Hemiplegic stroke in rural western Kenya: Clinical profile, risk factors, rehabilitation strategies, and functional outcomes between 2025 and 2026

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ABSTRACT

Stroke is a leading cause of disability globally, with a disproportionate burden in low- and middle-income countries. Hemiplegia is among the most disabling consequences of stroke, yet there is limited evidence from rural Kenya regarding functional outcomes and rehabilitation needs. To examine the clinical profile, risk factors, rehabilitation strategies, and functional outcomes among stroke survivors in rural Western Kenya. Objective: To describe rehabilitation interventions and functional outcomes among stroke survivors and determine their implications for strengthening stroke care delivery in resource-limited African settings. A retrospective hospital-based descriptive cross-sectional study was conducted at Busia County Referral Hospital (BCRH), Kenya, between November 2025 and February 2026. Fifty-four adult patients with confirmed stroke-related hemiplegia who met the study inclusion criteria were included through consecutive sampling using medical record and patient biodata review. Data were collected through medical record review with a structured data extraction form, and clinical assessment findings documented in patient files. Functional status was assessed using the Modified Rankin Scale (mRS), while the International Classification of Functioning, Disability and Health framework (ICF) was used to categorize impairments, activity limitations, participation restrictions, and environmental factors. Data were analyzed using SPSS version 22 that adopted descriptive and inferential statistics for data analysis. Ethical approval was obtained from National Commission for Science, Technology and Innovation and Institutional Scientific Ethics and Review Committee, and informed consent was secured from participants and caregivers where applicable. Results: Haemorrhagic stroke accounted for 51.9% of cases, while ischemic stroke accounted for 48.1%. Hypertension was the predominant risk factor (92.6%), with poor medication adherence reported in 60% of patients. Retrospectively, severe neurological impairments were linked to altered consciousness (ICF-b110: 87%) and orientation deficits (ICF-b114: 87%). Motor impairment was substantial, with 53.7% observed partial movement and 22.2% showing no movement (ICF-b730). Dysphagia was linked to 38.9% of patients (ICF-b510). At discharge, 81.5% of patients were linked to severe disability, corresponding to a Modified Rankin Scale score of 4, despite low in-hospital mortality (3.7%). Participation restrictions were marked (ICF-d910: 72.2%), with high dependence on family caregivers (ICF-e310: 70%). Environmental barriers were linked to delayed referral and limited rehabilitation services (ICF-e355: 100%). Most patients (96.3%) were referred for physiotherapy management. Rehabilitation interventions were documented as early bed mobility and transfer training, trunk control and balance retraining, gait rehabilitation, progressive muscle strengthening, range-of-motion exercises, proprioceptive training, and repetitive task-specific exercises initiated within 24–72 hours after admission. Conclusion: Hemiplegic stroke at the hospital was noted to affect older women, with systemic hypertension identified as the major modifiable risk factor. Although in-hospital mortality was observed to be low, severe functional disability remained common among survivors. Recommendations: Strengthen preventive strategies targeting hypertension control, adherence to antihypertensive medication, and enhance community-based rehabilitation and interdisciplinary referral pathways for stroke survivors.

Keywords: Hemiplegic Stroke, Hypertension Preventive Strategies, Functional Outcomes, ICF, Multidisciplinary Approach, Rehabilitation Referral Pathways

I. INTRODUCTION

Stroke is defined as the sudden onset of neurological dysfunction resulting from interruption of cerebral blood flow due to ischemia or haemorrhage (Feigin et al., 2025). It remains one of the leading causes of mortality and long-term disability worldwide, with approximately 12 million new cases, over 7 million deaths, and nearly 93 million stroke survivors globally (Abissegue et al., 2024; Feigin et al., 2026). Although mortality has declined in many high-income countries, the burden of stroke continues to rise in low- and middle-income countries, which account for nearly three-quarters of global cases (Feigin et al., 2025). Sub-Saharan Africa (SSA) experiences disproportionately high stroke incidence, prevalence, and mortality rates compared to Western Europe and North America (Akinyemi et al., 2021; Owalabi et al., 2015; World Health organisation (WHO), 2022). Stroke in SSA commonly affects individuals at younger ages and is strongly associated with uncontrolled cardiovascular risk factors, particularly systemic hypertension, alongside diabetes mellitus, dyslipidaemia, tobacco use, harmful alcohol consumption, physical inactivity, and unhealthy dietary practices (Feigin et al., 2022; Musung et al., 2022).

In Kenya, stroke represents an increasing but under-characterized public health problem, especially in rural and resource-limited settings where access to neuroimaging, specialized stroke care, and rehabilitation services remains limited (Waweru & Gatimu, 2021). Existing studies from urban centers such as Nairobi and Eldoret report increasing hospitalization rates, high disability burden, and poor functional outcomes among stroke survivors. However, evidence describing stroke patterns, rehabilitation pathways, and functional outcomes in Western Kenya remains limited. Hemiplegia is the most common disabling manifestation of stroke and results from injury to corticospinal pathways affecting one side of the body (WHO, 2016; Langhorne et al., 2011). It significantly impairs mobility, self-care, communication, and participation in daily and community activities, often leading to long-term dependence, caregiver burden, and socioeconomic hardship. Early multidisciplinary post-stroke rehabilitation has been associated with improved functional recovery and reduced disability; however, such services remain inadequate in many low-resource African settings (Aderinto et al., 2025; Hornby et al., 2019; Olaleye & Lawal, 2017).

Given the limited subnational data on stroke-related hemiplegia in Kenya, hospital-based studies are essential for informing rehabilitation planning, quality improvement, and stroke surveillance (Waweru & Gatimu., 2021; Kaduka et al., 2018). This study therefore applied the International Classification of Functioning, Disability and Health (WHO, (2001) framework to evaluate the clinical characteristics, risk factors, rehabilitation strategies, and functional outcomes of adult patients with hemiplegic stroke admitted to Busia County Referral Hospital between 2025 and 2026.

1.2 Research Objectives

1.2.1 To determine the prevalence, clinical profile, and modifiable risks factors among adult hemiplegic stroke patients at BCRH, Kenya, between 2025 and 2026

1.2.2 To determine the application of the ICF Framework to assess neurological deficits and functional status among Adult Hemiplegic Stroke Patients Following Hospitalization and Discharge at BCRH, Kenya, between 2025 and 2026

1.2.3 To determine post-stroke rehabilitation strategies among adult hemiplegic stroke patients following hospitalization and discharge at BCRH, Kenya, between 2025 and 2026

II. LITERATURE REVIEW

2.1 Theoretical Revie

2.1.1 Prevalence, Clinical Profile, and Modifiable Risks Factors Among Adult Hemiplegic Stroke Patients

According to epidemiological transition theory (Khanday et al., 2026; Omran, 2005) describes the shift from communicable diseases to non-communicable diseases as societies undergo demographic, socioeconomic, and lifestyle changes. This transition has been associated with the growing burden of stroke among relatively younger and economically active populations in SSA (De Oliveira et al., 2025; Feigin et al., 2024).This transition has been associated with increasing exposure to vascular risk factors, including hypertension, diabetes mellitus, obesity, physical inactivity, and tobacco use, contributing to the emergence of hemiplegic stroke among relatively younger and economically active populations in Africa (Napoleon et al., 2025).

The vascular theory of stroke provides a biological explanation for hemiplegia, whereby interruption of the corticospinal tract following cerebral infarct or intracerebral haemorrhage results into contralateral motor impairment (Unnithan & Das, 2025). Chronic uncontrolled hypertension leads to pathological changes of small cerebral vessels especially lipohyalinosis and Charcot-Bouchard microaneurysm formation, increasing the risk of lacunar infarction and hypertensive intracerebral haemorrhage linked to severe motor deficits (Osman et al., 2025; Hainsworth et al., 2024; Webb & Werring, 2022). Beyond biological mechanisms, the Andersen Behavioural Model of health services utilization explains that stroke outcomes are influenced by the interaction of predisposing characteristics, enabling resources, healthcare needs, socioeconomic status, health literacy, access to rehabilitation services and stroke severity

(Alkhawaldeh et al., 2023; Adoukonou et al., 2021; Mohammed et al., 2021). These theories provide a conceptual framework for understanding the epidemiology, clinical characteristics, and modifiable determinants of adult hemiplegic stroke for this current study.

2.2.2 To determine the Application of the ICF Framework to assess neurological deficits and functional status of Adult Hemiplegic Stroke Patients

The WHO International Classification of Functioning, Disability and Health (ICF) provide theoretical basis for understanding disability following hemiplegic stroke (WHO, 2001). Unlike the traditional biomedical model that focuses primarily on neurological impairment, the ICF conceptualizes functioning as a dynamic interaction between the health condition, body structures and functions, activities, participation, and contextual factors (Cieza et al., 2002).Within stroke rehabilitation, the ICF recognizes that neurological injury results impairments in domains affecting consciousness, cognition, communication, muscle strength, and muscle tone, which subsequently influence mobility, self-care, domestic activities, social participation, and community reintegration (WHO, 2001). The development of stroke-specific ICF Core Sets further supports standardized classification of stroke-related impairments, activity limitations, participation restrictions, and environmental factors for clinical and research applications (Cieza et al., 2002). Accordingly, the ICF provides a comprehensive framework for assessing neurological deficits, activity limitations, participation restrictions, and contextual factors influencing functional status among adult hemiplegic stroke patients, thereby supporting standardized assessment, interdisciplinary communication, and individualized rehabilitation planning in both clinical practice and measure of disability impairment-levels. Therefore, the ICF framework provides an appropriate theoretical approach for comprehensive assessment of post stroke disability beyond impairment level measures in this current study.

2.2.3 Post-stroke Rehabilitation strategies among adult hemiplegic stroke patients following hospitalization and discharge

Multidisciplinary rehabilitation and community-based support models have also shown benefits in improving quality of life and reducing participation restrictions among stroke survivors, even in resource-limited settings (Kayola et al., 2023; An et al., 2024). Evidence demonstrates that structured, repetitive, task-specific, and moderate-to-high-intensity locomotor rehabilitation improves mobility and functional recovery more effectively than low-intensity approaches (Hornby et al., 2019). Stroke rehabilitation is theoretically supported by neuroplasticity theory, motor learning theory, and continuity of care models. Neuroplasticity theory proposes that recovery following stroke occurs through adaptive changes in neural networks stimulated by repetitive, intensive, task-specific, and meaningful rehabilitation activities (French et al., 2016; Kleim & Jones, 2008).

Motor learning theory further emphasizes that functional recovery requires active participation, practice variability, feedback, and progressive task-specific training (Hornby et al., 2019). The continuity of care model emphasizes that rehabilitation should extend beyond acute hospitalization through coordinated inpatient rehabilitation, discharge planning, caregiver involvement, and community-based services. This model is particularly relevant in resource-limited settings where healthcare systems must develop sustainable rehabilitation pathways despite limited specialist availability (Langhorne et al., 2011; Kayola et al., 2023).

2.3 Empirical Review

2.3.1 Prevalence, Clinical Profile, and Modifiable Risks Factors Among Adult Hemiplegic Stroke Patients

Globally, approximately 80-90% of hemiplegic stroke burden is attributable to modifiable risk factors, with uncontrolled hypertension [HTN] accounting for almost 50% of the population attributable risk, followed by unhealthy diet (30%), physical inactivity (20%), smoking (15%), DM (10%) and excessive alcohol use (Feigin et al., 2025; Mbalinda et al., 2024; Global Burden of Disease, 2024). In SSA uncontrolled hypertension (HTN) contributes to 85-90% of stroke burden, affecting more than 60% of hospitalized stroke patients and the rest 30-35% with cardiometabolic risk (Owalabi et al., 2015; Mohammad et al., 2025). A multicenter study involving 4,387 stroke patients reported HTN in 73.5% of haemorrhagic stroke cases and 62.8% of ischemic stroke cases, while diabetes mellitus and atrial fibrillation were more common among ischemic stroke patients (Namale et al., 2018). In Kenya, HTN remains a leading modifiable risk factor, with approximately 50-80% of stroke admissions. Although an estimated 24% to 29% of Kenyan adults have hypertension, awareness, treatment, and blood pressure control remain suboptimal, increasing the risk of hemiplegic stroke and its associated complications (Waweru & Gatimu, 2021).

Across SSA, hospital-based studies consistently report severe motor impairment as the predominant clinical presentation, showing stroke as a major cause to long-term disability (Odetunde et al., 2026; Darkwah et al., 2025). Severe neurological deficits especially hemiplegia, impaired consciousness, communication disorders, dysphagia and functional dependence are frequently reported among patients with haemorrhagic stroke and delayed hospital presentation (Baye et al., 2020; Matuja et al., 2024; Wubshet et al., 2023). Recurrent stroke in SSA is estimated to be 9% and 25%, preventable aspiration pneumonia, hyperglycaemia, fever, and raised intracranial pressure, together with

a one-month case fatality rates range between 22% and 27%, worsening outcomes among hospitalized stroke patients (Wubshet et al., 2023; De Oliveira et al., 2025). Studies indicate that more than half of patients in some African settings present to hospital after 24 hours of symptom onset, (Adoukonou et al., 2021; Ackah et al., 2026). However, most studies have focused on heterogeneous stroke population rather than adult hemiplegic stroke patients, this study determined prevalence, clinical profile and modifiable risk factors among patients who were admitted during the study period in Busia County referral hospital, Kenya.

2.3.2 Application of the ICF Framework to assess neurological deficits and functional status of Adult Hemiplegic Stroke Patients

Studies demonstrates that disability after hemiplegic stroke is multidimensional, involving not only motor impairments but also cognitive dysfunction, communication difficulties, mobility restrictions, reduced independence in activities of daily living and participation limitations (Chen et al., 2025; Wong et al., 2023). Studies indicates that ICF-based rehabilitation approaches have demonstrated value in improving identification of patient needs and guiding individualized rehabilitation planning and interdisciplinary communication by integrating impairment, activity, participation, and contextual domains (Wong et al., 2023).

Despite global recognition of the ICF framework, stroke assessment within many African healthcare settings remains predominantly biomedical, relying mainly on impairment-focused measures rather than comprehensive functioning assessments. Limited rehabilitation resources, inadequate documentation systems, and insufficient integration of contextual factors remain important barriers to implementing ICF-based stroke rehabilitation in Africa (Kayola et al., 2023; Aderinto et al., 2025). However, there was no published studies identified regarding ICF-based characterization of neurological deficits and functional status among adult hemiplegic stroke patients in Busia county-level hospitals. Therefore, this study determined use of the ICF framework for assessing post-stroke disability beyond impairment-level measures in Busia County and referral hospital, Kenya.

2.3.3 Post-stroke rehabilitation strategies among adult hemiplegic stroke patients following hospitalization and discharge

Rehabilitation interventions including constraint-induced movement therapy, mirror therapy, mental practice, robot-assisted therapy, and functional electrical stimulation demonstrated varying levels of effectiveness in improving upper-extremity motor function when selected according to the patient's stage of recovery and level of impairment. The review recommends integrating these interventions within individualized multidisciplinary rehabilitation programmes results in greater functional gains than conventional therapy alone, although the strength of evidence differs across techniques (Hatem et al., 2016). Similarly, multidisciplinary, task-specific, and intensive rehabilitation has shown to improve mobility, functional independence, and participation among stroke survivors (Hornby et al., 2019; Langhorne et al., 2011). Structured rehabilitation programmmes involving physiotherapists, occupational Therapist, speech Therapist, and community-based interventions have also demonstrated improvements in quality of life and reduction of long-term residual disability (Aderinto et al. 2025; Kayola et al., 2023).

However, stroke rehabilitation services in Africa remain constrained by shortages of rehabilitation professionals, financial barriers, inadequate referral pathways, and poor continuity between hospital and community of care after hospital discharge, resulting inequitable access to rehabilitation services (Aderinto et al.,2025; Tawa et al., 2021). There are few studies that have documented on post stroke rehabilitation strategies following hospitalization and discharge, including their intensity, accessibility, and relationship with functional outcomes among adult hemiplegic stroke patients in Busia County and Referral Hospital. This gap provided the rationale for the present study to determines community-based rehabilitation services in the study settings.

III. METHODOLOGY

3.1 Study Setting

The study was conducted at Busia County Referral Hospital (BCRH), a 201-bed public tertiary hospital serving Western Kenya. The facility receives referrals from surrounding sub-county hospitals and neighbouring regions along the Kenya–Uganda border.

3.2 Study Design

A retrospective hospital-based cross-sectional descriptive study design was adopted. This design helped to draw sample at one time point from one hospital setting to determine the proportion of hemiplegic stroke burden cases in the hospital admissions. This design also facilitated the assessment of the hospital burden of stroke by extracting data from patients' medical records, including risk factors, socio-demographics characteristics, complications, length of hospital stay, imaging reports confirming stroke diagnosis and documentation by physicians, physiotherapists and occupational therapists. It also provided clinical assessment tools and discharge summaries was reviewed to provide a description of the study population and clinical practice by healthcare providers.

3.3 Study Population

The study population comprised medical records and biodata of adult patients aged 18 years and above admitted to BCRH between November 2025 and February 2026 whose clinical presentation and radiological investigation documentation confirmed stroke resulting in hemiplegia. *Inclusion Criteria:* Biodata of patients admitted during the study period with confirmed stroke and evident hemiplegia. *Exclusion Criteria:* Patients' biodata with neurological deficits secondary to non-stroke causes such as traumatic brain injury, infection, sickle cell anaemia, epilepsy, space occupying lesions and records with incomplete clinical information.

3.4 Sampling and Sample Size

Consecutive and purposive samplings were used to identify all eligible patient records and medical records for the study. Of the 176 stroke admissions recorded during the study period, purposively 54 adult patient files that met the inclusion criteria were included in the study.

3.5 Data Collection Procedure

Data were collected using a structured data extraction form through review of medical records, documented clinical assessments, and rehabilitation notes. Information obtained included socio-demographic characteristics, stroke subtype, comorbidities, behavioural risk factors, rehabilitation interventions, and functional outcomes. Functional disability was assessed using the Modified Rankin Scale (mRS). All extracted data were reviewed by the research team and verified by supervisors for accuracy and completeness.

3.6 Data Analysis

Data were cleaned, coded, and analysed using SPSS version 22. Descriptive and inferential statistics for mean, mode, median, standard deviation presented in Tables and figures. Data was presented in frequencies, percentages and spearman's' correlation and independent t-test to determine association between categorical variables used to summarize.

3.7 Ethical Considerations

Ethical approval was obtained from the Alupe University Institutional Scientific and Ethics Review Committee (ISERC; Ref No. AUC-071/2025), NACOSTI (Ref No. 642762) and Busia County Referral Hospital Ethics Committee, Kenya. Confidentiality of patient information was maintained through anonymized coding and password-protected electronic data storage.

IV. FINDINGS & DISCUSSION

4.1 Socio-demographic Characteristics and Stroke Profile Among Hemiplegic Stroke Patients

A total of 54 patient records with hemiplegic stroke were included in the study. Participants' ages ranged from 32 to 90 years, with a mean age of 61.7 years. Most participants were aged 61–70 years (29.6%), followed by 51–60 years (22.2%), 71–80 years (20.4%), and 41–50 years (18.5%). Females constituted 55.6% of the sample, while males accounted for 44.4%, giving a female-to-male ratio of 1.3:1. The mean age of stroke patients was 61.70 ± 12.90 years, revealing most were older adults, with ages clustering around the early sixties, with a median age of 62 and the modal age was 64 years. Haemorrhagic stroke accounted for 51.9% of cases, while ischemic stroke accounted for 48.1%. Left-sided hemiplegia was slightly more common (53.7%) than right-sided hemiplegia (46.3%). Independent t-test revealed there was a significant difference in mean age between male (58.4 ± 10.50) and female stroke patients (63.7± 11.50) years age. Female patients were significantly older than male patients. Male patients with ischemic stroke had a lower mean gender score (1.42 ± 0.504) compared to females with haemorrhagic stroke (1.68 ± 0.476) as shown in Figure 1 below,

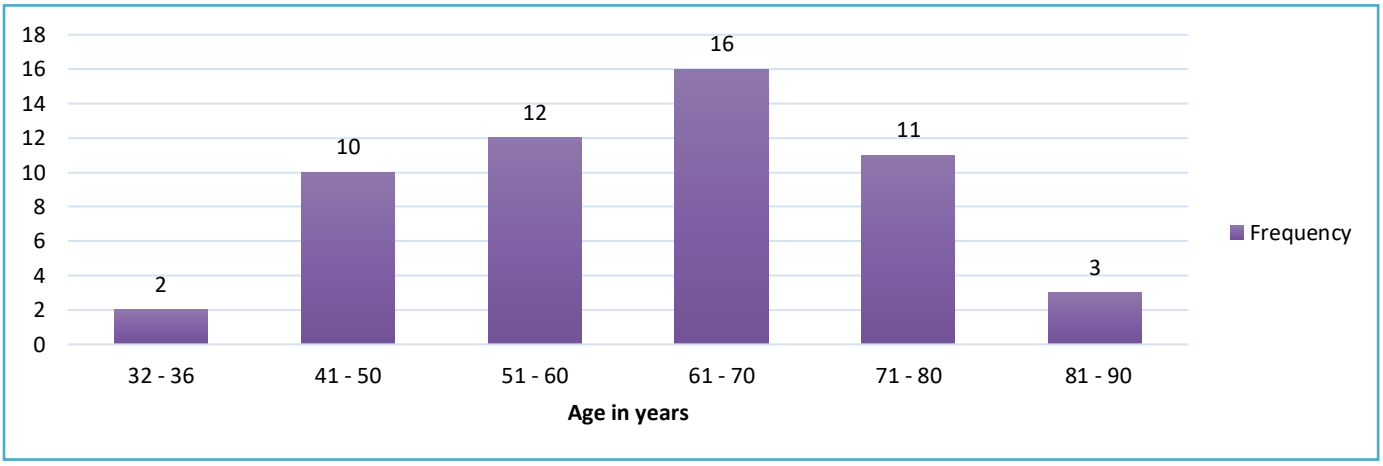

Figure 1
Age and Sex Distribution of Patients with Hemiplegic Stroke

Most participants were married (63%), widowed (31.5%), separated/divorced (3.7%), and single (1.9%) as shown in figure 2 below;

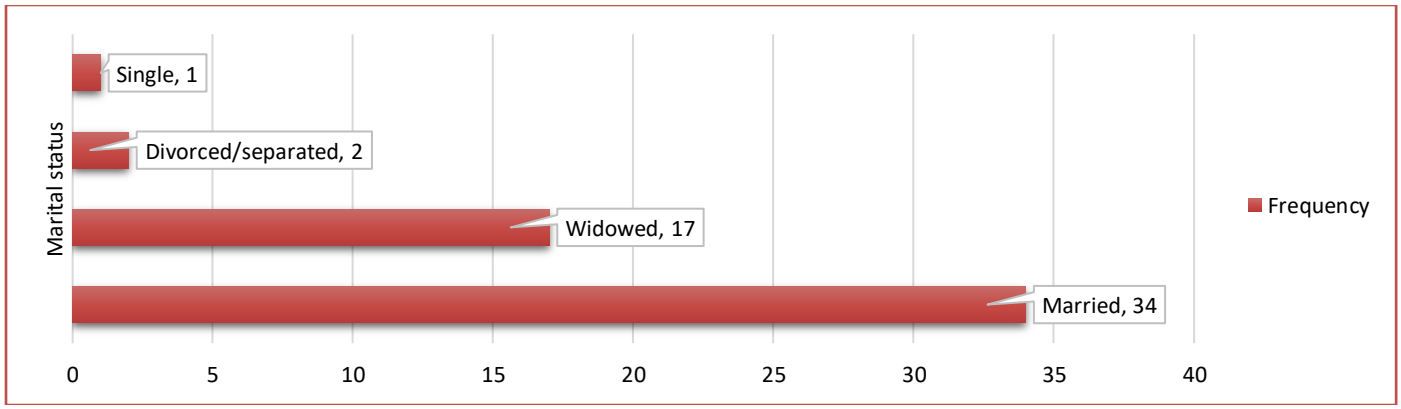

Figure 1
Marital Status Distribution of Patients with Hemiplegic Stroke

Regarding health-seeking behaviour, 38.9% of participants arrived at hospital within 3–6 hours after symptom onset, while 16.7% presented within less than 3 hours. However, 29.6% presented more than 12 hours after symptom onset. The onset time was unknown in 11.1% of cases, while 3.7% presented between 6–12 hours as shown in Figure 3 below;

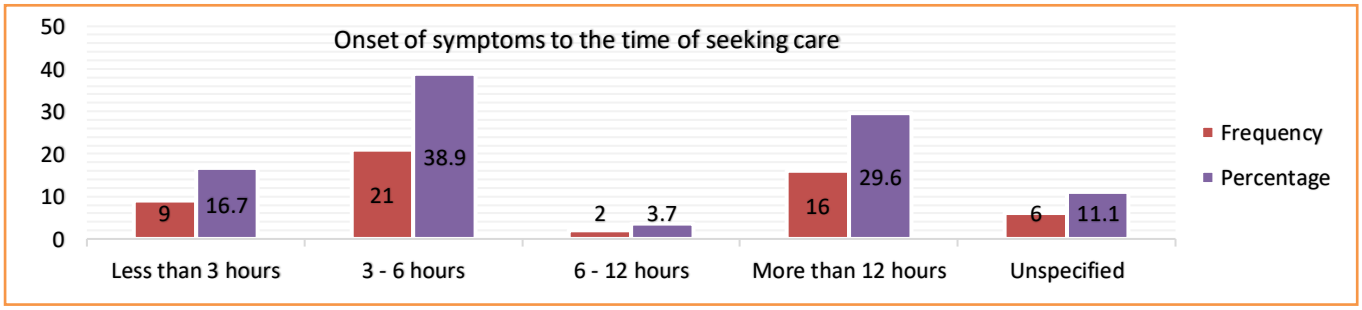

Figure 2:
Time from Symptom Onset to Hospital Arrival among Patients with Hemiplegic Stroke

The most common first point of care was a local clinic (42.6%), followed by direct presentation to the referral hospital (29.6%) and private hospitals (22.2%). A few patients remained at home after symptom onset (3.7%), while 1.9% initially consulted traditional healers. At admission, 46.3% of participants were drowsy, 40.7% were unconscious, and only 9.3% were fully alert. Mild speech impairment was documented in 51.9% of patients, while 24.1% had severe communication impairment. Swallowing impairment was present in 38.9% of participants, whereas 27.8% had eating

difficulties. Most patients (74.1%) had paralysis duration ranging from 1–4 weeks at presentation shown in Table 1 below;

Table 1

Clinical Presentation and Health-Seeking Behaviour (n = 54)

Variable Category	**Variable**	**Frequency (n)**	**Percentage (%)**
Care-seeking pattern	local clinic	23	42.6
	Direct referral hospital	16	29.6
	Private hospital	12	22.2
	Stayed home	2	3.7
	Traditional healer	1	1.9
Clinical presentation	Drowsy at admission	25	46.3
	Unconscious	22	40.7
	Alert	5	9.3
	Mild speech impairment	28	51.9
	Severe speech impairment	13	24.1
	Swallowing impairment	21	38.9
	Visual + swallowing impairment	15	27.8
	Paralysis duration (1–4 weeks)	40	74.1

The scatter plot revealed that there was a weak negative correlation between age groups and first point of care after stroke symptoms onset as shown in Figure 1 with downward sloping regression line. However, increased ages groups between 60-70 years sought care earlier after symptoms onset as shown in Figure 4 below.

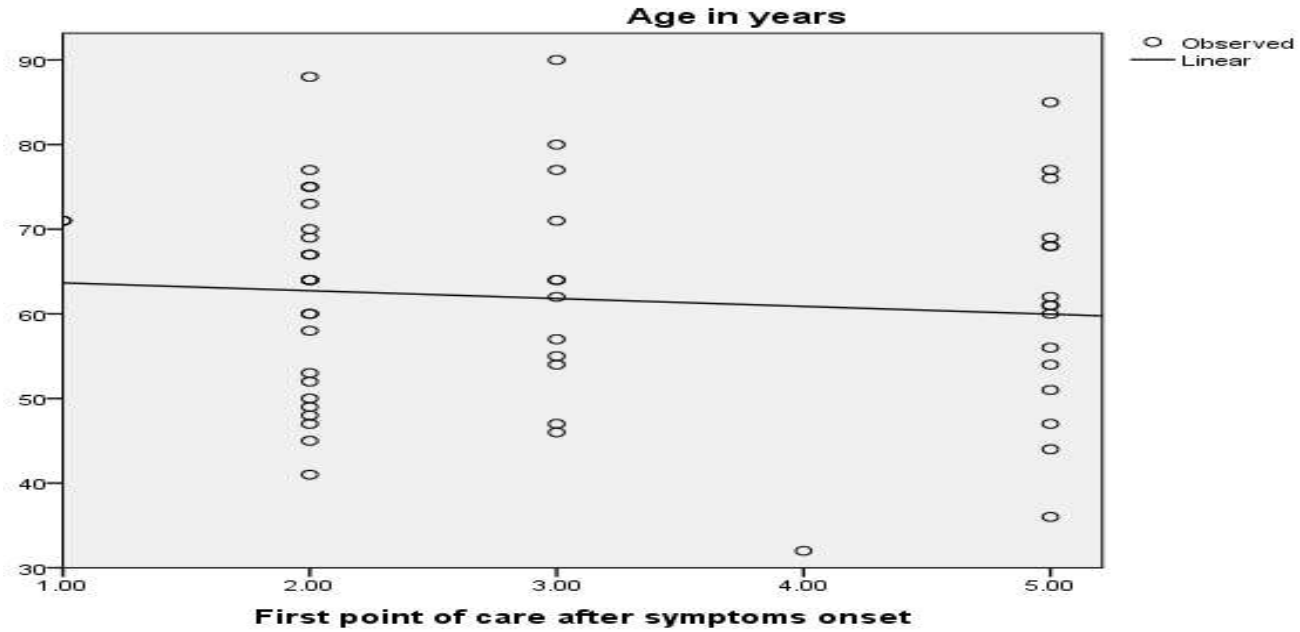

Figure 4

First point of care following onset of stroke symptom by age group

Following hemiplegic stroke symptom onset, 42.6% of participants, first sought care at a local clinic, 29.6% sought care directly to the referral hospital, 22.2% from private hospital, 3.7% (n=2) stayed at home, and 1.9% (n=1) consulted a traditional healer as shown in Table 2 below;

Table 2

Health care seeking behaviour among participants (n=54)

Health Care-Seeking behaviour	First visit: Local clinic	23	42.6
	Direct referral hospital	16	29.6
	Private hospital	12	22.2
	Stayed home	2	3.7
	Traditional healer	1	1.9

4.2 Prevalence, Clinical Profile and Lifestyle Modifiable Risk Factors among Hemiplegic Stroke Patients

Hypertension was the most prevalent modifiable risk factor, affecting 92.6% of participants. Among hypertensive patients, 60% reported poor adherence to antihypertensive medication. Diabetes mellitus was present in 18.5% of participants, while 22.2% had a previous history of stroke or transient ischemic attack (TIA). Among those with previous stroke episodes, 58.3% had experienced one previous episode and 41.7% had experienced two episodes. Most participants (81.5%) had never smoked, while 9.3% were former smokers and 9.3% were current smokers. Smoking duration ranged from 10 to 55 years, with daily cigarette consumption ranging from 2–30 sticks. Alcohol use was reported by 24.1% of participants, including 14.8% current users and 9.3% former users. Half of the participants (50%) reported engaging in physical activity at least three days per week, whereas 48.1% reported sedentary lifestyles. Dietary assessment revealed that 53.7% consumed fruits and vegetables only occasionally, while 20.4% rarely or never consumed them. Most participants (83.3%) reported adding extra salt to meals at the Table 3 below.

Table 3

Participants' Modifiable Risk Factors (n = 54)

Variable Category	Variable	Frequency (n)	Percentage (%)
Risk factors and lifestyle	Hypertension	50	92.6
	Poor medication adherence	30	60.0
	Previous stroke/TIA	12	22.2
	Diabetes mellitus	10	18.5
	Current smokers	5	9.3
	Current alcohol users	8	14.8
	Physically active ≥3 days/week	27	50.0
	Low fruit/vegetable intake	29	53.7
	Add salt at table	45	83.3

Binary logistic regression analysis was conducted to determine the association between risk factors and stroke type. Pre-stroke physical activity level was the only variable significantly associated with stroke type (B=14.790, p-value <0.001), indicating that sedentary lifestyle was associated with higher odds of ischemic stroke relative to haemorrhagic stroke. However, this finding should be interpreted with caution because the study had a small sample size of 54 patients, which may have resulted in unstable regression estimates. Spearman's' rank-order correlation analysis revealed communication difficulty was significantly associated with history of diabetes mellitus (r= -0.326, p = 0.016), the average number of cigarettes smoked per day (r = -0.688, p = 0.028), and pre-stroke physical inactivity level (r = 0.352, p = 0.009). More so, there was a moderate positive correlation between history of systemic hypertension and use of antihypertensive drugs (r=0.578, p < 0.001).

4.3 Application of the ICF Framework in Assessing Neurological Deficits and Functional Status following Hospitalization and discharge

Before stroke onset, 96.3% of participants were fully independent in activities of daily living, while 3.7% were partially independent. Following stroke, marked neurological and functional impairments were documented. Regarding postural control, 48.1% of patients were able to sit unsupported, whereas 42.6% were unable to maintain unsupported sitting. Manual muscle testing on oxford scale was recorded as follows; motor function on the affected side was substantially reduced, with 53.7% demonstrating partial voluntary movement, 22.2% having no observable movement, and 16.7% exhibiting only minimal movement. Full limb movement was documented in only 3.7% of patients as shown in Table 4 below.

Table 4: Oxford scale for muscle strength Testing (n=54)

Limb Movement on Affected Side	Frequency	Percentage
Full	2	3.7
Partial	29	53.7
Flicker	9	16.7
None	12	22.2
Not applicable (Deceased)	2	3.7

Functional disability assessed using the Modified Rankin Scale (mRS), showed that 81.5% of patients had severe disability (mRS 4), indicating inability to walk independently or perform self-care without assistance. Moderate disability (mRS 3) and slight disability (mRS 2) were each documented in 5.6% of participants. Severe dependence (mRS 5) and mortality (mRS 6) each accounted for 3.7% as shown in Figure 5 below.

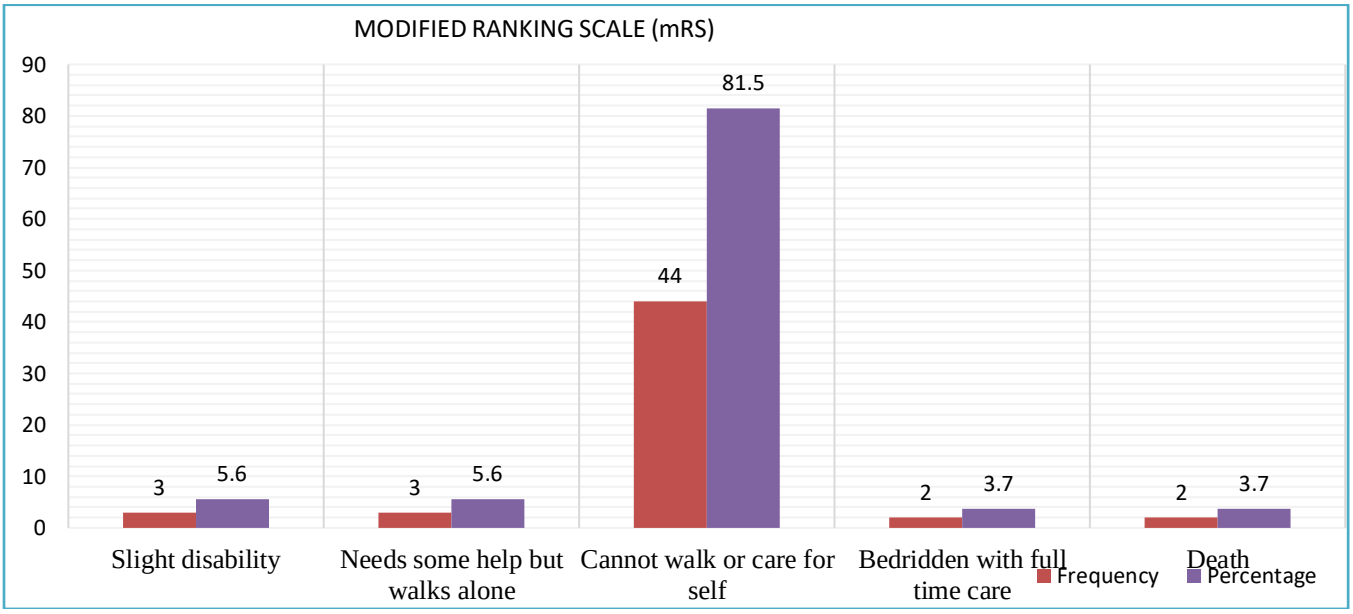

Figure 5:
Distribution of Modified Rankin Scale Scores Among Patients with Hemiplegic Stroke at Discharge

Although, the physiotherapists' documentation did not classify post-stroke disability using ICF Framework, the documented clinical findings could be interpreted within ICF domains of body functions and structures on impairments, activities limitations and participation restrictions and personal and environmental barriers to rehabilitation services. These findings highlight the need to adopt the ICF Framework in clinical practice to facilitate comprehensive assessment, rehabilitation planning, standardized documentation and effective communication among healthcare professionals at local and international levels. At the impairment level, the study revealed severe neurological deficits, with 87% of patients presenting with altered consciousness and orientation, 92.8% exhibiting one-sided upper and lower limb weakness, and 76% experiencing communication impairments. Some had dysphagia both in swallowing and eating (66.7%), pressure sores (24.1%), and hypertension (92.6%) reflected both primary neurological damage and secondary complications. This multidimensional classification points out to an extensive physiological burden of hemiplegic stroke and provides a clear focus for multidisciplinary targeted, and impairment-based physiotherapy interventions.

At the activity level, the ICF framework revealed functional limitations that would not be fully captured by diagnosis alone. Some of patients were unable to perform basic mobility and self-care tasks, with 42.6% unable to sit unsupported and 81.5% unable to walk independently. Dependence in activities of daily living, including eating, swallowing as it affects feeding, dressing, toileting, and personal hygiene, was strongly linked to motor weakness, speech and dysphagia impairments. Study findings that call for body function and task-oriented occupational and physiotherapy strategies focused on restoring functional independence through speech and swallowing re-education and mobility training, postural control, and activities of daily living retraining. The ICF framework demonstrated the direct progression from impairment to activity limitation, reinforcing the importance of early and structured physiotherapy rehabilitation in improving functional and mobility outcomes.

At the participation level, the study identified significant restrictions in social and community engagement, with 72.2% of patients discharged home despite high levels of dependency, indicating limited reintegration into community life and increased caregiver burden. Hospital environmental factors further seemed to worsen these challenges, including delayed access to specialized care with 29.6% seeking care directly to referral facilities, fragmented referral systems, and limited availability of community-based rehabilitation services highlight on need for prompt quality health care for post stroke incidences as shown in Table 5 below.

Table 5

ICF Domains, Impairments and Disability Findings (n = 54)

ICF Domain	ICF Code	Category	Findings
Body functions and structures	b110	Consciousness functions	87% drowsy or unconscious
	b114	Orientation functions	87% impaired
	b730	Muscle power functions	22.2% no movement; 53.7% partial movement
	b167	Mental functions of language	76% communication impairment
	b510	swallowing functions	38.9% dysphagia
	b280	Sensation of pain	11.1% shoulder pain
	b420	Blood pressure functions	92.6% hypertension
	b810	Protective functions of the skin	24.1% pressure sores
Activities and participation	d410	Changing body position	42.6% unable to sit unsupported
	d450	Walking	81.5% unable to walk independently
	d510–d540	Self-care activities	Severe dependence
	d550	Eating	27.8% impaired due to dysphagia
	d910	Community life	Limited participation after discharge
Environmental factors	e355	Health professionals	Limited multidisciplinary rehabilitation
	e580	Health services and systems	Limited stroke rehabilitation services
	e310	Immediate family	High caregiver dependence
Personal factors	—	Age and lifestyle	Older age, poor diet, physical inactivity

4.4 Post-Stroke Rehabilitation Strategies Following Hospitalization and Discharge among Adult Hemiplegic Stroke Patients

Length of hospital stay ranged from 2 to 39 days, with 14-day and 21-day admissions being the most common durations. Most participants (72.2%) were discharged home, while 18.5% remained hospitalized for ongoing medical and physiotherapy management and 5.6% were referred to higher-level facilities as shown in figure 6 below.

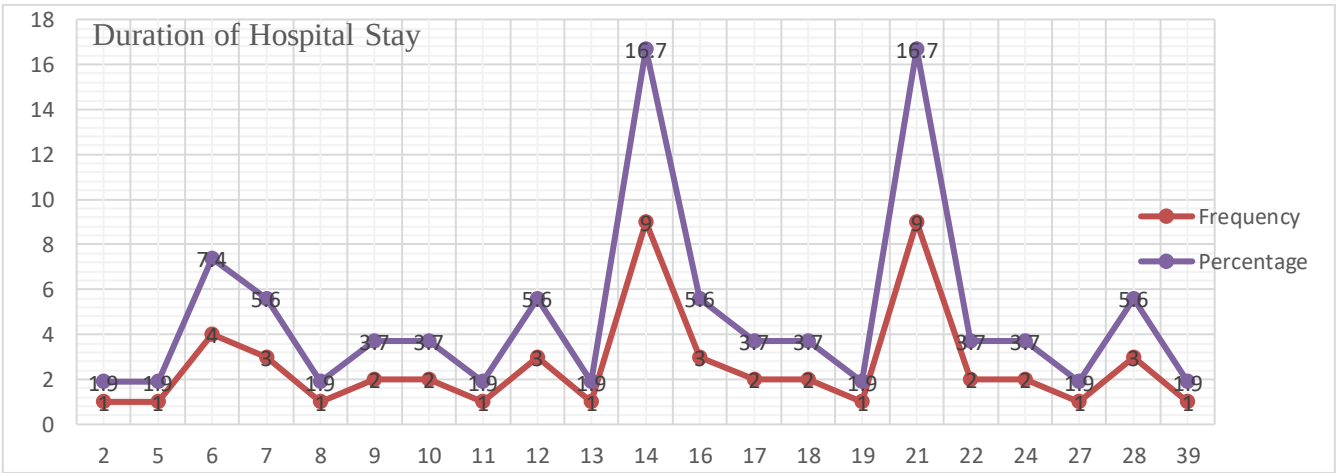

Figure 6:

Distribution of Length of Hospital Stay Among Patients with Hemiplegic Stroke

Despite at hospital admission 48.1% presented with ischemic stroke and 51.9% ischemic, following multidisciplinary management 53.7% had partial limb movement of MMT of 3- while 22.2% were unresponsive at discharge. More than half of participants (55.6%) developed no in-hospital complications. However, pressure sores (24.1%), hemiplegic shoulder pain (11.1%), pneumonia (5.6%), and seizures (3.7%) were documented. At discharge, 48.1% of participants demonstrated clinical improvement, while 40.7% remained clinically stable as shown in Table 6 below.

Most patient (96.3%) were referred for physiotherapy rehabilitation during hospitalization. Documented interventions included early mobilization, bed mobility and transfer training, trunk control exercises, sitting and standing balance retraining, gait re-education, progressive muscle strengthening, range-of-motion exercises, proprioceptive training, and repetitive task-specific functional exercises initiated within the first 24–72 hours after admission.

Despite rehabilitation interventions, most patients remained dependent at discharge, reflected by the predominance of severe disability (mRS 4). There was limited documentation of constraint-induced movement therapy (CIMT) and community-based rehabilitation referral pathways. There was also limited re-positioning schedules to prevent pressure sores development and caregivers' education of hemiplegic shoulder pain and handing despite the

documented physiotherapy interventions. However, there less documented on the use of International Classification of Functioning, Disability and Health (ICF) framework, impairments to identified body functions affected, activity limitations, participation restrictions, and environmental factors to guide on continuum rehabilitation strategies in hospital and community-based rehabilitation interventions and discharge follow-ups as shown in Table 6 below.

Table 6

Functional Status and Hospital Outcomes (n = 54)

Variable Category	Variable	Frequency (n)	Percentage (%)
Functional status	Ischemic stroke	26	48.1
	Haemorrhagic stroke	28	51.9
	Partial limb movement	29	53.7
	No movement	12	22.2
	Severe disability (mRS 4)	44	81.5
Hospital complications	No complications	30	55.6
	Pressure sores	13	24.1
	Shoulder pain	6	11.1
	Pneumonia	3	5.6
	Seizures	2	3.7
Outcomes	Improved	26	48.1
	Stable	22	40.7
	Deteriorated	1	1.9
	Died	2	3.7
	Discharged home	39	72.2

4.5 Discussion

4.5.1 Socio-demographic Characteristics and Clinical Profile of adult Hemiplegic Stroke Patients

This study found that hemiplegic stroke affected a broad age range, with many patients presenting during economically productive years. These findings are consistent with studies from SSA reporting earlier stroke onset compared to high-income countries (De Oliveira et al., 2025; Baye et al., 2020; Musung et al., 2022). The slight female predominance observed contrasts with studies reporting male predominance or near-equal sex distribution in African stroke cohorts (Akinyemi et al., 2021). This difference may reflect local variations in health-seeking behaviour and survival patterns.

The predominance of haemorrhagic stroke is comparable to findings from other African studies, where uncontrolled hypertension contributes substantially to intracerebral haemorrhage (Akinyemi et al., 2021; Matuja et al., 2024). Delayed presentation to referral facilities observed in this study is also consistent with reports from Ethiopia and Ghana demonstrating weak referral systems, poor stroke awareness, and limited emergency transport services (Wubshet et al., 2023; Mohammed et al., 2021). Such delays reduce opportunities for timely intervention and worsen neurological outcomes. These findings imply to delayed access to acute stroke care remains an important determinant of stroke severity and functional outcomes in resource-limited settings, reinforcing the need to strengthen referral systems and community stroke awareness.

4.5.2 Prevalence and Modifiable Risk Factors Associated with Adult Hemiplegic Stroke

Hypertension was the dominant modifiable risk factor, consistent with evidence identifying uncontrolled blood pressure as the leading driver of stroke burden in Africa (Musung et al., 2022; Ackah et al., 2026). The high prevalence of hypertension documented in patients' biodata in this study points to persistent challenges in blood pressure control and secondary stroke prevention within the study population. The prevalence of diabetes mellitus and recurrent stroke observed in this study supports previous evidence linking metabolic disorders with poor functional outcomes and increased mortality among stroke survivors (Adoukonou et al., 2021). The revealed burden of hypertension is consistent with previous studies linking unhealthy dietary patterns characterized by high salt intake and low fruit and vegetable consumption and unhealthy inactivity lifestyles to increased stroke risk in SSA (Jobe et al., 2025; Okekunle et al., 2024; Akinyemi et al., 2021).

4.5.3 Neurological deficits, Functional Impairment and Disability Outcomes Following Hospitalization and Discharge

Most participants presented with severe neurological deficits, including impaired consciousness, communication difficulties, dysphagia, and major motor weakness. Similar findings have been reported in other African hospital-based studies where delayed presentation is associated with increased stroke severity at admission (Mohammed

et al., 2021). The predominance of severe disability (mRS 4) at discharge indicates that stroke in this setting contributes more to long-term disability than mortality. Although in-hospital mortality was relatively low compared to some African studies reporting mortality rates between 20%–30% (Tesfaye et al., 2025; Adoukonou et al., 2021), many survivors remained dependent in activities of daily living. Pressure sores and hemiplegic shoulder subluxation related pain were common complications, suggesting gaps in preventive nursing care, positioning strategies, caregiver education, and early mobilization. Similar complications have been reported in Ethiopia and Tanzania among severely dependent stroke patients (Wubshet et al., 2023; Mohammed et al., 2021). These findings indicate preventable secondary complications remain among hemiplegic stroke patients with severe disability and may reflect delayed bed to wheelchair mobilization and inadequate multidisciplinary rehabilitation during acute phase.

4.5.4 Application of the ICF Framework in Assessing Neurological Deficits and Functional Status following Hospitalization and discharge

Although physiotherapy documentation in the present study did not explicitly classify post-stroke disability using the ICF framework, the documented clinical findings could be interpreted within the ICF domains of body functions and structures, activity limitations, participation restrictions, and contextual factors. Greater integration of the ICF into routine clinical documentation may facilitate standardized assessment, improve interdisciplinary communication, and support comprehensive rehabilitation planning.

Greater integration of ICF based documentation into routine stroke care would improve standardised assessment, interdisciplinary communication, and individualized rehabilitation planning by reporting stroke-related disability across body functions, activity limitations, participation restrictions, and environmental barriers as guided by WHO (2016, 2001). Severe impairments in motor function, communication, swallowing, mobility, and self-care demonstrated the multidimensional burden of hemiplegic stroke in this setting was consistent with global burden of disease (Feigin et al., 2026; Global Burden of Disease [GBD], 2024) estimates indicating stroke as one of the leading causes long term disabilities and high mortality rates worldwide (Jacobs et al., 2025; Chen et al., 2025).

4.5.5 Post-Stroke Rehabilitation Strategies Following Hospitalization and Discharge among Adult Hemiplegic Stroke Patients

Early physiotherapy interventions including bed mobility training, trunk rehabilitation, balance retraining, gait re-education, and task-specific exercises were widely documented and are consistent with evidence supporting early locomotor rehabilitation for functional recovery following hemiplegic stroke (Todhunter-Brown et al., 2025; Khurshid et al., 2026; Du et al., 2025; Li et al., 2024). This finding is consistent with reports that demonstrated persistent rehabilitation service gaps in low-resource settings on constraint-induced movement therapy, speech therapy referral, caregiver training, and community-based rehabilitation referral pathways (Conchillo-liria et al., 2026; Kingau, 2023; Shrubsole et al., 2018). Participation restrictions remained substantial, with most patients discharged home despite persistent dependency and limited community reintegration. These findings emphasize the need to strengthen multidisciplinary stroke rehabilitation systems, structured discharge planning, caregiver support programs, and community-based rehabilitation pathways to improve long term functional recovery among adult hemiplegic stroke survivors in resource-limited settings, consistent with WHO rehabilitation recommendations (WHO, 2022).

However, limited documentation was available the use of constraint induced movement therapy, speech therapy referrals, caregivers' trainings and community-based rehabilitation pathways for stroke patients, as medical records dominated rehabilitation services delivery remained predominantly physiotherapy-centred. This pattern reflects broader challenges in SSA where shortages of specialized rehabilitation professionals and fragmented referral systems limit comprehensive stroke recovery pathways in line with Cyuzuzo et al. (2025). Therefore, this study findings reveals that adult hemiplegic stroke in Busia County Referral Hospital is characterised by a higher burden of modifiable vascular risk factors, severe neurological deficits, substantial functional dependence and limited continuity of rehabilitation following discharge. These findings support integrated stroke prevention, early multidisciplinary rehabilitation, standardized ICF based functional assessment and community-based rehabilitation services to improve long term outcomes among stroke survivors.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This study demonstrates that hemiplegic stroke in rural Western Kenya is strongly associated with uncontrolled hypertension, delayed presentation, severe neurological impairment with poor use of ICF, and substantial functional disability. Although most patients survived hospitalization, many remained highly dependent at discharge despite receiving physiotherapy rehabilitation.

5.2 Recommendations

Strengthening hypertension prevention and control programs, improving adherence to antihypertensive therapy, enhancing organized stroke referral systems, and expanding multidisciplinary and community-based rehabilitation services are essential for reducing stroke-related disability in resource-limited settings.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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