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Nutritional Status and Its Association with Health Outcomes Among Adolescents

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ABSTRACT
Adolescence is a critical period of physical and psychological development during which adequate nutrition is essential. Poor dietary habits, nutritional deficiencies, excessive consumption of processed foods, and sedentary lifestyles can negatively influence adolescent health. This paper examines the relationship between nutritional status and health outcomes among adolescents. Nutritional status is associated with growth, cognitive development, immune function, physical fitness, and long-term disease risk. School-based nutrition education, healthy meal programs, physical activity promotion, and family involvement can contribute to improved nutritional outcomes. Early nutritional interventions may help establish healthy behaviors that continue into adulthood..

Keywords: Adolescent health, nutrition, nutritional status, dietary habits, healthy lifestyle, public health
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I. BACKGROUND TO THE STUDY

Human immunodeficiency virus (HIV) remains a major public health concern, particularly in sub-Saharan Africa, where long-term treatment needs, stigma, comorbidities, and psychosocial challenges continue to affect people with HIV (PwHIV). Globally, an estimated 40.8 million people were living with HIV in 2024, while 31.6 million were receiving antiretroviral therapy (ART), demonstrating substantial progress in treatment access but also highlighting the continued need for comprehensive, person-centred care beyond viral suppression (UNAIDS, 2025). In Nigeria, HIV remains a significant public health issue, with approximately two million people estimated to be living with HIV (NACA, 2019; Onovo et al., 2023). Recent Nigerian evidence also shows that ART adherence, comorbidities, age, marital status, stigma, and socioeconomic conditions continue to influence health-related quality of life (QoL) among PwHIV receiving ART (Abba et al., 2026; Ali et al., 2026; Oladejo et al., 2024). In Kaduna State, secondary health facilities remain important ART service delivery points, making them suitable settings for interventions that address not only treatment continuation but also functional, psychosocial, and rehabilitative needs.The expansion of ART has transformed HIV from a life-threatening illness into a manageable chronic condition. Consequently, the focus of HIV care has shifted from survival alone to broader QoL outcomes, including physical functioning, psychological wellbeing, social relationships, treatment adherence, and ability to perform daily activities. QoL among PwHIV is influenced by several interrelated factors, including disease stage, ART adherence, comorbidities, stigma, social support, mental health status, socioeconomic status, and access to health services (Mutabazi-Mwesigire et al., 2015; Nigusso et al., 2021; Oladejo et al., 2024). A recent scoping review on QoL among virally suppressed PwHIV in Africa further emphasised that viral suppression alone does not guarantee optimal wellbeing, as social, psychological, economic, and health-system factors continue to shape QoL outcomes (Nomatshila et al., 2026). Similarly, Abba et al. (2026) found in Northwestern Nigeria that ART adherence was a positive predictor of QoL, while older age and comorbid conditions were associated with poorer QoL. These findings support the need for interventions that go beyond medication provision to address the functional and psychosocial dimensions of living with HIV.

Hearing loss is an important but often under-recognised health problem among PwHIV. It may result from direct viral effects, opportunistic infections, neurological involvement, chronic inflammation, ageing, ototoxic medications, tuberculosis treatment, occupational or environmental noise exposure, and other comorbidities. A systematic review by Ensink and Kuper (2017) reported that hearing impairment was more common among PwHIV than among HIV-negative controls in several low- and middle-income country studies. More recently, Khoza-Shangase (2025) highlighted the intersection between HIV, ART-related

ototoxicity, tuberculosis-related treatment exposure, and occupational noise-induced hearing loss, especially within African settings. This recent evidence suggests that hearing health should be considered within chronic HIV care, particularly in resource-limited settings where routine audiological screening and rehabilitation services may be limited.Hearing loss may negatively affect communication, understanding of treatment instructions, clinic interaction, medication counselling, employment, social participation, emotional wellbeing, and self-esteem. Among PwHIV, these challenges may be intensified by stigma, fear of disclosure, poverty, social isolation, and psychological distress. Ali et al. (2026) reported that stigma and discrimination among PwHIV receiving ART in Lagos, Nigeria, affected mental health, disclosure, healthcare access, and social integration. These findings are important because hearing loss may further worsen communication barriers and social withdrawal among PwHIV, thereby affecting the physical, social, and psychological domains of QoL. Although hearing loss has been documented among HIV-infected adults, its relationship with QoL remains insufficiently studied, particularly in Nigerian ART clinic populations (Duong et al., 2017; Ensink&Kuper, 2017).

Nurses play a central role in HIV care because they provide ART counselling, adherence education, symptom monitoring, referral, follow-up, health education, and psychosocial support. Nurse-led interventions are particularly relevant in resource-constrained settings because they are feasible, continuous, patient-centred, and can be integrated into routine clinic services. Evidence indicates that nurse-led and nurse-facilitated interventions can improve ART adherence and self-management among PwHIV (Lambert et al., 2021). A recent systematic review and meta-analysis by Huang et al. (2025) further reported that nurse-led self-care interventions significantly improved QoL and reduced depression among PwHIV, although effects on social support and anxiety were less consistent. This supports the potential value of nurse-led approaches for improving QoL outcomes among PwHIV, while also identifying the need for more targeted interventions addressing specific functional and psychosocial problems.A nurse-led auditory-educational intervention may be beneficial for PwHIV with hearing loss because it can provide structured education on hearing health, early reporting of auditory symptoms, coping strategies, communication skills, treatment adherence, avoidance of preventable auditory risk factors, referral for audiological care, and psychosocial adjustment. Such an intervention may improve patients' ability to communicate with health workers, understand treatment instructions, participate in social activities, and maintain psychological wellbeing. Within secondary health facilities in Kaduna metropolis, integrating auditory education into ART services could reduce missed opportunities for identifying and supporting PwHIV who experience hearing-related functional difficulties.

Despite growing interest in long-term HIV-related complications, limited local evidence exists on the outcome of nurse-led auditory-educational interventions among PwHIV with hearing loss in Nigeria. Existing studies have largely examined general QoL, ART adherence, stigma, or the prevalence of hearing-related problems, while few have tested structured interventions targeting physical, social, and psychological QoL among PwHIV with hearing loss. Recent literature also reinforces the need to study factors associated with QoL beyond viral suppression, including adherence, comorbidities, stigma, mental health, and social support (Abba et al., 2026; Ali et al., 2026; Nomatshila et al., 2026). This gap is important because reduced physical functioning may limit daily activities and treatment engagement; poor social functioning may increase isolation and stigma; and poor psychological functioning may worsen anxiety, depression, and adjustment to chronic illness.Therefore, the problem addressed in this study is that PwHIV on ART who have hearing loss may experience reduced QoL, yet routine HIV care in secondary health facilities may not adequately provide auditory education or structured support for hearing-related challenges. In Kaduna metropolis, there is insufficient evidence on whether a nurse-led auditory-educational intervention can improve the physical, social, and psychological QoL of this population. This pilot study is therefore designed to generate preliminary evidence on the outcome of a nurse-led auditory-educational intervention on QoL among PwHIV with hearing loss receiving ART in secondary health facility within Kaduna State, Nigeria.

The general aim of the study is to determine the outcome of a nurse-led auditory-educational intervention on the QoL of PwHIV with hearing loss who are receiving ART in secondary health facility within Kaduna. Specifically, the study seeks to determine the physical functionality of QoL pre and post the intervention; evaluate the social functionality of QoL pre and post the intervention; determine the

psychological functionality of QoL pre and post the intervention; and examinefactors that determine physical functionality, social functionality and psychological functionality among the participants. The findings are expected to provide pilot evidence for integrating nurse-led auditory education into HIV care and for improving patient-centred QoL outcomes among PwHIV with hearing loss.

II. METHOD

Research Design

This study adopted a pilot quasi-experimental research design involving a control group and an intervention group. The design was considered appropriate because the study sought to determine the outcome of a nurse-led auditory-educational intervention on the QoL of PwHIV with hearing loss receiving ART. The pilot design was used to generate preliminary evidence on the feasibility, acceptability, and potential effect of the intervention before implementation on a larger scale. The study compared QoL outcomes across physical, social, and psychological functionality domains at three points: no intervention, intervention baseline, and two weeks post-intervention.

Study Setting

The pilot study was conducted in secondary health facilityin Zaria, Kaduna State, Nigeria. Zaria is a typical Kaduna metropolis, it is an urban area with public health facility providing HIV care, ART services, counselling, follow-up, and referral services to PwHIV. The Zaria Secondary health facilitywas selected because it serves as important ART service delivery points and provide continuous care to clients living with HIV. The facility also offers a suitable setting for nurse-led interventions.This study is a pilot study designed to allow for preliminary testingof the study instruments and procedures in a controlled and manageable setting. It wasdesigned to assess the clarity, feasibility, and appropriateness of the data collectiontools, as well as the logistics of implementing the educational intervention, beforeconducting the main study

Study Population

The study population comprised PwHIV with hearing loss who were receiving ART in selected secondary health facility. Eligible participants were adult PwHIV on ART who had confirmed hearing loss based on audiometric assessment and who provided informed consent to participate in the study. Participants were included irrespective of sex, educational level, occupation, and duration of hearing loss. PwHIV who did not consent to participate or who were unable to participate in the intervention and follow-up process were excluded. In this pilot study, 18 participants were recruited and distributed equally into the control and intervention groups, with 9 participants in each group.

Instrument for Data Collection

Data were collected using a structured questionnaire and audiometric assessment. The questionnaire was designed to obtain information on respondents' sociodemographic and clinical characteristics, including gender, age, educational level, occupation, duration of hearing loss, and presence of illness besides HIV. The QoL component of the instrument assessed three main domains: physical functionality, social functionality, and psychological functionality.The physical functionality section assessed issues such as mobility, pain, sleep, tiredness, ability to perform daily activities, physical independence, physical discomfort, self-care, physical safety, and overall wellbeing. The social functionality section assessed family and friend support, participation in social activities, loneliness, personal relationships, communication, community support, religious participation, intimacy, emotional expression, and social wellbeing. The psychological functionality section assessed happiness, anxiety, concentration, life satisfaction, body image, emotional control, fear about the future, mental health satisfaction, self-esteem, decision-making, calmness, and overall psychological wellbeing.Responses were measured using a five-point Likert-type scale, with response options varying according to the item, such as "not at all" to "extremely" for physical functionality and "very dissatisfied/never" to "very satisfied/always" for social and psychological functionality. Audiometric assessment was used to classify participants' hearing loss as mild or moderate.

Procedure for Data Collection

Data collection was conducted in phases. First, eligible PwHIV attending ART clinics in the selected secondary health facility were identified and approached. The purpose of the study was explained to them, and informed consent was obtained from those willing to participate. Participants were then screened for hearing loss using audiometric assessment, after which those who met the eligibility criteria were included in the study.

Baseline data were collected using the structured questionnaire. Participants were then assigned into control and intervention groups. The control group

received routine ART care without the nurse-led auditory-educational intervention, while the intervention group received the structured nurse-led auditory-educational intervention in addition to routine ART care. The intervention included education on hearing health, recognition and reporting of auditory symptoms, coping strategies for hearing loss, communication techniques, self-care practices, adherence to ART, avoidance of preventable hearing risks, psychosocial adjustment, and referral for further audiological care where necessary.

Post-intervention data were collected two weeks after the intervention using the same QoL instrument. This allowed comparison of physical, social, and psychological functionality before and after the intervention. Data collection was conducted in a manner that ensured privacy, confidentiality, and minimal disruption of routine clinic activities.

Ethical Approval

Ethical approval was obtained from the appropriate health research ethics committee before the commencement of the study. Administrative permission was also obtained from the management of the selected secondary health facility. Participants were informed about the purpose of the study, the voluntary nature of participation, and their right to withdraw at any stage without any effect on their treatment or access to ART services. Written or verbal informed consent was obtained from all participants before data collection. Confidentiality was maintained by ensuring that participants' names and identifying information were not used in the analysis or reporting of findings. Data collected were used strictly for research purposes.

III. DATA ANALYSIS

Data were analysed using descriptive and inferential statistics. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise participants' demographic characteristics, audiogram results, and responses on physical, social, and psychological functionality. Mean scores were computed for the QoL domains to compare outcomes across the no-intervention, intervention, and post-intervention phases.

Analysis of variance was used to test differences in physical, social, and psychological functionality scores across the study phases. Where differences were observed, least significant difference post hoc multiple comparison tests were used to identify specific group differences. Regression analysis was used to examine factors determining physical functionality, social functionality, and psychological functionality among participants. The independent variables included age, educational level, occupation, duration of hearing loss, and presence of illness besides HIV. Statistical significance was set at $p < .05$, while marginal significance was noted where applicable at $p < .10$ due to the exploratory nature of the pilot study.

IV. RESULTS AND DISCUSSION

Overview of Data Collection and Participants' Profile

Table 1 presents the overview of data collection, consent rate, sample distribution, and audiogram findings. Out of the expected participants, 18 consented to participate, representing a consent rate of 90%, while 2 declined participation. The final sample was evenly distributed between the control and intervention groups, with 9 participants in each group. This represents 60% of the expected sample for both groups. The equal group distribution is important because it provides a balanced basis for comparing the outcomes of the nurse-led auditory-educational intervention across the study arms. Audiogram results showed that all participants had hearing loss, with mild hearing loss being more common than moderate hearing loss in both groups. In the control group, 66.7% had mild hearing loss and 33.3% had moderate hearing loss, while in the intervention group, 77.8% had mild hearing loss and 22.2% had moderate hearing loss. This confirms that the study participants met the hearing-loss-related focus of the study and that most participants had mild hearing impairment at baseline.

Table 1. Overview of Data Collection

	Yes (%)	**No (%)**	
Participation Consent	18 (90)	2 (10)	
	Expected	**Sampled**	**Sampled %**
Control Group	15	9	60
Intervention Group	15	9	60

	Yes (%)	**No (%)**	
Participation Consent	18 (90)	2 (10)	
	Expected	**Sampled**	**Sampled %**
Total	30	**18**	**60**
	Audiogram Results		
	Mild Hearing Loss (%)	Moderate Hearing Loss (%)	
Control Group	6 (66.7)	3 (33.3)	
Intervention Group	7 (77.8)	2 (22.2)	

Source: 2026 Survey

Table 2 shows the demographic characteristics of the respondents. The sample was predominantly female, with 17 females representing 94.4% of participants, while males accounted for only 5.6%. This indicates that the findings mainly reflect the experiences of female PwHIV with hearing loss. The age distribution showed that most respondents were within the older adult age categories, with 44.4% aged 48–57 years and 38.9% aged 38–47 years, while only 16.7% were aged 28–37 years. This age pattern is relevant because increasing age may influence both hearing loss and QoL outcomes.

Educational attainment was generally low, as 61.1% of participants had primary education, 27.8% had secondary education, and only 11.1% had tertiary education. This suggests that health literacy may be an important consideration in designing and delivering auditory-educational interventions. Occupational status also showed socioeconomic vulnerability, as 66.7% of respondents were unemployed, while only 11.1% were formally employed. Most participants, 77.8%, had experienced hearing loss for less than one year, suggesting that hearing loss was relatively recent for most respondents. In addition, 27.8% reported having another illness besides HIV, while 72.2% did not. Thus, Table 2 indicates that the study population was largely female, middle-aged to older, less formally educated, and economically vulnerable, all of which are important contextual factors in interpreting QoL outcomes among PwHIV with hearing loss.

Table 2. Demographic Information of Respondents

		No of Persons	**Percent (%)**
Gender	Female	17	94.4
	Male	1	5.6
Age Group	28-37yrs	3	16.7
	38-47yrs	7	38.9
	48-57yrs	8	44.4
Educational Level	Primary	11	61.1
	Secondary	5	27.8
	Tertiary	2	11.1
Occupation	Formally Employed	2	11.1
	Informally employed	1	5.6
	Self employed	3	16.7
	Unemployed	12	66.7
Duration of Hear Loss	< 1yr	14	77.8
	1-3yrs	3	16.7
	> 6yrs	1	5.6
Present of Illness besides HIV	No	13	72.2
	Yes	5	27.8

Source: Survey 2026

PhysicalFunctionalities of the QoL of PWHIV with Hearing Loss Pre and Post Nurse-Led Intervention

Table 3 presents item-by-item responses on the physical functionality of QoL among PwHIV with hearing loss across the no-intervention, intervention, and post-intervention phases. The table assessed several physical QoL indicators, including mobility, pain, sleep, tiredness, ability to perform daily activities, ability to carry out physical tasks without assistance, engagement in physical activities, physical weakness, physical discomfort, self-care, physical independence, physical safety, and overall wellbeing. The descriptive findings in Table 3 show mixed but generally positive changes in some physical-functioning indicators after the intervention. For example, the proportion of participants who reported no difficulty moving around increased to 77.8% at post-intervention, compared with 55.6% at the intervention phase. Similarly, the proportion reporting that they could carry out physical tasks without assistance remained high at post-intervention, with 55.6% indicating "extremely" and 44.4% indicating "very." Responses on physical safety and overall wellbeing also improved post-intervention, with 77.8% reporting that they felt physically safe "very" often and 22.2% "extremely," while 55.6% rated overall wellbeing as "very" and 44.4% as "extremely." These patterns suggest that the nurse-led auditory-educational intervention may have contributed to improved confidence in physical functioning and general wellbeing

Table 3. Physical Functionalities of the QoL of PWHIV with Hearing Loss – Nurse-Led Intervention (%)

	No Intervention					**Intervention (0 Week)**					**Post Intervention (Week 2)**				
	Not at All	**A little**	**Moderately**	**Very**	**Extremely**	**Not at All**	**A little**	**Moderately**	**Very**	**Extremely**	**Not at All**	**A little**	**Moderately**	**Very**	**Extremely**
Doyou havedifficulty moving around?	77.8	0.0	22.2	0.0	0.0	55.6	22.2	11.1	0.0	11.1	77.8	0.0	0.0	22.2	0.0
Howoftendoyou experience pain?	66.7	33.3	0.0	0.0	0.0	44.4	22.2	33.3	0.0	0.0	44.4	22.2	11.1	22.2	0.0
Doyouhavetroublesleeping?	11.1	0.0	0.0	0.0	88.9	33.3	0.0	11.1	11.1	44.4	22.2	0.0	0.0	11.1	66.7
Howoftendoyou feeltired?	55.6	44.4	0.0	0.0	0.0	44.4	33.3	11.1	11.11	0.0	22.2	55.6	22.2	0.0	0.0
Doyouhavedifficulty performing daily activities?	11.1	0.0	0.0	0.0	88.9	33.3	0.0	11.1	55.6	0.0	0.0	0.0	66.7	0.0	33.3
Canyoucarryout physical task without assistance?	11.1	0.0	0.0	0.0	88.9	22.2	0.0	0.0	22.2	55.6	0.0	0.0	0.0	44.4	55.6
Howoftendoyou engagein physical activities?	0.0	0.0	0.0	11.1	88.9	11.1	0.0	11.1	33.3	44.4	0.0	0.0	22.2	22.2	55.6
Doyoufeelphysically weak?	22.2	44.4	0.0	0.0	33.3	44.4	33.3	22.2	0.0	0.0	44.4	33.3	22.2	0.0	0.0
Doyouexperience physical discomfort?	66.7	33.3	0.0	0.0	0.0	66.7	22.2	11.1	0.0	0.0	55.6	22.2	22.2	0.0	0.0
Can you move around easily?	0.0	0.0	0.0	11.1	88.9	11.1	0.0	0.0	22.2	44.4	22.2	0.0	0.0	22.2	55.6

Do you experience physical symptoms like fatigue, pain etc.	66.7	33.3	0.0	0.0	0.0	33.3	33.3	33.3	0.0	0.0	44.4	22.2	33.3	0.0	0.0
Howoftendoyou rest?	0.0	22.2	33.3	11.1	33.3	0.0	0.0	33.3	55.6	11.1	0.0	0.0	77.8	0.0	22.2
Do you have difficulty in physical self-care?	44.4	0.0	0.0	0.0	55.6	22.2	0.0	0.0	33.3	44.4	0.0	0.0	0.0	44.4	55.6
Canyou perform physical tasks quickly?	0.0	0.0	11.1	11.1	77.8	11.1	11.1	11.1	11.1	55.6	0.0	0.0	22.2	44.4	33.3
Do you always feel physically fit?	0.0	0.0	0.0	44.4	55.6	11.1	22.2	11.1	11.1	44.4	0.0	0.0	22.2	0.0	77.8
How often do you experience physical limitation?	100.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	55.6	44.4	0.0	0.0	0.0
Do you need assistance with physical tasks?	100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	55.6	22.2	0.0	0.0	22.2
Can you maintain your physical independence?	0.0	0.0	0.0	55.6	44.4	0.0	0.0	0.0	66.7	3.3	0.0	0.0	0.0	55.6	44.4
Do you always feel physically safe?	0.0	0.0	0.0	100.0	0.0	11.1	0.0	22.2	33.3	33.3	0.0	0.0	0.0	77.8	22.2
How would you rate your overall well-being?	0.0	0.0	0.0	88.9	11.1	0.0	0.0	33.3	33.3	33.3	0.0	0.0	0.0	55.6	44.4

Source: Survey 2026

However, Table 3 also shows that some physical challenges persisted. For instance, sleep difficulties remained notable, with 66.7% reporting extreme trouble sleeping at post-intervention. Some participants also continued to report pain, tiredness, and physical symptoms such as fatigue or discomfort. This suggests that although the intervention may have supported some aspects of physical QoL, physical health outcomes may also be influenced by other factors such as HIV-related symptoms, ART effects, age, comorbidities, and socioeconomic stressors.

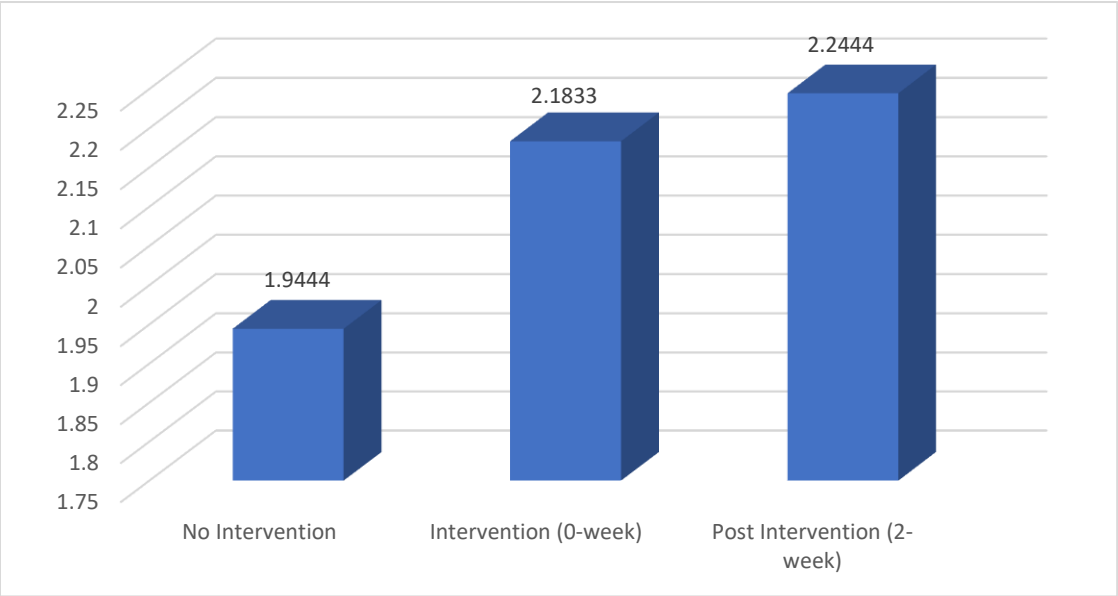

Figure 1. Physical Functionalities'Score

Table 4.ANOVA Test and LSD Multiple Comparisons of the Physical Functionalities' Scores

	Mean Score	**F-Statistics**	**P-value**	
No Intervention	1.9444	2.088	0.146	
Intervention	2.1833			
Post Intervention	2.2444			
(I)	**(J)**	**Mean Difference (I-J)**	**Std. Error**	**P-value**
No Intervention	Intervention	-.23889	.15514	.137
	Post Intervention	-.30000	.15514	.065*
Intervention	No Intervention	.23889	.15514	.137
	Post Intervention	-.06111	.15514	.697
Post Intervention	No Intervention	.30000	.15514	.065*
	Intervention	.06111	.15514	.697

Note: * denotes significant at 0.10 level

Figure 1 illustrates the mean physical functionality scores across the three assessment points. The figure shows a gradual increase in mean physical functionality from no intervention to intervention and post-intervention. The mean score increased from 1.9444 in the no-intervention group to 2.1833 at intervention and 2.2444 at post-intervention. This upward trend suggests a modest improvement in physical functionality following the nurse-led intervention.

Table 4 presents the ANOVA and LSD multiple comparison results for physical functionality scores. The ANOVA result showed an F-statistic of 2.088 and a p-value of 0.146. This means that the overall difference in physical functionality scores across the three assessment points was not statistically significant at the 0.05 level. However, the LSD pairwise comparison showed that the difference between no intervention and post-intervention approached significance at the 10% level, with a mean difference of -0.30000 and p = 0.065. This suggests a marginal improvement in physical functionality after the intervention.

Therefore, Table 3, Figure 1, and Table 4 indicates that physical functionality improved slightly after the nurse-led auditory-educational intervention, but the

improvement was not strong enough to reach statistical significance at the conventional 5% level. Since this was a pilot study with a small sample size, the observed improvement remains important as preliminary evidence and may become more pronounced in a larger study with longer follow-up.

SocialFunctionalities of the QoL of PWHIV with Hearing Loss Pre and Post Nurse-Led Intervention

Table 5 presents the social functionality of QoL among PwHIV with hearing loss before and after the nurse-led intervention. The table assessed social support, participation in social activities, loneliness, personal relationships, ability to make friends, feelings of exclusion or rejection, comfort in social situations, satisfaction with sex life, community support, religious participation, sense of belonging, communication with others, embarrassment or shame, intimacy, family relationships, availability of help, participation in social activities, emotional expression, and overall social wellbeing.The descriptive results in Table 5 show that many participants reported favourable social QoL across the assessment points. For example, post-intervention responses showed that 100% of participants reported always participating in social activities, 100% were very satisfied with personal relationships, 100% reported no difficulty communicating with others, and 100% indicated participation in spiritual or religious activities. Similarly, 77.8% reported very high satisfaction with family relationships, 77.8% felt they had someone to turn to for help, and 77.8% were very satisfied with their social wellbeing.These findings suggest that participants generally had good social support and social engagement. However, some areas remained variable. For example, satisfaction with sex life and comfort with physical touch or intimacy showed less consistent responses post-intervention. In addition, some participants still reported feelings of exclusion, embarrassment, or reduced community support. This suggests that social QoL among PwHIV with hearing loss may be influenced by complex interpersonal, cultural, emotional, and stigma-related factors that may not change rapidly within a short intervention period.

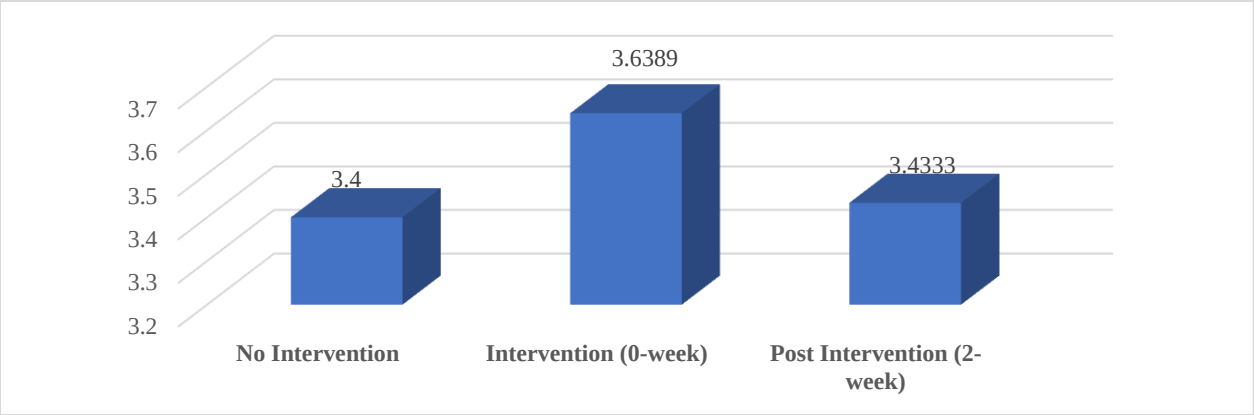

Figure 2. Social Functionalities'Scores

Table 5. Social Functionalities of the QoL of PWHIV with Hearing Loss – Nurse-Led Intervention (%)

	No Intervention					**Intervention (0 Week)**					**Post Intervention (Week 2)**				
	Very dissatisfied Never	**Somewhat dissatisfied Rarely**	**Neutral Sometimes**	**Somewhat satisfied Often**	**Very satisfied Always**	**Very dissatisfied Never**	**Somewhat dissatisfied Rarely**	**Neutral Sometimes**	**Somewhat satisfied Often**	**Very satisfied Always**	**Very dissatisfied Never**	**Somewhat dissatisfied Rarely**	**Neutral Sometimes**	**Somewhat satisfied Often**	**Very satisfied Always**
Doyoufeel supportedby your friendsand family?	0.0	0.0	11.1	0.0	88.9	22.2	22.2	0.0	11.1	44.4	22.2	0.0	0.0	11.1	66.7

How well do you participate in social activities?	0.0	0.0	0.0	22.2	77.8	0.0	11.1	0.0	11.1	77.8	0.0	0.0	0.0	0.0	100.0
Doyoufeeliso lated or lonely?	0.0	11.1	0.0	0.0	88.9	0.0	22.2	0.0	0.0	77.8	22.2	0.0	0.0	.0.0	77.8
Howsatisfied areyou with your personal relationships?	0.0	0.0	0.0	0.0	100.0	11.1	11.1	0.0	0.0	77.8	0.0	0.0	0.0	0.0	100.0
Doyou havedifficulti es in making friends?	0.0	11.1	0.0	0.0	88.9	11.1	0.0	0.0	22.2	66.7	0.0	0.0	0.0	0.0	100.0
Howoften doy ou feelexcludedo rrejected?	0.0	0.0	0.0	0.0	100.0	0.0	22.2	0.0	0.0	77.8	0.0	22.2	0.0	0.0	77.8
Doyoufeel comfortablein socialsituatio ns?	0.0	0.0	0.0	11.1	88.9	0.0	11.1	0.0	11.1	77.9	0.0	0.0	0.0	0.0	100.0
Howsatisfied areyou with your sex life?	11.1	0.0	55.6	0.0	33.3	0.0	22.2	0.0	0.0	77.8	44.4	0.0	0.0	0.0	55.6
Doyou feel supported by your community?	11.1	0.0	0.0	33.3	55.6	11.1	22.2	0.0	11.1	55.6	22.2	0.0	0.0	11.1	66.7
Howoftendoy ou participatein Spiritualor religious activities?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	11.1	77.8	0.0	0.0	0.0	0.0	100.0
Do you feel like you belongto a community?	11.1	0.0	0.0	0.0	88.9	0.0	0.0	0.0	44.4	55.6	0.0	0.0	0.0	33.3	66.7
Howsatisfied areyou withyoursoci allife?	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	22.2	77.8	0.0	0.0	0.0	44.4	55.6
Doyouhave difficulty communicati ngwithothers ?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	0.0	88.9	0.0	0.0	0.0	0.0	100.0
Howoftendoy ou	0.0	11.1	0.0	0.0	88.9	11.1	0.0	11.1	22.2	55.6	0.0	0.0	22.2	11.1	66.7

feelembarrassedor ashamed?															
Doyoufeel comfortable with physicaltouchorintimacy?	0.0	0.0	100.0	0.0	0.0	0.0	11.1	0.0	0.0	88.9	44.4	0.0	22.2	22.2	11.1
Howsatisfied areyou withyourrelationshipwith family members?	0.0	0.0	0.0	11.1	88.9	11.1	0.0	0.0	11.1	77.8	22.2	0.0	0.0	0.0	77.8
Do you feel like you have someone toturn to for help?	0.0	11.1	0,0	0.0	88.9	11.1	11.1	0.0	11.1	66.7	22.2	0.0	0.0	0.0	77.8
How often do you feel left out of social activities?	0.0	0.0	0.0	11.1	88.9	0.0	11.1	0.0	0.0	88.9	0.0	0.0	0.0	0.0	100.0
Doyoufeel comfortable expressing your feelings?	0.0	0.0	0.0	11.1	88.9	0.0	11.1	0.0	0.0	88.9	0.0	0.0	0.0	22.2	77.8
Howsatisfied areyou withyoursocial well-being?	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	22.2	77.8	0.0	0.0	0.0	22.2	77.8

Source: Survey 2026

Table 6.ANOVA Test and LSD Multiple Comparisons of the Social Functionalities' Scores

	Mean Score	**F-Statistics**	**P-value**	
No Intervention	3.4000	0.549	0.585	
Intervention	3.6389			
Post Intervention	3.4333			
(I)	**(J)**	**Mean Difference (I-J)**	**Std. Error**	**P-value**
No Intervention	Intervention	-.23889	.24700	.343
	Post Intervention	-.03333	.24700	.894
Intervention	No Intervention	.23889	.24700	.343
	Post Intervention	.20556	.24700	.413

Post Intervention	No Intervention	.03333	.24700	.894
	Intervention	-.20556	.24700	.413

Figure 2 shows the mean social functionality scores across the study phases. The mean social functionality score was 3.4000 in the no-intervention group, increased to 3.6389 at intervention, and declined slightly to 3.4333 at post-intervention. The figure therefore indicates a temporary improvement during the intervention phase, followed by a slight reduction after the intervention. Nevertheless, the post-intervention mean remained slightly higher than the no-intervention mean.

Table 6 presents the ANOVA and LSD multiple comparison results for social functionality. The ANOVA result showed an F-statistic of 0.549 and a p-value of 0.585. This indicates that the differences in social functionality scores across no intervention, intervention, and post-intervention were not statistically significant. The LSD multiple comparisons also showed no significant pairwise differences. The comparison between no intervention and intervention had p = 0.343, no intervention and post-intervention had p = 0.894, and intervention and post-intervention had p = 0.413.Based on the foregoing, Table 5, Figure 2, and Table 6 indicates that the nurse-led auditory-educational intervention did not produce a statistically significant improvement in social functionality within the two-week post-intervention period. Although social scores were generally favorable and increased slightly during the intervention phase, the effect was not sustained strongly enough to produce statistical significance. This may be because social functionality is shaped by wider social relationships, stigma, family support, disclosure experiences, community acceptance, and communication barriers, which may require longer-term intervention or family- and community-based components.

PsychologicalFunctionalities of the QoL of PWHIV with Hearing Loss Pre and Post Nurse-Led Intervention

Table 7 presents psychological functionality of QoL among PwHIV with hearing loss across the no-intervention, intervention, and post-intervention phases. Psychological functionality was assessed through indicators such as happiness and fulfilment, anxiety, concentration, life satisfaction, body image, perceived control over life, fear about the future, emotional comfort, sleep disturbance due to mental distress, joyful activities, goal attainment, mental health satisfaction, decision-making, calmness, self-esteem, and overall psychological wellbeing.

Table 7. Psychological Functionalities of the QoL of PWHIV with Hearing Loss – Nurse-Led Intervention (%)

	No Intervention					**Intervention (0 Week)**					**Post Intervention (Week 2)**				
	Very dissatisfied / Never	**Somewhat dissatisfied / Rarely**	**Neutral / Sometimes**	**Somewhat satisfied / Often**	**Very satisfied /Always**	**Very dissatisfied / Never**	**Somewhat dissatisfied / Rarely**	**Neutral / Sometimes**	**Somewhat satisfied / Often**	**Very satisfied / Always**	**Very dissatisfied / Never**	**Somewhat dissatisfied / Rarely**	**Neutral / Sometimes**	**Somewhat satisfied / Often**	**Very satisfied / Always**
Doyoufeelhappyand fulfilled?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	22.2	66.7	0.0	0.0	0.0	0.0	100.0
Howoftendo youfeel anxious or nervous?	0.0	11.1	0.0	0.0	88.9	11.1	11.1	11.1	44.4	22.2	0.0	0.0	22.2	0.0	77.8
Doyouhaved ifficulty concentrating?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	33.3	55.6	0.0	0.0	0.0	11.1	88.9
Howsatisfiedareyou with your life?	0.0	0.0	0.0	0.0	100.0	11.1	11.1	0.0	44.4	33.3	0.0	0.0	0.0	0.0	100.0

Howsatisfiedareyou with your body image?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	11.1	77.8	0.0	0.0	0.0	0.0	100.0
Doyoufeellike you havecontrol over yourlife?	0.0	0.0	0.0	0.0	100.0	0.0	22.2	0.0	33.3	44.4	0.0	0.0	0.0	22.2	77.8
Howoftendo youfeel anxiousorfearful aboutthefuture?	0.0	0.0	0.0	0.0	100.0	0.0	22.2	0.0	44.4	33.3	0.0	0.0	11.1	22.2	66.7
Doyoufeel comfortable with your emotions?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	44.4	44.4	0.0	0.0	0.0	0.0	100.0
Dohavetrouble sleeping due to mental distress?	0.0	11.1	0.0	0.0	88.9	0.0	11.1	0.0	11.1	66.7	0.0	0.0	0.0	11.1	88.9
How often do you engage in activities that bring you joy?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	22.2	66.7	0.0	0.0	0.0	22.2	77.8
Doyouthink youcan achieve your goal?	0.0	0.0	0.0	11.1	88.9	11.1	0.0	0.0	22.2	66.7	0.0	0.0	0.0	0.0	100.0
Howsatisfiedareyou withyourmental health?	0.0	0.0	0.0	0.0	100.0	11.1	0.0	0.0	22.2	66.7	0.0	0.0	0.0	0.0	100.0
Howsatisfiedareyou with your body image?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	22.2	66.7	0.0	0.0	0.0	0.0	100.0
Doyouhavedifficulties making decisions?	0.0	0.0	11.1	0.0	88.9	0.0	22.2	0.0	33.3	44.4	0.0	0.0	0.0	0.0	100.0
Howoftendo youfeel calm and relaxed?	0.0	0.0	11.1	0.0	88.9	0.0	11.1	0.0	33.3	55.6	0.0	0.0	0.0	22.2	77.8
Howsatisfiedareyou with your self-esteem?	0.0	0.0	0.0	0.0	100.0	11.1	0.0	0.0	33.3	55.6	0.0	0.0	0.0	11.1	88.9

Doyoufeel comfortable with your emotions?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	33.3	55.6	0.0	0.0	0.0	0.0	100.0
How often do you feel fearful and anxious about the future?	0.0	0.0	0.0	0.0	100.0	0.0	22.2	22.2	11.1	44.4	0.0	0.0	0.0	11.1	88.9
How satisfied are you with your mental health?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	22.2	66.7	0.0	0.0	0.0	0.0	100.0
How satisfied are you with your overall psychological well-being?	0.0	0.0	0.0	0.0	100.0	0.0	11.1	0.0	11.1	77.8	0.0	0.0	0.0	0.0	100.0

Source: Survey 2026

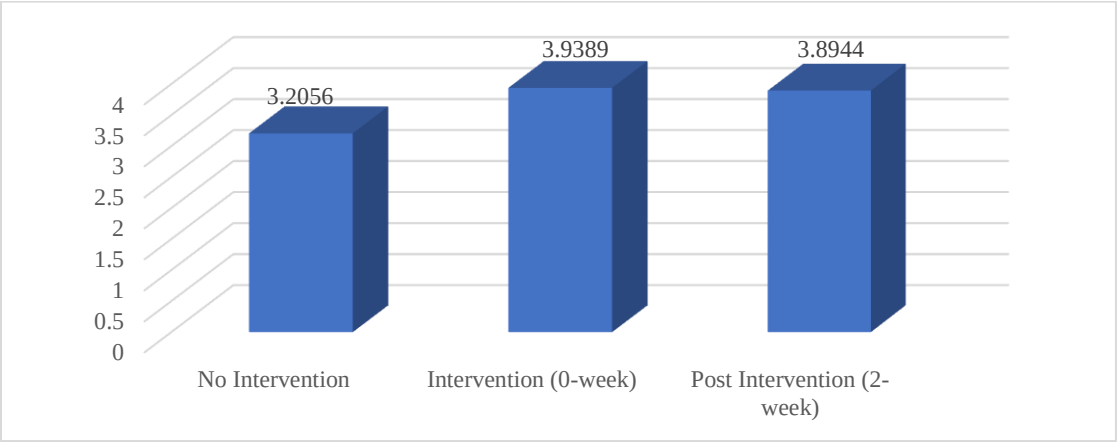

Figure 3. Psychological Functionalities'Scores

Table 8.ANOVA Test and LSD Multiple Comparisons of the Psychological Functionalities' Scores

	Mean Score	**F-Statistics**	**P-value**
No Intervention	3.2056	4.0690	0.030*
Intervention	3.9389		
Post Intervention	3.8944		

(I)	**(J)**	**Mean Difference (I-J)**	**Std. Error**	**P-value**
No Intervention	Intervention	-.73333	.28825	.018*
	Post Intervention	-.68889	.28825	.025*
Intervention	No Intervention	.73333	.28825	.018*
	Post Intervention	.04444	.28825	.879

Post Intervention	No Intervention	.68889	.28825	.025*
	Intervention	-.04444	.28825	.879

Note: * denotes significant at 0.05 level

The descriptive findings in Table 7 show strong positive changes in psychological QoL after the intervention. At post-intervention, 100% of participants reported feeling happy and fulfilled, being satisfied with life, being satisfied with body image, feeling comfortable with emotions, believing they could achieve their goals, being satisfied with mental health, and being satisfied with overall psychological wellbeing. Similarly, high proportions of participants reported improvement in concentration, self-esteem, calmness, and control over life. These findings suggest that the nurse-led auditory-educational intervention had a meaningful positive effect on psychological wellbeing.

Nevertheless, some psychological concerns persisted among a smaller proportion of participants. For example, some respondents still reported anxiety or fear about the future at varying levels. This indicates that while the intervention improved psychological QoL, some participants may still require ongoing counselling, psychosocial support, or referral for mental health services.

Figure 3 shows the mean psychological functionality scores. The mean score increased from 3.2056 in the no-intervention group to 3.9389 during the intervention phase and remained high at 3.8944 after the intervention. Although there was a slight decline from intervention to post-intervention, the post-intervention score remained much higher than the no-intervention score. This trend suggests that the improvement in psychological functionality was not only immediate but was also largely sustained two weeks after the intervention.

Table 8 presents the ANOVA and LSD multiple comparison results for psychological functionality. The ANOVA result showed an F-statistic of 4.0690 and a p-value of 0.030, indicating a statistically significant difference in psychological functionality scores across the three assessment points at the 0.05 level. The LSD comparisons showed that the no-intervention group differed significantly from the intervention phase, with a mean difference of -0.73333 and p = 0.018. The no-intervention group also differed significantly from the post-intervention phase, with a mean difference of -0.68889 and p = 0.025. However, the difference between intervention and post-intervention was not significant, with p = 0.879.Based on the foregoing, Table 7, Figure 3, and Table 8 indicates that the nurse-led auditory-educational intervention produced a statistically significant improvement in psychological functionality among PwHIV with hearing loss. The lack of significant difference between intervention and post-intervention further suggests that the psychological gains were maintained after two weeks. This was the strongest intervention effect observed in the pilot study.

Factors DeterminingPhysical Functionality, Social Functionality and Psychological Functionality among the Participants

Furthermore, Table 9 presents the regression analysis of factors determining physical functionality, social functionality, and psychological functionality among participants. The independent variables included age, educational level, occupational status, duration of hearing loss, and presence of illness besides HIV.

For physical functionality, the regression model was statistically significant, with F = 7.037 and p = 0.008. The R-square value was 0.910, meaning that 91.0% of the variation in physical functionality was explained by the predictors included in the model. This indicates that the model had strong explanatory power for physical functionality in this pilot sample.Several predictors significantly determined physical functionality. Age was significant, as participants aged 38–47 years had higher physical functionality scores than those aged 28–37 years, with B = 0.703 and p = 0.005. Participants aged 48–57 years also had higher physical functionality scores than those aged 28–37 years, with B = 0.701 and p = 0.008. This suggests that older participants reported better physical functionality than the youngest age group. Although this may appear unexpected, it may reflect better adaptation to chronic illness, different expectations of physical functioning, or more stable coping patterns among older participants.Occupation was also significant. Compared with formally employed participants, informally employed participants had higher physical functionality scores, with B = 0.902 and p = 0.037. Unemployed participants also had higher physical functionality scores, with B = 1.080 and p = 0.008. This suggests that occupational category influenced perceived physical functionality. However, this finding should be interpreted cautiously because of the small pilot sample and unequal distribution across employment categories.Duration of hearing loss was another

significant determinant of physical functionality. Participants with hearing loss for 1–3 years had significantly higher physical functionality scores compared with those with hearing loss for less than one year, with B = 0.975 and p = 0.004. This may suggest that participants with longer experience of hearing loss had adapted better to physical challenges or developed coping mechanisms over time. However, hearing loss above six years was not significant, with p = 0.212. Educational level and presence of illness besides HIV were not significant determinants of physical functionality.

Table 9. Regression Analysis of Factors Determining Physical Functionality, Social Functionality and Psychological Functionality Among the Participants

Dependent Variable:	Physical Functionalities			Social Functionalities			Psychological Functionalities		
Model	**Unstandardized Coefficients**		**P-value**	**Unstandardized Coefficients**		**P-value**	**Unstandardized Coefficients**		**P-value**
	B	**Std. Error**		**B**	**Std. Error**		**B**	**Std. Error**	
(Constant)	.495	.377	.231	4.394	.936	.002*	4.694	1.550	.019*
Reference Age 28-37yrs									
Age_38-47yrs	.703	.177	.005*	.231	.440	.616	.697	.728	.371
Age_48_57yrs	.701	.190	.008*	.393	.471	.431	.638	.780	.441
Reference Primary-Edu									
Secondary-Edu	.125	.129	.367	-.484	.321	.176	-.698	.532	.231
Tertiary-Edu	-.123	.170	.493	-.588	.423	.207	-.333	.699	.649
Reference Formally Employed									
Informally Employed	.902	.351	.037*	-.625	.871	.497	-1.391	1.442	.367
Self Employed	.214	.309	.511	-1.343	.768	.124	-1.799	1.272	.200
Unemployed	1.080	.296	.008*	-.619	.735	.428	-.994	1.216	.441
Reference < 1yrs Hearing Loss									
1-3yrs Hearing Loss	.975	.234	.004*	-1.075	.580	.106	-.950	.960	.356
Above 6yrs Hearing Loss	-.385	.280	.212	-.481	.696	.511	-.633	1.152	.600
Reference No – Present Illness besides HIV									
Yes - Present Illness besides HIV	.057	.157	.727	-.224	.391	.584	-.764	.647	.277
Model Summary									
	F-Stat (P-value)	**R-Square**	**DW-Stat**	**F-Stat (P-value)**	**R-Square**	**DW-Stat**	**F-Stat (P-value)**	**R-Square**	**DW-Stat**
	7.037 (0.008**)	0.910	2.165	1.550 (0.288)	0.689	2.376	1.133 (0.448)	0.618	2.437

Note: * denotes significant at 0.05 level

For social functionality, the regression model was not statistically significant, with F = 1.550 and p = 0.288. Although the R-square value was 0.689, meaning that 68.9% of the variation in social functionality was

explained by the predictors, the overall model was not statistically reliable. None of the individual predictors significantly determined social functionality at the 0.05 level. Age, educational level, occupation, duration of hearing loss, and presence of illness besides HIV all had p-values greater than 0.05. This suggests that the measured demographic and clinical variables did not significantly explain social functionality among participants.

The non-significant social functionality model implies that social QoL may be influenced by other factors that were not included in the regression model. These may include family support, HIV-related stigma, disclosure status, marital relationship, communication confidence, peer support, religious participation, community acceptance, and perceived social inclusion. Therefore, future larger studies should include broader psychosocial and environmental variables to better explain social functionality among PwHIV with hearing loss.

For psychological functionality, the regression model was also not statistically significant, with F = 1.133 and p = 0.448. The R-square value was 0.618, indicating that 61.8% of the variation in psychological functionality was explained by the predictors in the model, but the predictors did not jointly explain psychological functionality significantly. None of the individual predictors was statistically significant. Age, education, occupation, duration of hearing loss, and presence of illness besides HIV did not significantly determine psychological functionality.

This suggests that psychological QoL among participants may be influenced by factors beyond the demographic and clinical variables assessed in the study. Such factors may include anxiety, depression, stigma, coping ability, self-efficacy, perceived severity of hearing loss, social support, spiritual coping, ART-related concerns, and confidence in communication. Notably, although Table 9 did not identify significant predictors of psychological functionality, Table 8 showed that psychological functionality improved significantly following the nurse-led intervention. This implies that psychological QoL may be more responsive to structured counselling, health education, reassurance, and coping support than to the demographic variables included in the regression model. Based on the foregoing, Table 9 indicates that physical functionality was significantly determined by age, occupation, and duration of hearing loss, while social and psychological functionality were not significantly determined by the selected demographic and clinical factors. This finding highlights the need for broader assessment of psychosocial, behavioural, and environmental determinants in future studies.

V. DISCUSSION OF FINDINGS

This pilot study examined the outcome of a nurse-led auditory-educational intervention on the QoL of PwHIV with hearing loss within Kaduna State. The findings showed that the intervention produced different levels of effect across the physical, social, and psychological domains of QoL. Physical functionality improved modestly from the no-intervention phase to the post-intervention phase, as the mean score increased from 1.9444 to 2.2444; however, the difference was not statistically significant at the 0.05 level, although the post-intervention improvement approached significance at the 10% level. This suggests that the intervention may have had a positive but limited short-term effect on physical QoL. This finding agrees with existing literature that QoL among PwHIV is multidimensional and may not improve uniformly across all domains following an intervention. Oladejo et al. (2024) reported that QoL among PwHIV is influenced by socioeconomic, demographic, and clinical factors, while Nomatshila et al. (2026) emphasized that even among virally suppressed PwHIV, physical wellbeing and independence may remain affected by broader health and social determinants. Similarly, Huang et al. (2025) found that nurse-led interventions can improve QoL, but the strength of effect may vary across domains. In the present study, the short follow-up period, small pilot sample, and persistence of symptoms such as fatigue, pain, sleep disturbance, and physical discomfort may explain why physical improvement was modest rather than statistically significant

The findings on social functionality showed that participants generally had favourable social QoL scores, but the nurse-led auditory-educational intervention did not produce a statistically significant improvement. The mean social functionality score increased from 3.4000 at no intervention to 3.6389 during intervention but declined slightly to 3.4333 at post-intervention, with no significant difference across the phases. This result is consistent with Huang et al. (2025), who reported that nurse-led self-care interventions among PwHIV improved QoL and depression outcomes but had less consistent effects on social support. Social functionality may be less responsive to short-term individual-level interventions because it is shaped by family relationships, stigma, disclosure experiences, community support, peer acceptance, intimate relationships, and communication confidence. Ali et

al. (2026) also observed that stigma and discrimination among PwHIV can affect social integration, healthcare access, and overall wellbeing. The present finding is therefore common with previous evidence showing that social QoL often requires broader interpersonal and community-level approaches. However, the unique contribution of this study is that it examined social functionality among PwHIV with hearing loss, a group that may experience both HIV-related stigma and communication-related social barriers. The absence of significant improvement suggests that auditory education alone may not be sufficient to improve social QoL unless combined with family involvement, peer support, stigma reduction, and communication-support strategies.

Psychological functionality showed the strongest and most statistically significant improvement following the nurse-led auditory-educational intervention. The mean psychological functionality score increased from 3.2056 at no intervention to 3.9389 during intervention and remained high at 3.8944 at post-intervention. The ANOVA result was statistically significant, and pairwise comparisons showed significant differences between the no-intervention and intervention phases and between the no-intervention and post-intervention phases. This indicates that the psychological benefit of the intervention was not only achieved during the intervention but was also sustained two weeks after the intervention. This finding agrees with Huang et al. (2025), who found that nurse-led self-care interventions significantly improved QoL and reduced depression among PwHIV. It also supports the position of Nomatshila et al. (2026), who noted that psychological wellbeing remains an important QoL concern among PwHIV, even when biomedical outcomes such as viral suppression are achieved. The psychological improvement in this study may be linked to the supportive role of nurses, provision of hearing-health information, reassurance, counselling, coping education, and improved confidence in managing hearing-related difficulties. Although Duong et al. (2017) reported that the relationship between hearing loss and QoL among adults with HIV may be complex, the present study suggests that structured auditory education can positively influence psychological adjustment among PwHIV with hearing loss. This is a unique finding because most previous nurse-led HIV studies focused on ART adherence, general self-care, or depression, while this study specifically introduced auditory education as a nurse-led intervention within HIV care.

The regression findings showed that age, occupation, and duration of hearing loss significantly determined physical functionality, while the selected demographic and clinical factors did not significantly determine social or psychological functionality. The physical functionality model was statistically significant, suggesting that physical QoL among participants was meaningfully influenced by participant characteristics. This partly agrees with Oladejo et al. (2024), who found that sociodemographic and clinical factors predicted QoL among PwHIV in Nigeria. However, the present study differs by identifying duration of hearing loss as a significant predictor of physical functionality, suggesting that adjustment to hearing loss may influence how participants perceive and manage their physical functioning. Participants who had experienced hearing loss for 1–3 years may have developed better coping strategies than those with more recent hearing loss. This represents a unique contribution of the study because hearing-loss duration is rarely examined as a determinant of QoL among PwHIV. In contrast, the non-significant findings for social and psychological functionality suggest that these domains may be shaped more by psychosocial variables such as stigma, disclosure status, depression, anxiety, family support, peer support, communication confidence, self-esteem, and coping ability than by age, education, occupation, duration of hearing loss, or comorbidity alone. Overall, the study confirms that nurse-led auditory-educational intervention has promising value, especially for psychological QoL, but also shows that physical and social QoL may require longer, broader, and more intensive intervention strategies.

VI. CONCLUSION

This pilot study concludes that a nurse-led auditory-educational intervention has potential to improve QoL among PwHIV with hearing loss receiving ART in secondary health facilities within Kaduna metropolis, with the strongest evidence observed in the psychological domain. The intervention produced a statistically significant improvement in psychological functionality, indicating that structured nurse-led education, counselling, reassurance, and coping support can enhance emotional wellbeing, self-confidence, mental health perception, and psychological adjustment among PwHIV with hearing loss. Physical functionality also improved from baseline to post-intervention, although the improvement was modest and not statistically significant at the conventional 0.05 level, suggesting that physical QoL may require longer follow-up,

repeated educational sessions, and additional clinical or rehabilitative support. Social functionality did not improve significantly, indicating that social QoL may be influenced by wider relational, cultural, stigma-related, and community factors that cannot be fully addressed through a short individual-level intervention. The study further concludes that age, occupation, and duration of hearing loss were significant determinants of physical functionality, while the selected demographic and clinical variables did not significantly determine social or psychological functionality. The unique contribution of this pilot study lies in its focus on PwHIV with hearing loss and its demonstration that auditory education can be integrated into nurse-led HIV care. Although the small sample size and short follow-up period limit generalization, the findings provide preliminary evidence that hearing-health education should be considered an important component of holistic HIV care, particularly for improving psychological wellbeing and supporting patient-centered QoL outcomes.

VII. RECOMMENDATIONS

Secondary health facilities should incorporate basic hearing-health education into routine ART counselling for PwHIV, especially for those with confirmed or suspected hearing loss.

ART clinics should consider periodic hearing assessment or referral for audiological evaluation, particularly among patients reporting communication difficulty, tinnitus, reduced hearing, dizziness, or hearing-related social withdrawal.

Nurses should be trained to provide structured auditory-educational counselling that includes hearing-loss awareness, coping strategies, communication techniques, self-care guidance, and referral pathways.

Since psychological functionality improved significantly in this pilot study, ART clinics should include brief psychological counselling, reassurance, and mental-health screening as part of care for PwHIV with hearing loss.

Future interventions should include family members, peer-support groups, community education, and stigma-reduction components because social functionality may not improve through individual education alone.

A larger study with extended follow-up is recommended to determine whether improvements in physical and social functionality become stronger over time.

Further studies should assess stigma, disclosure status, depression, anxiety, family support, social support, coping ability, self-esteem, and communication confidence as possible determinants of QoL among PwHIV with hearing loss.

Since this was a pilot study, a larger adequately powered intervention study should be conducted across more secondary health facilities in Kaduna State to validate the findings and strengthen evidence for policy and practice.

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