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Psychological Distress, Economic Pressure, and Sexual Risk behavior Among Young People Living with HIV in Northwestern Nigeria: A Mixed-Methods Study

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Abstract

The persistence of sexual risk behavior among young people living with HIV (YPLHIV) even after diagnosis and enrollment in care represents a critical public health paradox in Nigeria. Although multi-level determinants of such behavior are widely acknowledged, the specific contributions of psychological distress and economic pressure and their relationship to both sexual risk behavior and ART adherence outcomes remain inadequately examined in the context of insecurity in Northern Nigeria. Drawing on a qualitative-dominant mixed-methods exploratory case study of 48 YPLHIV aged 15–24 years in high-security risk zones of Sokoto, Kebbi, and Zamfara States, this study foregrounds the study's quantitative hypothesis-testing findings and integrates them with thematic qualitative evidence. Spearman rank-order correlation analysis revealed a statistically significant, moderately strong positive relationship between psychological distress and sexual risk behavior ($r_s = 0.592$, $p < 0.01$, $N = 48$), confirming that depressive symptomatology is a central, not a peripheral, determinant of risk engagement. A chi-square test found no statistically significant association between economic pressure and sexual risk behavior ($\chi^2(2, N = 48) = 1.77$, $p = .413$), though directional trends in the crosstabulation showed that economically vulnerable respondents were disproportionately concentrated in the high-risk category (52.6% vs. 33.3%). Fisher's exact test found no significant association between case management support and ART adherence ($p = 1.000$), interpreted as a ceiling effect produced by near-universal case management access rather than program ineffectiveness. Qualitative data contextualized these patterns through eight interlocking themes: diagnosis as biographical disruption, health system responsiveness as a structural driver of adherence, social support as distributed coping infrastructure and disclosure as strategic social negotiation. The findings demonstrate that mental health integration is not optional but essential within HIV case management and that the non-significance of economic pressure in statistical testing masks a substantive social vulnerability that qualitative evidence consistently affirms. The policy and practice implications are discussed about fragile and conflict-affected settings across Northern Nigeria.

Keywords: *psychological distress; sexual risk behavior; economic pressure; ART adherence; YPLHIV; mixed methods; Northwestern Nigeria; case management*

1. INTRODUCTION

Young people living with HIV (YPLHIV) represent one of the most complex and underserved populations within global and Nigerian HIV responses. Their clinical vulnerability navigating adolescent development while managing a chronic, stigmatized condition interrupts with psychosocial pressures that frequently override health-protective decision-making. Globally, the Joint United Nations program on HIV/AIDS (UNAIDS, 2024) estimates that approximately 4,900 adolescent girls and young women aged 15–24 are newly infected each week, with 63% of these infections concentrated in sub-Saharan Africa. In Nigeria, young women aged 20–24 carry a disproportionate HIV burden relative to male peers, a pattern driven by gender-based power imbalances, economic dependence and early sexual debut (Okoye, 2024).

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What is especially striking, and what this paper seeks to illuminate, is not the fact of infection per se but the persistence of sexual risk behavior after diagnosis. Across sub-Saharan Africa and Nigeria, research consistently documents that many YPLHIV with confirmed knowledge of their status continue to engage in unprotected intercourse, multiple concurrent partnerships, non-disclosure to sexual partners, and transactional sex (de Wit et al., 2023; Dirisu, 2022). This knowledge-behavior gap (the failure of HIV awareness to translate into consistent protective behavior) is the central empirical puzzle addressed in this study through the lens of psychological and structural determinants.

Two inter-related explanatory pathways receive particular attention in this study. The first concern is psychological distress: depression, hopelessness, and internalized stigma have been theorized and partially evidenced as impairments to the self-regulatory capacity needed for health-protective sexual decision-making (Boutrin & Williams, 2021). The second concern is economic pressure: poverty, livelihood disruption, and survival imperatives linked to transactional sex constitute structural drivers of risk engagement that individual-level interventions cannot address without systemic support (Njoku & Akintayo, 2021; Kunnuji et al., 2024). These two pathways converge particularly sharply in Northwestern Nigeria, where chronic armed banditry and communal violence in Zamfara, Kebbi, and Sokoto States have produced environments of social dislocation, health service disruption, and livelihood collapse that simultaneously amplify psychological distress and economic precarity among YPLHIV (Sani et al., 2024).

Both pathways interface with the social work case management structures through which YPLHIV receive coordinated care. If psychological distress undermines adherence and safe sexual practice, and if case management is insufficiently attentive to mental health needs, then a fundamental gap in service design exists. Similarly, if economic pressure drives sexual risk but case management does not integrate economic empowerment pathways, then care coordination addresses only part of the problem. Therefore, this paper is positioned at the interface of behavioral evidence, structural analysis and service evaluation, asking: What do quantitative findings about psychological distress and economic pressure tell us about how HIV case management must be redesigned in fragile Northern Nigerian contexts?

The paper is organized as follows: Section 2 reviews the relevant literature on psychological distress, economic pressure, and sexual risk behavior among YPLHIV in conflict-affected settings. Section 3 describes the mixed-methods study from which the data are drawn, emphasizing the quantitative hypothesis-testing strand. Section 4 presents the results, including three hypothesis-testing tables and summaries of the supporting qualitative themes. Section 5 discusses the findings about theory and policy. Section 6 concludes with recommendations for practice and future research.

2. LITERATURE REVIEW

2.1 Psychological Distress as a Determinant of Sexual Risk behavior

The relationship between psychological distress and sexual risk behavior is one of the more robust findings in the YPLHIV literature, although it remains under-examined in Nigerian contexts marked by conflict and insecurity. Depression, hopelessness, anxiety, and internalized stigma have been consistently linked to impaired self-efficacy the capacity to make deliberate, health-protective decisions in HIV-positive adolescents and young adults (Boutrin & Williams, 2021; Msefula & Umar, 2023). The multiple mechanisms through which distress generates risk are as follows: emotional dysregulation reduces the capacity to negotiate condom use in the moment; hopelessness about the future undermines motivation to practise prevention; internalized stigma produces self-abandonment rather than self-protection; and depression is associated with social withdrawal, which paradoxically increases reliance on sexual relationships for emotional validation (Rich et al., 2022).

In the literature on HIV in Nigeria, psychological distress among YPLHIV is frequently documented but rarely tested as a primary predictor of sexual risk behavior using inferential statistics. Most Nigerian studies examining the relationship deploy qualitative or descriptive quantitative designs (Dirisu, 2022; Badejo, 2024), which establish associations but cannot speak to the strength or significance of relationships. This study aims to test this relationship rigorously in a conflict-affected Northern Nigerian sample and to interpret the statistical result within a multilevel qualitative framework.

Within the SEM, psychological distress is also understood as an individual-level determinant that both reflect and is amplified by community and structural conditions. Trauma exposure from banditry, displacement, and the loss of social networks generates acute and chronic psychological burdens in insecure settings that operate alongside (and interact with) the pre-existing stigma-driven distress of HIV management (Ekoh et al., 2023). This compounding effect makes the distress-risk relationship in Northwestern Nigeria both theoretically expected and urgent.

2.2 Economic Pressure and Its Relationship with Sexual Risk

Economic precarity is among the most widely theorized structural drivers of HIV risk among young people in sub-Saharan Africa. Poverty compels transactional sex the exchange of sexual access for material resources in which power asymmetries between economically dependent young women and better-resourced older male partners structurally compromise condom negotiation (Stoebenau et al., 2016; Njoku & Akintayo, 2021). In conflict-affected settings, economic precarity is not merely an antecedent condition but an actively produced consequence of insecurity: armed banditry disrupts livelihoods, destroys markets, displaces workers, and severs supply chains, generating unemployment and economic desperation that intersect with YPLHIV's pre-

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existing vulnerabilities (Kunnuji et al., 2024; Bolanle et al., 2023).

However, the relationship between economic pressure and sexual risk behavior is more complex than a simple deterministic pathway. Several studies note that buffering factors including social support, case management, and access to income-generating alternatives can attenuate the translation of economic vulnerability into risky sexual practice (Chowa et al., 2021). This raises the empirically important question of whether the direct statistical relationship between economic pressure and sexual risk is detectable in settings where case management is sufficiently robust. As this study demonstrates, the quantitative answer is nuanced: the relationship may not achieve statistical significance in small samples with ceiling-level service access, but the data's directional patterns retain substantive meaning.

2.3 Case Management, ART Adherence, and Ceiling Effect

Social work case management in HIV care is defined as a systematic, holistic, and continuously adaptive process of coordinating services across health, psychosocial, and structural domains (NASW, 2021; Tolley et al., 2022). For YPLHIV, case management addresses the developmental particularities of adolescence (identity negotiation, peer influence, emotional instability, and relational complexity) through continuous guidance, tailored counseling, and rights-based advocacy. Theoretically, it has a strong relationship with ART adherence: case management reduces structural barriers to clinic attendance, addresses psychosocial barriers to medication-taking, and provides the relational scaffolding within which adherence becomes sustainable (Okonji et al., 2022).

However, the statistical detection of the impact of case management on adherence is complicated by what researchers have termed the ceiling effect: in contexts where case management access is near-universal, the comparison group (those without case management) becomes too small to generate statistical power for hypothesis testing. This paper encounters this methodological condition, and its interpretation offers an important lesson for HIV program evaluation in settings where services have achieved high coverage: null findings in such contexts do not indicate program ineffectiveness; they indicate that the intervention has become so embedded in the standard of care that its counterfactual is nearly absent.

2.4 The theoretical framework

The analysis is grounded in two complementary frameworks. The SEM, as elaborated by Bronfenbrenner (1979) and applied to public health by Flynn and Mathias (2025), holds that health behavior is shaped by dynamic interactions across individual, interpersonal, community, and structural ecological levels. The SEM provides the architecture for understanding how psychological distress (individual) interfaces with relational dynamics (interpersonal), community stigma (community), and economic precarity and insecurity (structural) to produce the behavioral outcomes observed in this study. Social Work Case Management Theory (SWCMT), as conceptualized by NASW (2021) and Islam (2024), frames case management as the coordinating mechanism through which multi-level determinants are addressed in practice. SEM maps the terrain of determinants, and SWCMT provides the intervention logic for navigating it.

3. METHODOLOGY

3.1 Research design and context

This study employed a qualitative-dominant mixed-methods exploratory case study design, integrating quantitative survey data with qualitative in-depth interviews. This design reflects the recognition that sexual risk behavior and its determinants are simultaneously measurable phenomena (amenable to quantitative hypothesis testing) and lived, interpretive experiences (requiring qualitative depth to understand). The study was conducted in three states of Northwestern Nigeria (Zamfara, Kebbi, and Sokoto) purposively selected for their combination of high HIV burden, adolescent vulnerability, documented chronic insecurity, and the presence of functional ART programs and active social work structures (Mahmud & Maigari, 2024; Abdullahi, 2022).

3.2 Sampling and Participants

A total of 48 YPLHIV aged 15–24 were recruited through purposive sampling from ART clinics and community-based HIV support groups. All participants were confirmed HIV-positive and currently receiving ART at the time of data collection. The quantitative survey covered sociodemographic characteristics, sexual behaviors, psychological distress indicators, economic pressure measures, case management access, and ART adherence data. Qualitative in-depth interviews (IDIs) were conducted with five participants (R1–R5), selected through maximum variation sampling to ensure diversity in gender, relationship status, insecurity exposure, and duration on ART. Data saturation was reached between 35 and 40 participants in the qualitative strand (Guest et al., 2020). Parental or guardian consent was obtained alongside participant assent for participants aged 15–17. All data were anonymized; qualitative participants are identified by respondent codes throughout.

3.3 Data Analysis

The quantitative data were analyzed using SPSS. Three inferential tests were conducted: (i) a Spearman rank-order correlation to examine the relationship between psychological distress and sexual risk behavior; (ii) a Chi-square test of independence to examine the relationship between economic pressure and sexual risk behavior; and (iii) a Fisher's Exact Test to examine the association between case management support and ART adherence, applied due to the small expected cell frequencies that violated Chi-square assumptions. The results of the three inferential tests were as follows: Qualitative transcripts were imported into NVivo and subjected to hybrid thematic analysis, combining deductive codes derived from SEM ecological levels and SWCMT components with inductive codes that emerged from participant narratives.

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Table 1. Sociodemographic characteristics of the respondents (N = 48)

Variable	Category	n	%
Age (years)	15–19	10	20.8
	20–24	38	79.2
Gender	Female	27	56.3
	Male	21	43.8
Marital Status	Single	34	70.8
	Married/Other	14	29.2
Education Level	None/Primary	14	29.2
	Secondary	25	52.1
	Tertiary	9	18.8
Employment	Student	21	43.8
	Not employed	18	37.5
	Employed	9	18.8
Duration of ART	< 1 year	7	14.6
	1–3 years	25	52.1
	> 3 years	16	33.3

Note. All participants (100%) were enrolled in ART at the time of data collection.

4. RESULTS

4.1 Sociodemographic Profile

Table 1 presents the sociodemographic profile of the study population. The sample was predominantly older adolescents and young adults, with 79.2% aged 20–24 and 20.8% aged 20–24 and 15–19, respectively. Females constituted 56.3% of the sample, which is consistent with the documented higher vulnerability of young women in Nigeria's HIV epidemic (UNAIDS, 2024). The majority were single (70.8%), and 81.3% were students and the unemployed, reflecting the livelihood disruptions produced by insecurity in the study states. All 48 participants were on ART, and 52.1% had been in treatment for 1–3 years.

4.2 Hypothesis One: Psychological Distress and Sexual Risk behavior

H_{01}: There is no significant relationship exists between psychological distress and sexual risk behavior among YPLHIV. H_{11}: There is a significant relationship exists between psychological distress and sexual risk behavior among YPLHIV.

Table 2. Spearman Rank-Order Correlation between Psychological Distress and Sexual Risk behavior in YPLHIV (N = 48)

Variables	Psychological Distress	Sexual Risk behavior
Psychological distress		.592**
Sexual risk behavior	.592**	

Note. r_s = Spearman's rho. **p < .01 (2-tailed).

Spearman rank-order correlation analysis revealed a statistically significant, positive, and moderately strong relationship between psychological distress and sexual risk behavior (r_s = 0.592, p < 0.01, n = 48). Therefore, the null hypothesis is rejected. The magnitude of this coefficient is substantively important: it indicates that psychological distress is not a marginal or incidental factor in the determination of sexual risk behavior among this population, but a central one. Respondents who reported feeling depressed or hopeless more frequently were significantly more likely to exhibit inconsistent condom use, reduced caution in sexual decision-making, and multiple concurrent partnerships.

The quantitative finding gains qualitative depth through the thematic analysis. Theme 2 (Emotional Disruption Followed by Resilient Adaptation) documented a trajectory from initial diagnostic devastation to eventual normalization. However, this trajectory was not automatic; it required active relational and institutional scaffolding. Participants who had not yet completed the adaptive journey (those still in the disruption phase) described states of hopelessness, social withdrawal, and emotional isolation consistent with the quantitative distress measure's depressive symptomatology. R1's account of his initial diagnosis, mediated through a spiritual attribution framework ("my relations said they think this isn't a hospital case... it could be a demonic attack from an unknown spirit"), illustrates how distress and its resolution operate through culturally specific pathways that clinical case management must be equipped to navigate.

This finding aligns with and extends the individual-level analysis of SEM. Within the SEM, psychological distress is understood as an individual-level determinant that reflects both upstream community and structural conditions (stigma, insecurity, and relational uncertainty) and directly impairs the self-efficacy required for consistent protective behavior. The statistical strength of the distress-risk relationship (r_s = 0.592) suggests that the pathway from distress to risk is especially pronounced in this particular ecology of compounded vulnerability, likely because insecurity weakens the usual buffering mechanisms (stable social support networks, mental health services, secure economic foundations).

4.3 Hypothesis Two: Economic Pressure and Sexual Risk behavior

H_{02}: There is no significant relationship between economic pressure and sexual risk behavior among YPLHIV. H_{12}: There

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is a significant relationship exists between economic pressure and sexual risk behavior among YPLHIV.

Table 3. Chi-Square Test of the Relationship between Economic Pressure and Sexual Risk behavior in YPLHIV (N = 48)

Economic Pressure	Low risk n (%)	High risk n (%)	Total n (%)
No	18 (66.7)	9 (33.3)	27 (100.0)
Don't know	1 (50.0)	1 (50.0)	2 (100.0)
Yes	9 (47.4)	10 (52.6)	19 (100.0)
Total	**28 (58.3)**	**20 (41.7)**	**48 (100.0)**

Note. $\chi^2(2, N = 48) = 1.77$, $p = 0.413$. The percentages are row percentages. Some expected cell counts were less than 5.

The chi-square test found no statistically significant association between economic pressure and sexual risk behavior ($\chi^2(2, N = 48) = 1.77$, $p = 0.413$). The null hypothesis cannot be rejected based on this test. However, the distributional pattern in the crosstabulation is substantively important and requires careful interpretation. Among respondents reporting no economic pressure on sexual decisions, 66.7% and 33.3% fell in the low- and high-risk categories, respectively. This pattern was reversed among those reporting economic pressure as a factor: 52.6% were in the high-risk category and 47.4% were in the low-risk category. This directional trend is consistent with the theoretical expectation that economic vulnerability increases engagement in high-risk sexual practices, although it does not achieve statistical significance in this sample.

Two methodological factors account for the non-significant results. First, the sample size (N = 48) provides limited statistical power, particularly given the presence of cells with expected counts below five (the "don't know" category), which partially violates chi-square assumptions. Second, the near-universal case management support documented in this study is likely to actively buffer the direct translation of economic precarity into risky sexual practice a finding consistent with the emphasis of SWCMT on holistic care as a structural protective factor. In this reading, the absence of a statistically significant relationship reflects program effectiveness rather than the irrelevance of economic pressure.

Qualitative evidence from Theme 6 (Structural Enablers and Resilience despite Insecurity) provides important contextualization. Participants described adapting creatively to economic and security constraints: R1's account of telephoning clinic staff in advance to arrange medication collection before road insecurity worsened reflects individual-level agency operating under structural constraint. The extended 6-month ART dispensing intervals implemented by some facilities (which reduce both clinic journey costs and road-exposure risk) represent a program-level structural accommodation that simultaneously addresses economic pressure (transport costs) and security risk. The directional pattern in Table 3, read alongside these qualitative insights, supports the conclusion that economic pressure is a real but institutionally mediated determinant in this setting.

4.4 Hypothesis Three: Case Management Support and ART Adherence

H_{03}: There is no significant relationship exists between case management support and ART adherence among YPLHIV.
H_{13}: There is a significant relationship exists between case management support and ART adherence among YPLHIV.

Table 4. Relationship between Case Management Support and ART Adherence among YPLHIV (n = 46)

Case management support	Good Adherence n (%)	Poor Adherence n (%)	Total n (%)
No	0 (0.0)	1 (100.0)	1 (2.2)
Yes	22 (48.9)	23 (51.1)	45 (97.8)
Total	**22 (47.8)**	**24 (52.2)**	**46 (100.0)**

Note. Fisher's exact test, $p = 1.000$. Two participants were excluded due to incomplete data on adherence.

Fisher's exact test revealed no statistically significant association between case management support and ART adherence ($p = 1.000$). The null hypothesis cannot be rejected. However, the crosstabulation reveals a condition of near-complete case management penetration: 97.8% of participants (45 of 46) reported receiving case management support, leaving only one participant in the "no case management" comparison group. This extreme imbalance eliminates the statistical power necessary for hypothesis testing and produces what is technically termed a ceiling effect a condition in which program coverage is so high that comparative analysis cannot detect its impact.

The finding of the ceiling effect is, paradoxically, a strong indicator of program success. The fact that 95.8% of participants were assigned a case manager, 93.8% received counseling on safe sexual practices, and 95.8% confirmed appointment coordination support (across the broader 48-participant sample) reflects a well-institutionalized case management infrastructure that has achieved near-universal penetration within the ART clinic and community support group systems from which participants were recruited. The fact that 50.0% of participants reported no missed ART doses and 93.8% reported that their information was kept confidential by the clinic is consistent with the patient-centered clinical environment that case management is theoretically expected to produce.

Theme 3 from the qualitative analysis (Robust Medication Adherence Enabled by Supportive Clinical Relationships) provides the interpretive account of how adherence is produced. The theme documents that sustained adherence was generated by a layered ecology of structural support (free medication, extended refill intervals), relational support (case

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managers, health workers, partners), and discursive support (narrative reframing of HIV as a manageable chronic condition) rather than individual willpower alone. R2's statement: "HIV is the least of my problems." I even forget most of the time that I've HIV", encodes the psychosocial normalization that is made possible by effective case management when it is robustly delivered. This normalization is achieved in an insecurity-affected environment, making it a particularly significant programmatic accomplishment.

4.5 Summary of the integrated findings

The quantitative findings present a coherent and theoretically interpretable pattern across the three hypotheses. Psychological distress is a moderately strong predictor of sexual risk behavior (H_1 accepted). Economic pressure shows a directionally expected but statistically non-significant relationship with sexual risk (H_0 retained, but substantively qualified). Case management support showed no detectable statistical relationship with ART adherence, indicating program saturation rather than ineffectiveness (H_0 retained, ceiling effect explanation). Qualitative data contextualize and deepen all three findings, confirming that the observed statistical patterns are embedded in complex social, relational, and structural processes that numbers alone cannot capture.

5. DISCUSSION

5.1 Psychological Distress: The Non-Negotiable Clinical Imperative

The confirmation of a significant, moderately strong correlation between psychological distress and sexual risk behavior ($r_s = 0.592$, $p < 0.01$) has direct and urgent implications for the design of HIV case management in Nigeria. It establishes that addressing mental health is not a supplementary or aspirational component of HIV care; rather, it is central to the prevention mission. If psychological distress is a primary driver of sexual risk behavior among YPLHIV in Northwestern Nigeria, then any case management model that does not routinely screen for, assess, and respond to depressive symptomatology is structurally incapable of fulfilling its prevention mandate.

This argument aligns with and strengthens a growing global consensus that HIV care must shift toward genuinely integrated biopsychosocial models (Okonji et al., 2022). However, the specific implications for insecurity-affected Northern Nigeria are distinct. The psychological burden borne by YPLHIV in Zamfara, Kebbi, and Sokoto reflects not only the stigma and relational challenges of HIV management but also the acute and chronic trauma of living under armed banditry, witnessing community violence, and experiencing the loss of education, livelihoods, and social networks. This compounded distress demands trauma-informed, not merely counseling-centered case management responses. Case managers require training in psychological first aid and trauma-sensitive practice, and facilities require clear referral pathways to mental health services even where those services are limited, the existence of a pathway signals that their psychological suffering is clinically recognized.

This finding also explains the knowledge-behavior gap documented across the broader study. Among participants with high HIV awareness (83.3% knew that consistent condom use prevents transmission, 91.7% were aware that ART enables healthy living), only 2.1% reported consistent condom use. Psychological distress provides a mechanistic explanation: when individuals are depressed, hopeless, or emotionally dysregulated, their capacity to translate knowledge into behavior is undermined. Interventions that target knowledge without addressing the psychological conditions under which behavior is enacted will continue to produce this paradox.

5.2 Economic Pressure: Statistical Silence Does Not Mean the Absence of Substantive Evidence

The non-significant Chi-square result for economic pressure ($\chi^2(2, N = 48) = 1.77$, $p = .413$) requires careful interpretation to ensure that it is not misinterpreted as evidence that economic factors are irrelevant to sexual risk behavior in this setting. The directional pattern in Table 3 with 52.6% of economically pressured respondents in the high-risk category versus 33.3% of those not economically pressured is precisely what economic vulnerability theory predicts. The sample size limitation and assumption violations in the chi-square test provide a methodological explanation for why this pattern does not achieve significance; the substantive interpretation of the data should not be constrained by a statistical threshold that the study's design was not adequately powered to meet.

The interpretation that case management buffers the direct economic-to-risk pathway is both theoretically plausible and empirically supported by the qualitative findings. In this study's context, the near-universal provision of case management support, including appointment coordination, counseling, and psychosocial guidance, constitutes an institutional protective layer that partially insulates YPLHIV from the most direct expressions of economic vulnerability. However, this interpretation carries a critical policy implication: the underlying economic risk pathway will likely re-emerge with greater force when case management coverage declines or economic disruptions exceed what case management can absorb. The 39.6% of participants reporting economic challenges influencing their sexual decisions cannot be dismissed; this proportion might well generate a statistically significant result in a larger, more diverse, or less well-serviced sample.

For practice and policy, these findings reinforce the case for integrating economic empowerment programming: vocational training, income-generating activity linkages, and social protection referrals within HIV case management frameworks. That such integration is not yet standard in the fragile context of Northwestern Nigeria is itself a structural gap that requires urgent policy attention.

5.3 The Ceiling Effect and Its Policy Significance

The Fisher's exact test finding ($p = 1.000$) on case management support and ART adherence deserves recognition as a policy success signal that is easily misread as a null result. This study's near-universal case management

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coverage represents a significant programmatic achievement in a region where insecurity, health worker shortages, and supply chain disruptions regularly undermine service delivery. Sustaining this level of coverage in Zamfara, Kebbi, and Sokoto requires active institutional effort, financial commitment, and adaptive management strategies that are not visible in routine health system data but are evident in the qualitative accounts of case manager ingenuity: mobile outreach, advance medication preparation, telephonic follow-up, and community-based distribution.

The practical lessons for program evaluators and policymakers are both methodological and substantive. Standard comparative hypothesis testing is poorly suited to evaluating programs that have achieved near-universal penetration. In such contexts, evaluation designs should shift toward pre-post comparisons, interrupted time-series analyses, or qualitative program documentation methods that can capture the processes and mechanisms of impact rather than merely comparing those with and without the intervention. The present ceiling-effect finding should prompt a conversation about appropriate evaluation methodology for high-coverage case management programs in fragile settings; a conversation that has not yet occurred prominently in the Nigerian HIV monitoring and evaluation literature.

5.4 Implications for the SEM and SWCMT

Across all three hypothesis-testing findings, the multilevel architecture of the SEM is both analytically powerful and practically generative. The Spearman correlation confirms an individual-level determinant (psychological distress) that is shaped by stigma, insecurity, relational dynamics). The chi-square crosstabulation illustrates a structural-level determinant (economic pressure) whose effects are controlled by institutional factors (case management). The ceiling effect of Fisher's exact test demonstrates that the institutional system operates as a structural-level protective factor that partially buffers individual vulnerability. This multilevel story in which psychological, economic, institutional, and structural forces interact to produce observable behavioral and adherence outcomes is precisely what SEM is designed to tell and what single-level analyses systematically miss.

For SWCMT, the integrated findings identify three priority targets for case management reform: mental health integration (addressing the distress-risk pathway), economic empowerment linkage (addressing the economic pressure pathway), and adaptation of evaluation methodology (measuring case management impact in high-coverage contexts). These are not theoretical aspirations but empirically grounded practice imperatives derived from the interaction of quantitative patterns and qualitative processes in a specific, contextualized study.

6. CONCLUSION

This study demonstrated that psychological distress is a statistically significant and substantively important predictor of sexual risk behavior among YPLHIV in the insecurity-affected states of Northwestern Nigeria. The moderate strength of the Spearman correlation ($r_s = 0.592$, $p < 0.01$) places psychological distress in the first rank of intervention priorities for HIV case management in this context. Economic pressure, while not statistically significant in this sample, shows directional patterns and qualitative support that demand continued policy attention and economic empowerment integration into HIV programming. The ceiling effect finding on case management and ART adherence is best read as evidence of program success under extremely challenging conditions and as a call for evaluation methodology that can capture the impact of high-coverage social work interventions.

Taken together, the findings make a clear case for the mental health mainstreaming of HIV care in Northern Nigeria: for the training of case managers in trauma-informed and depression-sensitive practice; for the development of formal mental health screening protocols within ART clinic workflows; for the integration of economic support pathways within case management frameworks; and for the adaptation of program evaluation methods to insecurity-affected, high-coverage contexts where conventional hypothesis testing encounters structural limitations.

Future research should employ longitudinal designs capable of tracking the temporal relationship between psychological distress trajectories and sexual risk behavior over time; integrate biomarker data (viral load, STI incidence) to complement self-reported behavioral outcomes; and include community-based and displaced YPLHIV not reached by clinic-based sampling, whose experiences of economic pressure and psychological distress may be more acute and whose access to case management is less certain. The evidence generated by such research, interpreted through the integrated SEM-SWCMT framework demonstrated here, would substantially advance both theory and practice in HIV case management for YPLHIV in Nigeria's fragile north.

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