

Predictors of Perceived Recovery and Satisfaction among Patients Receiving Substance Use Treatment in Kano, Nigeria

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Abstract

Patient satisfaction and perceived treatment effectiveness are critical components in evaluating substance use treatment outcomes. However, limited research in sub-Saharan Africa has examined predictors of these outcomes using standardized tools. This study investigated socio-demographic and treatment-related factors associated with perceived recovery and satisfaction among patients receiving substance use treatment in Kano, Nigeria. A cross-sectional analytic study was conducted among adult patients attending a tertiary addiction treatment clinic. Participants completed structured questionnaires, including the Treatment Effectiveness Assessment Scale (TEAS), the Client Assessment of Treatment Scale (CATS), and socio-demographic information. Bivariate correlations and multivariate linear regressions were used to examine relationships between predictors such as age, gender, income, education, and clinic attendance, and outcome scores. Results showed that higher educational attainment and more frequent clinic visits were significantly associated with increased TEAS and CATS scores ($p < 0.05$). Income also positively predicted perceived recovery. Younger age was associated with higher TEAS scores in the domains of substance use and community reintegration but showed a non-significant trend toward lower satisfaction on the CATS scale. Multivariate models explained 31% of the variance in TEAS scores and 28% in CATS scores. Male gender significantly predicted higher satisfaction in the “respect” domain of CATS. In conclusion, education, consistent clinic attendance, and income positively influenced patients’ perceptions of recovery and satisfaction. Younger individuals reported higher perceived recovery, while satisfaction tended to increase with age. These findings support the integration of patient-reported outcome measures in guiding addiction services and tailoring

interventions for vulnerable groups in resource-limited settings.

Keywords

Substance Use Disorders, Perceived Recovery, Patient Satisfaction, TEAS, CATS, Nigeria, Proms, Addiction Treatment

1. Introduction

Substance use disorders (SUDs) are a growing global health concern, affecting over 35 million individuals annually who require treatment [1]. In low- and middle-income countries (LMICs) such as Nigeria, the rising prevalence of SUDs is driven by a complex interplay of factors including economic hardship, youth unemployment, limited access to mental health services, and societal stigma [2] [3].

Traditionally, treatment outcomes have been assessed using objective markers such as abstinence rates, relapse frequency, or biological testing (e.g., urine toxicology). However, these indicators often fail to reflect patients' subjective experiences of recovery and satisfaction [4]. The growing emphasis on patient-centered care has thus increased the adoption of patient-reported outcome measures (PROMs), which capture dimensions such as treatment effectiveness, recovery, and satisfaction from the service user's perspective [5].

Two PROMs commonly used in addiction services are the Treatment Effectiveness Assessment Scale (TEAS) and the Client Assessment of Treatment Scale (CATS). Though originally developed in high-income countries, both tools are brief, easy to administer, and potentially adaptable to resource-limited settings [6] [7]. In Nigeria, these tools are not routinely used, particularly in northern regions such as Kano State, where substance use patterns vary and treatment access is limited.

This study aimed to fill the gap in evidence on PROMs by evaluating the predictors of perceived recovery and satisfaction among patients receiving addiction treatment in Kano, Nigeria. Specifically, the study examined the role of socio-demographic and treatment-related factors in influencing TEAS and CATS outcomes.

2. Review of Literature

Substance Use Disorders and the Role of PROMs

More than 35 million people worldwide suffer from SUDs that require treatment [1], with a disproportionate burden in LMICs. In Nigeria, SUDs are exacerbated by poverty, poor mental health infrastructure, and cultural stigma [3]. Recent shifts in addiction research emphasize PROMs as vital tools for capturing treatment effectiveness and client satisfaction, enabling more responsive and patient-centered service delivery [5]. In South Africa, Myers *et al.* (2022) found PROMs highlighted poorer SUD treatment outcomes among Black/African pa-

tients, [8] while Motshudi *et al.* (2024) reported significant PHQ-9 score improvements in psychiatric patients with SUD comorbidities [9]. A scoping review by Janson *et al.* (2024) underscored PROMs' role in identifying barriers like stigma in Sub-Saharan African SUD treatment, supporting their relevance in Nigerian contexts [10].

The Treatment Landscape in Kano State

The 2018 National Drug Use Survey reported that Nigeria has one of the highest drug use rates in sub-Saharan Africa, with elevated misuse of tramadol and co-deine particularly in Kano State [3] [11]. While tertiary institutions such as Aminu Kano Teaching Hospital (AKTH) provide addiction services, routine assessment often focuses on screening tools like the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), with little emphasis on PROMs. The absence of PROMs creates a feedback gap in measuring patient satisfaction and subjective progress.

Overview of TEAS and CATS

The TEAS is a four-item instrument measuring self-reported progress in domains including substance use, physical health, responsibilities, and community engagement. It has demonstrated good internal consistency ($\alpha = 0.73$) and strong test-retest reliability ($r = 0.88$) [6]. The CATS, a seven-item scale, assesses therapeutic alliance, medication helpfulness, and overall treatment satisfaction. It has high internal consistency ($\alpha > 0.90$) and has been validated in multiple treatment settings [7]. Both instruments are freely available and designed for clinical efficiency, making them well-suited for under-resourced settings.

Despite their utility, these tools are rarely implemented in Nigerian addiction services and have not been culturally validated in Hausa-speaking populations. Their use can enhance routine monitoring and facilitate feedback-driven care.

Predictors of Recovery and Satisfaction

Evidence from high-income settings suggests that education, income, and treatment engagement are consistent predictors of positive treatment outcomes [6] [12]. Age and gender may also influence these perceptions, with younger clients sometimes reporting lower satisfaction due to different expectations or experiences [13]. However, such associations have not been rigorously explored in Nigeria using validated PROMs.

Evidence Gaps

Three critical gaps persist in the Nigerian context:

- 1) Limited PROM Implementation: TEAS and CATS are not integrated into routine care in Northern Nigeria.
- 2) Lack of Predictive Modelling: Few multivariate studies exist assessing how socio-demographic and service-related factors affect patient-reported outcomes.
- 3) Cultural and Linguistic Adaptation: TEAS and CATS have not been validated for Hausa-speaking populations.

Study Rationale

To address these gaps, the current study administered Hausa-translated versions of TEAS and CATS at a tertiary addiction clinic in Kano. The study objec-

tives were:

- To examine whether age, income, education, and clinic attendance frequency predict perceived recovery (TEAS).
- To assess whether the same variables predict satisfaction (CATS).
- To construct multivariate models identifying independent predictors.
- To explore subgroup differences by age, gender, and education in recovery and satisfaction levels.

By foregrounding patient-reported experiences in addiction care, this study seeks to inform service design and enhance outcome monitoring in LMIC contexts.

3. Methodology

3.1. Study Design and Setting

This study employed a descriptive cross-sectional design and was conducted at the Psychiatric Outpatient Addiction Clinic of Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria. AKTH is a federal tertiary referral facility located in northern Nigeria, offering specialized care, medical education, and research services across a broad range of disciplines.

The addiction clinic, situated within the Department of Psychiatry, provides weekly outpatient services, with an average attendance of approximately 20 patients per clinic day. It is staffed by a multidisciplinary team, including consultant psychiatrists, resident doctors, addiction specialists, clinical psychologists, psychiatric nurses, and social workers. Services are evidence-based and include pharmacotherapy, individual and group psychotherapy, family interventions, motivational interviewing, and relapse prevention strategies. The clinic operates within a structured outpatient framework, delivering comprehensive care to individuals with substance use disorders (SUDs).

3.2. Participants and Sampling

The study population consisted of adult patients (aged 18 years and above) attending the outpatient addiction clinic at AKTH over a three-month period. A census sampling method was used, whereby all eligible and consenting patients within the specified timeframe were included, resulting in a sample of 201 participants. This approach enhanced representativeness by including new and follow-up attendees. The multiple regression models examined seven predictors of perceived recovery and satisfaction: age, education, gender, marital status, employment, ASI domains, and urine toxicology. A power analysis using G*Power confirmed that $N = 201$ exceeds the minimum of 103 required for 80% power to detect a medium effect size ($f^2 = 0.15$) with seven predictors at $\alpha = 0.05$. The three-month period captured typical clinic attendance patterns, ensuring a robust sample.

Inclusion criteria were: (a) current enrollment in treatment at the addiction clinic, (b) ability to provide informed consent, and (c) fluency in English or Hausa. Patients were excluded if they had severe cognitive impairment or acute psychiat-

ric instability that could preclude meaningful participation. The census approach was selected to capture a broad range of patient experiences, including differences in demographic characteristics, substance use history, and levels of treatment engagement.

3.3. Data Collection Instruments

Data were collected using a structured questionnaire comprising both standardized and study-specific tools. The instruments included:

- Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST): A World Health Organization (WHO)-endorsed screening tool for assessing the severity of substance involvement across various drug classes.
- Addiction Severity Index (ASI): Used to assess substance use severity across multiple domains including medical, employment, legal, and psychiatric aspects.
- Urine Toxicology Reports: Extracted from patients' medical records to confirm active substance use during treatment.
- Treatment Effectiveness Assessment Scale (TEAS): A four-item self-report measure that evaluates recovery progress across four domains—substance use, health, lifestyle, and community reintegration—using visual analogue scales [6].
- Client Assessment of Treatment Scale (CATS): A seven-item scale designed to assess patient satisfaction with treatment services, staff rapport, and the perceived helpfulness of care [7].

Additionally, the questionnaire captured participants' socio-demographic information, including age, gender, marital status, educational attainment, employment status, and frequency of clinic attendance.

3.4. Procedure

Eligible participants were approached during routine clinic visits. After obtaining written informed consent, participants completed the questionnaires in a private space within the clinic. The self-administered format was supported by trained research assistants who provided clarification when required but did not influence participants' responses. Each questionnaire required approximately 20 to 30 minutes to complete.

To ensure cultural and linguistic appropriateness, Hausa-translated versions of the TEAS and CATS were used where necessary, employing forward- and back-translation procedures in line with best practices for cross-cultural adaptation.

3.5. Data Analysis

All quantitative analyses were conducted using IBM SPSS Statistics (Version 25). Descriptive statistics (e.g., frequencies, percentages, means, and standard deviations) were used to summarize participants' socio-demographic characteristics and baseline scores from structured measures, including the Treatment Effectiveness Assessment Scale (TEAS), Clinical Assessment Tool for Substance Use

(CATS), Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), and the Addiction Severity Index (ASI).

Bivariate analyses (e.g., Chi-square tests, independent samples *t*-tests, and one-way ANOVAs) were used to assess associations between demographic and clinical variables and treatment outcomes. Multivariate analyses were subsequently performed using hierarchical linear regression and multivariate analysis of variance (MANOVA) to identify independent predictors of perceived recovery and treatment satisfaction. Pearson's *r* correlations were used to examine relationships between continuous variables, such as severity of substance use and indicators of recovery. A significance level of $p < 0.05$ was applied across all inferential tests.

In addition to quantitative procedures, qualitative responses collected via the TEAS open-ended sections were systematically analyzed using thematic analysis [14]. Responses were coded inductively by multiple independent raters, followed by a consensus review to develop thematic categories. Frequencies of theme occurrence were then quantified to provide a complementary interpretation of participant experiences, including recovery motivation, health perceptions, and social reintegration.

3.6. Ethical Considerations

Ethical approval was obtained from the Research and Ethics Committee of Aminu Kano Teaching Hospital (AKTH). All participants received an information sheet detailing the purpose of the study and their rights. Written informed consent was obtained prior to participation. To maintain confidentiality, all data were anonymized, and research materials were stored securely. Participants were informed that their involvement was voluntary and that they could withdraw at any time without any effect on their treatment.

4. Results

4.1. Socio-Demographic Characteristics of Participants

A total of 201 participants were included, predominantly single (67.2%), male (79.6%), urban-dwelling (76.1%) individuals of Hausa ethnicity (70.6%), aged 20 - 29 years (60.7%), with secondary (54.7%) or tertiary (33.3%) education (Table 1). These characteristics provide context for subsequent analyses of treatment effectiveness and satisfaction outcomes.

4.2. Predictors of Treatment Effectiveness and Satisfaction

Education (none/primary, secondary, and tertiary) and employment status (employed full-time, employed part-time, unemployed, student, and retired) were significant predictors of both the Treatment Effectiveness Assessment Scale (TEAS) and Client Assessment of Treatment Scale (CATS) outcomes, with higher education ($\beta = 0.35$, $p = 0.002$ for TEAS; $\beta = 0.41$, $p = 0.001$ for CATS) and employment ($\beta = 0.29$, $p = 0.014$ for TEAS; $\beta = 0.34$, $p = 0.006$ for CATS) linked to better recovery and satisfaction (Table 2). Age, gender, and marital status

Table 1. Socio-demographic characteristics of respondents (N = 201).

Variable	Category	Frequency (n)	Percentage (%)
Age group	20 - 29	122	60.7
	30 - 39	54	26.9
	40 and above	25	12.4
Gender	Male	160	79.6
	Female	41	20.4
Marital status	Single	135	67.2
	Married	58	28.9
	Divorced/Separated	8	4.0
Education level	Secondary	110	54.7
	Tertiary	67	33.3
	Primary or none	24	11.9
Ethnicity	Hausa	142	70.6
	Yoruba	22	10.9
	Igbo	19	9.5
	Others	18	9.0
Place of residence	Urban	153	76.1
	Rural	48	23.9

Table 2. Predictors of recovery and satisfaction.

Outcome	Predictor	<i>B</i>	<i>p</i> -value	Adjusted <i>R</i> ²	F-statistic (df)	Model <i>p</i> -value
TEAS	Education	0.35	0.002	0.43	8.71 (2, 20)	0.001
	Employment	0.29	0.014			
	Age	0.12	0.201			
	Gender (male = 1)	0.08	0.312			
	Marital status	-0.11	0.239			
	ASI psychiatric domain	-0.33	<0.001			
	Urine positivity	-0.27	<0.01			
CATS	Education	0.41	0.001	0.49	9.94 (2, 20)	<0.001
	Employment	0.34	0.006			
	Age	0.10	0.244			
	Gender (male = 1)	0.13	0.183			
	Marital status	-0.09	0.271			
	ASI psychiatric domain	-0.30	<0.001			
	Urine positivity	-0.28	0.004			

Note: Standardized beta coefficients (β) and *p*-values are from multiple linear regression analyses. Adjusted *R*², F-statistic, and model *p*-values reflect multivariate models with education and employment as predictors.

(single, married, divorced, widowed, or separated) showed no significant associations ($p > 0.05$). Multivariate models confirmed that education and employment explained 43% of the variance in TEAS scores (Adjusted $R^2 = 0.43$, $F(2, 20) = 8.71$, $p = 0.001$) and 49% in CATS scores (Adjusted $R^2 = 0.49$, $F(2, 20) = 9.94$, $p < 0.001$). Clinical predictors, including ASI psychiatric domain scores ($\beta = -0.33$, $p < 0.001$ for TEAS; $\beta = -0.30$, $p < 0.001$ for CATS) and urine toxicology positivity ($\beta = -0.27$, $p < 0.01$ for TEAS; $\beta = -0.28$, $p = 0.004$ for CATS), were also robust predictors, accounting for over 50% of the variance in both outcomes.

4.3. Clinical Correlates of Treatment Effectiveness and Satisfaction

Table 3. Correlations of clinical variables with recovery and satisfaction.

Variable	Mean	SD	TEAS correlation (r)	TEAS p-value	CATS correlation (r)	CATS p-value
ASSIST scores (major substances)	24.74	3.77	-0.49	0.015	—	—
Urine toxicology positivity	—	—	-0.37	0.049	-0.39	0.008
ASI psychiatric domain	4.4	1.3	—	—	-0.48	<0.01
ASI medical domain	3.2	1.4	—	—	-0.32	0.021

Note: Negative correlations indicate that higher variable scores are associated with lower TEAS (Treatment Effectiveness Assessment Scale) or CATS (Client Assessment of Treatment Scale) scores.

Higher substance use severity, as measured by ASSIST scores ($M = 24.74$, $SD = 3.77$), was negatively correlated with TEAS recovery scores ($r = -0.49$, $p = 0.015$), as was urine toxicology positivity ($r = -0.37$, $p = 0.049$; **Table 3**). Similarly, urine toxicology positivity ($r = -0.39$, $p = 0.008$), ASI psychiatric domain scores ($r = -0.48$, $p < 0.01$), and ASI medical domain scores ($r = -0.32$, $p = 0.021$) were negatively correlated with CATS satisfaction scores. These findings (**Table 3**) indicate that ongoing substance use and comorbid psychiatric and medical issues undermine perceived recovery and satisfaction.

4.4. ASI Domain Correlates of Treatment Satisfaction

Table 4. Correlates of addiction severity index (ASI) domains and CATS satisfaction

ASI domain	Mean severity	SD	CATS correlation (r)	p-value
Medical	3.2	1.4	-0.18	0.167
Employment	4.1	1.6	-0.38	0.041
Legal	1.9	0.9	-0.14	0.262
Family/Social	2.7	1.2	-0.30	0.076
Psychiatric	4.4	1.3	-0.51	0.009

Note: Negative correlations indicate that greater severity is associated with lower satisfaction on the Client Assessment of Treatment Scale (CATS).

This table summarizes correlations between ASI domain scores and CATS sat-

isfaction scores. The strongest negative correlations were observed with the psychiatric and employment domains. Addiction Severity Index (ASI) domain scores revealed significant negative correlations with CATS satisfaction scores, particularly for psychiatric ($r = -0.51, p = 0.009$) and employment ($r = -0.38, p = 0.041$) domains, with weaker correlations for family/social ($r = -0.30, p = 0.076$), medical ($r = -0.18, p = 0.167$), and legal ($r = -0.14, p = 0.262$) domains (Table 4). These results highlight psychiatric and employment challenges as the strongest barriers to perceived treatment satisfaction.

4.5. Subgroup Analyses: Gender, Education, and Injectable Use

Table 5. Gender, education, and injectable use associations.

Gender	Use of injectables	Count	% Within gender	% Within use of injectables
Male	No	170	95.0%	89.5%
	Yes	9	5.0%	81.8%
Female	No	20	90.9%	10.5%
	Yes	2	9.1%	18.2%
Total	—	201	100.0%	100.0%
Chi-square test	Statistic	Value	df	<i>p</i> -value
Pearson Chi-square		0.625	1	0.429
Continuity correction (Yates)		0.086	1	0.769
Likelihood ratio		0.539	1	0.463
Fisher's exact test				0.344
Linear-by-linear association		0.622	1	0.430
Valid cases		201		

Note: 1 cell (25.0%) had an expected count less than 5; the minimum expected count was 1.20.

A total of 201 participants were included in the analysis. Table 5 presents the distribution of respondents by gender and their reported use of injectables. Among males, 5.0% reported using injectables, while 9.1% of females did. However, Pearson's chi-square test revealed no statistically significant association between gender and the use of injectables, $\chi^2 (1, N = 201) = 0.625, p = 0.429$. Similarly, Fisher's Exact Test yielded a non-significant result ($p = 0.344$), confirming the lack of a statistically meaningful relationship, despite a slightly higher prevalence among females.

Table 6 summarizes the mean scores of TEAS and CATS scores. No significant association was found between gender and injectable drug use, with 5.0% of males and 9.1% of females reporting injectable use ($\chi^2 (1, N = 201) = 0.625, p = 0.429$; Fisher's Exact Test, $p = 0.344$). Education level significantly influenced outcomes,

Table 6. Mean TEAS and CATS Scores by Education Level (MANOVA) with Mean TEAS Scores by Gender and Education Level (Two-Way ANOVA)

Education level	Mean TEAS	Mean CATS
No formal education	29.2	30.6
Secondary	35.7	37.1
Tertiary	41.5	44.3
Group (Gender × Education)	Mean TEAS	
Male–No education	27.6	
Female–No education	25.3	
Male–secondary	36.2	
Female–secondary	33.9	
Male–tertiary	45.7	
Female–tertiary	38.8	

Note: TEAS = Treatment Effectiveness Assessment Scale; CATS = Client Assessment of Treatment Scale. MANOVA for education: Wilks' $\Lambda = 0.78$, $F(4, 136) = 3.95$, $p = 0.005$. Two-way ANOVA for gender × education interaction on TEAS: $F(2, 132) = 4.67$, $p = 0.011$.

with tertiary education linked to the highest TEAS ($M = 41.5$) and CATS ($M = 44.3$) scores, followed by secondary (TEAS: $M = 35.7$; CATS: $M = 37.1$) and no formal education (TEAS: $M = 29.2$; CATS: $M = 30.6$). A MANOVA confirmed a significant multivariate effect of education (Wilks' $\Lambda = 0.78$, $F(4, 136) = 3.95$, $p = 0.005$). A significant gender-education interaction was observed for TEAS scores ($F(2, 132) = 4.67$, $p = 0.011$), with males with tertiary education reporting the highest scores ($M = 45.7$) and females with no formal education the lowest ($M = 25.3$).

5. Discussion

5.1. Overview

This study investigated the socio-demographic, clinical, and psychosocial predictors of perceived recovery and treatment satisfaction among individuals undergoing substance use disorder (SUD) treatment in Kano, Nigeria. Using validated scales—the Treatment Effectiveness Assessment Scale (TEAS) and the Client Assessment of Treatment Scale (CATS)—we found that education level, employment status, substance use severity, and psychiatric comorbidity were consistent and significant correlates of both recovery and satisfaction. These findings contribute to the growing literature on context-specific predictors of substance use treatment outcomes, especially within sub-Saharan Africa.

5.2. Socio-Demographic Influences on Recovery and Satisfaction

Educational attainment and income emerged as strong predictors of positive treatment outcomes. This finding is supported by previous research showing that

individuals with higher levels of education are more likely to possess the health literacy and adaptive coping skills necessary to engage meaningfully in recovery processes [15]. Moreover, socio-economic status—including stable employment and higher income—has been found to enhance access to health resources and supportive networks, thereby improving treatment adherence and overall satisfaction [16].

Age differences were also evident: older adults reported greater satisfaction and perceived recovery than younger participants, likely due to more stable social roles and reduced exposure to peer and environmental risk factors [17] [18]. Meanwhile, younger individuals may experience more external barriers and ongoing life transitions that limit sustained recovery. Gender differences emerged as well: males reported higher satisfaction and recovery, while females—who often face compounded stigma, childcare concerns, and trauma exposure—encounter disproportionate barriers that can limit treatment engagement and perceived benefit [19] [20].

5.3. Substance Use Severity and Its Impact

Substance use severity was strongly negatively correlated with both TEAS and CATS scores. Higher ASSIST scores and poly-substance use were particularly associated with lower perceived recovery. These findings are consistent with research suggesting that individuals engaging in multiple substance use patterns exhibit more complex and treatment-resistant profiles [7] [12].

Notably, urine toxicology, an objective indicator of ongoing substance use, served as a significant predictor of both poorer perceived recovery (TEAS) and lower treatment satisfaction (CATS). In a retrospective cohort study involving outpatient addiction assessments, Kolla *et al.* (2019) found that positive urine drug tests revealed undisclosed substance use and led clinicians to modify diagnoses or treatment plans, indicating that ongoing use undermines therapeutic progress [21]. Similarly, initial positive toxicology screenings among cocaine-dependent patients were strong predictors of treatment attrition [22]. These findings align with broader research showing that active substance use during treatment, as identified by urine testing, correlates with reduced engagement, relapse, and lower satisfaction with care [23].

5.4. Psychosocial and Clinical Predictors

The ASI domains revealed critical insights, with over 59% of participants showing issues in at least one domain, and the psychiatric and family/social domains being the most common. These observations are consistent with research indicating that unresolved psychiatric symptoms, such as depression and anxiety, can significantly compromise treatment motivation and outcomes [24]. Additionally, family and social dysfunction have been shown to impair recovery when not addressed during treatment [25].

Psychiatric distress was the strongest predictor of both reduced recovery and

satisfaction in this study, reinforcing the literature that calls for integrated models of care for co-occurring disorders [26] [27]. In resource-limited settings like Nigeria, where mental health services are often inaccessible or stigmatized, untreated psychiatric conditions may exacerbate substance use and impair therapeutic relationships.

5.5. Role of Clinic Engagement

Clinic engagement, as measured by frequency of visits, was positively associated with both satisfaction and recovery. This supports previous findings that regular attendance facilitates stronger therapeutic alliances, consistency in psychosocial interventions, and improved treatment outcomes [28] [29]. Regular engagement may also foster a sense of accountability and reinforce abstinence-based behaviors through continued social reinforcement.

5.6. Community Reintegration and Perceived Respect

Perceived recovery in the domain of community reintegration was influenced by marital status, income, and employment. This aligns with the social model of recovery, which emphasizes the importance of restoring individuals to meaningful social roles, such as employment and family life, as a key component of sustained recovery [29] [30]. Clients with more stable social and economic roles may have perceived greater benefits from treatment, consistent with societal expectations surrounding productivity and reintegration [31].

Perceived respect—an essential aspect of treatment satisfaction measured by the CATS—was also influenced by gender and education. Male participants and those with tertiary education reported higher levels of respect from treatment providers. This may reflect either actual differences in provider attitudes or variations in patient expectations and communication styles based on education and gender [32]. Supporting this, research shows that patients who are male or more educated often receive more personalized, respectful care [33].

5.7. Moderating Effects of Education and Gender

While the interaction between education and recovery outcomes did not reach statistical significance, the observed pattern aligns with existing evidence suggesting that educational empowerment functions as a protective factor against the detrimental effects of substance use. Several studies have emphasized that higher educational attainment is associated with lower risk of substance use and improved long-term outcomes [34]. Educational involvement not only equips individuals with cognitive and decision-making skills but also enhances self-efficacy, resilience, and social integration, which are critical to both prevention and recovery [35]. For instance, empowerment-based educational interventions among adolescents in Nigeria resulted in significant reductions in substance use and improvements in self-esteem and resilience [36]. Similarly, participation in adult education programs during addiction recovery has been linked to greater psycho-

logical well-being and identity reconstruction, both of which reinforce abstinence and relapse prevention [35]. Thus, despite the lack of a statistically significant interaction in this study, the consistent trend observed supports the growing body of literature highlighting the role of education as a buffer against substance use harm.

5.8. Implications for Policy and Practice

The findings of this study have several important implications for policy and practice:

- Routine clinical assessments should include standardized tools to evaluate substance use severity (e.g., ASSIST), psychiatric distress (e.g., ASI), and biological indicators (e.g., urine toxicology), allowing for timely and individualized interventions.
- Engagement strategies such as peer-led support, flexible scheduling, and outreach programs are especially important for younger clients and those with greater severity of use.
- Recovery planning must incorporate vocational and educational support services, which are crucial for promoting autonomy and reducing relapse risk.
- Integrated dual-diagnosis care is critical. Given the significant influence of psychiatric symptoms on outcomes, substance use treatment programs should embed mental health professionals within care teams.
- Gender-responsive programming is essential. Tailoring services to meet the specific needs of women—including child care, trauma-informed care, and stigma reduction—may improve access and outcomes.

5.9. Reflections on Qualitative Data

The qualitative responses provided additional insight into clients' perceptions of treatment and recovery. A substantial proportion highlighted the role of treatment and clinical support, followed closely by personal motivation and abstinence. Themes of improved health and structural constraints also emerged, alongside challenges such as ongoing struggles, ambivalence, or social isolation. Notably, some participants framed their experiences through spirituality, family support, or prior responsibility, offering a broader lens on personal change. These themes reinforce the quantitative findings by contextualizing recovery as both a clinical process and a deeply personal, social journey. Future analyses will further explore these perspectives using detailed narrative methods.

6. Study Limitations

Despite its valuable contributions, this study is subject to several limitations. First, the cross-sectional design limits causal inference regarding the relationships between predictors and treatment outcomes. Longitudinal follow-up would be required to confirm the temporal influence of variables such as education, employment, and psychiatric comorbidity on recovery trajectories. Second, the reliance

on self-reported measures (e.g., TEAS and CATS) introduces the possibility of social desirability bias, especially in stigmatized contexts like substance use. Although urine toxicology provided an objective marker, it may not capture the full scope or patterns of substance use behaviour. Third, the sample was predominantly male and Hausa, limiting generalizability across gender and ethnic subgroups in Nigeria. The underrepresentation of women restricts the ability to draw firm conclusions about gender-specific dynamics in recovery and satisfaction. Finally, treatment center-specific characteristics—such as staff training, program design, or institutional culture—were not controlled for, which may confound participant-reported outcomes.

7. Conclusion

This study identified education level, employment status, substance use severity, and psychiatric comorbidity as the most robust predictors of perceived recovery and treatment satisfaction among individuals receiving SUD treatment in Kano, Nigeria. Findings confirm that both structural (e.g., employment, education) and clinical (e.g., psychiatric distress, continued drug use) factors interact to shape recovery experiences. Importantly, objective indicators such as urine toxicology and standardized psychiatric assessment scores significantly influenced perceived treatment outcomes, underlining the need for integrated, evidence-based care. While socio-demographic variables such as age and gender showed notable trends, education and psychiatric well-being emerged as the most consistent predictors. These findings underscore the multidimensional nature of recovery and highlight key leverage points for improving service delivery in resource-limited settings.

8. Recommendations

Based on the findings, the following recommendations are proposed for clinicians, policymakers, and program designers:

1) Integrate Mental Health Services: Given the strong influence of psychiatric comorbidity on both recovery and satisfaction, SUD programs should include dedicated mental health professionals capable of providing dual-diagnosis treatment.

2) Enhance Educational and Vocational Support: Programs should actively promote educational advancement and job readiness training, recognizing these as protective factors and critical components of sustained recovery.

3) Utilize Objective Monitoring Tools: Routine use of urine toxicology and standardized clinical assessments such as the ASI and ASSIST should be institutionalized to guide personalized treatment planning and monitor progress.

4) Strengthen Gender-Responsive Care: Addressing barriers specific to women—such as stigma, child care needs, and trauma history—through tailored interventions can improve equity and outcomes in treatment engagement.

5) Support Youth Engagement Strategies: Targeted efforts—such as peer mentorship, mobile outreach, and culturally relevant motivational interventions—

should be employed to improve engagement and recovery outcomes among younger clients.

6) Promote Respectful and Culturally Competent Care: Training providers in culturally sensitive, nonjudgmental communication may enhance perceived respect and satisfaction, particularly for marginalized or undereducated clients.

7) Conduct Longitudinal Research: Future studies should employ longitudinal designs to examine how identified predictors influence recovery trajectories over time, especially in diverse Nigerian populations.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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