

# Prevalence of Post-Traumatic Stress Disorder and Associated Trauma Exposure Among Inpatients with Substance Use Disorders in Nairobi Rehabilitation Centers

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## ABSTRACT

**Objective(s):** To determine the prevalence of post-traumatic stress disorder (PTSD), describe patterns of trauma exposure, and identify associated factors among inpatients with substance use disorders (SUDs) in Nairobi.

**Design:** Cross-sectional analytical study.

**Setting:** Thirteen inpatient rehabilitation centers within a 50-kilometre radius of Nairobi, Kenya.

**Subjects or Participants:** A total of 222 adult inpatients aged 18–65 years with diagnosed SUDs, stabilized on treatment for at least two weeks.

**Interventions:** None.

**Main Outcome Measures:** PTSD prevalence and severity assessed using the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5), trauma exposure patterns, and substance involvement measured using ASSIST.

**Results:** Participants were predominantly male (91.0%) with a mean age of 34.1 years (SD 9.0). Trauma exposure was reported by 59.9%, including significant life events (37.4%), physical injury (19.4%), and sexual assault (3.2%). The prevalence of PTSD was 27.5% (95% CI: 22.1–33.3). Independent predictors of higher PTSD severity included divorced/separated/widowed marital status ( $\beta = -11.10$ ,  $p=0.001$ ), physical injury ( $\beta = 8.00$ ,  $p=0.028$ ), and significant life events ( $\beta = 9.69$ ,  $p=0.001$ ). PTSD severity was strongly correlated with depression severity ( $r=0.545$ ,  $p<0.001$ ).

**Conclusion:** PTSD is a common comorbidity among SUD inpatients in Nairobi and is strongly associated with trauma exposure and marital disruption. Routine trauma screening and integration of trauma-informed care into substance use treatment programs are recommended.

**Keywords:** Post-traumatic stress disorder; substance-related disorders; dual diagnosis; rehabilitation; Kenya

## INTRODUCTION

Substance use disorders (SUDs) represent a significant public health challenge in East Africa. In Kenya, national data indicate substantial and persistent use of alcohol, tobacco, and khat. Reports from the National Authority for the Campaign Against Alcohol and Drug Abuse (NACADA) show that approximately one in every eight Kenyans aged 15–65 years consumes alcohol, with alcohol remaining the most widely used substance. These patterns contribute to considerable health, social, and economic burdens.<sup>1</sup>

A critical factor complicating SUD treatment is psychiatric comorbidity, with post-traumatic stress disorder (PTSD) being one of the most prevalent and disabling co-occurring conditions.<sup>2</sup> PTSD arises following exposure to a traumatic event and is characterized by intrusive re-experiencing, persistent avoidance, negative alterations in cognition and mood, and marked alterations in arousal and reactivity.<sup>3</sup> The disorder follows a chronic course

in a significant proportion of affected individuals and is associated with substantial functional impairment, reduced quality of life, and increased risk of suicide.<sup>4</sup>

The relationship between PTSD and SUDs is complex and bidirectional. The self-medication hypothesis posits that individuals with PTSD may use alcohol or other substances to alleviate distressing symptoms such as hyperarousal, insomnia, and intrusive memories.<sup>5,6</sup> Longitudinal studies have demonstrated that PTSD symptoms frequently precede the onset of problematic substance use.<sup>7</sup> Conversely, substance use increases the risk of exposure to further traumatic events through engagement in high-risk behaviors and may exacerbate existing PTSD symptoms.<sup>8</sup> Neurobiologically, both conditions share common pathways involving dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, alterations in the mesolimbic dopamine system, and deficits in fear extinction and emotional regulation.<sup>9,10</sup>

The dual diagnosis of PTSD and SUD is associated with a more severe clinical profile compared to either condition alone. Individuals with co-occurring PTSD and SUD experience earlier onset of substance use, greater addiction severity, higher rates of polysubstance use, increased suicide attempts, poorer treatment retention, and higher relapse rates.<sup>11,12</sup> A systematic review by Roberts and colleagues found that individuals with comorbid PTSD and SUD had significantly worse treatment outcomes than those with SUD alone.<sup>13</sup>

In high-income countries, current PTSD prevalence among SUD treatment seekers ranges from 25% to over 50%.<sup>14,15</sup> The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) in the United States reported a lifetime PTSD prevalence of 14.5% among individuals with alcohol dependence and 26.3% among those with drug dependence.<sup>16</sup> However, epidemiological data on this dual diagnosis in East African inpatient rehabilitation settings remains scarce. In sub-Saharan Africa, studies from South Africa have reported high rates of trauma exposure among individuals with SUDs, with one study finding that 73% of patients in substance use treatment reported a history of traumatic events.<sup>17</sup> A study by Kuria and colleagues in Kenya documented high rates of depression among SUD patients but did not specifically assess PTSD.<sup>18</sup>

This gap in knowledge hinders the development and implementation of integrated, trauma-informed treatment models essential for improving patient outcomes. This study aimed to determine the prevalence of PTSD, describe patterns of trauma exposure, and identify socio-demographic and clinical factors associated with PTSD among inpatients receiving treatment for SUDs in rehabilitation centers in Nairobi, Kenya.

## MATERIALS AND METHODS

### Study Design and Setting

A cross-sectional study employing quantitative methods was conducted between May and June 2019. The study was carried out in 13 inpatient rehabilitation centers located within a 50-kilometer radius of Nairobi. These centers were selected to provide a representative sample of available services, including both private and non-governmental facilities, and to capture diversity in treatment approaches and patient populations.

### Study Population

The study population comprised inpatients aged 18–65 years with diagnosed SUDs, stabilized on treatment for at least two weeks. Exclusion criteria were: (1) presence of active psychotic or bipolar affective disorders, as determined by clinical assessment; (2) significant cognitive impairment precluding informed consent; (3) being an outpatient.

### Sample Size and Sampling

Sample size was calculated using the Yamane formula:  $n = N / 1 + N(e^2)$ .<sup>19</sup> With a total population of 451 inpatients and precision level of 5%, the minimum sample was 212, adjusted to 233 for 10% attrition. A census of all eligible inpatients was conducted across 13 selected centers.

### Data Collection Instruments

**1. Socio-demographic and trauma questionnaire:** Collected age, sex, education, marital status, and trauma exposure categorized as: sexual assault, physical injury, significant life event, or no trauma.

2. **Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5):** A 20-item self-report measure assessing DSM-5 PTSD symptoms over the past month.<sup>20</sup> Total scores range 0–80. PTSD caseness was determined using the DSM-5 diagnostic algorithm. The PCL-5 has excellent internal consistency ( $\alpha = 0.94–0.96$ ) and has been validated in African contexts.<sup>20,21</sup>
3. **Alcohol, Smoking and Substance Involvement Screening Test (ASSIST):** Developed by the World Health Organization, this instrument screens for problematic use of tobacco, alcohol, and other drugs. The ASSIST has demonstrated excellent reliability and validity in international settings<sup>22</sup> and has been successfully used in previous Kenyan studies.<sup>23</sup> It generates substance-specific risk scores and provides information on lifetime and recent use patterns.
4. **Beck Depression Inventory-II (BDI-II):** A 21-item self-report instrument assessing the severity of depressive symptoms over the preceding two weeks, corresponding to DSM-IV criteria for depression.<sup>24</sup> Total scores range from 0 to 63 and are categorized as: minimal (0–13), mild (14–19), moderate (20–28), and severe (29–63). The BDI-II has high internal consistency (Cronbach's  $\alpha = 0.91$ ) and good convergent validity.<sup>25</sup> It has been successfully used in Kenyan research contexts.<sup>26</sup>

### Data Collection Procedure

Ethical approval was obtained from the Kenyatta National Hospital/University of Nairobi Ethics and Research Committee (KNH-UoN ERC). After mental status examination, eligible participants provided written informed consent. Questionnaires were administered privately by the principal investigator.

### Data Analysis

Data was analyzed using SPSS Version 24.0. Descriptive statistics summarized participant characteristics. Group differences were analyzed using independent t-tests and one-way ANOVA, with post-hoc Bonferroni corrections. Variables with  $p < 0.10$  were entered into multiple linear regression. Statistical significance was set at  $p < 0.05$ .

## RESULTS

### Participant Characteristics

Of 233 approached, 222 provided complete data (95.3% response rate). The sample was predominantly male (91.0%), with a mean age of 34.1 years (SD 9.0). Most (77.9%) had tertiary education. Marital status distribution: 40.3% married, 35.7% single, 24.0% divorced/separated/widowed (Table 1).

**Table 1: Socio-demographic Characteristics (N=222)**

Variable	Category	Frequency (N)	Percentage (%)
Gender	Female	20	9.0
	Male	202	91.0
Age	18-25	31	14.0
	26-30	42	19.0
	31-35	63	28.5
	36-40	43	19.5
	Above 41	42	19.0
Marital Status	Single (Never Married)	79	35.7
	Married	89	40.3
	Divorced/Separated/Widowed	53	24.0
Education Level	Secondary	49	22.1
	Tertiary	173	77.9
Occupational Status	Unemployed	41	18.8
	Business	47	21.6
	Employed	97	44.5
	Student	33	15.1

## Trauma Exposure

Regarding trauma exposure, 40.1% had never been exposed to trauma, 37.4% had been exposed to a significant life event, 19.4% had experienced physical injury, and 3.2% had experienced sexual assault. A history of traumatic exposure was reported by 133 participants (59.9%) (Table 2).

**Table 2: Trauma Exposure History (N=222)**

Type of Trauma Exposure	Frequency (N)	Percentage (%)	95% CI
Sexual Assault	7	3.2	1.3–6.4
Physical Injury	43	19.4	14.4–25.2
Significant Life Event	83	37.4	31.1–44.0
No Trauma Reported	89	40.1	33.7–46.8

## Prevalence of Substance Use

Alcohol was the most used substance, with 97.7% of participants reporting any alcohol use. Among alcohol users, beer products (92.3%) and wines (83.3%) were the most prevalent forms, while traditional alcoholic beverages including chang'aa (49.5%) and muratina (44.6%) were also commonly used. Tobacco products were used by 64.4% of respondents, while half (50.0%) used khat (miraa). Other substances, including cannabis, heroin, and prescription medications, were used by 25.7% of participants (Table 2).

**Table 3: Prevalence of Substance Use (N=222)**

Substance	Frequency (N)	Percentage (%)	95% Confidence Interval
Alcohol (any)	217	97.7	95.9–99.5
Beer Products	205	92.3	88.7–95.5
Wines	185	83.3	77.9–87.8
Tobacco products	143	64.4	58.1–70.7
Khat/Miraa	111	50.0	44.1–55.9
Chang'aa	110	49.5	43.2–56.3
Muratina/Karubu	99	44.6	39.2–51.3
Other substances	57	25.7	20.3–31.5

## Prevalence of PTSD

Using DSM-5 diagnostic criteria, 61 participants met criteria for current PTSD, yielding a prevalence of **27.5%** (95% CI: 22.1–33.3). Using the cut-off score of  $\geq 33$ , prevalence was 32.0% (95% CI: 25.7–37.8). The mean PCL-5 score was 22.9 (SD 20.7, range 0–80).

## Factors Associated with PTSD Severity

### Bivariate Analysis

Bivariate analysis revealed significant associations between PTSD severity and marital status ( $F=7.21, p=0.001$ ) and trauma exposure ( $F=5.42, p=0.001$ ). Gender showed borderline significance ( $t=1.95, p=0.053$ ). Age ( $p=0.234$ ), education ( $p=0.277$ ), and occupational status ( $p=0.296$ ) were not significantly associated.

### Multivariate Analysis

Multiple linear regression identified independent predictors of PTSD severity (Table 3). Married participants had significantly lower PTSD scores than divorced/separated/widowed participants ( $\beta = -11.10, p=0.001$ ). Exposure to physical injury ( $\beta = 8.00, p=0.028$ ) and significant life events ( $\beta = 9.69, p=0.001$ ) were associated with higher PTSD scores compared to no trauma. Gender was not significant in the final model ( $p=0.169$ ). The model explained 14.3% of variance (adjusted  $R^2 = 0.143, F=7.28, p<0.001$ ).

**Table 4: Independent Predictors of PTSD Severity (Multiple Linear Regression)**

Variable	Category	$\beta$	S. E.	95% Confidence Interval		P-Value
				Lower	Upper	
Gender	Female	6.803	4.944	-2.887	16.493	0.169
	Male	Ref.				
Marital Status	Single (Never Married)	-6.271	3.505	-13.140	0.598	0.074
	Married	-11.100	3.419	-17.802	-4.399	<b>0.001</b>
	Divorced/Separated/Widowed	Ref.				
Exposure to trauma	Sexual assault	11.339	8.275	-4.879	27.557	0.171
	Physical injury	8.004	3.639	0.871	15.137	<b>0.028</b>
	Significant life event	9.693	3.019	3.775	15.611	<b>0.001</b>
	No Trauma	Ref.				

### Clinical Correlations

PTSD severity correlated strongly with depression severity ( $r = 0.545, p < 0.001$ ) and moderately with alcohol ( $r = 0.269, p < 0.001$ ), beer ( $r = 0.269, p < 0.001$ ), and wine ( $r = 0.200, p = 0.003$ ) severity.

## DISCUSSION

This study found a PTSD prevalence of 27.5% among SUD inpatients in Nairobi, with 59.9% reporting trauma exposure. These rates are consistent with international findings from SUD treatment settings (25–50%),<sup>14,15</sup> suggesting the trauma-addiction link is a universal clinical phenomenon.<sup>16</sup> The high burden of trauma exposure in this population reflects the complex interplay between substance use and social-environmental risk factors, including poverty, marginalization, and exposure to violence, consistent with findings from other African settings.<sup>17,27</sup>

The independent association between PTSD severity and specific trauma types—physical injury and significant life events—validates the etiological model of PTSD.<sup>28</sup> Physical injury may be a potent risk factor for PTSD development due to direct threat to life and potential for lasting physical consequences.<sup>29</sup> The strong association with significant life events, such as sudden loss of a loved one, highlights the importance of considering non-violent traumatic experiences in clinical assessment, particularly in cultures where family and community ties are central to social support structures.<sup>30</sup>

The finding that divorced, separated, or widowed individuals had markedly higher PTSD scores compared to married participants is clinically salient. Married participants had PTSD scores 11 points lower than those who were divorced, separated, or widowed. This relationship is likely bidirectional: severe PTSD strains intimate relationships, while loss of a primary relationship constitutes a traumatic stressor disrupting coping mechanisms.<sup>31</sup> The protective effect of marriage is consistent with literature demonstrating that marriage is associated with better mental health outcomes.<sup>32</sup>

The robust correlation between PTSD and depression severity ( $r=0.545$ ) indicates high co-occurrence of these internalizing disorders, creating synergistic negative effects on mood and functioning.<sup>33</sup> This comorbidity is well-documented, with overlapping dysregulation of stress-responsive neurobiological systems.<sup>34</sup> The correlation with alcohol severity supports the self-medication hypothesis, where alcohol is used to dampen hyperarousal and intrusive symptoms.<sup>5</sup>

### Cultural and contextual considerations

Cultural and contextual factors may further shape the observed patterns. In the Kenyan context, stigma surrounding mental health, gender norms discouraging emotional disclosure—particularly among men—and reliance on informal, family-based, or spiritual coping systems may influence both trauma reporting and help-

seeking behaviors. These factors may also contribute to underreporting PTSD symptoms and delayed access to formal mental health care. Such contextual dynamics are important to consider when interpreting prevalence estimates and designing trauma-informed interventions in similar low-resource settings.

### **Strengths and Limitations**

Key strengths of this study include its relatively large sample drawn from 13 rehabilitation centers, enhancing the generalizability within inpatient SUD treatment settings. The use of validated instruments such as the PTSD Checklist for DSM-5 (PCL-5) and the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) strengthens methodological rigor and comparability with other studies. Additionally, the inclusion of a two-week stabilization period prior to assessment likely reduced the confounding effects of acute withdrawal symptoms.

However, several limitations should be acknowledged. First, the cross-sectional design limits causal inference, and it is not possible to determine the temporal direction of the relationship between PTSD and substance use disorders. Second, the sample was predominantly male (91%), limiting generalizability to female populations, who may experience and express trauma differently. Third, PTSD was assessed using a screening instrument (PCL-5) rather than a structured clinical diagnostic interview, meaning that findings reflect probable PTSD rather than confirmed clinical diagnosis. Fourth, trauma exposure was assessed using broad categories, without differentiation between specific trauma types such as childhood adversity, intimate partner violence, or chronic interpersonal trauma, limiting more nuanced interpretation of trauma pathways. Finally, depression measurement procedures and severity classification should be interpreted with caution due to limited methodological detail in reporting.

### **Implications for Practice**

These findings underscore the need for: (1) routine trauma and PTSD screening at intake; (2) adoption of trauma-informed care principles; (3) development of integrated treatment pathways for PTSD and SUDs; and (4) targeted support for individuals with psychosocial losses.<sup>31,35</sup> Strengthening mental health services in rehabilitation settings may improve both engagement and treatment outcomes.

### **Future Research Directions**

Future research should employ longitudinal designs to clarify the temporal and potentially bidirectional relationship between PTSD and substance use disorders. The integration of structured clinical interviews alongside validated screening tools would improve diagnostic accuracy. More detailed assessment of trauma histories; including childhood adversity, intimate partner violence, and repeated or chronic trauma would allow for a more nuanced understanding of risk pathways. Finally, mixed-methods studies incorporating qualitative approaches could provide deeper insight into lived experiences, coping strategies, and barriers to care within Kenyan rehabilitation settings.

## **CONCLUSION**

PTSD is a prevalent comorbidity among SUD inpatients in Nairobi, strongly linked to trauma exposure and marital disruption. Routine trauma screening and trauma-informed care are essential for improving treatment outcomes in substance use rehabilitation programmes.

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### **Conflict Of Interest**

The authors declare no conflict of interest.

## Ethical Approval

Ethical approval for this study was obtained from the Kenyatta National Hospital/University of Nairobi Ethics and Research Committee (KNH-UoN ERC) (Reference Number: [KNH-ERC/A/254]). Permission was also obtained from the administration of each participating rehabilitation center. All participants provided written informed consent prior to enrollment. The study was conducted in accordance with the principles of the Declaration of Helsinki.

## Author Contributions

JMM: Conceptualization, methodology, investigation, data curation, formal analysis writing and original draft

LK: Conceptualization, Supervision, methodology, review and editing

FRO: Conceptualization, Supervision, validation, review and editing

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