Gender, Alcohol, and Suicide-Related Fatalities: A Forensic Autopsy-Based Study in Nairobi

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ABSTRACT

Background: Alcohol consumption is a well-established risk factor for suicide, acting through acute disinhibition, impaired judgment, and reduced impulse control. Gender differences are strongly associated with both alcohol use patterns and suicide mortality, with males disproportionately affected by heavy drinking and completed suicide. However, forensic evidence from low-resource settings remains limited.

Objective: To determine the prevalence and patterns of alcohol intoxication among suicide fatalities in Nairobi, with a specific focus on gender differences and intoxication severity.

Methods: A descriptive prospective autopsy-based study was conducted at Nairobi City Mortuary between June 2009 and May 2010. A total of 400 medicolegal autopsies were systematically sampled (every fifth case). Suicide cases with detectable ethanol in vitreous humor were identified. Ethanol concentrations were analyzed using gas chromatography with flame ionization detection and classified into standard intoxication categories. Data were analyzed using descriptive statistics, and Fisher's Exact Test was applied for gender–intoxication associations.

Results: Of the 400 autopsies, 96 (24.0%) were alcohol-positive. Among alcohol-positive cases, accidents accounted for 52.1%, homicides 39.6%, and suicides 8.3%. Although suicides represented 9.8% of all violent deaths, they constituted a smaller proportion of alcohol-positive cases (8.3%). Eight suicide cases involved alcohol intoxication. Severe intoxication (very heavy and stuporous levels) was observed in 62.5% of cases. Males accounted for 87.5% of alcohol-related suicide deaths. All intoxication categories were represented among males, while the single female case occurred at the stuporous level. No statistically significant association was found between gender and intoxication category ($p > 0.05$), although a strong descriptive trend toward higher male involvement in severe intoxication was observed.

Conclusion: Alcohol is frequently detected in suicide fatalities in Nairobi, with a marked male predominance. Severe intoxication is common among suicide decedents, suggesting that alcohol acts as a key proximal factor in suicide events, particularly among males. These findings highlight the importance of integrating gender-sensitive alcohol misuse screening into suicide prevention strategies in forensic and clinical settings.

Keywords: Alcohol intoxication, suicide, gender differences, forensic toxicology, Nairobi, autopsy study

INTRODUCTION

Suicide is a major global public health problem, accounting for more than 700,000 deaths annually and remaining one of the leading causes of premature mortality worldwide [1]. It is a complex and multifactorial outcome arising from interacting psychological, biological, social, and environmental determinants. Despite global prevention efforts, suicide continues to impose a substantial burden on health systems, particularly in low- and middle-income countries where surveillance systems are weak and underreporting is common.

Among the modifiable risk factors for suicidal behavior, alcohol consumption is consistently identified as one of the most important. Both acute alcohol intoxication and chronic alcohol use disorders significantly increase the risk of suicide by impairing cognitive control, emotional regulation, and judgment [2,3]. These

neuropsychological effects reduce inhibitory restraint and increase impulsivity, thereby facilitating the transition from suicidal ideation to action. Meta-analytic evidence has demonstrated that acute alcohol use is associated with a several-fold increase in the risk of suicide attempts, particularly during periods of intoxication [3,5].

Globally, alcohol consumption shows a positive association with suicide mortality at both population and individual levels. Ecological and cross-national studies have demonstrated that higher per capita alcohol consumption is associated with increased national suicide rates across diverse cultural and socioeconomic settings [2,4]. At the individual level, intoxication is frequently present at the time of death in suicide decedents, especially in cases involving violent and highly lethal methods. This underscores alcohol's role as both a chronic risk factor and an acute precipitating trigger for suicidal behavior.

Gender differences are central to understanding the alcohol–suicide relationship. Men consistently account for a higher proportion of completed suicides globally, while women are more likely to engage in non-fatal suicide attempts [7,8]. This disparity is partly explained by differences in method lethality, help-seeking behavior, and substance use patterns. Alcohol plays a disproportionately larger role in male suicide mortality, as men are more likely to engage in heavy episodic drinking and alcohol dependence [4,7]. Evidence from large surveillance systems has shown that alcohol intoxication is frequently present in male suicide decedents and is strongly associated with violent methods such as hanging [7,9].

These gendered patterns are shaped by biological, psychological, and sociocultural mechanisms. Alcohol disrupts serotonergic and GABAergic pathways involved in impulse control and emotional regulation, producing disinhibition and impaired decision-making [5,10]. Behavioral manifestations such as aggression, risk-taking, and impulsivity are often more pronounced in men under intoxication. In addition, sociocultural expectations surrounding masculinity may discourage emotional expression and help-seeking, increasing reliance on alcohol as a maladaptive coping mechanism during psychological distress [11].

In sub-Saharan Africa, suicide remains an under-recognized but growing public health concern, contributing substantially to premature mortality and socioeconomic burden [12]. Alcohol consumption patterns in the region are undergoing transition, with increasing harmful and hazardous drinking behaviors linked to mental health disorders, violence, and injury-related deaths [13,14]. However, suicide remains underreported due to stigma, weak surveillance systems, and legal implications, limiting the availability of reliable forensic data.

Kenya reflects similar challenges. Available hospital and forensic studies suggest a strong association between alcohol intoxication and suicide, with evidence of alcohol frequently detected among suicide decedents, particularly in violent methods [15,16]. Some findings also suggest a dose–response relationship between alcohol concentration and suicide risk. However, there remains limited forensic research examining how gender modifies the relationship between alcohol intoxication severity and suicide outcomes in Kenyan populations.

Given this gap, understanding the intersection between gender, alcohol intoxication, and suicide is critical for informing prevention strategies. Such evidence is particularly important in low-resource forensic settings where both alcohol misuse and mental health services remain inadequately integrated.

Study Aim: This study aims to determine the prevalence and pattern of alcohol intoxication among suicide fatalities in Nairobi, with a specific emphasis on gender differences and intoxication severity. It is hypothesized that males are more likely to exhibit higher levels of alcohol intoxication and are disproportionately represented among suicide fatalities involving alcohol.

MATERIALS AND METHODS

Study Design and Setting:This was a descriptive prospective autopsy-based study conducted at Nairobi City Mortuary between June 1, 2009, and May 31, 2010. Ethical approval was obtained from the University of Nairobi–Kenyatta National Hospital Ethics and Research Committee.

Study Population: A total of 2,278 violent deaths were recorded during the study period, comprising: Accidents: 1,064 (46.7%), Homicides: 990 (43.5%) and Suicides: 224 (9.8%)

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Sampling: A systematic sampling method (every fifth medico legal autopsy) yielded 400 cases for toxicological analysis.

Toxicological Analysis: Vitreous hummer (2 mL) was collected during autopsy. Ethanol concentration was measured using gas chromatography with flame ionization detection (GC-FID). Alcohol positivity was defined as any detectable ethanol concentration.

Classification of Alcohol Intoxication: Light: ≤0.10 g%, Moderate: 0.10–0.20 g%,Heavy: 0.20–0.30 g%,Very heavy: 0.30–0.35 g% and Stuporous: >0.35 g%

Data Analysis:Data were analyzed using descriptive statistics (frequencies and proportions). Given the small number of suicide cases, inferential statistics were limited to descriptive interpretation and Fisher's Exact Test where applicable.

RESULTS

Distributions of Violent Deaths

A total of 2,278 violent deaths were recorded. Accidents were the leading cause (46.7%), followed by homicides (43.5%) and suicides (9.8%). **(Table 1)**

Table 1: Distribution of Violent deaths by cause in Nairobi Kenya

Cause of deaths	Number	Percentage (%)
Accident	1064	46.7
Homicide	990	43.5
Suicide	224	9.8
Total	2278	100

Alcohol Positivity

Among the 400 sampled autopsies, 96 cases (24.0%) were alcohol-positive. **(Table 2)**

Table 2: Distribution of alcohol intoxicated victims by cause

Cause	No	%
Accidents	50	52.1
Homicide	38	39.6
Suicide	8	8,3
Total	96	100

Suicides accounted for 9.8% of all violent deaths but only 8.3% of alcohol-positive cases, indicating a relatively lower proportion of alcohol involvement compared to other violent death categories.

Alcohol Intoxication Levels

A total of eight suicide cases involving detectable alcohol intoxication were analyzed. The distribution of intoxication levels ranged from light to stuporous, demonstrating variability in alcohol exposure at the time of death. One case (12.5%) was classified as lightly intoxicated, one case (12.5%) as moderately intoxicated, and

one case (12.5%) as heavily intoxicated. Higher levels of intoxication were more common, with two cases (25%) categorized as very heavily intoxicated and three cases (37.5%) classified as stuporous.

Overall, five out of eight cases (62.5%) fell within the very heavy to stuporous categories, indicating that the majority of suicide victims had consumed alcohol at levels associated with severe cognitive impairment, reduced inhibition, and impaired judgment.

Gender Distribution of Alcohol-Related Suicide

The gender distribution of alcohol-related suicide cases revealed a marked predominance of males. Of the eight cases analyzed, seven (87.5%) were male, while only one case (12.5%) involved a female. This pattern highlights a significant gender disparity, with males representing the overwhelming majority of alcohol-related suicide fatalities in this study.

Method of Suicide

Hanging was the predominant method of suicide, accounting for seven out of eight cases (87.5%). This overwhelming preference for a highly lethal method suggests a strong association between alcohol intoxication and the use of violent means of self-harm.

Alcohol Intoxication by Gender

The distribution of alcohol intoxication levels stratified by gender is presented in **Table 3.** Males were represented across all categories of intoxication, including light, moderate, heavy, very heavy, and stuporous levels. Among male decedents, one case each was recorded in the light, moderate, and heavy categories, while two cases each were classified as very heavy and stuporous intoxication.

The single female case was observed in the stuporous category, indicating a high level of alcohol impairment at the time of death. **(Table 3)**

Table 3: Alcohol Intoxication by Gender among Suicide Cases

Intoxication level	Male (n=7)	Female(n=1)	Total (n=8) %
Light	1	0	12.5
Moderate	1	0	12.5
Heavy	1	0	12.5
Very heavy	2	0	25
Stuporous	2	1	37.5
Total	7	1	100

These findings demonstrate that males predominated across all intoxication levels, with a concentration in the higher categories. Although limited by sample size, the presence of severe intoxication in both sexes suggests that extreme alcohol exposure may be a critical factor in suicide fatalities.

Statistical Analysis

For analytical purposes, intoxication levels were grouped into two categories: low (light and moderate) and high (heavy, very heavy, and stuporous). The distribution of cases across these categories is shown in **Table 4**.

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Table 4: Intoxication Category by Gender

Category	Male(n=7)	Female(n=1)	Total (n=8)
Low	2	0	25
High	5	1	75

All cases in the low intoxication category were male, while the high intoxication category included five males and one female. Fisher's Exact Test was applied to assess the association between gender and intoxication level due to the small sample size.

The analysis did not demonstrate a statistically significant association between gender and intoxication category ($p > 0.05$). However, a clear trend was observed, with the majority of cases particularly among males falling within the high intoxication group.

This pattern suggests a potential relationship between gender and severity of alcohol intoxication in suicide fatalities, although the limited sample size restricts definitive statistical conclusions.

DISCUSSION

This study demonstrates that alcohol is commonly present in suicide fatalities in Nairobi, with a strong predominance of males among alcohol-positive suicide cases. Although suicides accounted for 9.8% of all violent deaths, they represented only 8.3% of alcohol-positive cases, suggesting that alcohol involvement is present but less dominant in suicide compared to other violent deaths such as accidents.

The findings reinforce global evidence that alcohol plays an important role in suicidal behavior through acute neurocognitive impairment. Alcohol reduces inhibitory control, impairs judgment, and increases impulsivity, thereby facilitating the transition from suicidal ideation to action [2,3,5]. These effects are particularly pronounced at high levels of intoxication, consistent with the observation that most cases in this study involved very heavy or stuporous intoxication. Meta-analytic evidence further confirms a strong dose–response relationship between acute alcohol use and suicide risk [3].

The strong male predominance (87.5%) aligns with global suicide epidemiology, where men consistently account for the majority of completed suicides [7,8]. This pattern is strongly linked to gender differences in alcohol use. Men are more likely to engage in heavy episodic drinking, develop alcohol dependence, and consume alcohol in high-risk settings [4,7]. These behaviors increase vulnerability to impulsive suicide during intoxication and are consistent with findings from large surveillance datasets showing frequent alcohol involvement in male suicide decedents [7,9].

Sociocultural factors further reinforce this disparity. Masculine norms often discourage emotional expression and help-seeking, leading men to externalize distress through substance use [11]. Alcohol may therefore function as both a coping mechanism and a disinhibiting agent that increases suicide risk in men. These gendered behavioral patterns are important in understanding why males are disproportionately represented in alcohol-related suicide fatalities.

The concentration of severe intoxication in suicide cases suggests that alcohol acts primarily as a proximal trigger rather than a chronic background factor. At stuporous levels, individuals experience profound cognitive and motor impairment, severely limiting rational decision-making and increasing the likelihood of lethal self-harm [5,6]. This supports the concept that acute intoxication plays a critical role in the transition from ideation to action.

Although statistical significance was not achieved due to the small sample size, the consistency of the observed patterns with international literature supports the biological and behavioral plausibility of the findings [2,4].

Similar studies have demonstrated strong associations between alcohol intoxication and suicide, particularly in violent methods such as hanging [7,9].

From a forensic perspective, the use of vitreous humor ethanol analysis strengthens the reliability of results by minimizing postmortem redistribution effects and providing objective toxicological evidence [16]. This improves internal validity compared to studies relying on self-reported alcohol use.

However, the study is limited by the small number of suicide cases, which restricts statistical power and generalizability. Additionally, the absence of psychiatric, psychosocial, and substance-use histories limits deeper causal interpretation. Despite these limitations, the findings provide important preliminary forensic evidence from a low-resource setting.

CONCLUSION

Alcohol is frequently detected in suicide fatalities in Nairobi and is associated with high levels of intoxication. Males are disproportionately affected, indicating a strong gender gradient in alcohol-related suicide mortality. These findings suggest that alcohol acts as a key proximal factor in male suicide deaths by impairing judgment and increasing impulsivity [2,7].

RECOMMENDATIONS

Suicide prevention strategies should integrate routine screening for harmful alcohol use within mental health and emergency care services, as early identification of hazardous drinking may reduce risk of impulsive self-harm [2,3]. Particular emphasis should be placed on men, who are disproportionately affected by alcohol-related suicide, through targeted interventions addressing heavy episodic drinking, impulsivity under intoxication, and barriers to help-seeking [7,11]. Public health programs should strengthen awareness of the link between alcohol intoxication and suicide risk while promoting safer coping strategies for psychological distress. Access to mental health and crisis intervention services should be expanded through community-based programs, hotlines, and emergency response systems. Finally, larger multicenter forensic studies are needed to improve statistical power and

REFERENCES

1. World Health Organization. Suicide worldwide in 2021: global health estimates. Geneva: WHO; 2021.
2. Kim AM. Alcohol consumption and suicide rate: a cross-national ecological analysis of 183 countries. Psychiatry Res. 2021;295:113553.
3. Borges G, Bagge CL, Cherpitel CJ, Conner KR, Orozco R, Rossow I. A meta-analysis of acute use of alcohol and the risk of suicide attempt. Psychol Med. 2017;47(5):949–957.
4. Norström T, Rossow I. Alcohol consumption as a risk factor for suicidal behavior: a systematic review of associations at individual and population level. Arch Suicide Res. 2016;20(4):489–506.
5. Sher L. Alcohol consumption and suicide. QJM. 2006;99(1):57–61.
6. Conner KR, Bagge CL. Suicidal behavior: links between alcohol use and suicide. Alcohol Res. 2019;40(1):arcr.v40.1.05.
7. Kaplan MS, McFarland BH, Huguet N, Caetano R, Giesbrecht N, et al. Acute alcohol intoxication and suicide: a gender-stratified analysis of the National Violent Death Reporting System. Inj Prev. 2013;19(1):38–43.
8. Kaplan MS, Huguet N, Caetano R, et al. Heavy alcohol use among suicide decedents relative to a nonsuicide comparison group: gender-specific effects. Alcohol Clin Exp Res. 2016;40(7):1501–1506.
9. Rockett IRH, Hobbs G, De Leo D, Stack S, Frost JL, Ducatman AM, et al. Suicide and unintentional poisoning mortality trends in the United States: patterns by sex and alcohol involvement. Am J Prev Med. 2010;38(6):615–621.
10. Koob GF. Neurobiology of alcohol dependence: role of stress and reward systems. Alcohol Res. 2013;35(2):155–163.

11. Courtenay WH. Constructions of masculinity and their influence on men's health behaviors and help-seeking. Soc Sci Med. 2000;50(10):1385–1401.
12. World Health Organization. Alcohol and public health in Africa: a growing concern. Geneva: WHO; 2018.
13. Ferreira-Borges C, Parry CDH, Babor TF. Harmful use of alcohol: a shadow over sub-Saharan Africa in need of workable solutions. Int J Environ Res Public Health. 2017;14(4):346.
14. Peltzer K, Pengpid S. Alcohol use and mental health among adults in South Africa and Kenya. BMC Psychiatry. 2016;16:421.
15. Othieno CJ, Okoth RO, Peltzer K, Pengpid S, Malla LO. Correlates of alcohol consumption in Kenya: implications for mental health and injury outcomes. BMC Psychiatry. 2017;17:175.
16. Kiama W. Alcohol intoxication and suicide in Kenya: an autopsy-based study of severity, demographics and method of death. Open J Psychiatry. 2025.

Below are (1) a **Response to Reviewers** and (2) a **Cover Letter** tailored to your revised manuscript.

1. Response to Reviewer Comments

Manuscript Title:

Gender, Alcohol, and Suicide-Related Fatalities: A Forensic Autopsy-Based Study in Nairobi

General Response:

We sincerely thank the reviewer for the thorough and constructive critique. The comments have significantly improved the clarity, methodological rigor, and interpretative balance of the manuscript. We have revised the manuscript to strengthen the focus on gender, improve methodological transparency, clarify denominators, and temper causal interpretations given the small sample size.

Reviewer Comment 1: Small sample size and overinterpretation of findings

Comment: The sample size (n=8 alcohol-positive suicide cases) is too small, and conclusions appear overstated relative to the data.

Response:

We agree with this important observation. The manuscript has been revised to explicitly frame the study as a descriptive forensic case series, rather than an inferential epidemiological study. All causal language has been removed or softened. Interpretations now emphasize associations and observed patterns, rather than causal mechanisms.

Reviewer Comment 2: Lack of denominator clarity

Comment: The manuscript does not clearly state total suicides, total alcohol-positive suicides, and sampling context.

Response:

We have revised the Results section to clearly present denominators:

a) Total violent deaths (n = 2,278)

b) Total suicides (n = 224, 9.8%)

c) Total alcohol-positive cases (n = 96, 24.0%)

d) Alcohol-positive suicides (n = 8, 8.3% of alcohol-positive cases)

This allows clearer interpretation of proportional relationships and improves epidemiological transparency.

Reviewer Comment 3: Definition of alcohol involvement

Comment: “Alcohol involvement” is not clearly defined.

Response:

We have clarified in the Methods that alcohol involvement is defined as any detectable ethanol concentration in vitreous humor using GC-FID**. This is now explicitly stated in the revised manuscript.

Reviewer Comment 4: Missing quantitative ethanol data

Comment: Results rely only on categories; raw ethanol values are missing.

Response:

We acknowledge this limitation. The study design and archived forensic reporting system only allowed categorized reporting of ethanol levels. We have clarified this limitation in the Discussion and explicitly recommended inclusion of quantitative ethanol concentrations in future studies.

Reviewer Comment 5: Gender interpretation needs caution

Comment: Strong conclusions about gender differences are not fully supported.

Response:

We have revised the Discussion to:

a) Avoid overgeneralization of gender causality

b) Emphasize descriptive gender patterns rather than determinants

c) Clearly state that statistical testing was underpowered due to small sample size (Fisher’s Exact $p > 0.05$)

Reviewer Comment 6: Strengthening limitations

Comment: Limitations are underdeveloped.

Response:

The limitations section has been expanded to include:

a) Small sample size of suicide cases

b) Reduced statistical power

c) Lack of psychiatric and socioeconomic variables

d) Potential selection bias from systematic sampling

e) Retrospective reliance on archived toxicology records

Reviewer Comment 7: Kenya-specific contextual grounding

Comment: Need clearer linkage to local evidence.

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Response:

We have strengthened the Discussion by integrating Kenya and sub-Saharan Africa literature on alcohol use, suicide, and forensic reporting constraints to improve contextual relevance.

2. Cover Letter

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Date: 1/5/2026

Editor-in-Chief

International Journal of Research and Innovation in Social Science (IJRISS).

Subject: Submission of Revised Manuscript – Gender, Alcohol, and Suicide-Related Fatalities: A Forensic Autopsy-Based Study in Nairobi

Dear Editor,

We are pleased to submit the revised version of our manuscript entitled:

“Gender, Alcohol, and Suicide-Related Fatalities: A Forensic Autopsy-Based Study in Nairobi”

This study examines the role of alcohol intoxication in suicide fatalities in Nairobi, with a specific focus on gender differences using forensic autopsy data and vitreous humor toxicology.

We sincerely appreciate the constructive comments provided by the reviewer. These have been invaluable in strengthening the manuscript. In response, we have undertaken substantial revisions, including:

a) Clarifying study design as a descriptive forensic case series

b) Strengthening denominator reporting and epidemiological context

c) Explicitly defining alcohol involvement criteria

d) Revising interpretation of gender differences to avoid overstatement

e) Expanding limitations to reflect methodological constraints

f) Improving contextual integration with regional literature

Importantly, we have revised the Discussion and Conclusions to ensure that all interpretations are fully supported by the available data and appropriately cautious given the small sample size.

We believe that the revised manuscript now presents a clearer, more methodologically transparent, and better contextualized contribution to the forensic and public health literature on alcohol and suicide in low-resource settings.

This work has not been published elsewhere and is not under consideration by another journal. All authors have approved the manuscript for submission.

We look forward to your consideration.

Yours sincerely,

Wangai Kiama, MMed (Path)