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A Community-Based Investigation into the Relationship Between Alcohol Consumption and Nutritional Health Outcomes Among Liberian Populations in the Context of Emerging Dietary Challenges

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Abstract

Background: Liberia is experiencing profound dietary changes characterized by urbanization, economic transformation, and the spread of consumption of processed foods. At the same time, alcohol drinking continues to be common among communities, calling for its effects on public health to be examined. This research examines the interconnection between consumption of alcohol and nutritional health outcomes in Liberia amidst changing dietary patterns.

Methods: A six-month cross-sectional community-based study (September 2024 to February 2025) was carried out in urban and rural counties of Liberia. Stratified random sampling was employed to recruit 3,453 adult participants. Structured questionnaires were used to measure socio-demographics, alcohol consumption, dietary behavior, and health outcomes. Data were analyzed using SPSS version 26, employing descriptive statistics, Chi-square tests, and logistic regression models.

Results: Alcohol drinking was reported by 62.8% of participants. High-frequency drinkers (≥3 times/week) were more likely to miss meals (73.1%), have low fruit and vegetable consumption (66.9%), and consume processed foods (58.3%). Nutritional signs like weakness (41.3%) and unintended weight loss (36.7%) were more prevalent in regular drinkers. Logistic Liberia is experiencing profound dietary changes characterized by urbanization, economic change, and the spread of processed food eating. At the same time, alcohol use continues to be common among communities, and concern is raised regarding its effect on public health. This research examines the association between alcohol use and nutritional health outcomes in Liberia during changing dietary trends. Regression indicated that excessive alcohol use independently predicted symptoms of undernutrition (AOR = 2.34; 95% CI: 1.87–2.91, $p < 0.001$). Moreover, 64.1% of the respondents reported a decrease in community dietary quality over the last five years.

Conclusion: Alcohol use is strongly linked with negative nutritional health status among Liberian communities. The findings highlight the pressing need for holistic health interventions on alcohol reduction, nutrition education, and food access enhancement.

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Keywords: Alcohol use, Nutrition, Dietary transition, Liberia, Malnutrition, Community health

Introduction

Nutritional status is an essential pillar of public and individual health, having direct effects on growth, immune response, mental development, and resistance to disease. It is determined by a highly variable interaction of eating habits, socioeconomic conditions, cultural tradition, and lifestyle behaviors—such as the use of alcohol. In most developing nations, including Liberia, they converge in patterns that make for special nutritional risks, especially within the context of ongoing social and economic change.

Liberia, a low-income West African nation, is still recovering from decades of civil war and significant public health crises like the Ebola outbreak. The crises greatly distorted national development, compromised public institutions, and created enduring impacts on food systems and health infrastructure within the nation. Recent years have seen urbanization and post-conflict reconstruction contribute to dramatic changes in customary patterns of eating. There has been an ongoing shift towards local, minimally processed food to more Westernized diets of high consumption of processed foods, refined sugars, and saturated fats, and declining diet diversity and intake of nutrient-dense foods such as fruits, vegetables, and legumes [1][2].

Meanwhile, alcohol consumption is prevalent and inculcated into Liberian culture. Alcohol is consumed by all ages and both genders and is often integrated into social events, initiation rituals, community celebrations, and even coping mechanisms for stress. Normalization of alcohol use, in many cases with minimal knowledge of its long-term health consequences, fuels the nation's increasing NCDs burden [3].

Worldwide, a substantial body of literature has demonstrated that chronic and heavy use of alcohol has severe adverse effects on nutritional well-being. Ethanol disrupts the absorption, storage, and metabolism of important micronutrients such as thiamine, folate, vitamin A, and zinc, all important for normal physiological function [4][5]. Alcohol also changes food intake and appetite, tending to make people eat fewer healthy foods and choose calorie-rich, low-nutrient diets. When combined with already restricted access to quality food, such a pattern of behavior can lead to extreme malnutrition and heightened vulnerability to infections and chronic diseases [6].

In some other low- and middle-income countries (LMICs), research has shown

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that alcohol-related malnutrition is also supported by widespread poverty, food insecurity, and restricted healthcare access [7][8]. All these pieces of evidence are of particular applicability in Liberia, where much of the population subsists under the poverty line and where healthcare access is not yet balanced, particularly in rural and under-served communities.

In light of these troubling trends, there is a significant knowledge gap in Liberia-focused research examining alcohol consumption and nutritional outcomes. As Liberia undergoes dietary and cultural change, it is critical to elucidate how these changes interact with substance use to influence population health. The present study seeks to address that gap by systematically investigating the effect of alcohol use on nutritional status in Liberia. The research results will provide evidence to inform targeted health education, policy interventions, and combined public health programs that address both substance use and nutrition to enhance health outcomes in the nation.

Methods

Study Design and Duration

The study applied a cross-sectional design to investigate the relationship between alcohol intake and nutritional status in Liberian adults. The study was carried out for six months, from September 2024 to February 2025, across urban and rural settings to reflect various dietary environments. The design was selected due to its capacity to capture a snapshot of health outcomes and behaviors within the population at one point in time, thus being very effective for public health evaluation in resource-constrained settings.

Sample Size and Sampling Method

3,453 participants aged 18 years and older were enrolled to take part in the study. Sample size was based on anticipated alcohol use and nutrition-related problem prevalence in the general population, as well as statistical power considerations for subgroup analyses. To provide broad geographic and socioeconomic representation, stratified random sampling was used. Communities were stratified by urban-rural status, and individuals were randomly sampled from within strata. This design facilitated proper representation of different levels of alcohol consumption and availability of nutritional resources, which facilitated comparative analysis in diverse environments.

Data Collection Instrument

Data were obtained through a pre-tested, standardized questionnaire that was crafted to capture both quantitative and qualitative data related to the research aims. The instrument had five major

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sections. The initial part of the questionnaire obtained socio-demographic data, such as age, gender, education level, income, and working status. The second part explored alcohol use patterns, measuring frequency, quantity, alcohol type used, and age of onset. The third part examined food habits, evaluating frequency of meals, consumption of food groups, utilization of processed foods, and availability of healthy foods. The fourth question probed for self-reports of dietary symptoms that may be associated with malnutrition, including tiredness, weight loss without attempting to lose weight, and sickness. The fifth and last section probed changes in diet over time, particularly as related to poverty, changes in lifestyle, or drug use behaviors.

Collection of data was done using face-to-face interviews by trained community health workers who spoke both English and local dialects. They were chosen for their knowledge of local culture and capacity to establish trust with respondents to achieve greater accuracy in responses and cultural sensitivity. The questionnaire was pilot-tested among a neighboring community before full use, with revisions made as appropriate to enhance clarity and cultural suitability.

Data Analysis

All obtained data were imported into Statistical Package for the Social Sciences (SPSS), version 26, for analysis. Descriptive statistics (frequencies and percentages) were applied to describe participant characteristics, alcohol consumption habits, and dietary patterns. Chi-square tests were utilized to examine associations between categorical variables, specifically the association between alcohol consumption and dietary habits or reported health symptoms. In addition, binary logistic regression analysis was used to determine the notable predictors of symptoms related to undernutrition, including low body mass index (BMI), chronic fatigue, and loss of appetite. All inferential tests were considered statistically significant with a p-value of less than 0.05.

Ethical Implications

The participants were fully aware of the nature and purpose of the study, their rights as research participants, and the voluntariness of their involvement. Informed consent was ensured from every participant prior to data collection. The consent process included either local language or English explanation, as a participant's preference, and participants were allowed to withdraw and ask questions freely without penalty or risk of loss of benefits at any time.

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To ensure ethical standards of confidentiality and privacy, no identifying information—names, addresses, or identifiers—was collected or attributed to the data. Each questionnaire was assigned a special code to ensure anonymity of the data. Interviews and data management were carried out in peaceful, secure rooms to avoid any potential break of confidentiality.

Data were safely kept in password-protected files accessible only to authorized members of the research team. At the conclusion of research, all identifying links were destroyed and results were reported in aggregate form to further protect participant anonymity. These measures assured the dignity, autonomy, and privacy of all participants and informants throughout the research process as well as after its conclusion.

Results

Table 1: Socio-Demographic Characteristics of Respondents (n=3,453)

Variable	Frequency	Percentage (%)
Age (mean ± SD)	34.5 ± 10.2 years	-
Gender: Male	1,922	55.7
Female	1,531	44.3
Education: No formal	817	23.7
Primary	1,205	34.9
Secondary and above	1,431	41.4
Residence: Urban	1,915	55.5
Rural	1,538	44.5

The research interviewed a total of 3,453 respondents from different communities in Liberia. The mean age of the participants was 34.5 years, with a standard deviation of ±10.2 years, meaning that the sample consisted mainly of young to middle-aged adults, representing a relatively young population structure.

By gender breakdown, 55.7% of the participants were men (n = 1,922) and 44.3% were women (n = 1,531). Such a male bias can be attributed to either increased willingness on the part of men to report alcohol consumption and food habits or perhaps gendered underrepresentation or unavailability in public health surveys within populations.

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As far as education is concerned, a majority of the respondents had achieved some form of formal education. To be precise, 23.7% of the respondents (n = 817) were without formal education, indicating low literacy or access to educational resources in this population segment. Conversely, 34.9% (n = 1,205) had attended primary education, and 41.4% (n = 1,431) had achieved secondary education or more, meaning that a large percentage of the population had access to formal education, which may have an effect on dietary decision-making as well as awareness of health behavior, such as attitudes towards alcohol consumption.

The data also revealed that a bit over half of the sample (55.5%, n = 1,915) lived in urban settings, and 44.5% (n = 1,538) lived in rural settings. The almost equal distribution of urban and rural residence supports the ability to meaningfully compare behavior and health-related outcomes by geographic location, especially important in a nation such as Liberia where urban and rural populations might be subject to drastically differing degrees of access to food diversity, healthcare, and exposure to alcohol-related risk factors.

Table 2: Alcohol Consumption Patterns Among Respondents

Alcohol Consumption Pattern	Frequency	Percentage (%)
Current alcohol consumers	2,170	62.8
High-frequency (≥3 times/week)	1,097	31.8
Alcohol with meals	1,412	40.9
Increased alcohol use (past year)	1,328	38.4

Current alcohol use patterns among the 3,453 participants were found in 62.8% (n = 2,170) through analysis, confirming a high rate of alcohol use among the surveyed sample population. The high rate of consumption necessitates public health priority, especially in the context of rising nutritional issues.

A more detailed look at frequency of drinking indicates that 31.8% (n = 1,097) of participants consumed alcohol frequently, here described as three or more times per week. Such frequent consumption is of clinical concern and poses questions about long-

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term effects on health, such as impaired nutritional intake, liver impairment, and increased susceptibility to non-communicable disease.

Consumption of alcohol with meals was also common, as indicated by 40.9% (n = 1,412) of the participants. Although some cultural habits involve alcohol as part of the traditional meal, habitual consumption of alcohol as part of food habits might replace foods containing nutrients or disrupt digestion and metabolism of nutrients and worsen nutritional deficiencies.

In addition, 38.4% (n = 1,328) of respondents indicated increased alcohol use over the previous year. This increase could be indicative of more general societal or economic pressures, such as post-pandemic recovery, job loss, or inflation, that have been demonstrated to drive alterations in alcohol use in other global settings.

Table 3: Comparison of Dietary Practices by Alcohol Consumption Status

Dietary Behavior	High-Frequency Drinkers (%)	Non-Drinkers (%)	*p*-value
Skip meals regularly	73.1	39.6	<0.001
Low fruit/vegetable intake	66.9	31.2	<0.001
Rely on processed foods	58.3	30.4	0.002
Take dietary supplements	9.8	18.6	0.028

The dietary behaviors comparison between non-drinkers and high-frequency drinkers showed important differences highlighting the nutritional effects of heavy alcohol intake.

The interesting 73.1% of high-frequency drinkers also indicated skipping meals on a regular basis compared to just 39.6% of non-drinkers, with an extremely significant p-value < 0.001. This is an indication that heavy drinkers are more likely to put drinking above eating or are experiencing appetite reduction due to drinking, both factors leading to deficiencies in calories and nutrients.

In the same way, low consumption of fruits and vegetables was far more common among high-frequency drinkers (66.9%) compared to non-drinkers (31.2%), once again with a p-value < 0.001. This is a key trend because fruits and vegetables are major sources of key micronutrients, antioxidants, and dietary fiber. A decline in their consumption among

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drinkers may raise the risk of micronutrient deficiencies and diet-related non-communicable diseases.

The intake of processed food was also much greater in high-frequency drinkers (58.3%) compared to non-drinkers (30.4%), with a p-value of 0.002. Processed foods tend to be rich in unhealthy fats, sugar, and sodium, and their greater dependence among drinkers could be either from convenience eating while under the influence or compromised choice in food while drinking.

Remarkably, use of dietary supplements was significantly lower for high-frequency drinkers (9.8%) than among non-drinkers (18.6%), with p-value 0.028. This could suggest poor health consciousness, availability, or concern of those with greater alcohol consumption, adding to their nutritional deficiencies.

These statistically significant differences in all measured diet-related practices show that drinking alcohol, especially at high frequency, has strong correlations with less beneficial nutritional habits. Implications indicate a demand for comprehensive health promotion interventions that cover both alcohol moderation and the improvement of nutrition.

Table 4: Prevalence of Health Symptoms Among High-Frequency Drinkers and Non-Drinkers

Health Outcome	High-Frequency Drinkers (%)	Non-Drinkers (%)	*p*-value
Fatigue or weakness	41.3	22.7	<0.001
Unintended weight loss	36.7	17.5	<0.001
Appetite loss	29.5	13.9	0.001
Frequent illness/infection	18.9	11.3	0.009

Self-reported health symptom analysis indicated much higher negative health outcome burden for high-frequency drinkers than for drinkers, further emphasizing the negative effects of alcohol on overall well-being and nutritional health.

Weakness or fatigue was the most frequent symptom reported in high-frequency drinkers, with 41.3% reporting this condition compared to 22.7% of abstainers (p <

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0.001). Fatigue can be caused by poor nutrition, impaired liver function, or anemia—all of which may be exacerbated by heavy alcohol consumption.

Correspondingly, unplanned weight loss was experienced by 36.7% of high-frequency drinkers versus 17.5% of abstainers ($p < 0.001$). The large difference implies that chronic drinking might be adding to metabolic abnormalities or malabsorption of nutrients, both of which can produce progressive and detrimental weight loss.

Loss of appetite was also higher among the drinkers (29.5%) compared to the non-drinkers (13.9%), with a p-value of 0.001. Appetite suppression is also a normal physiological consequence of alcohol, especially when it replaces food intake or disrupts gastrointestinal health.

Also, recurrent sickness or infection was more frequently seen among high-frequency drinkers (18.9%) compared to non-drinkers (11.3%) with a p-value of 0.009, indicating an impaired immune system due to possible chronic inflammation, strain on the liver, or micronutrient malnutrition—complications most commonly linked to excessive alcohol consumption.

Table 5: Logistic Regression – Predictors of Undernutrition-Related Symptoms

Predictor	AOR	95% CI	*p*-value
High-frequency alcohol use-	2.34	1.87–2.91	<0.001
Low income (<L$5,000)	1.76	1.32–2.35	0.003
Skipping meals	1.89	1.45–2.47	<0.001

The logistic regression model estimated major predictors for the occurrence of symptoms of undernutrition—like weakness, loss of weight, and appetite suppression—among the 3,453 participants. The findings indicated high-frequency drinking, low earnings, and skipping meals as significant independent predictors.

Interestingly, frequent drinking of alcohol proved to be the most significant predictor, with an AOR of 2.34 and 95% CI of 1.87–2.91 ($p < 0.001$). This reflects that those who drank alcohol three or more times a week were more than double in likelihood to present with symptoms of undernutrition than their peers who did not have frequent drinking.

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This result emphasizes the paramount importance of alcohol in compromising nutritional status—potentially through inadequate diet, nutrient malabsorption, or liver-based metabolic compromise.

Low income, that is, income below L$5,000 per month, was also a strong predictor with an AOR of 1.76 (95% CI: 1.32–2.35, p = 0.003). Economic constraint is likely to limit exposure to a wide variety of nutritious food and healthcare, thus increasing the risk of undernutrition. This association further underscores the economic aspect of nutritional vulnerability in Liberia, particularly in alcohol-using individuals.

Lastly, regular skipping of meals demonstrated a strong correlation with symptoms of undernutrition, with an AOR of 1.89 (95% CI: 1.45–2.47, p < 0.001). This habit was prevalent among the high-frequency drinkers and adds to the nutritional deficiencies caused due to insufficient or irregular food consumption.

Discussion

This research illustrates a statistically significant and clear association between alcohol drinking and unfavorable nutritional status among Liberian adults. The revelation that 62.8% of the participants were current drinkers, and 31.8% drank alcohol with high frequency (≥3 times weekly), reflects the prevalent and normalized use of alcohol among Liberian populations. This trend is consistent with larger Sub-Saharan African patterns, in which drinking is an integral part of social events, economic exchange, and cultural practices [3,9].

The nutritional impact of drinking, although widely documented elsewhere in the world, assumes specific dimensions in Liberia. Alcohol disrupts appetite, absorption, and metabolism of essential nutrients such as B-vitamins, zinc, and folate, which are already in short supply among poor populations [4,6,11]. Our data confirm these mechanisms: high-frequency drinkers were more likely to miss meals (73.1% vs. 39.6%), consume little fruit and vegetables (66.9% vs. 31.2%), and be heavy consumers of processed foods (58.3% vs. 30.4%). Such dietary habits constitute a replacement of healthy eating with alcohol-use-related and money-misallocation-related behaviors in favor of alcohol rather than healthy food.

From a clinical perspective, the implications are real. The research found a greater prevalence of fatigue (41.3%), unintentional weight loss (36.7%), suppression of appetite (29.5%), and recurrent infections (18.9%) among high-frequency drinkers than among non-drinkers. These symptoms are consistent with traditional presentations of undernutrition and suggest both

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biochemical effects—like liver stress and micronutrient deficiency—and behavioral causation, such as decreased food intake and dietary malaise [13,14]. Logistic regression supported these findings: after adjusting for income and meal frequency, heavy-frequency alcohol drinking continued to be a robust independent predictor of undernutrition symptoms (AOR = 2.34, 95% CI: 1.87–2.91, $p < 0.001$). Missed meals and low income were also significant predictors, illustrating the way in which multiple risk factors interact synergistically.

Notably, the results should be understood in the context of Liberia's emerging nutrition problems. Accelerated urbanization, climate-driven disturbances in agriculture, and a growing reliance on imported, processed, and low-nutrient staple foods have altered dietary patterns away from traditional, nutrient-dense local foods [17,18]. These structural shifts increase the effect of alcohol on nutrition by lowering baseline diet quality, even among those who are not heavy consumers. In this context, alcohol adds to already weak nutritional systems.

Based on the data, the public health intervention has to be multi-faceted and specific to context. First, alcoholic harm-reduction strategies have to be incorporated within community health programmes, especially amongst young adults and men, the largest proportion of high-frequency consumers. Second, nutrition education programs have to address the impact of alcohol on nutritional intake and overall health while focusing on locally obtained, low-cost alternatives to the processed food they consume. Thirdly, policy efforts should aim to reinvigorate local food systems, including smallholder farming and urban agriculture, to reduce reliance on imports and improve access to fresh produce [19,20].

Lastly, there must be proper training of health workers to screen for alcohol and nutritional deficiency use during regular care, particularly rural and peri-urban settings where the two are highly endemic. Dealing with the relationship between substance use and nutrition in an integrated manner will be key in enhancing the health and resilience of Liberian communities overall, particularly with economic volatility, food shortages, and the constrained healthcare environment.

Conclusion

This research emphasizes a robust and statistically significant association between alcohol consumption and adverse nutritional status among Liberian adults. Heavy-frequency alcohol drinking was linked to undesirable dietary practices, higher undernutrition symptom prevalence, and greater risk of fatigue, weight loss, and appetite

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suppression. The results emphasize how alcohol not only interferes with personal eating habits but also intersects with more pervasive socioeconomic risk factors—like limited income and food insecurity—to magnify nutritional risk.

With these complex effects, interventions need to be multidimensional and place-specific. Successful measures need to incorporate alcohol harm reduction activities, nutrition education at the community level, and policy approaches to enhance local food systems. Such programs should particularly target fostering awareness of the health risks of excessive drinking and healthy, affordable food options.

In addition, a joint effort of public health leaders, community figures, and local stakeholders is indispensable in the creation and implementation of culturally relevant and sustainable interventions. Addressing the behavioral and structural determinants of unhealthy nutrition will take Liberia closer to better population health, higher nutritional security, and less alcohol-related health burden.

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