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Stroke Awareness and Prevention in West Africa: Bridging Gaps in Knowledge, Perceptions, and Strategies for Improved Neurological Health

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Abstract

Background: Rapid urbanization and globalization in developing countries have increased health issues like those in developed nations. Non-communicable diseases (NCDs), particularly stroke, have surged to become the leading cause of mortality. This study, conducted in the Ferlo region, Senegal, aims to assess the population's knowledge, perceptions, and attitudes towards stroke and its preventable aspects. **Methods:** Conducted from May 2018 to June 2019, this cross-sectional study surveyed 366 participants aged 18 and above in the rural silvopastoral area of Widou Thiengoly. A structured questionnaire covered sociodemographics, medical history, personal habits, stroke awareness, and risk factors. Data analysis utilized Epi-info 2000 and GraphPad 5. **Results:** Stroke prevalence was 3.3%, with higher rates among those over 65. The term "stroke" was unfamiliar to 99.5% of participants, and only 30.3% recognized its symptoms. Only 11.7% identified stroke risk factors, highlighting the imperative for targeted education. Cultural beliefs, including fatalistic views of stroke, were present in 21% of respondents. Despite these challenges, the study's robust methodology ensures valuable insights. **Conclusion:** This research reveals significant gaps in stroke awareness in Senegal, emphasizing the need for targeted educational interventions. The findings underscore the

necessity of involving cultural and religious actors to enhance awareness and preventive measures effectively.

Keywords

Stroke, Awareness, Prevention, Neurological Health, Knowledge, Perceptions, Hypertension

1. Introduction

Developing countries, propelled by the forces of rapid urbanization, impetuous globalization, and accelerated modernization, face health challenges as complex as those of wealthier nations. This swift transformation is marked by the increasing adoption of unhealthy lifestyles, such as detrimental dietary habits, reduced physical activity, and often inadequate stress management. At the heart of this evolution, non-communicable diseases (NCDs), including cardiovascular diseases, cancer, diabetes, and neurological conditions, have surpassed infectious diseases to become the leading cause of mortality [1]-[3].

Among neurological conditions causing mortality and morbidity, stroke emerges as the most crucial preventable disease [4] [5]. Stroke is the second leading cause of mortality and disability worldwide, with more than 13 million new cases per year. Modifiable risk factors include hypertension, elevated lipid profile, diabetes mellitus, heart diseases, and smoking. Effective stroke prevention should focus on increased public awareness of warning signs, proactive management of modifiable risk factors, and prompt medical intervention.

Rapid urbanization in sub-Saharan Africa is driving lifestyle changes that heighten the risk of stroke. These changes include a dietary shift towards processed foods, saturated fats, and excessive salt, coupled with reduced physical activity due to increased reliance on motorized transport and sedentary lifestyles [6]. This combination contributes to a rising prevalence of hypertension, a major stroke risk factor, in both urban and rural areas. Additionally, the stress associated with urban living further exacerbates the problem. These findings highlight the urgent need for comprehensive interventions to promote healthier lifestyles and mitigate the growing burden of stroke in this region.

In sub-Saharan Africa, the incidence of stroke is between 26 and 30 per 100,000 inhabitants. The prevalence is around 58 to 243 per 100,000 inhabitants [7]. Thus, it has been reported that strokes represent 30% of neurological pathologies in Dakar (Senegal) [8], 60% in Ouagadougou [9] and 8.8% in Bangui [10]. In Senegal, stroke is the predominant neurological condition in Dakar, with a significant impact on quality of life and mortality [11]-[13]. This study aims to comprehensively assess the knowledge, perceptions, and attitudes of the Senegalese population towards stroke and its risk factors. By probing into these aspects, our goal is to dissect the specific challenges faced by the Senegalese population. Thus, we aspire to

inform targeted interventions, strengthen stroke awareness and prevention strategies in this region, and contribute to the overall improvement of neurological health.

2. Methods and Materials

2.1. Study Framework

This cross-sectional study was conducted in the locality of Widou Thiengoly, a silvopastoral rural area situated in the northeastern region of Senegal. The survey period took place from May 2018 to June 2019. The research protocol adhered to the Helsinki Declaration guidelines and received approval from the Institutional Ethics Committee and was approved by the FMPO/UCAD Ethics Committee (Référence: Protocole 050/2015/CER/UCAD "Facteurs de risques des accidents vasculaires cérébraux dans la population du Ferlo").

2.2. Population

Study participants were selected from the general population aged 18 and above, residing in the study area for at least 6 months. Informed consent was obtained from all participants before administering the questionnaire.

2.3. Sampling

Non-probabilistic sampling method was employed, considering all villages in Widou Thiengoly. To select the household to include in the study, a random direction was chosen from the village center, followed by door-to-door surveys in that direction. All consenting individuals aged 18 and above in each chosen household were interviewed. In total, 366 subjects were recruited.

2.4. Data Collection

A structured questionnaire covering sociodemographic aspects (gender, age, occupation, education level), medical history, personal habits, history of stroke, source of information, as well as knowledge of stroke warning signs and risk factors, was developed. The questionnaire was administered in the local Pulaar language, with the presence of a trained interpreter during face-to-face interviews.

2.5. Data Analysis

Data were entered using Excel software version 2013 during the survey. Data analysis was performed using Epi-info 2000 and GraphPad 5 software. Descriptive analysis was conducted by calculating proportions for continuous and discrete data, respectively.

This rigorous methodology aims to ensure the representativeness of the sample and the reliability of the results, providing a solid foundation for analyzing the knowledge, perceptions, and attitudes of the Senegalese population towards stroke and its risk factors.

3. Results

A total of 366 participants were included in the study, comprising 172 men (46.9%) and 194 women (53.1%), with a male-to-female sex ratio of 0.89. Most of the population (59.3%) was under 40 years old, while 25% were over 50 years old. Ages ranged from 20 to 92 years, with an average of 39.4 ± 16.4 years and a median of 35 years.

The main professions included homemakers (44.3%), mainly women, followed by herders (40.7%), mostly men. Trade was practiced by 2.5% of the population, while 0.8% were farmers. Unemployment affected 10.7% of the population, mainly the elderly.

Only 4.1% of the population had formal education (2.3% of men and 5.7% of women), with the majority not surpassing elementary school (Table 1).

Table 1. Sociodemographic characteristics of the study population.

Characteristics		MEN (%) N = 172	Women (%) N = 194	Total Pop (%) N = 366	95% IC
Age (years)	20 - 34	45.3	54.7	49.5	44.4 - 54.5
	35 - 49	47.3	52.7	24.9	20.7 - 29.5
	50 - 64	52.6	47.4	15.6	12.2 - 19.6
	65+	45.9	54.1	10.1	7.4 - 13.6
Marital Status	Married	86.0	85.1	85.5	81.5 - 88.7
	Not-Married	14.0	14.9	14.5	11.2 - 18.5
	Monogamy	55.8	44.3	49.7	52.6 - 63.5
	Polygamy	30.2	40.7	35.8	36.5 - 47.4
Level of Study	Schooled	2.3	5.7	4.1	2.5 - 6.6
	Unschooled	97.7	94.3	95.9	93.4 - 97.5
Profession	Breeder	86.6	0.0	40.7	35.8 - 45.8
	Farmer	1.7	0.0	0.8	0.3 - 2.4
	Household	0.0	83.5	44.3	39.3 - 49.4
	Trader	4.1	1.0	2.5	1.3 - 4.6
	Unemployed	5.2	15.5	10.7	7.9 - 14.2
	Others	2.3	0.0	1.1	0.4 - 2.7
Lifestyle	Sedentary	60.5	76.3	68.8	63.9 - 73.4
	Semi-nomadic	29.7	17.0	22.9	18.9 - 27.5
	Nomadic	9.9	6.7	8.2	5.8 - 11.5

The overall prevalence of stroke was 3.3% (95% CI: 1.9 - 5.6), affecting 8.8% of hypertensive individuals (95% CI: 5.1 - 14.7). Women had a slightly higher prevalence (3.6%; 95% CI: 1.8 - 7.3) than men (2.9%; 95% CI: 1.3 - 6.6), although the difference was not statistically significant.

Stroke prevalence increased with age, both in men and women (p = 0.0021). Individuals over 65 were the most affected, with a prevalence of 24.2% (95% CI: 12.8 - 41.0). Those aged 50 to 64 represented 8.6% (95% CI: 2.9 - 22.3), while those aged 35 to 49 had a prevalence of 3.1% (95% CI: 0.5 - 15.7) (Figure 1).

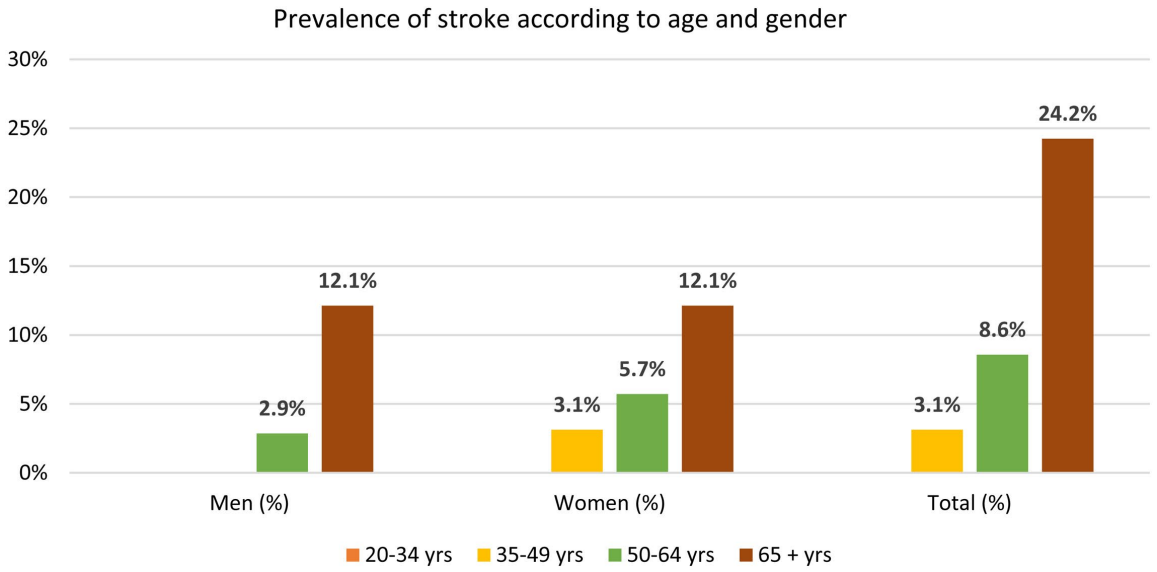

Figure 1. Prevalence of stroke according to age and gender.

The overall prevalence of hypertension was 37.4% (95% CI: 32.6 - 42.5) of our study population. It was more noted among women with 38.1% (95% CI: 31.6 - 45.1) of them compared to 36.6% (95% CI: 29.8 - 44.1) among men. However, there is no statistically significant difference between the two groups.

On the other hand, it was noted that hypertension was frequent in G4 with 89.2% (95% CI: 75.2 - 95.7) of individuals in this group followed by G3 (61.4%; (95% CI: 48.4 - 72.9) with a p < 0.0001 (Figure 2).

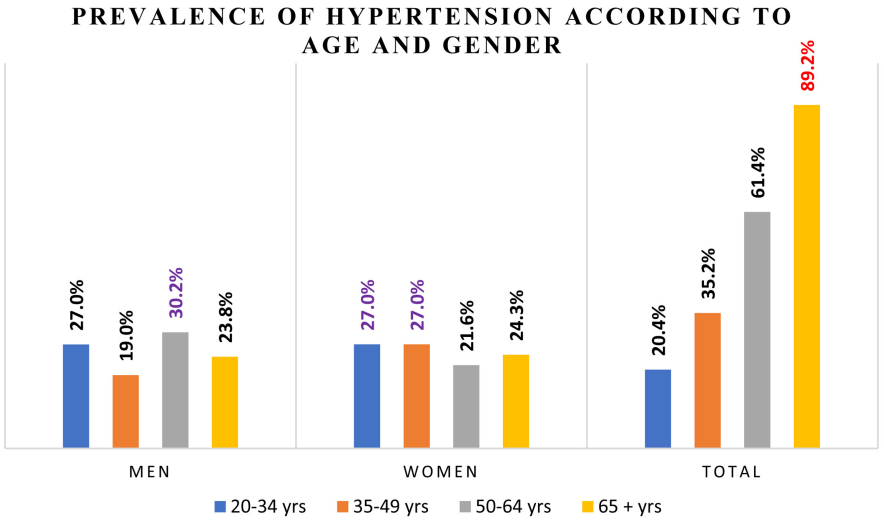

Figure 2. Prevalence of hypertension according to age and gender.

More than half of hypertensives (56.2%) had not been diagnosed but women were more aware of their hypertensive status compared to men. Likewise, people aged over 50 were better informed about their hypertensive state.

Among known hypertensives, only 18.2% (95% CI: 12.7 - 25.5) were treated with medications with an antihypertensive effect and, among these, only 2.9% were controlled (BP < 140/90 mmHg) (Figure 3).

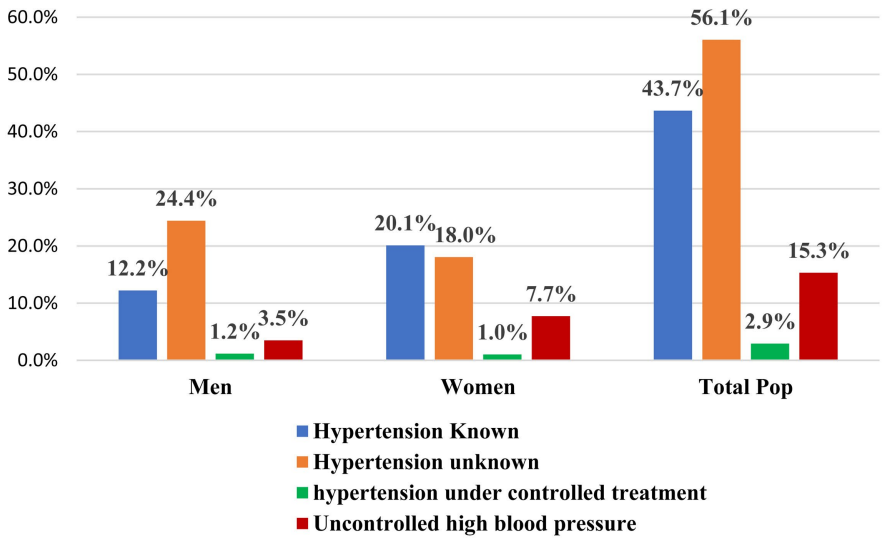

Figure 3. Percentage of hypertensive subjects diagnosed and controlled.

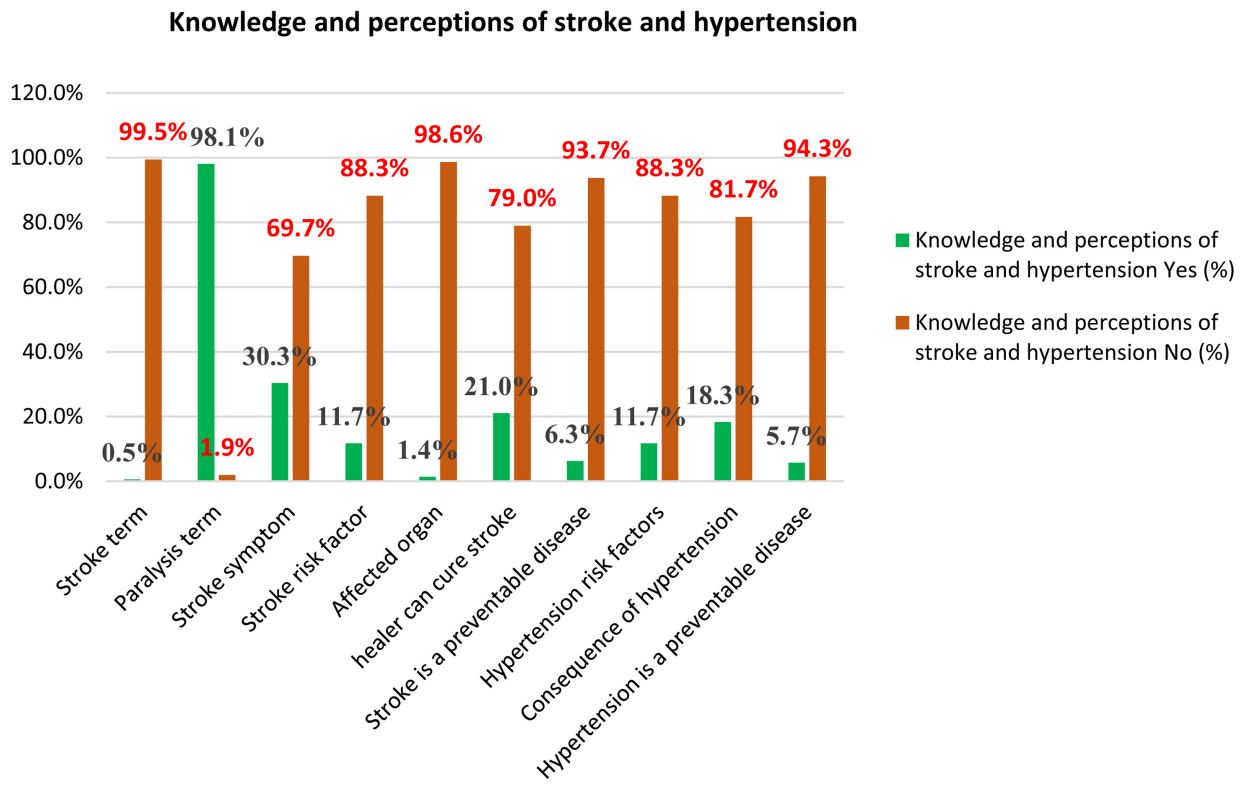

Figure 4. Knowledge and understanding of stroke and hypertension.

Almost 99.5% of the population was unfamiliar with the term "stroke" but recognized the term "paralyzed" (in Pulaar). Only 30.3% were aware of stroke symptoms, with paralysis of one side of the body being the most cited, followed by aphasia. Risk factors for stroke were known by only 11.7% of the population, with diet and high blood pressure (HBP) cited as the most common.

Only 1.4% knew the specific organ affected by stroke. Regarding the possibility of treatment by a marabout or healer, 21% responded positively. Only 6.3% believed stroke was preventable, often perceiving it as fate or divine punishment.

Additionally, 11.7% and 18.3% were informed about the risk factors and consequences of high blood pressure, respectively. Only 5.7% believed there were preventive measures against HBP (**Figure 4**).

4. Discussion

Noncommunicable diseases are fast becoming a serious public health concern in developing countries [14] such as Senegal. Lack of knowledge of stroke risk factors contributes to the rising incidence of stroke amongst Africans [15]-[18], 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 rural populations in Senegal. The results of this study raise crucial questions about awareness and understanding of stroke within the Senegalese population. The following conclusions highlight significant gaps and perceptions that could influence stroke prevention and awareness strategies.

The overall prevalence of stroke in this population was 3.3%, which, while relatively moderate compared to some regions (Dakar and Saint-Louis), remains a concerning reality [14] [19]-[21]. The results indicate a significant increase in prevalence with age, especially in individuals over 65. This trend aligns with global literature data, emphasizing the importance of increased monitoring and targeted prevention strategies for older age groups.

The unfamiliarity with the term "stroke" in favor of the local term "paralyzed" underscores the urgent need for an educational campaign focusing on precise medical terminology. Nearly 70% of participants did not know any stroke risk factors and warning signs and 98.6% did not recognize the brain as the organ affected. Akiniyemi in Nigeria found 29% of respondents did not recognize the brain as the organ affected [22]. Although, A study in Nigeria reported that nearly ¾ of the participants did not know any stroke risk factors and warning signs or recognize the brain as the organ affected [23].

Only 30.3% of participants were aware of stroke symptoms, with a focus on paralysis and aphasia. This observation highlights the need for more in-depth education on the multiple clinical manifestations of stroke to encourage early identification.

The identification of stroke risk factors by only 11.7% of the population suggests a limited understanding of the determinants of this pathology. Several stud-

ies in Africa have reported results similar to ours [2] [16]-[18] [20] [22] [24] Particularly, the low awareness of the links between diet and high blood pressure, two major risk factors, underscores a critical need for nutritional education and awareness of blood pressure management.

The perception of stroke as fate or a disease of mystical origin by a significant portion of the population (21%) highlights cultural challenges and pre-existing beliefs that can hinder the acceptance of prevention strategies. In Uganda, 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 [25]. In the Ferlo region, Ka *et al.* (2016) noted that certain traditional healers acknowledge referring patients to health centers when hypertension is suspected, recognizing the efficacy of biomedical treatments for managing these conditions. However, in emergency situations, they employ traditional remedies, such as baths with *Bombax costatum* leaves to reduce fever and infusions of *Sclerocarya birrea* leaves to lower blood pressure [26].

This finding emphasizes the importance of integrating cultural and religious actors into awareness initiatives to establish more effective connections with the population.

The low proportion of people believing stroke is preventable (6.3%) suggests an urgent need to change perceptions and promote the idea that preventive measures, including lifestyle changes, can reduce the risk of stroke.

There is lack of knowledge about stroke among the public even in developed countries like the United States [27] and Australia [28]. Consistent with other reports, among our Senegalese sample, perception and knowledge of stroke were poor [3] [15] [17] [19] [29].

The results of this study underscore the need for well-targeted awareness initiatives, integrating culturally appropriate approaches to maximize impact. The inclusion of religious and cultural actors in such initiatives can help overcome cultural barriers and improve the acceptance of stroke preventive measures within the Senegalese population.

While Senegal has implemented some stroke awareness initiatives, including media campaigns and patient support groups, significant gaps remain. These include a lack of continuous and large-scale awareness campaigns, limited access to information (especially in rural areas), and insufficient community engagement. Furthermore, resource constraints, inadequate stroke care, and the high cost of treatment pose additional challenges. A comprehensive, multi-sectoral approach involving communities, healthcare providers, policymakers, and the media is crucial to strengthen stroke awareness and improve outcomes in Senegal and sub-Saharan Africa.

4.1. Strengths of the Study

Sample Representativeness: Non-probabilistic sampling was rigorously conducted, including all villages in Widou Thiengoly, providing a diverse representation of

the local population. **Robust Methodology:** The adopted cross-sectional methodology allowed for data collection at a specific moment, offering an instantaneous view of the knowledge, perceptions, and attitudes of the Senegalese population towards stroke. **Informed Consent:** The data collection process integrated informed consent, ensuring voluntary participant adherence and respecting fundamental ethical principles. **Trained Interpreter:** The presence of a trained interpreter facilitated smooth communication with participants, minimizing the risks of linguistic misunderstandings.

4.2. Weaknesses of the Study

Linguistic Bias: Despite interpreter training, there is still a risk of linguistic bias, potentially influencing the accurate understanding of questions and responses. **Recall Bias**: Since participants had to recall past events, this could lead to recall bias, affecting the accuracy of medical history and personal habits. **Limited Sample**: The study population is from a specific geographical area, potentially limiting the generalization of results to other regions of Senegal or different cultural contexts. **Declarative Knowledge**: Results are based on participants' self-reported knowledge, which might not precisely reflect their actual understanding of stroke.

Despite these limitations, this study provides a significant contribution to understanding local perceptions of stroke in Senegal, paving the way for more in-depth future research and tailored interventions.

5. Conclusions

This study highlights significant gaps in the knowledge, perceptions, and attitudes of the Senegalese population towards stroke. The results indicate a notable prevalence of stroke, especially among the elderly, emphasizing the need for increased attention to this population segment. Several key points emerge from this analysis.

Firstly, the unfamiliarity with the term "stroke" in favor of the local term "paralyzed" underscores the urgency of an educational campaign promoting precise medical terminology. Limited understanding of stroke symptoms and risk factors emphasizes the need for more comprehensive educational strategies to encourage early identification and adequate management. Secondly, the perception of stroke as fate or a disease of mystical origin by a significant portion of the population highlights cultural challenges faced by awareness initiatives. It is imperative to integrate culturally appropriate approaches involving religious and cultural actors to overcome these barriers and promote increased acceptance of stroke prevention measures. Thirdly, the low proportion of people believing stroke is preventable underscores the urgent need to change perceptions and promote the idea that preventive measures, including lifestyle changes, can reduce the risk of stroke.

In conclusion, these results underscore the importance of targeted awareness initiatives, incorporating culturally appropriate approaches to maximize impact. The inclusion of religious and cultural actors in such initiatives can contribute to overcoming cultural barriers and improving the acceptance of stroke prevention

measures within the Senegalese population. These findings call for immediate action to develop comprehensive educational programs, involving close partnerships between health authorities, community actors, and religious leaders. These efforts aim to enhance knowledge, change perceptions, and encourage preventive behaviors, thereby contributing to reducing the burden of stroke in Senegal.

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Conflicts of Interest

The authors declare that they have no conflict of interest.

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