

Research Article

Knowledge and Perception of Stroke: A Population-Based Survey in Uganda

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Purpose. This study, designed to complement a large population survey on prevalence of stroke risk factors, assessed knowledge and perception of stroke and associated factors. **Methods.** A population survey was conducted in urban Nansana and rural Busukuma, Wakiso district, central Uganda. Adult participants selected by multistage stratified sampling were interviewed about selected aspects of stroke knowledge and perception in a pretested structured questionnaire. **Results.** There were 1616 participants (71.8% urban; 68.4% female; mean age: 39.6 years \pm 15.3). Nearly 3/4 did not know any stroke risk factors and warning signs or recognize the brain as the organ affected. Going to hospital (85.2%) was their most preferred response to a stroke event. Visiting herbalists/traditional healers was preferred by less than 1%. At multivariable logistic regression, good knowledge of stroke warning signs and risk factors was associated with tertiary level of education (OR 4.29, 95% CI 2.13–8.62 and OR 5.96, 95% CI 2.94–12.06), resp.) and self-reported diabetes (OR 1.97, 95% CI 1.18–3.32 and OR 1.84, 95% CI 1.04–3.25), resp.). **Conclusion.** Knowledge about stroke in Uganda is poor although the planned response to a stroke event was adequate. Educational strategies to increase stroke knowledge are urgently needed as a prelude to developing preventive programmes.

1. Introduction

Stroke is one of the leading causes of mortality and morbidity worldwide [1–4] with developing countries accounting for 85% of global deaths from stroke [1–3]. Lack of information and poor control of stroke risk factors contribute to the rising incidence of stroke amongst Africans [5–7]. The success of primary preventive measures and timely medical attention immediately following a stroke is influenced by the public's knowledge and perception of stroke and its risk factors [6, 8–10]. The few studies done in Africa to assess the knowledge of stroke among health workers, stroke patients, carers of stroke patients, and the general population have reported low levels

of knowledge about recognizing and preventing stroke [6, 8–12]. Published studies from Africa note that stroke-like symptoms may be considered both physical and social conditions resulting from natural or environmental causes and supernatural causes such as demons and witchcraft [13–15]. Health care access is strongly influenced by cultural knowledge and interpretation of disease symptoms [16, 17], structural and gender constraints [17, 18], and trust in providers [19]. In Uganda, public perception and level of knowledge of stroke warning signs and risk factors have not been well studied. Given the close relationship between health behaviours and health knowledge, this study assessed the knowledge and perception of stroke (organ focus, risk factors, warning signs,

treatment choice, availability of sources of information, and perceived risk) among urban and rural populations in Wakiso district, central Uganda. This information is critical to inform appropriate health promotion campaigns to prevent stroke and minimise acute stroke complications among high risk populations.

2. Materials and Methods

This was a cross sectional study within an existing population survey of 5481 participants on prevalence of stroke risk factors in Wakiso district. Face to face interviews were conducted between August 2012 and August 2013. Multistage stratified sampling technique was used as described below. At the subcounty level, urban Nansana town council was randomly selected out of 5 urban subcounties and rural Busukuma subcounty was randomly selected out of 13 rural subcounties in Wakiso district. Mapping of the selected urban and rural areas followed by a household census identified 25 villages with 26,575 households in Nansana town council and 48 villages with 13,091 households in Busukuma subcounty. The sampling frame was all households in these areas. Systematic sampling was used to select households in each village to total 4,023 in the urban area and 1458 in the rural area that would participate in the large population survey. One adult, randomly selected from each household and consented, participated in the study. The selected households were visited by the research team. The randomly selected participant was informed about the research and the intended use of the information obtained. A request for a written informed consent was then sought. Consented participants presented to the selected health facility the following morning from where they were interviewed in English or the local language by trained survey staff; blood pressure and anthropometric measurements were taken and blood samples for HIV, fasting blood sugar, fasting lipid profile, and rapid plasma reagin tests were provided. Out of the 4023 participants in the urban area and 1458 in the rural area, systematic sampling was used to select 1161 and 455 participants from the urban and rural areas, respectively, to be interviewed on selected aspects of stroke knowledge and perception. Ethical approval for the study was obtained from Makerere University College of Health Sciences' School of Medicine review board and ethics committee. Written informed consent was obtained before enrolling the participants into the study.

2.1. Questionnaire. Selected aspects of stroke knowledge and perceptions were obtained using a pretested and standardised questionnaire with options for multiple responses. Following extensive literature search, the questionnaire was constructed and modified from research by Sug Yoon et al. [20], Ayanniyi et al. [9], Borhani Haghghi et al. [11], and Akinyemi et al. [6] to evaluate knowledge and perception of stroke in an Australian urban population, among adults in Osogbo, Nigeria, and Iranian population, among hospital workers in an African community, respectively. The questionnaire evaluated selected sociodemographic characteristics: perceptions of stroke, what they believe causes a stroke; planned response

to a stroke event and concern about having a stroke; basic knowledge of stroke: organ affected, if stroke is preventable, recurrence of a stroke, and effect of stroke on daily activities; knowledge of stroke warning signs and risk factors; sources of information about stroke. Participant's knowledge of stroke warning signs was categorized based on the numbers of stroke warning signs [9, 21]. Individuals with good knowledge could identify 5–10 stroke warning signs, fair knowledge 2–4 signs, and poor knowledge one stroke warning sign. A similar categorization was used for participant's knowledge of stroke risk factors.

2.2. Statistical Analysis. Descriptive statistics of mean, frequency, and percentages were used to summarise data on sociodemographic variables and stroke knowledge and perceptions. Chi-square tests were used to assess associations between stroke knowledge and perception and demographic variables and self-reported risk factors. Logistic regression was used to determine predictors of knowing the organ affected by stroke and good level of knowledge of stroke warning signs and risk factors. All tests of hypothesis were two tailed with a level of significance at 0.05. All statistical analysis was performed using STATA software version 12.

3. Results

A total of 1616 adults, 1161 (71.8%) from the urban area (71.9% females; mean age 38.8 years \pm 14.8) and 455 (28.2%) from the rural area (59.6% females; mean age 43.0 years \pm 17.1), participated in the study. There was a significant difference in proportions between urban and rural participants regarding male sex $P = 0.004$, female sex $P < 0.001$, Protestant religion $P = 0.028$, Muslim religion $P = 0.033$, primary level of education $P = 0.005$, and secondary level of education $P = 0.038$. Sociodemographic details are as shown in Table 1.

3.1. Organ Affected by Stroke. One thousand two hundred and forty-four (77.0%) participants comprising 885 (76.2%) and 359 (78.9%) from urban and rural areas, respectively, did not recognize the brain as the organ affected by stroke. Substantial proportions of participants also believed other organs were the predominant focus of strokes including the heart ($N = 417$; urban 21.9%; rural 35.8%; $P < 0.001$), lungs ($N = 64$; urban 2.8%; rural 7.0%; $P < 0.001$), liver ($N = 57$; urban 2.2%; rural 6.8%; $P < 0.001$), and kidneys ($N = 73$; urban 2.2%; rural 10.6%; $P < 0.001$). Mentioning the brain as the correct organ affected in stroke was associated with good knowledge of stroke warning signs (OR 1.53; 95% CI 1.13–2.07) at bivariate logistic regression but not by multivariable logistic regression.

3.2. Risk Factors for Stroke. Four hundred and thirty-six (27%; 74.5% urban) participants out of 1616 said they knew stroke risk factors. Two hundred and thirteen (48.9%) knew at least one risk factor, 215 (49.3%) knew 2–4 risk factors, and 8 (1.8%) knew 5 or more risk factors. The most common risk factor identified by 244 (56%) participants was hypertension (63.7% urban; 33.3% rural; $P < 0.001$) followed by stress 224

TABLE 1: Sociodemographic characteristics of the study participants.

Characteristics	Total N = 1616 Number (%)	Urban (Nansana) Number (%)	Rural (Busukuma) Number (%)	P value
Gender				
Male	510 (31.6)	326 (28.1)	184 (40.4)	0.004
Female	1,106 (68.4)	835 (71.9)	271 (59.6)	<0.001
Age group (years)				
Teenagers <20	56 (3.5)	48 (4.1)	8 (1.8)	0.761
Young adults (20–39)	853 (52.8)	619 (53.3)	234 (51.4)	0.698
Middle aged adults (40–59)	500 (30.9)	368 (31.7)	132 (29.0)	0.618
Elderly/aged (60–80)	207 (12.8)	126 (10.9)	81 (17.8)	0.224
Mean age	39.6 ± 15.4	38.8 ± 14.8	41.5 ± 16.6	
Religion				
Catholic	503 (31.1)	345 (29.7)	157 (34.5)	0.274
Protestant	480 (29.7)	313 (27.0)	167 (36.7)	0.028
Muslim	357 (22.1)	299 (25.7)	58 (12.8)	0.033
Pentecostal (born again)	207 (12.8)	151(13.0)	57 (12.5)	0.925
Other	69 (4.3)	53 (4.6)	16 (3.5)	0.806
Highest level of education				
Tertiary	133 (8.2)	89 (7.7)	56 (12.3)	0.361
Secondary	638 (39.5)	475 (40.9)	224 (49.2)	0.038
Primary	699 (43.3)	502 (43.2)	136 (29.9)	0.005
Never attended school	146 (9.0)	95 (8.2)	39 (8.6)	0.794
Marital status				
Married	986 (61.0)	712 (61.3)	274 (60.2)	0.773
Separated (not divorced)	199 (12.3)	146 (12.6)	53 (11.7)	0.860
Divorced	52 (3.2)	23 (2.0)	29 (6.4)	0.439
Single (never married)	226 (14.0)	169 (14.5)	57 (12.5)	0.703
Widowed	153 (9.5)	111 (9.6)	42 (9.2)	0.937

(51.4%; 53.2% urban; 46.0% rural). None of the participants identified atherosclerosis and oral contraceptives as risk factors. The other risk factors identified are as shown in Table 2. At multivariable logistic regression, good knowledge of stroke risk factors was associated with tertiary level of education (OR 5.96; 95% CI 2.94–12.06) and self-reported diabetes (OR; 1.84; 95% CI 1.04–3.25).

3.3. Warning Symptoms of Stroke. Table 3 shows the profile of participant identified stroke warning signs. Most (1,214, 75.1%) participants did not know any stroke warning signs. Of the minority that knew stroke warning signs ($N = 402$), 162 (40.3%) knew 1 warning sign, 228 (56.7%) knew 2–4 warning signs, and 12 (3.0%) knew 5 or more warning signs. At multivariable logistic regression, good knowledge of stroke warning signs was associated with tertiary level of education (OR 4.29; 95% CI 2.13–8.62) and self-reported diabetes (OR 1.97; 95% CI 1.18–3.32).

3.4. Concern about Having a Stroke, Prevention, Recurrence, and Effect on Activities of Daily Living. Table 4 shows the participants' responses to their own possibility of having a stroke and their knowledge as to whether stroke is preventable or can occur more than once. There was a significant difference

in proportions between urban and rural responses regarding participants who had not thought about stroke over the past two years $P = 0.017$, had thought about stroke over the past two years $P < 0.001$, had thought that there is no chance of having a stroke in a life time $P = 0.006$, had thought that stroke is not preventable $P < 0.001$, and had thought that stroke cannot occur more than once $P = 0.043$. All the participants thought that stroke would have an effect on the activities of daily living like driving a car, dressing, use of a toilet, and sustaining a job.

3.5. Planned Response to a Stroke Event. When offered choices of a planned response to a stroke event, eighty-five percent of the participants (86.1% urban; 82.9% rural) reported that they would go to hospital should they or their relative experience sudden symptoms suggestive of a stroke, whilst only 0.7% (0.3% urban; 1.8% rural; $P = 0.003$) would combine going to hospital with tradition. However, 0.7% would call a general practitioner or family doctor and 6.9% (8% urban; 4% rural; $P = 0.004$) would ask family members or relatives to help, whilst 6.8%, 0.5%, 1.7%, and 0.8%, respectively, would self-medicate, visit alternative health care providers (herbal medicine, traditional healers), seek spiritual healing, or invite a physiotherapist.

TABLE 2: Stroke risk factors identified by participants (multiple responses).

	Total 1616	Urban	Rural	Difference between regions (χ^2)
	Number (%)	Number (%)	Number (%)	P value
Do you know any stroke risk factors?				
No	1180 (73.0)	836 (72.0)	344 (75.6)	
Yes	436 (27.0)	325 (28.0)	111 (24.4)	0.143
If yes	436 (27.0)			
Old age	55 (12.6)	20 (6.2)	35 (31.5)	<0.001
Diabetes	65 (14.9)	44 (13.5)	21 (18.9)	0.169
Heart disease	18 (4.1)	14 (4.3)	4 (3.6)	0.748
Obesity	24 (5.5)	19 (5.9)	5 (4.5)	0.593
Stress	224 (51.4)	173 (53.2)	51 (46.0)	0.185
Poor hygiene	3 (0.7)	2 (0.6)	1 (0.9)	1.000
Cancer	5 (1.2)	4 (1.2)	1 (0.9)	1.000
Bad diet	129 (29.6)	101 (31.0)	28 (25.2)	0.244
Hypertension	244 (56.0)	207 (63.7)	37 (33.3)	<0.001
Cigarette smoking	3 (0.7)	2 (0.6)	1 (0.9)	1.000
Alcohol	15 (3.4)	11 (3.4)	4 (3.6)	1.000
High cholesterol	53 (12.2)	48 (14.8)	5 (4.5)	0.004
Genetics (hereditary)	3 (0.7)	2 (0.6)	1 (0.9)	1.000
Lack of exercise	112 (25.7)	89 (27.4)	23 (20.7)	0.165
Headache or migraine	2 (0.5)	1 (0.3)	1 (0.9)	0.445
Tremors	6 (1.4)	6 (1.9)	0 (0.0)	0.149
Demons	4 (0.9)	3 (0.9)	1 (0.9)	0.983
Witchcraft	4 (0.9)	2 (0.6)	2 (1.8)	0.258
God's will	26 (6.0)	14 (4.3)	12 (10.8)	0.013
Angry ancestral spirits	4 (0.9)	4 (1.2)	0 (0.0)	0.240

The risk factors required a yes/no response.

3.6. Source of Information about Stroke. Only 402 (24.9%) participants, 70.4% from the urban area, had heard about stroke. The commonest source of information on stroke from multiple responses was friends/relatives reported by 270 (67.2%) participants (62.5% urban; 78.2 rural; $P = 0.002$) followed by health care providers reported by 154 (38.3%) participants (46.3% urban; 19.3% rural; $P < 0.001$). However, 6.2% reported newspapers as their source of stroke information, whilst 19.9%, 8.0%, and 2.0%, respectively, reported radio (22.6% urban; 13.45% rural; $P = 0.036$), television (10.3% urban; 2.5% rural; $P = 0.009$), and other electronic media such as internet. None of the rural participants used other forms of electronic media besides radio and television.

4. Discussion

Noncommunicable diseases are fast becoming a serious public health concern in developing countries [1–3] such as Uganda. Lack of knowledge of stroke risk factors contributes to the rising incidence of stroke amongst Africans [5–7], and it is imperative that educational campaigns target both general and high risk members of the population with accurate and appropriate information. To our knowledge, this is the first study to establish the perception and knowledge about stroke from urban and rural populations in Uganda. Main

findings are that stroke knowledge is poor with some groups being particularly uninformed, individuals do not personally believe stroke is something that can actually happen to them, and few individuals see primary health care workers as a resource for stroke prevention or care. Such information can set the stage for future strategies and campaigns to promote stroke knowledge and facilitate stroke prevention initiatives.

4.1. Poor Knowledge regarding Stroke. There is lack of knowledge about stroke among the public even in developed countries like the United States [10] and Australia [20]. Consistent with other reports, among our Ugandan sample, perception and knowledge of stroke were poor [7, 9, 10, 12, 20]. Almost three quarters of participants wrongly identified the heart as the organ affected in stroke. Association of stroke with heart disease by the participants in this study might have been informed by the local belief that the heart is a major organ of thinking.

Multiple studies have reported inadequate knowledge of stroke outside the western industrialized world [10]. The lack of information on risk factors and warning signs for stroke in our study was much higher than in other samples [10, 11, 20, 22]. While this knowledge gap is daunting, it also illuminates multiple potential opportunities to improve general knowledge especially among those at high risk for

TABLE 3: Stroke warning symptoms identified by participants (multiple responses).

	Total 1616	Urban	Rural	Difference between regions (χ^2)
	Number (%)	Number (%)	Number (%)	P value
Do you know any stroke warning signs				
No	1,214 (75.1)	878 (75.6)	336 (73.9)	
Yes	402 (24.9)	283 (24.4)	119 (26.2)	0.457
If yes	402 (24.9)			
Dizziness	95 (23.6)	67 (23.7)	28 (23.5)	0.975
Headache	65 (16.2)	51 (18.0)	14 (11.8)	0.120
Tiredness	66 (16.4)	50 (17.7)	16 (13.7)	0.297
Shortness of breath	39 (9.7)	22 (7.8)	17 (14.3)	0.044
Nausea/vomiting	4 (1.0)	3 (1.1)	1 (0.84)	0.839
Weakness of one side of the body	105 (26.1)	78 (27.6)	27 (22.7)	0.310
Paralysis on one side of the body	115 (28.6)	97 (34.3)	18 (15.1)	<0.001
Numbness tingling sensation or dead sensation of any part of body	36 (9.0)	28 (9.9)	8 (6.7)	0.309
Numbness tingling sensation or dead sensation on one side of the body	17 (4.2)	16 (5.7)	1 (0.8)	0.029
Blurred/double /loss of vision	11 (2.7)	8 (2.8)	3 (2.5)	0.864
Sudden difficulty in speaking/understanding/reading	9 (2.2)	9 (3.2)	0 (0.00)	0.063
Fever/sweating	39 (9.7)	24 (8.5)	15 (12.6)	0.202
Chest pain/tightness	15 (3.7)	13 (4.6)	2 (1.7)	0.248
Weakness of any part of the body	30 (7.5)	15 (5.3)	15 (12.6)	0.011
Paralysis of any part of body	70 (17.4)	35 (12.4)	35 (29.4)	<0.001
Fainting/black out/collapse	26 (6.5)	23 (8.1)	3 (2.5)	0.037
Others (specify)	31 (7.7)	21 (7.4)	10 (8.4)	0.736

Warning symptoms required yes/no response.

stroke and low level of education and help individuals in the future both reduce stroke risk and reduce complications should a stroke occur.

Less than 1% of participants thought demons, witchcraft, or angry ancestral spirits caused stroke and a similar percentage preferred traditional healers and herbal medication in the event of a stroke. Most Ugandans have an identified religion with Christians comprising 85.2% and Muslims about 12% of the population [23]. Though cultural belief in the causation of ill health and misfortune through the activity of witchcraft is reportedly still quite common in the area of HIV/AIDS [24], our study's findings were in contrast to this regarding the cause of stroke and preferred response to a stroke event. There was however a significant difference in the number of participants from the rural area that preferred a combination of hospital and tradition compared to participants from the urban area.

4.2. Stroke as a Personal and Potentially Relevant Disorder. While many participants in our study endorsed the fact that stroke could have serious and far-reaching effects, the majority (>75%) said that they had never thought about stroke before and opined that there was no chance or low chance of them having a stroke in the last 12 months or in a lifetime. It is clear that many individuals in our sample did

not conceptualize stroke as a disorder that was relevant to them personally, and stroke awareness campaigns will have to address this barrier.

4.3. Resources for Stroke Information and Care. The minority of individuals in our sample that had heard about stroke depended more on relatives/friends than health personnel for information on stroke. This upheld the findings of Sug Yoon et al. [20] among an Australian urban population. Among the urban population, health care providers were the next identified source of stroke information (45.8%) while they ranked third (10.6%) after radio (21.2%) among the rural population. Our findings may imply that health care givers are ineffective in reaching rural populations with stroke information. The higher proportion of participants who obtained stroke information from electronic media-radio may imply that the rural population may be better served by receiving information on stroke through the radio.

Majority of the participants (>80%), from either the urban or rural areas, preferred going to hospital when they or someone close to them had experienced symptoms of stroke. Comparable responses were seen in other studies [22, 25, 26] except in Nigerian subjects [9] where only 22.4% of them mentioned that they would visit a hospital and the most preferred response (34.9%) was calling a general

TABLE 4: Participants' concern about having a stroke, if preventable, and recurrence.

Concern about having a stroke	Total 1616 Number (%)	Urban Number (%)	Rural Number (%)	P value
Have you thought about stroke over the recent past 2 years?				
No	431 (26.7)	354 (30.5)	78 (17.1)	0.017
Yes	1,185 (73.3)	807 (69.5)	377 (82.9)	<0.001
If yes				
Possibility of you having a stroke in next 12 months?				
No chance	463 (39.1)	299 (37.1)	164 (43.5)	0.178
Low chance	350 (29.5)	240 (29.7)	110 (29.2)	0.924
Moderate chance	238 (20.1)	173 (21.4)	65 (17.2)	0.473
High chance	134 (11.3)	95 (11.8)	39 (10.3)	0.804
Have you thought about stroke before?				
No	348 (21.5)	270 (23.3)	77 (16.9)	0.231
Yes	1,268 (78.5)	891 (76.7)	378 (83.1)	0.011
If yes				
Possibility of you having a stroke in your lifetime?				
No chance	432 (34.1)	269 (30.2)	163 (43.1)	0.006
Low chance	381 (30.0)	279 (31.3)	102 (27.0)	0.418
Moderate chance	273 (21.5)	210 (23.6)	63 (16.7)	0.246
High chance	182 (14.4)	133 (14.9)	49 (13.0)	0.746
Is stroke preventable				
No	500 (30.9)	310 (26.7)	190 (41.8)	<0.001
Yes	638 (39.5)	470 (40.5)	168 (36.9)	0.413
Do not know	478 (29.6)	381 (32.8)	97 (21.3)	0.028
Can a person have stroke more than once?				
No	467 (28.9)	306 (26.4)	161 (35.4)	0.043
Yes	715 (44.3)	511 (44.0)	204 (44.8)	0.846
Do not know	434 (26.9)	344 (29.6)	90 (19.8)	0.064

practitioner/family doctor. In our study, less than 1% of participants from either urban or rural area preferred calling a general practitioner/family doctor. This might be because, for the majority of the participants, it sounds probably most rational to rush stroke patients to general hospitals where they thought a medical doctor will be available to attend to the stroke patient. The doctor available at the hospital did not have to be known to them and the treatment if available was done at no additional cost. However, compared to the very rare practice of the study population having a family doctor or even knowing a general practitioner and the additional cost involved in calling one under a private arrangement was probably the reason for their choice.

5. Conclusion

This first report of a large Ugandan general population sample found that individuals had extremely limited knowledge of stroke and did not feel that stroke as a disorder had any personal relevance to them. Primary health care workers were not identified as a key resource in stroke care. These results indicate a need to increase public stroke awareness in Uganda. Local and regional healthcare workers are resources that are

not optimally used and represent an opportunity to improve stroke prevention and stroke community response.

Conflict of Interests

The authors declare that they have no conflict of interests regarding the publication of this paper.

Authors' Contribution

All authors made substantial contribution to conception and designing of the study and development of the data collection tools and data analysis. Jane Nakibuuka participated in data collection. All authors participated in drafting or revising the paper critically for important intellectual content and approval of the final version to be published.

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