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ORIGINAL ARTICLE

Awareness of Stroke Risk Factors and Warning Signs Among Informal Caregivers in North-East Nigeria

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Abstract

Introduction: Stroke remains a leading cause of mortality and long-term disability in Nigeria. Recurrent strokes, which have higher morbidity and mortality rates, necessitate preventive strategies. Informal caregivers are critical in managing risk factors and recognizing warning signs, yet their awareness levels remain understudied. This study aimed to evaluate and enhance informal caregivers' awareness of stroke risk factors and warning signs to strengthen preventive care behaviors and improve emergency response during stroke events.

Methods: A cross-sectional study was conducted at the Federal University of Health Sciences Teaching Hospital Azare, involving 403 informal caregivers of stroke patients aged 18 years. Participants were grouped by income and education, and stratified random sampling was used during the recruitment procedure. Validated Hausa or English questionnaires (QFAS and PIF) assessed awareness. Data were analyzed using chi-square tests and logistic regression (SPSS v22).

Results: High awareness of hypertension (94%) and visual problems (80.9%) contrasted with low recognition of smoking (23.1%) and severe headache (0.2%) as risk factors/warning signs. Significant predictors of knowledge included tertiary education (OR=3.185, 95% CI: 1.387–7.314, $P < 0.001$) and family history of stroke (OR=3.545, 95% CI: 2.875–4.369, $P = 0.012$).

Conclusion: To reduce stroke recurrence and mortality, targeted educational interventions—including community workshops, pictorial tools, and CHW-led home education—must urgently address awareness gaps in smoking risks, severe headache recognition, and among female/low-literacy caregivers.

Keywords: Stroke, Informal caregivers, Awareness, Risk factors, Warning signs, Nigeria

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Introduction

Stroke constitutes a major global health crisis, accounting for 87% of disability-adjusted life years in low- and middle-income countries (LMICs) like Nigeria Adeloye et al. 2017. Nigeria bears one of the world's highest stroke burdens, with prevalence reaching 1,460 per 100,000 in some regions adeloye2017; Agunloye and Ogunniyi 2019. LMICs shoulder 70% of global stroke deaths and 87% of stroke-related disabilities Agyemang et al. 2012, with Africans experiencing strokes a decade earlier (ages 40–60), intensifying familial and socioeconomic strains Akinyemi et al. 2021. Alarmingly, 25% of survivors face recurrence within five years—often with higher mortality than initial events Arabambi, Akinyemi, and Ogbole 2022; Awosan et al. 2018. Yet 90% of strokes link to modifiable risks like hypertension, diabetes, smoking, and physical inactivity Awosika et al. 2015.

In Nigeria's under-resourced health system, informal caregivers, usually spouses, daughters, or siblings, provide more than 80% long-term stroke care without formal training. These caregivers navigate complex responsibilities: medication adherence, rehabilitation support, dietary management, and emergency response, often while managing economic hardships and limited healthcare access. Cultural norms further intensify burdens, with women providing over 70% of caregiving hours Faronbi, Adebowale, and Faronbi 2017.

Caregiver recognition of warning signs (e.g., facial asymmetry, speech difficulty, sudden severe headache) and risk factor management is critical for secondary prevention Bakas et al. 2014; Benjamin et al. 2019. However, Nigerian studies reveal severe knowledge gaps: only 23.1% identify smoking as a risk factor, and a mere 0.2% recognize severe headache as a warning sign Bushnell et

al. 2020. Low literacy and gender disparities further constrain awareness, perpetuating unsafe practices.

This study evaluates gaps in awareness of stroke risk factors and warning signs among informal caregivers of stroke patients in Nigeria to design culturally tailored interventions that strengthen preventive care and emergency response, thereby improving patient outcomes.

Materials and Methods

Study Design

This descriptive cross-sectional study was conducted at the Physiotherapy Department of the Federal University of Health Sciences Teaching Hospital, Azare, Bauchi State, Northeast Nigeria, between October 2023 and August 2024. The aim of the study was to assess the awareness of stroke risk factors and warning signs among informal caregivers of stroke patients attending the Physiotherapy Clinic.

Participants

Eligible participants were informal caregivers aged 18 years or older who had provided primary care to a stroke patient for at least three months. Caregivers of deceased patients or those who declined participation were excluded. Ethical approval was granted by the Ethics, Research and Review Committee of the Federal University of Health Sciences Teaching Hospital Azare. Written informed consent was obtained from literate participants, while verbal consent—witnessed and documented by an impartial observer—was secured for illiterate participants.

Sample Size and Sampling

A sample size of 400 caregivers was calculated using the G * Power software (version 3.1.9.7) Faul et al. 2007 with a moderate effect size of 0.3, significance level ($\alpha = 0.05$) and power 80%, based on previous studies Vincent-Onabajo and Moses 2016. Participants were stratified by income and education level. Stratified random sampling ensured proportional representation of socio-economic and educational subgroups from informal caregivers attending the physiotherapy clinic between November 2023 and August 2024. Random selection within strata minimized bias, and final exclusions yielded the target sample.

Instruments and Validation

Two validated instruments were used: the Participant Information Form (PIF) and the Questionnaire Form About Stroke (QFAS), adapted from Yesilbalkan et al. 2019 to reflect Nigeria's context.

The PIF captured socio-demographic and clinical data, such as age, gender, marital status, employment, educational level, and income. Socio-economic status was classified using Nigerian National Bureau of Standards brackets as low (<₦50,000/month), middle (₦50,000–₦150,000), or high (>₦150,000). Nigerian National Bureau of Standards 2023. It also recorded the caregiver's relationship to the patient, family history of stroke, and caregiving duration.

The QFAS assessed knowledge of stroke risk factors and warning signs through 27 items: 15 on risk factors (e.g., hypertension, smoking, stress), and 12 on warning signs (e.g., visual loss, severe headache). Knowledge percentiles were calculated using $(n+1) \times p$, where n is sample size and p is the desired percentile. Knowledge levels were classified as good ($\geq 75^{\text{th}}$ percentile), moderate (25^{th}–74^{th}), or poor ($< 25^{\text{th}}$).

Tools were translated from English to Hausa using forward-backward translation by bilingual experts. Content validity was confirmed by five stroke experts using a 4-point Likert scale. The Content Validity Index (CVI) for both instruments was 0.86, surpassing the 0.80 threshold O'Donnell et al. 2016.

A pilot study with 30 caregivers (excluded from analysis) confirmed reliability. Cronbach's alpha was 0.82 for QFAS and 0.78 for PIF, showing excellent internal consistency. The validation process followed COSMIN guidelines Mokkink et al. 2018.

Data Analysis Procedure

Descriptive statistics summarized the data. Chi-square tests evaluated associations between awareness levels and participant characteristics. Logistic regression identified significant predictors of knowledge. All analyses were performed using SPSS version 26, with a significance threshold set at $p < 0.05$.

Results

Socio-Demographic Characteristics

The study included 403 participants, with a majority being male (57.8%, $n = 233$) and a mean age of 28.04 ± 6.57 years (range: 17–66). Over half of the participants were married (55.6%), and most belonged to the low socio-economic stratum (71.0%). Educational attainment varied: 38.5% had completed secondary education and 36.7% attained tertiary-level qualifications. A significant proportion of caregivers (63.3%) were immediate family members of the stroke patient (e.g., parents, children), while nearly one-quarter (23.1%) reported a family history of stroke or transient ischemic attack (TIA). See Table 1.

Awareness of Stroke Risk Factors and Warning Signs

Slightly over half of the participants (58.1%, $n = 236$) correctly identified the brain as the organ affected by stroke. Awareness was notably high for hypertension (94.0%) and excessive salt intake (71.7%) as risk factors, as well as for visual disturbances (80.9%) and speech difficulties (70.2%) as warning signs. However, critical knowledge gaps were observed: only 23.1% recognized smoking as a risk factor, and just 0.2% identified severe headache as a warning sign. These findings underscore the need for

Table 1. Sociodemographic Characteristics of the Study Participants

Variable	Category	n (%)
Age (Years)	Mean ± SD	28.04 ± 6.57
Gender	Male	233 (57.8)
	Female	170 (42.2)
Marital Status	Married	224 (55.6)
	Divorced	159 (39.5)
	Single	16 (4.0)
	Other	4 (1.0)
Socioeconomic Status	Low	286 (71.0)
	Middle/High	117 (29.0)
Education Level	Non-formal	81 (20.1)
	Primary School	19 (4.7)
	Secondary School	155 (38.5)
	Tertiary School	148 (36.7)
Employment Status	Employed	130 (32.3)
	Unemployed	156 (38.7)
Relationship to Patient	Father	148 (36.7)
	Mother	108 (26.8)
	Son	7 (1.7)
	Daughter	26 (6.5)
	Partner	19 (4.7)
	Relatives	78 (19.4)
	Other	17 (4.2)
Family History of Stroke/TIA*	Yes	93 (23.1)
	No	310 (76.9)
Target Organ (Brain)	Yes	235 (59.1)
	No	168 (41.7)

Table notes
* TIA: Transient Ischemic attack.

targeted educational interventions to address underrecognized aspects of stroke awareness. Complete awareness rates are detailed in Table 2.

Associations Between Risk Factors and Warning Signs

Chi-square analysis revealed significant associations between several risk factors and stroke warning signs: diabetes ($\chi^2 = 7.636$, $P = 0.006$), physical inactivity ($\chi^2 = 5.495$, $P = 0.019$), stress ($\chi^2 = 4.702$, $P = 0.030$), and facial numbness or weakness ($\chi^2 = 6.400$, $P = 0.011$). However, no significant associations were found between warning signs and hypertension, smoking, salt intake, or previous stroke history (Table 3).

Predictors of Stroke Knowledge

Logistic regression analysis identified several independent predictors of higher stroke knowledge. Males had significantly greater odds of knowledge compared to females (OR = 2.93, 95% CI: 1.45–5.92, $P < 0.001$). Participants with tertiary education had 3.19 times higher odds of good knowledge compared to those with lower education (95% CI: 1.39–7.31, $P < 0.001$). High socio-economic status was also a predictor (OR = 2.31, 95% CI: 1.19–3.48, $P < 0.001$), as was having a family history of stroke or TIA (OR = 3.55, 95% CI: 1.34–2.88, $P = 0.012$) (Table 3).

Table 2. Associations Between Risk Factors and Warning Signs (Chi-Square Test)

Risk Factor	$\emptyset^2$	p-value
Diabetes	7.636	0.006**
Lack of Physical Activity	5.495	0.019*
Stress	4.702	0.030*
Numbness/Weakness in Face	6.400	0.011*
Hypertension	0.053	0.818
Smoking	0.986	0.321

* $p < 0.05$, ** $p < 0.01$.

Table 3. Predictors of Stroke Knowledge (Logistic Regression)

Variable	OR	95% CI	p-value
Male	2.930	1.452–5.916	<0.001***
Tertiary Education	3.185	1.387–7.314	<0.001***
High Socio-Economic	2.305	1.194–3.477	<0.001***
Family History of Stroke/TIA	3.545	1.339–2.875	0.012*

Reference groups: Female, Low Socio-Economic Status, No Family History of Stroke/TIA.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Discussion

This study provides critical insights into stroke risk factor and warning sign awareness among informal caregivers in northeastern Nigeria, a region characterized by limited healthcare resources and a high stroke burden Feigin, Norrving, and Mensah 2016. The findings reveal a paradoxical landscape where high awareness of hypertension (94%) coexists with alarming gaps in recognizing modifiable risks such as smoking (23.1%) and critical warning signs like severe headache (0.2%) Awosan et al. 2018; Arabambi, Akinyemi, and Ogbole 2022. These disparities underscore the urgent need for targeted educational interventions and culturally adaptive strategies to empower caregivers—who serve as a frontline defense in stroke prevention and management.

The predominance of young, educated caregivers aligns with broader sub-Saharan African trends, where younger family members often assume caregiving roles due to familial obligations and higher health literacy Feigin, Norrving, and Mensah 2016. However, the low socio-economic status of 71% of participants highlights systemic barriers to healthcare access, exacerbating vulnerabilities in stroke management. This mirrors findings from Sokoto and Ibadan, where economic constraints hindered caregivers' ability to act on health knowledge Vincent-Onabajo and Moses 2016. The gender disparity in awareness—

with males demonstrating superior knowledge—contrasts with Western studies and reflects patriarchal norms in northern Nigeria, where men traditionally control household health decisions and resources Akinyemi et al. 2021; Arabambi, Akinyemi, and Ogbole 2022.

These awareness gaps are particularly perilous given that smoking is a modifiable risk factor, and severe headache may signal hemorrhagic stroke requiring urgent intervention Benjamin et al. 2019. The findings stand in stark contrast to high-income countries like the United States and Australia, where targeted public health campaigns have improved stroke symptom recognition rates to 80% or higher Bushnell et al. 2020; Feigin, Norrving, and Mensah 2016. Nigeria's lag highlights the need for contextually relevant education, leveraging local languages (e.g., Hausa) and mobile technology—especially given the country's 82% phone penetration rate O'Donnell et al. 2016.

Several methodological limitations warrant consideration. The use of convenience sampling in a tertiary center may introduce selection bias by underrepresenting rural or marginalized caregivers, potentially inflating awareness estimates. Self-reported data also pose a risk of social desirability bias, wherein participants may overstate their knowledge. The exclusion of 15% of approached caregivers due to illiteracy suggests potential non-response bias, likely underestimating the true awareness gap. Moreover, the cross-sectional design limits causal inferences regarding the impact of education or socioeconomic status on stroke awareness.

Nonetheless, tertiary education and high socio-economic status emerged as robust predictors of stroke knowledge, offering actionable entry points for intervention. Physiotherapists, by virtue of their frequent interaction with caregivers during rehabilitation sessions, can deliver structured stroke education in Hausa, focusing on modifiable risks and emergent warning signs. Simultaneously, Community Health Workers (CHWs) can conduct home visits using pictorial flipbooks and radio messaging to bridge access barriers. The recruitment and training of female CHWs are essential to navigate gender norms and ensure inclusivity. These efforts can be further supported through mobile health technology such as SMS reminders and education tips in local languages O'Donnell et al. 2016; Owolabi, Akinyemi, and Akinyemi 2023.

Conclusion

This study identifies critical deficits in stroke awareness among Nigerian caregivers, rooted in gender inequity, poverty, and disparities in education. Despite methodological limitations related to sampling and self-reported data, the dangerously low recognition of modifiable risks (e.g., smoking) and emergent symptoms (e.g., severe headache) highlights an urgent need for policy-level action.

We strongly recommend the integration of standardized stroke education into Nigeria's Primary Health Care systems, including task-shifting strategies where physiotherapists and CHWs deliver structured content. Gender-responsive approaches—such as prioritizing female CHW recruitment—should be mandated. Mobile health interventions, particularly Hausa-language SMS alerts, must also be scaled to improve reach.

These culturally appropriate, community-based strategies can empower caregivers, reduce stroke recurrence, and lower mortality through early recognition and timely action—providing a scalable model for similar LMIC settings.

Conflict of Interest Statement

There are no conflicts of interests to declare.

References

Adeloye, D., A. Auta, O. A. Oni, R. A. David, A. Iseolorunkanmi, A. Oyedokun, and I. F. Adewole. 2017. Estimating the incidence of stroke in africa: a systematic review and meta-analysis. Journal of the Neurological Sciences 377:55–61.

Agunloye, A. M., and A. Ogunniyi. 2019. Stroke care in africa: a systematic review of the literature. International Journal of Stroke 14 (6): 590–597.

Agyemang, C., E. Boon, E. Owusu-Dabo, and S. Agyei-Mensah. 2012. Awareness and knowledge of stroke among hypertensive patients in kumasi, ghana. International Journal of Stroke 7 (3): 21–25.

Akinyemi, R. O., B. Ovbiagele, O. A. Adeniji, F. S. Sarfo, and A. I. Makanjuola. 2021. Stroke in africa: profile, progress, prospects, and priorities. Nature Reviews Neurology 17 (1): 634–656.

Arabambi, B., R. O. Akinyemi, and G. I. Ogbole. 2022. Stroke units in nigeria: a report from a nationwide organizational cross-sectional survey. Pan African Medical Journal 42:140.

Awosan, K. J., M. T. O. Ibrahim, A. A. Sabir, S. P. Ejimadu, and B. A. Isah. 2018. Awareness and prevalence of stroke risk factors among workers in sokoto, nigeria. Journal of Medicine in the Tropics 20 (1): 19–25.

Awosika, O. E., A. Ogunniyi, O. Baiyewu, R. O. Akinyemi, and A. O. Ogunseyinde. 2015. Impact of educational status on stroke risk factors and stroke knowledge in ibadan, nigeria. Journal of Stroke and Cerebrovascular Diseases 24 (11): 2720–2726.

Bakas, T., M. McCarthy, E. T. Miller, and K. M. Yorkston. 2014. Caregiving tasks among family caregivers of patients with stroke: a report from the american heart association/american stroke association. Stroke 45 (7): 2041–2046.

Benjamin, E. J., S. S. Virani, C. W. Callaway, A. M. Chamberlain, A. R. Chang, S. Cheng, and P. Muntner. 2019. Heart disease and stroke statistics—2019 update: a report from the american heart association. Circulation 139 (10): e56–e528.

Bushnell, C., L. D. McCullough, I. A. Awad, M. V. Chireau, W. N. Fedder, K. L. Furie, and V. Caso. 2020. Guidelines for the prevention of stroke in women: a statement for healthcare professionals from the american heart association/american stroke association. Stroke 51 (3): e66–e99.

Faronbi, J. O., O. Adebowale, and G. O. Faronbi. 2017. Gender differentials in caregivers' burden of stroke survivors in rural nigeria. Journal of Neuroscience Nursing 49 (5): 306–311.

Faul, F., E. Erdfelder, A.-G. Lang, and A. Buchner. 2007. G*power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods 39 (2): 175–191.

Feigin, V. L., B. Norrving, and G. A. Mensah. 2016. Global burden of stroke. Circulation Research 120 (3): 439–448.

Mokkink, L. B., C. A. C. Prinsen, D. L. Patrick, J. Alonso, L. M. Bouter, H. C. W. de Vet, and C. B. Terwee. 2018. Cosmin methodology for systematic reviews of patient-reported outcome measures (proms). Quality of Life Research 27 (5): 1147–1157.

Nigerian National Bureau of Standards. 2023. Income categorization framework.

O'Donnell, M. J., S. L. Chin, S. Rangarajan, D. Xavier, L. Liu, H. Zhang, and S. Yusuf. 2016. Global and regional effects of potentially modifiable risk factors associated with acute stroke in 32 countries (interstroke): a case-control study. The Lancet 388 (10046): 761–775.

Owolabi, M. O., R. O. Akinyemi, and J. O. Akinyemi. 2023. Knowledge and perspectives of community members on risk factors and digital stroke risk calculators in nigeria. Journal of Stroke and Cerebrovascular Diseases 32 (5): 106–114.

Vincent-Onabajo, G., and T. Moses. 2016. Knowledge of stroke risk factors among stroke survivors in nigeria. Stroke Research and Treatment 2016:1902151.

Yesilbalkan, O. U., A. Karadakovan, B. V. Dogru, and M. Yavuz. 2019. Awareness of risk factors and warning signs of stroke among caregivers of patients with and without stroke. Journal of the Pakistan Medical Association 69 (8): 1114–1118.