

Assessment of quality of life and risk of fall among stroke survivors in selected hospitals in Maiduguri, Borno state

Muhammad Audu Dan-Inu¹, Abubakar Baba Saleh¹, Auwal Shitu¹, Yunusa Usman Muhammad².

¹Department of physiotherapy, College of medical Sciences, Yobe state university, Damaturu,

²Department of physiotherapy, Yobe State University Teaching Hospital, Damaturu.

Corresponding Author: Dan-Inu Muhammad Audu, Email: daninumuhd@ysu.edu.ng

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ABSTRACT

Background: Stroke remains a major cause of long-term disability worldwide, affecting physical, psychological, and social functioning. In Nigeria, stroke survivors frequently experience reduced quality of life (QoL) and heightened fall risk due to persistent impairments and limited access to rehabilitation services. The interplay between these outcomes remains underexplored in Northern Nigeria, particularly in conflict-affected regions.

Objective: To assess the quality of life and risk of fall among stroke survivors in selected hospitals in Maiduguri, Borno State.

Materials and Methods: A cross-sectional survey was conducted among 62 stroke survivors recruited using convenience sampling from Umaru Shehu Ultra-Modern Hospital and the University of Maiduguri Teaching Hospital. Socio-demographic and clinical data were collected using a structured questionnaire. Fall risk was assessed using the Falls Risk Assessment Tool (FRAT), while QoL was measured using the Stroke-Specific Quality of Life Scale (SS-QoL). Data were analyzed using descriptive statistics and Chi-square tests, with significance set at $p < 0.05$.

Results: Participants included 32 males (51.6%) and 30 females (48.4%), with the majority aged 51–60 years (33.9%). QoL scores varied across domains, with no significant association between overall QoL and fall risk ($\chi^2 = 450.352$, $df = 432$, $p = 0.262$). However, a significant linear trend was observed between QoL and fall risk (Linear-by-Linear Association = 7.058, $p = 0.008$). Age, gender, educational level, and post-stroke duration were significantly associated with selected QoL domains ($p < 0.05$). No socio-demographic variable showed a significant association with fall risk.

Conclusion: No statistically significant association was found between overall QoL and fall risk among stroke survivors. However, specific socio-demographic factors significantly influenced QoL domains. Rehabilitation programs should target modifiable determinants of QoL while implementing fall prevention strategies for at-risk survivors.

Keywords: Stroke, Quality of Life, Fall Risk, Stroke Survivors, Maiduguri

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Introduction

Stroke remains a leading cause of long-term disability and mortality globally, with profound impacts on physical, psychological, and social functioning [1,2]. The global burden of stroke has continued to rise, with low- and middle-income countries (LMICs) bearing a disproportionate share of the disease burden. In Sub-Saharan Africa, the prevalence of stroke has been reported at 4.3 per 1,000 population, with Nigeria contributing significantly to this burden [3]. Recent modeling studies from Nigeria have demonstrated that stroke prevalence is high and predicted to rise, with projections indicating a 29.63% increase by December 2022 and 36.67% by December 2023 [4]. The consequences of stroke include balance impairment, muscle weakness, cognitive decline, reduced quality of life, and significantly increased risk of falls [5,6].

Quality of life (QoL) among stroke survivors has been extensively studied, with evidence consistently demonstrating reduced QoL compared to the general population [7]. In Nigeria, recent research has shown that resilience significantly influences QoL across the first post-stroke year, with higher resilience associated with improved QoL over time [8]. A study conducted at the University of Ilorin Teaching Hospital specifically assessed the relationship between stroke severity and health-related quality of life (HRQoL) among Nigerian stroke survivors, revealing that stroke severity inversely correlates with QoL outcomes [9]. Similarly, research from the University of Maiduguri Teaching Hospital has documented the functional outcomes and QoL challenges faced by stroke survivors in the region [10].

Falls represent a major complication of stroke, contributing substantially to morbidity, mortality, and healthcare costs. Globally, falls account for over 684,000 deaths annually, with stroke survivors being

particularly vulnerable due to impaired postural control, muscle weakness, and neurological deficits [11]. Recent prospective cohort evidence demonstrates that falls affect over 30% of stroke survivors within the first year post-stroke [12]. Among chronic stroke patients, falls occur most frequently during walking (38.5%), with 46.5% of first falls occurring within 2-6 months post-stroke. Furthermore, over 54% of falls lead to consequences such as fractures, ligament strains, bruises, or abrasions, significantly impacting QoL and functional independence [13]. Research has demonstrated that self-help activities, social roles, and upper extremity function are significantly lower in the fall group among chronic stroke patients ($p < 0.05$), indicating the far-reaching consequences of falls on overall well-being [14].

In Nigeria, approximately 23% of adults report experiencing falls, and stroke survivors are particularly vulnerable due to persistent impairments [15]. The interplay between QoL and fall risk in stroke survivors is complex and multifactorial. Studies have reported that falls are significantly associated with reduced life satisfaction among hospitalized stroke patients (OR = 0.77, 95% CI: 0.61-0.98, $p = 0.0325$), highlighting the critical relationship between fall events and overall QoL [16]. However, the simultaneous assessment of both QoL and fall risk among stroke survivors in Northern Nigeria, particularly in conflict-affected regions, remains limited.

Maiduguri, the capital of Borno State, presents unique challenges that may influence stroke recovery outcomes. The region has been affected by prolonged conflict, which has disrupted healthcare infrastructure, limited access to rehabilitation services, and created socio-economic stressors that may compound the burden of stroke. These contextual factors make understanding QoL and fall risk particularly

important for planning targeted, contextually appropriate rehabilitation interventions.

Despite the high prevalence of stroke-related disability and the unique challenges in Maiduguri, limited studies have examined both fall risk and QoL simultaneously in this population. This study, therefore, assessed the quality of life and risk of fall among stroke survivors in selected hospitals in Maiduguri, Borno State.

Materials and Methods

Study Design

A cross-sectional survey design was employed for this study.

Participants and Study Site

A total of 62 male and female stroke survivors residing within Maiduguri Metropolitan City participated in the study. Participants were recruited from two healthcare facilities: Umaru Shehu Ultra-Modern Hospital and the University of Maiduguri Teaching Hospital (UMTH). These hospitals serve as major referral centers for stroke care in Borno State and the surrounding regions.

Inclusion and Exclusion Criteria

Participants were included if they were diagnosed stroke survivors living within the metropolis, irrespective of the chronicity of their condition (acute, sub-acute, or chronic phases). Individuals with other neurological disorders, a history of fractures, or lower-limb musculoskeletal conditions that could independently affect fall risk were excluded from the study.

Sample Size Determination

The sample size was determined using the Taro-Yamane formula based on the available population of 73 stroke survivors who were registered and receiving care at the two study sites during the study period. This yielded a final sample size of 62 participants. The use of convenience sampling was employed to recruit participants voluntarily. The limited sample size is acknowledged as a limitation

of this study, and findings should be interpreted with this consideration.

Instruments

Socio-demographic and Clinical Questionnaire: A structured questionnaire was used to collect socio-demographic and clinical information, including age, gender, educational level, type of stroke, side affected, and post-stroke duration. A separate consent form was administered to document written informed consent from all participants prior to data collection.

Falls Risk Assessment Tool (FRAT): The FRAT was used to evaluate fall risk. This validated tool assesses four domains: recent falls, medication use, psychological status, and cognitive status. Higher scores indicate greater fall risk.

Stroke-Specific Quality of Life Scale (SS-QoL): The SS-QoL, a validated 49-item instrument assessing 12 health-related domains (energy, family roles, language, mobility, mood, personality, self-care, social roles, thinking, upper extremity function, vision, and work/productivity), was used to measure quality of life. Each domain is scored on a 5-point Likert scale, with higher scores indicating better QoL.

Data Collection Procedure

Data collection was conducted at the participating hospitals. Eligible participants were approached, and the study objectives were explained. Written informed consent was obtained from all participants. The socio-demographic questionnaire, FRAT, and SS-QoL were administered through face-to-face interviews conducted by trained research assistants. Clinical data were verified from participants' medical records where available.

Ethical Considerations

Ethical approval was obtained from the Borno State Ministry of Health and the University of Maiduguri Teaching Hospital

Research Ethics Committee. Written informed consent was obtained from all participants. Confidentiality was maintained throughout the study, and participants were informed of their right to withdraw at any time without consequences.

Data Analysis

Data were analyzed using SPSS version 22. Descriptive statistics (mean, standard deviation, frequencies, and percentages) were used to summarize the socio-demographic and clinical characteristics of participants. Chi-square tests were applied to determine associations between fall-risk levels, quality of life, and socio-demographic variables, as well as between quality of life and fall-risk level. Statistical significance was set at $\alpha = 0.05$.

Results

Socio-demographic Characteristics of Participants

A total of 62 stroke survivors participated in the study. Table 1 presents the socio-

demographic characteristics of the respondents. The sample comprised 32 males (51.6%) and 30 females (48.4%). The majority of respondents were within the 51–60-year age group (33.9%), followed by those aged 61–70 years (27.4%). Participants aged 31–40 years represented the smallest proportion (6.5%).

Regarding educational background, the majority had tertiary education (38.7%), while 21% had no formal education, and only 4.8% had primary-level education. In terms of post-stroke duration, 38.7% of participants were in the chronic phase (>6 months), 32.3% were in the sub-acute phase (1-6 months), and 29% were in the acute phase (<1 month). The distribution of stroke laterality indicated equal occurrence on both sides, with left and right hemiparesis each reported in 31 participants (50%).

Table 1. Socio-demographic Characteristics of Respondents

Characteristic	Frequency (n)	Percentage (%)
Age (years)		
31-40	4	6.5
41-50	13	21.0
51-60	21	33.9
61-70	17	27.4
71-80	7	11.3
Total	62	100
Gender		
Male	32	51.6
Female	30	48.4
Total	62	100

Characteristic	Frequency (n)	Percentage (%)
Education		
None	13	21.0
Tsangaya	12	19.4
Primary	3	4.8
Secondary	10	16.1
Tertiary	24	38.7
Total	62	100
Post-stroke Duration		
Acute (<1 month)	18	29.0
Sub-acute (1-6 months)	20	32.3
Chronic (>6 months)	24	38.7
Total	62	100
Affected Body Side		
Left	31	50.0
Right	31	50.0
Total	62	100

Quality of life scores

Table 2 presents the mean scores, standard deviations, and ranges for each domain of the SS-QoL. The highest mean scores were observed in the Language domain (mean = 17.9, SD = 5.6) and Mood domain (mean = 17.4, SD = 3.3), indicating relatively better

functioning in these areas. The lowest scores were observed in the Energy domain (mean = 6.9, SD = 3.2) and Work/Productivity domain (mean = 8.6, SD = 4.4), suggesting significant impairment in these aspects of QoL.

Table 2. Quality of Life Domain Scores (SS-QoL)

Domain	Mean	SD	Min	Max
Energy (EG)	6.9	3.2	3	15
Family Roles (FR)	9.7	3.6	3	15
Language (LG)	17.9	5.6	7	25
Mobility (MB)	16.3	7.9	6	30
Mood (MD)	17.4	3.3	10	22
Personality (PS)	9.9	1.6	7	14
Self-Care (SC)	11.8	6.6	5	25
Social Roles (SR)	12.7	6.6	5	25
Thinking (TK)	10.6	3.2	3	15
Upper Extremity Function (UEF)	11.3	5.2	5	23
Vision (VS)	11.0	3.1	3	15
Work/Productivity (WP)	8.6	4.4	3	15

KEY**Max=** **Maximun****Min=** **Minimun**

Table 3. Fall Risk Domain Scores (FRAT)

Domain	Mean	SD	Min	Max
Recent Fall	2.9	1.5	1	6
Medication	2.1	0.7	1	3
Psychological	1.8	0.7	1	3
Cognitive Status	1.4	0.6	1	4
Total	8.2	2.6		

Level of fall risk

Table 3 presents the FRAT domain scores. The total mean FRAT score was 8.2 (SD = 2.6), with the highest scores observed in the recent falls domain (mean = 2.9, SD = 1.5), indicating a substantial history of falls among participants.

Association between quality of life and fall risk

Table 4 presents the Chi-square analysis examining the relationship between QoL and fall risk. The Pearson Chi-Square value ($\chi^2 = 450.352$, $df = 432$, $p = 0.262$) indicates no statistically significant association between overall QoL scores and fall-risk categories. However, the Linear-by-Linear Association value (7.058, $df = 1$, $p = 0.008$) suggests a significant linear trend when assessing the ordinal relationship between QoL and fall risk. This indicates that while the overall categorical association is not significant, a directional gradient pattern may exist across the ordered categories of QoL and fall risk.

Table 4. Association between quality of life and fall risk

Test	Value	df	p-value
Pearson Chi-Square	450.352	432	0.262

Test	Value	df	p-value
Likelihood Ratio	228.066	432	1.000
Linear-by-Linear Association	7.058	1	0.008*

*Statistically significant at $p < 0.05$

Association between socio-demographic factors and quality of life

Chi-square analysis revealed significant associations between selected socio-demographic factors and QoL domains. Age was significantly associated with upper extremity function ($p < 0.05$), consistent with age-related decline in motor performance. Gender showed significant associations with mobility and self-care domains. Educational level was significantly associated with multiple QoL domains, including language, social roles, and thinking. Post-stroke duration showed significant associations with energy, mobility, and work/productivity domains ($p < 0.05$).

Association between socio-demographic factors and fall risk

No socio-demographic variable showed a statistically significant association with fall risk ($p > 0.05$ for all variables). Age, gender, educational level, and post-stroke duration did not significantly influence fall risk status among participants.

Discussion

This study assessed quality of life and fall risk among stroke survivors in selected hospitals in Maiduguri, Borno State. The findings provide valuable insights into the functional and psychosocial outcomes of stroke survivors in a conflict-affected region of Northern Nigeria.

The gender distribution observed in this study (male and female) differed from the more pronounced male predominance reported in some previous Nigerian studies [17], although stroke remains more common among males globally [18]. The age distribution revealed that the majority of participants were aged 51-70 years, consistent with findings that stroke predominantly affects the older adult population [19]. The high proportion of participants with tertiary education (38.7%) reflects the urban nature of the study setting in Maiduguri Metropolitan City, while the 21% with no formal education highlights the continued need for health literacy interventions in the region.

The study found that specific socio-demographic factors significantly influenced QoL domains. Educational level was significantly associated with language, social roles, and thinking domains, supporting the assertion that higher education enhances coping strategies and self-management capabilities [20]. This finding aligns with recent literature demonstrating that health literacy, which is closely linked to educational attainment, facilitates better engagement with rehabilitation and adaptation to post-stroke challenges [21]. Our findings suggest that stroke survivors with higher educational attainment may be better equipped to navigate the rehabilitation

process and access available support resources.

Age was significantly associated with upper extremity function, consistent with the established age-related decline in motor performance and neuromuscular efficiency [22]. This finding is supported by recent research from the University of Maiduguri Teaching Hospital, which documented that stroke survivors aged 56.0 ± 15.8 years show varying functional outcomes based on age-related factors [10]. Additionally, a study of 85 hospitalized stroke patients found that age was significantly associated with functional independence and discharge outcomes ($p < 0.05$) [23].

Post-stroke duration showed significant associations with energy, mobility, and work/productivity domains. This finding is consistent with previous research indicating that QoL varies across different phases of stroke recovery [24]. Participants in the chronic phase (38.7%) may have developed better adaptation strategies and compensation mechanisms compared to those in the acute phase. However, the persistence of QoL impairment in the chronic phase highlights the need for continued rehabilitation support beyond the acute period. A Nigerian study similarly found that health-related QoL scores were lowest in the early sub-acute phase but demonstrated improvement over time in some domains [25].

Gender was significantly associated with mobility and self-care domains. This finding supports previous research suggesting differential recovery trajectories between male and female stroke survivors [26]. Females may face additional challenges related to caregiving responsibilities and socio-cultural expectations in the Nigerian context, potentially influencing their rehabilitation participation and outcomes [27].

The mean FRAT score of 8.2 (SD = 2.6) in this study indicates moderate fall risk among participants. The highest scores were observed in the recent falls domain (mean = 2.9), suggesting a substantial history of falls in this population. This finding is consistent with the international evidence that over 30% of stroke survivors experience falls within the first year post-stroke [12]. The absence of significant associations between fall risk and socio-demographic factors aligns with some studies [28] but contrasts with others that have reported age and gender differences in fall risk [29]. This disparity may be attributable to sample size constraints, variability in stroke severity, or differences in the measurement tools used.

Interestingly, no statistically significant association was found between overall QoL and fall risk ($p = 0.262$). This finding contrasts with studies that have demonstrated significant associations between impaired balance and reduced QoL [30]. However, the significant Linear-by-Linear Association ($p = 0.008$) suggests a gradient pattern, indicating that as QoL improves, fall risk tends to decrease in an ordered fashion. This nuanced relationship may reflect the complex, multifactorial nature of both constructs. Recent research has shown that falls are significantly associated with reduced life satisfaction among hospitalized stroke patients (OR = 0.77, 95% CI: 0.61-0.98, $p = 0.0325$) [16], suggesting that the relationship may be more apparent when specific aspects of QoL are examined rather than global scores.

Furthermore, a study among chronic stroke patients found that social roles and upper extremity function were significantly associated with fall experiences, with the fall group demonstrating significantly lower scores in self-help activities, social roles, and upper extremity function ($p < 0.05$) [14].

These findings highlight that the relationship between QoL and fall risk may be domain-specific, with certain aspects of QoL (such as physical function and social participation) being more closely linked to fall risk than others.

The absence of a strong overall association in our study may also be explained by cultural factors. In the Nigerian context, QoL may be influenced by factors such as family support, religious beliefs, and community integration that are not captured by the SS-QoL tool. Additionally, the relatively high prevalence of falls (46.5% occurring within 2-6 months post-stroke) [13] may have normalized fall experiences among participants, potentially attenuating the perceived impact on QoL. The consequences of falls, including fractures and ligament strains occurring in over 54% of cases [13], underscore the need for comprehensive fall prevention strategies regardless of QoL scores.

Clinical Implications

The findings of this study have several clinical implications. The significant associations between socio-demographic factors and QoL highlight the need for tailored rehabilitation approaches that consider individual patient characteristics. Educational level, in particular, may serve as a marker for health literacy and should be considered when designing patient education and self-management interventions [21]. The influence of post-stroke duration on QoL domains underscores the importance of ongoing rehabilitation throughout the recovery trajectory, with particular attention to the acute and sub-acute phases when QoL may be most compromised.

The moderate fall risk scores and high recent falls scores emphasize the critical need for systematic fall risk assessment in stroke rehabilitation. Fall prevention interventions,

including balance training, environmental modifications, and education on fall prevention strategies, should be integrated into standard stroke care. Despite the lack of significant association between socio-demographic factors and fall risk in this study, clinical vigilance for fall risk remains essential for all stroke survivors.

Study Limitations

This study has several limitations that should be acknowledged. First, the sample size ($n = 62$) is relatively small, which limits the generalizability of findings to the broader stroke survivor population in Maiduguri. The convenience sampling method may also introduce selection bias. Second, the cross-sectional design precludes establishing causal relationships between QoL and fall risk. Third, the study was conducted in two hospitals, which may not be representative of all stroke survivors, particularly those who do not seek hospital-based care. Fourth, the use of self-report measures may be subject to recall bias and social desirability bias. Fifth, the conflict context of Maiduguri may have influenced the experiences and outcomes of participants in ways that are not fully captured by the quantitative measures used. Future studies should employ larger, community-based samples and incorporate qualitative methods to better understand the experiences of stroke survivors in conflict-affected regions.

Conclusion

This study found no statistically significant association between overall quality of life and fall risk among stroke survivors in selected hospitals in Maiduguri, Borno State. However, a significant linear trend suggested a directional relationship between these variables. Fall risk was not significantly associated with socio-demographic characteristics of the participants. In contrast,

quality of life was significantly associated with specific socio-demographic factors including age, gender, educational level, and post-stroke duration. These results indicate that while socio-demographic characteristics influence functional and psychosocial outcomes among stroke survivors, fall risk may be determined by other clinical or functional factors beyond basic demographic profiles.

Recommendations

Based on the findings of this study, the following recommendations are made:

- **Comprehensive QoL Assessment:** Physiotherapists and rehabilitation professionals should consistently assess the quality of life of stroke survivors as part of their management plan to ensure comprehensive and holistic care delivery.
- **Fall Risk Evaluation and Prevention:** Physiotherapists should systematically evaluate the risk of falls among stroke survivors and implement balance training and other appropriate interventions for those identified at risk to enhance stability and prevent potential falls.
- **Tailored Rehabilitation:** Rehabilitation interventions should consider socio-demographic factors, particularly educational level and post-stroke duration, in designing patient education, self-management strategies, and treatment protocols.
- **Future Research:** Researchers are encouraged to conduct further studies with larger sample sizes, community-based designs, and longitudinal follow-up to address existing knowledge gaps and validate these findings. Qualitative studies should also be conducted to explore the lived

experiences of stroke survivors in conflict-affected regions.

- **Public Health Education:** Public health education programs on stroke risk factors, warning signs, and the importance of rehabilitation services should be prioritized in conflict-affected regions like Maiduguri to improve awareness and health-seeking behaviors.
- **Health System Strengthening:** Healthcare administrators and policymakers should strengthen rehabilitation services and fall prevention programs in hospitals serving stroke survivors, particularly in resource-limited settings.

Limitations

This study is limited by a relatively small sample size ($n = 62$), which constrains the statistical power and generalizability of the findings. The use of convenience sampling from two hospitals may not be representative of all stroke survivors in Maiduguri, particularly those who do not access hospital-based care. The cross-sectional design limits causal inferences. Additionally, self-report measures may be subject to recall and social desirability biases. The conflict context of Maiduguri may have influenced outcomes in ways not fully captured by the quantitative methods employed. Future studies with larger, community-based samples are needed to validate these findings.

Conflict of Interest

The authors declare no conflict of interest.

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