “*Heart Disease,*” and “*Liver Disease.*”

Predictors. Selected behavioral variables and cancer-related beliefs to describe the study population were based on whether respondents reported receiving counseling about the health risks associated with drinking alcohol. These clinically relevant predictors were selected using a pre-specified full model, an approach used in multivariable prediction modeling in which predictors are selected and included in the model *a priori*, based on clinical knowledge or existing evidence, rather than post hoc statistical criteria.¹⁸ Alcohol use was defined as consuming at least one alcoholic drink on one or more days in the past 30 days versus no alcohol consumption during that period. Perceptions of alcohol-related health risks were assessed using the question: “*Compared to drinking no alcohol, do you think that having 1-2 alcoholic drinks per day...*” (response options: *has no effect on, decreases, increases the risk of future health problems, or don't know*). Beliefs about cancer were measured by the question: “*How worried are you about getting cancer?*” with response options categorized as *not at all/slightly, somewhat, or moderately/extremely*.

Covariates. We included selected sociodemographic characteristics as covariates: Age in years (18-34, 35-49, 50-64, 65-74, ≥75), sex (male, female), race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic Asian, and non-Hispanic other). *Note:* “non-Hispanic other” included American Indian or Alaska Native, Native Hawaiian, Guamanian or Chamorro, Samoan, and Other Pacific Islander.

The other covariates included: Education (up to high school, some college/post-high school, college graduate, and postgraduate), household income (<\$20,000; \$20,000 to \$34,999; \$35,000 to \$49,999; \$50,000 to \$74,999; and ≥\$75,000), and place of residence (urban,

rural).

Using sociodemographic characteristics as covariates controlled for confounding, as these variables may be associated with both the exposure and the outcome. Adjusting for them allowed for a more accurate estimation of the true effect of the main variable of interest. This approach also increased the precision of the estimates and strengthened the validity of the results.^{19,20}

Missing Data. To address small-sample bias and potential separation due to outcome imbalance, Firth’s penalized likelihood logistic regression was applied. It is a statistical method designed to address issues of bias and separation in standard logistic regression, especially when sample sizes are small, or outcome events are rare. It uses penalized maximum likelihood estimation to produce more reliable and stable estimates.²¹ In addition, missing data were assumed to be missing at random (MAR), and model estimation was carried out using maximum likelihood under this assumption.²² Together, these methods yielded robust parameter estimates and standard errors.

Statistical Analysis. A three-stage, survey-weighted analytic approach was used. First, a survey-weighted univariate analysis described distributions of study variables using survey-weighted frequencies and percentages for categorical variables, and survey-weighted means for continuous variables. Second, a survey-weighted bivariate analysis examined associations between reported negative health consequences of alcohol use and predictor variables (age, sex, educational level, race/ethnicity, residence) using cross-tabulations and chi-square tests. Confidence intervals (95%) were calculated for all proportions.

Third, a survey-weighted multivariable logistic regression identified independent predictors of being advised about alcohol-related negative health consequences, adjusting for potential confounders. Model performance was assessed using receiver operating characteristic (ROC) curve analysis. Odds ratios (ORs) with 95% confidence intervals (95% CIs) were reported. A p-value <0.05 (two-tailed) was considered statistically significant. All analyses accounted for the complex survey design through stratification using the provided stratum variable. Analyses were conducted using SAS® version 9.4 (SAS Institute Inc., Cary, NC) in July 2025.

RESULTS

Demographic Information. Data from 6,252 respondents were included in the study. Table 1 presents the demographic characteristics of the sample. The mean age of respondents was 55.6 years (standard deviation = 17.4). Of the total respondents, 56.5% were women, 51.2% were non-Hispanic White, 50.0% had no less than a college education, 42.0% were married, and the majority (87.0%) resided in urban areas.

As shown in Table 2, only 26.1% of respondents reported receiving counseling from a health care professional about the negative health consequences associated with alcohol use. Among those who received such guidance, 62.1% were informed about multiple health consequences, while only 10.9% were specifically counseled about liver disease.

Table 1. Respondent characteristics, HINTS 2022 (N = 6,252).

Characteristics	N (%)
Sex	
Male	2,307 (36.9)
Female	3,535 (56.5)
Missing	410 (6.6)
Age, years	
Mean (SD)	55.6 (17.4)*
Age group	
18-34	939 (15.0)
35-49	1,240 (19.8)
50-64	1,772 (28.3)
65-74	1,356 (21.7)
≥75	847 (13.5)
Missing	98 (1.6)
Educational level	
Up to high school	1,455 (23.3)
Post high school/some college	1,672 (26.7)
College graduate	1,613 (25.8)
Postgraduate	1,108 (17.7)
Missing	404 (6.5)
Household income	
<\$20,000	959 (15.3)
\$20,000 to <\$35,000	729 (11.7)
\$35,000 to <\$50,000	732 (11.7)
\$50,000 to <\$75,000	937 (15.0)
≥75,000	2,163 (34.6)
Missing	732 (11.7)
Race/Ethnicity	
Non-Hispanic White	2,303 (51.2)
Non-Hispanic Black or African American	889 (14.2)
Hispanic	1,001 (16.0)
Non-Hispanic Asian	288 (4.6)
Non-Hispanic Other	184 (2.9)
Missing	687 (11.0)
Marital status	
Married	2,624 (42.0)
Living as married or living with a romantic partner	373 (6.0)
Divorced	939 (15.0)
Widowed	646 (10.3)
Separated	136 (2.2)
Single, never been married	1,119 (17.9)
Missing	415 (6.6)
Place of residence	
Rural	811 (13.0)
Urban	5,441 (87.0)

Note: HINTS, Health Information National Trends Survey.

*Mean (standard deviation).

Results of Bivariate Analysis. Counseling rates were notably lower among certain groups, including men (12.3%), individuals with postgraduate education (5.0%), rural residents (3.1%; Figure 1a), non-Hispanic Asian individuals (1.7%), and adults aged 75 and older (5.0%; Figure 1b).

Table 2. Respondents advised about the negative health consequences of alcohol use, HINTS 2022.

Negative Health Consequences Associated with Alcohol Use	N (%)
In the past 12 months, have you heard about the negative health consequences of drinking alcohol from doctors or other health care professionals?	
Yes	1,633 (26.1)
No	3,898 (62.3)
I have not had any medical appointments in the past 12 months	357 (5.7)
Missing	364 (5.8)
Type of negative health consequences	
Alcoholism	n = 1633 122 (7.5)
Cancer	33 (2.0)
Diabetes	78 (4.8)
Heart disease	61 (3.7)
Liver disease	178 (10.9)
Multiple health consequences	1,014 (62.1)
Missing	147 (9.0)

Note: HINTS, Health Information National Trends Survey.

Results of Multivariable Analysis. In the survey-weighted multivariable logistic regression analysis (Table 3), several factors significantly were associated with higher odds of receiving counseling from a health care professional about the negative health consequences of alcohol use. These included: drinking more than one alcoholic beverage per week (OR = 1.40; 95% CI, 1.22-1.61); believing that drinking 1-2 alcoholic beverages per day has no impact on future health problems (OR = 2.10; 95% CI, 1.49-2.83); age 18-34 years (OR = 2.43; 95% CI, 1.84-3.21); having a high school diploma or less (OR = 1.29; 95% CI, 1.03-1.54); identifying as non-Hispanic Black (OR = 1.45; 95% CI, 1.20-1.75); and having an annual household income below \$20,000 (OR = 1.27; 95% CI, 1.02-1.59). Conversely, being somewhat worried about getting cancer (OR = 0.67; 95% CI, 0.59-0.79) and being a woman (OR = 0.67; 95% CI, 0.59-0.77) were associated with lower odds of receiving counseling.

Table 3. Factors associated with negative consequences of drinking alcohol, HINTS 2022.

Variable	In the past 12 months, have you heard about the negative health consequences of drinking alcohol from doctors or other health care professionals?		
	OR (95% CI)	Standard Error	P value
Intercept		0.1657	<.0001
During the past 30 days, how many days per week did you have at least one drink of any alcoholic beverage?			
At least 1 vs 0 day	1.40 (1.20-1.61)	0.07	<.0001
Compared to drinking no alcohol, do you think that having 1-2 alcoholic drinks per day...			
Has no effect vs decreases the risk of future health problems	2.10 (1.49-2.83)	0.16	<.0001
Increases vs decreases the risk of future health problems	1.26 (1.02-1.55)	0.11	0.0288
Don't know vs decreases the risk of future health problems	1.89 (1.61-2.21)	0.08	<.0001
How worried are you about getting cancer?			
Somewhat vs not at all/slightly	0.67 (0.57-0.79)	0.08	<.0001
Moderately/extremely vs not at all/slightly	0.81 (0.67-0.96)	0.09	0.0147
Age, y			
18-34 vs ≥75	2.43 (1.84-3.21)	0.14	<.0001
35-49 vs ≥75	1.96 (1.51-2.57)	0.14	<.0001
50-64 vs ≥75	1.91 (1.52-2.57)	0.13	<.0001
65-74 vs ≥75	1.44 (1.11-1.88)	0.13	0.0064
Sex			
Female vs Male	0.67 (0.59-0.77)	0.07	<.0001
Educational level			
Up to high school vs postgraduate	1.29 (1.03-1.54)	0.12	0.0251
Post high school/some college vs postgraduate	1.26 (1.03-1.53)	0.10	0.0238
College graduate vs postgraduate	0.99 (0.83-1.22)	0.10	0.9404
Race and ethnicity			
Non-Hispanic Black vs Non-Hispanic White	1.45 (1.20-1.75)	0.10	0.0001
Hispanic vs Non-Hispanic White	1.39 (1.16-1.67)	0.09	0.0005
Non-Hispanic Asian vs Non-Hispanic White	1.37 (1.02-1.84)	0.15	0.0355
Non-Hispanic other vs Non-Hispanic White	0.97 (0.67-1.41)	0.19	0.8726
Annual income, \$			
<20,000 vs ≥75,000	1.27 (1.02-1.59)	0.11	0.0362
20,000 to <35,000 vs ≥75,000	1.08 (0.87-1.39)	0.12	0.3779
35,000 to <50,000 vs ≥75,000	1.14 (0.92-1.42)	0.11	0.2425
50,000 to <75,000 vs ≥75,000	1.09 (0.90-1.32)	0.10	0.3690
Place of residence			
Rural vs Urban	0.93 (0.76-1.14)	0.11	0.5217

Note: HINTS, Health Information National Trends Survey; OR, odds ratio.

c-Statistics: 0.65. This measured the model's ability to discriminate between observations with different outcomes.

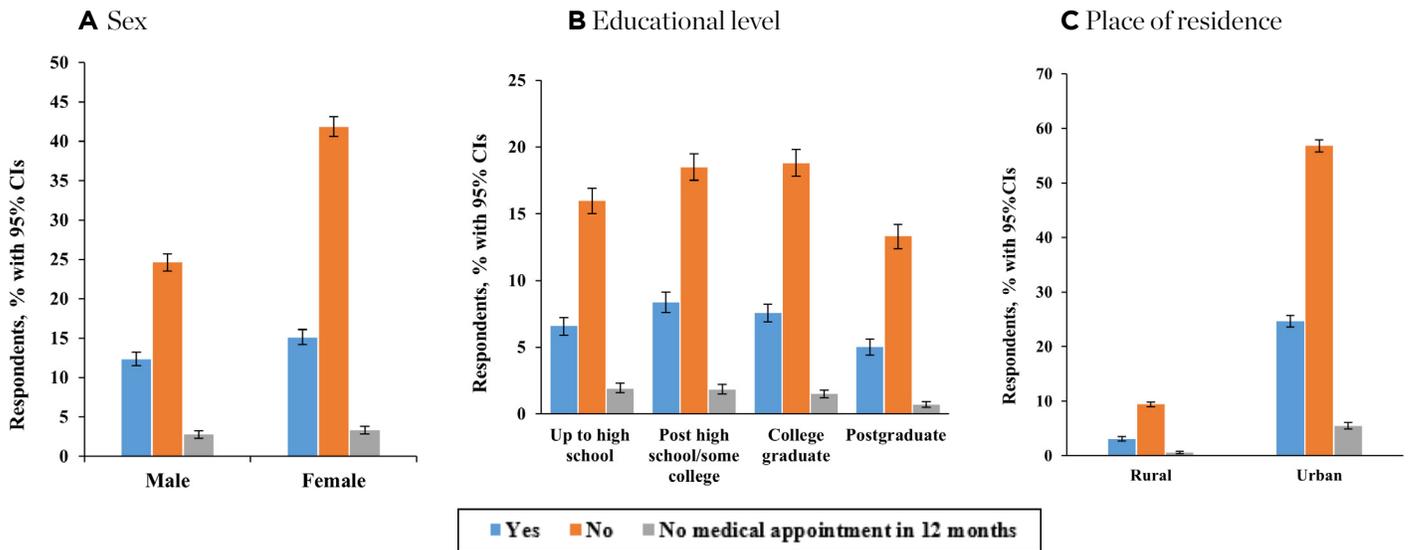


Figure 1a. Distribution of negative health consequences of drinking alcohol in the U.S. adult population, HINTS 2022. Responses are shown to the following question: *In the past 12 months, have you heard about the negative health consequences of drinking alcohol from doctors or other healthcare professionals?* Error bars indicate 95% CIs from Chi-square tests.

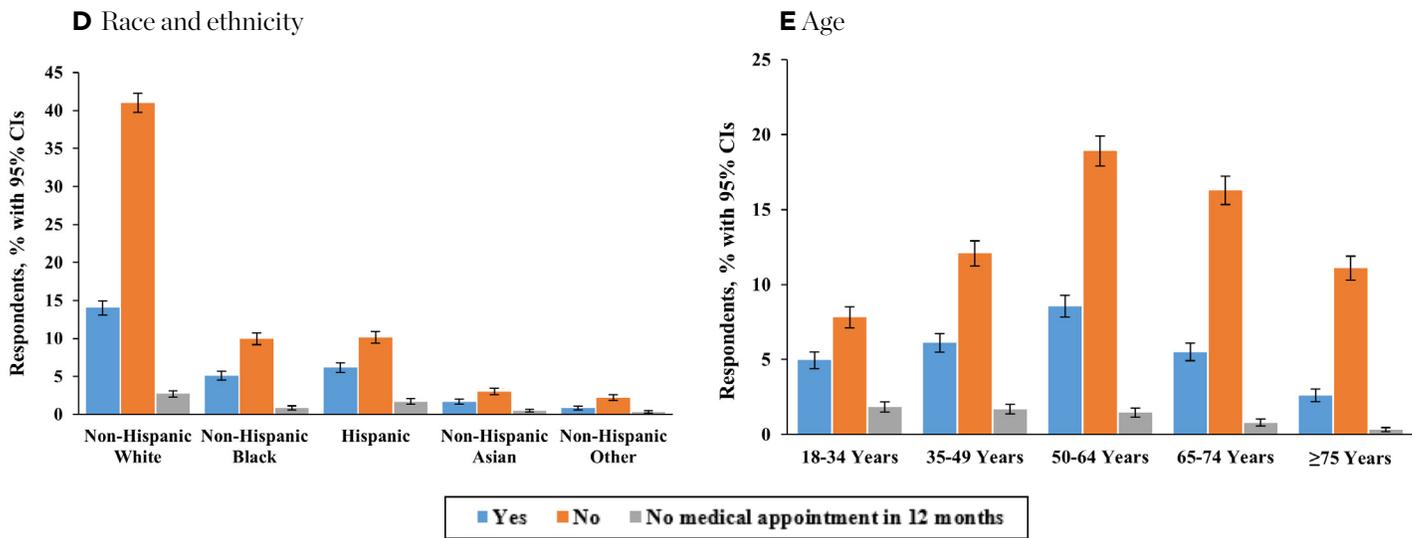


Figure 1b. Distribution of negative health consequences of drinking alcohol in the U.S. adult population, HINTS 2022. Responses are shown to the following question: *In the past 12 months, have you heard about the negative health consequences of drinking alcohol from doctors or other healthcare professionals?* Error bars indicate 95% CIs from Chi-square tests. The classification “non-Hispanic Other” includes the following race groups: American Indian or Alaska Native, Native Hawaiian, Guamanian or Chamorro, Samoan, and Other Pacific Islander, who reported their ethnicity as non-Hispanic.

DISCUSSION

The findings reveal a substantial gap in preventive counseling on alcohol use, with only 26.1% of United States adults reporting that they received alcohol-related counseling from a health care professional. While the majority of those counseled (62.1%) were informed about multiple health consequences, only a small fraction (10.9%) was specifically counseled about liver disease, despite it being a well-established alcohol-related condition.^{1,10,23} Counseling rates were notably lower among certain groups, including men, non-Hispanic Asian individuals, older adults (≥ 75 years), those with postgraduate education, and rural residents. These disparities suggest that key populations at risk may be overlooked in clinical settings, either due to provider bias, assumptions about risk, or gaps in screening protocols.

The multivariable analysis further clarified predictors of counseling. Individuals who drank more than one alcoholic beverage per week and those who held the misconception that moderate drinking has no health impact were more likely to receive counseling. This may reflect targeted efforts by providers toward individuals with evident risk behaviors or misinformed health beliefs.²⁴ Younger adults (18-34), individuals with lower educational attainment, non-Hispanic Black respondents, and those with lower income also had higher odds of receiving counseling, which may reflect both risk-based screening and targeted outreach.^{12,25}

Conversely, women and individuals who expressed concern about developing cancer were less likely to receive alcohol-related counseling. This trend may represent missed opportunities in populations that are already health-conscious or perceived as lower risk.

Taken together, these findings highlight the need for more consistent and equitable delivery of alcohol-related counseling across demographic groups. Standardizing brief counseling in primary care, regardless of age, gender, or perceived risk, could reduce disparities and improve population health outcomes.

Significant public health efforts are underway to address alcohol misuse. One key initiative is SBIRT (Screening, Brief Intervention, and Referral to Treatment), supported by the Substance Abuse and Mental Health Services Administration (SAMHSA). SBIRT promotes early identification and intervention for individuals at risk through structured screening tools, patient-centered brief interventions, and timely referrals to treatment when necessary. This approach has been shown to reduce harmful alcohol consumption and support healthier long-term outcomes.^{26,27}

Strengths. The study has several strengths that improve generalizability. First, the study utilized data from the HINTS, a well-established, population-based survey designed to reflect the adult United States population. The inclusion of diverse respondents across age, sex, race/ethnicity, education, income, and geographic location strengthens the ability to generalize findings to the broader United States adult population. Second, with 6,252 respondents, the sample provides adequate statistical power and reflects a broad range of sociodemographic and behavioral characteristics, improving the reliability and applicability of

subgroup analyses. Finally, the use of real-world, self-reported health communication practices reflects actual interactions between health care professionals and patients. This enhances the relevance of the results to clinical and public health settings.

Limitations. First, outcomes such as whether alcohol-related health consequences were discussed relied on respondent recall, making them subject to recall and social desirability bias. Misreporting could affect the accuracy of prevalence estimates. Second, certain questions are absent from HINTS that could provide additional insights. Most notably, the survey does not ask whether patients have a usual source of care. Continuity of care relationships may be important predictors of alcohol use counseling, but the current dataset cannot address this factor. Third, the cross-sectional design captures a single point in time and does not permit causal inference; longitudinal data would be required to assess temporal changes or behavioral impacts.

Fourth, the survey included only non-institutionalized United States adults, potentially underrepresenting populations in long-term care, correctional facilities, or unstable housing who may face higher alcohol-related risks. Fifth, counseling reports were not validated against clinical records, nor were provider perspectives assessed, limiting insight into drivers of disparities or the influence of provider characteristics. Sixth, the model's c-statistic of 0.65 indicates only modest discrimination, raising concerns about predictive accuracy, generalizability, and clinical utility. Finally, while findings may apply within the United States, generalizability to other countries with different healthcare systems, policies, or cultural norms regarding alcohol is limited.

CONCLUSIONS

Despite the known health risks of alcohol use, fewer than one in three United States adults reported receiving counseling from a health care professional, with significant variation across demographic groups. Individuals at higher behavioral or socioeconomic risk were more likely to receive such guidance, while others, such as women, older adults, and rural residents, were less likely to be counseled. These disparities suggest missed opportunities for prevention and underscore the need for standardized, equitable approaches to alcohol-related counseling in clinical practice. Expanding routine screening and integrating brief interventions into primary care could ensure that all patients receive appropriate, evidence-based guidance on alcohol use and its negative health consequences.

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Conflicting and Competing Interests: Samuel Ofei-Dodoo is the Editor-in-Chief for the *Kansas Journal of Medicine*.

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