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# Death-related factors among people admitted with stroke at the Internal Medicine Department of the Dschang Regional Annex Hospital from 2012 to 2022

## Facteurs associés aux décès des patients admis pour accident vasculaire cérébral à l'Hôpital Régional Annexe de Dschang de 2012 à 2022

Simeni Njonnou SR[1,2,3&], Ngongang Ouankou C [1,3,4] , Moulion Tapouh JR[5,6], Adoum A[1], Ateudjieu J[7,8], Kemta Lekpa F[1,3,9], Fofang Fogoum Y[1,10], Kuate Tegueu C[11,12], Mapoure Njankouo Y[9,13], Choukem SP [1,3,9]

## Original Article

1. Department of Internal Medicine and Specialities, Faculty of Medicine and Pharmaceutical Sciences, University of Dschang, Dschang, Cameroon
2. Department of Internal Medicine, Dschang Regional Annex Hospital, Dschang, Cameroon,
3. Health and Human Development (2HD) Research Network, Douala, Cameroon
4. Yaoundé Teaching Hospital, Yaoundé, Cameroon,
5. Department of Radiology, Biophysics, and Medical Imaging, Faculty of Medicine and Pharmaceutical Sciences, University of Dschang, Dschang, Cameroon
6. Department of Radiology and Medical Imaging, Regional Hospital Centre of Bafoussam, Bafoussam, Cameroon
7. Department of Public Health, Faculty of Medicine and Pharmaceutical Sciences, University of Dschang, Dschang, Cameroon Department of Internal Medicine,
8. Ministry of Public Health, Yaoundé, Cameroon,
9. Department of Internal Medicine, Douala General Hospital, Douala, Cameroon,
10. Department of Neurology, Bafoussam Regional Hospital, Bafoussam, Cameroon
11. Department of Internal Medicine and Specialities, Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Yaoundé, Cameroon
12. Department of Neurology, Douala Laquintinie Hospital, Douala, Cameroon
13. Department of Clinical Sciences, Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon

**&Corresponding author**: Sylvain Raoul Simeni Njonnou, Email: raoulsims@yahoo.fr, Phone number: +237 650124347

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## ABSTRACT

**Introduction**: Strokes are a major cause of death, particularly in developing countries. This study aimed to estimate mortality and identify factors associated with deaths of patients admitted for stroke to the internal medicine department of the Dschang Regional Annex Hospital from 2012 to 2022.

**Methodology**: A cross-sectional study was conducted using the medical records of patients admitted for stroke between 2012 and 2022. The cases were patients who died of a stroke, and the controls, those released alive, matched for age and sex. Sampling was consecutive. Factors associated with in-hospital mortality were identified using logistic regression. p<0.05 was considered significant.

**Results**: Among the 292 records included (138 women, median age 62 years). The median hospital stay was 8 days. In-hospital mortality was 21.6%. A Glasgow coma score ≤ 8 (aOR: 3.65 [ 95% CI 1.1-12.1], p=0.034), a previous stroke (aOR: 3.7 [95% CI 1.2- 11.9], p = 0.02), a pneumonia (aOR: 5.43 [ 95% CI 1.54-19], p= 0.008) and haemorrhagic stroke (aOR: 20.7 [ 95% CI 4.7-90.4], p < 0.001) were associated with deaths.

**Conclusion**: Mortality among patients with stroke in this study was high and linked to several factors. Screening for, identifying and preventing these factors may help to reduce mortality.

## RESUME

**Introduction** : Les accidents vasculaires cérébraux (AVC) sont une cause majeure de décès, particulièrement dans les pays en développement. Cette étude visait à estimer la mortalité et identifier ses facteurs associés chez les hospitalisés en médecine interne pour AVC à l'Hôpital Régional Annexe de Dschang (2012–2022).

**Méthodologie** : Nous avons mené une étude transversale à recueil rétrospectif, incluant les dossiers des patients admis pour AVC de 2012 à 2022, au service de Médecine Interne de l'Hôpital Régional Annexe de Dschang. Les cas étaient les patients décédés d'AVC et les témoins ceux sortis vivants, appariés selon l'âge et le sexe. L'échantillonnage était consécutif. Une valeur de p < 0,05 était considérée comme significative.

**Résultats** : Nous avons inclus 292 dossiers (dont 138 femmes, avec un age médian de 62 ans). La durée médiane d'hospitalisation était de 8 jours. L'âge médian des participants était de 62 ans. La mortalité intrahospitalière était de 21,6 %. Le coma (score de Glasgow ≤ 8) (aOR : 3,65 [IC 95 % : 1,1–12,1], p = 0,034), un antécédent d'AVC (aOR : 3,7 [IC 95 % : 1,2–11,9], p = 0,02), une pneumonie (aOR : 5,43 [IC 95 % : 1,54–19], p = 0,008) et un AVC hémorragique (aOR : 20,7 [IC 95 % : 4,7–90,4], p < 0,001) étaient associés aux décès.

**Conclusion** : La mortalité intrahospitalière des AVC est élevée et multifactorielle. L'identification et la prévention de ces facteurs pourraient la réduire.

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## Introduction

According to the World Health Organisation (WHO), stroke is defined as the presence of acute neurological dysfunction combined with objective evidence of brain, spinal cord or retinal cell death (infarction or haemorrhage) via imaging or pathology [1]. Classically, there are three pathological entities: cerebral ischaemia (most common), cerebral haemorrhage and cerebral venous thrombosis (rare) [2,3]. Stroke is a major public health problem, affecting 16 million people worldwide every year [4,5]. Developing countries have a high prevalence and incidence of stroke. This situation could worsen by 2030 [6].

Death is one of the most frequent complications of stroke. Each year, around 5. 7 million deaths from stroke are recorded worldwide, making it the third leading cause of death and the leading cause of acquired physical disability [4, 4,6]. In- hospital stroke mortality is very high in resource- limited countries (87%) and low in developed countries [6]. In Denmark and Canada, it is 3. 3.3% and 6. 6.9%, respectively [7, 7,8]. In Burkina Faso and Senegal, it is 16. 9% and 24. 8%, respectively [9, 10]. In Cameroon, one study found an in- hospital mortality rate of 26. 8%, rising to 76. 12% for patients admitted to intensive care [11]. The occurrence of stroke- related death is associated with factors that predict mortality. Accordingly, studies have been conducted in several countries to identify these factors. In Denmark, age and stroke severity were the main factors associated with death [10]. In Senegal, previous stroke and coma were the main factors identified [11]. In Cameroon, a study in Douala found a Glasgow score ≤ 8, hyperthermia and the haemorrhagic type of stroke to be the main factors associated with death [11]. Another, even more recent study in Yaoundé, found an NIH Stroke Scale (NIHSS) score≥ 15, hyperthermia, the presence of swallowing problems on admission and the mass effect on brain CT- scan as the main factors associated with stroke- related death [12].

Despite the identification of these factors and their consideration in treatment protocols, stroke deaths continue to increase in our hospitals. Nevertheless, to date, we have little data on the factors associated with in- hospital deaths in semi- urban and rural settings where resources are limited, patients have a low socioeconomic level, and the prevalence of hypertension is high [13, 13,14]. The Dschang Regional Annex Hospital (HRAD), formerly known as the Dschang District Hospital, is a 3rd-category hospital in Cameroon's health pyramid, located in a semi- urban environment. With these observations in mind, our study aims to estimate the mortality rate linked to stroke and to identify the factors associated with stroke-related deaths in the Internal Medicine department of this hospital. Based on previous data on strokes in Cameroon, we wondered whether a history of stroke, a consultation delay > 6 hours, a Glasgow score ≤ 8, pneumonia and haemorrhagic stroke increase the risk of death in patients admitted for stroke to the Internal Medicine Department of the Regional Annex Hospital. This will therefore enable improved management and prevention of mortality linked to these pathologies.

## Methods

We carried out a retrospective, longitudinal, in-hospital study with two parts: a first descriptive part and a second, analytical part of the nested case-control type. The descriptive component targeted all records of patients admitted for stroke to the internal medicine department of the Dschang Regional Hospital Annex from 2012 to 2022 who had undergone a brain scan. In the analytical component of the nested case-control type matched for age and sex, the cases were patients who had died of stroke, while the controls were patients who had been discharged alive after a stroke. Exposures were: a history of stroke, a delay in consultation of 6 hours, a Glasgow score (GCS) ≤ 08, hemorrhagic stroke and pneumonia. This study took place from November to May 2024.

Our study took place at the Dschang Annex Regional Hospital, which is a hospital in the 3rd category of the health pyramid. It was created on 10 October 2022 on the structures of the former Dschang District Hospital, itself created in 1924. It is located in the Menoua division and the Dschang sub-division, in the Dschang Health District. Built on a 4-hectare site, it is made up of 4 blocks designated by the letters A to D. This structure is made up of an Emergency Department, Internal Medicine, Surgery, Paediatrics and Neonatology, and Gynaecology and Obstetrics, Imaging, Physiotherapy, Biological and Bioanalytical Laboratories, a blood bank and a mortuary.

The Internal Medicine department has been run for 4 years by an internist who has specialized in systemic diseases for 04 years. It is subdivided into two units, an A unit, known as ‘Medicine A’, and a B unit, known as ‘Medicine B’. The department's activities are currently carried out by an internist (from 2020), a gastroenterologist (from 2023), 2 general practitioners, 2 nurses and 4 care assistants.

Patients admitted for stroke to the Internal Medicine Department and meeting the inclusion criteria were recruited on an ad hoc basis during the study period. It was therefore a consecutive and exhaustive sampling. The sample size for the descriptive component, calculated using the Lorentz formula, used a stroke prevalence of 12.8% at the Douala General Hospital in 2012 and was estimated at 282 files. For the analytic component, we used the Lemeshow formula and the sample size was estimated at 122 files (61 cases and 61 controls).

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For the descriptive component, several variables were searched for in the various files of the patients included. These were socio-demographic data (age, sex, marital status, profession, and year of admission), data related to history and co-morbidities (hypertension, diabetes mellitus, heart disease, history of stroke, alcohol and tobacco consumption and other comorbidities, clinical data including clinical symptoms (disorders of consciousness, headache, convulsion, visual blur, photophobia, vomiting, tremor, motor deficit, sensory deficit, aphasia and other symptoms), neurological signs (Glasgow score, higher functions, cranial nerves, muscle strength, tone, reflexes, sensitivity, coordination, vegetative signs, and meningeal signs), neuroimaging data (time to scan, mechanism and location of stroke), management data (time taken for consultation), evolution data (decubitus complications (pneumonia, bedsores, urinary tract infections), death. For the analytical component, the dependent variable (outcome) was the stroke-related death, and the possible explanatory variables (independent) were: a history of stroke, time to consultation after the onset of the illness, pneumonia, Glasgow score ≤ 8 and hemorrhagic stroke.

After validation of the protocol by the supervisors and the jury of the Faculty of Medicine and Pharmaceutical Sciences of the University of Dschang, we obtained the agreement of the director of the Dschang Regional Annex Hospital and finally an ethical clearance from the West Regional Ethics Committee, Cameroon (N°368/27/03/2024/CE/CRERSH-OU/VP). The registers of patients admitted to the Internal Medicine Department during the period of study were searched for cases of stroke, followed by the recruitment of the medical records of patients meeting the various inclusion criteria to search for sociodemographic, clinical and paraclinical data and intra-hospital evolution.

The data collected was entered into Cs Pro® version 7.5 and analyzed using SPSS® version 23. Quantitative variables were expressed as mean (± standard deviation) or median (interquartile range) according to the distribution (Kolmogorov-Smirnov test). Qualitative variables were expressed as numbers and percentages. Proportion comparison tests were used to look for confounding factors. Chi-square tests of independence and Fisher's exact test were used for the association between categorical variables. Differences were considered statistically significant for values of $p < 0.05$. A multivariate analysis using binary logistic regression with the calculation of adjusted odds ratios (aOR with 95% confidence intervals) enabled us to establish the relationship between the different variables and the outcome of our study (stroke-related deaths). We included in the regression model those variables with a statistically significant association with stroke-related death after comparison and bivariate analysis.

## Results

During this study period, we identified 478 cases of stroke in the hospitalization registers of the Department of Internal Medicine. Of these cases found in the registers, 379 corresponding physical files were found. Of the records, 87 were excluded due to a lack of data. Finally, we included 292 (138 female) records for analysis. The participants' median age was 62 years, with the extremes ranging from 36 to 96 years. The most common age groups were 50-60 (89, 30.5%) and 61-70 (125, 42.8%) years (Table I). Hypertension (190, 65%), alcohol consumption (79, 27.1%), diabetes (65, 22.3%) and a history of previous stroke (45, 15.4%) were the most common antecedents and comorbidities. More than half of the patients were hypertensive (Table I).

**Table I**: population general characteristics

| Variables | Terms | Number (n) | Percentage (%) |
|---|---|---|---|
| **Age groups** | ≤40 | 13 | 4.4 |
| | 41-50 | 19 | 6.5 |
| | 50--60 | 89 | 30.5 |
| | 61-70 | 125 | 42.8 |
| | > 70 | 46 | 15.8 |
| **Sex** | Male | 154 | 52.7 |
| | Female | 138 | 47.3 |
| **Marital status** | Maried | 240 | 82.2 |
| | Widow(er) | 38 | 13 |
| | Divorced | 07 | 2.4 |
| | Single | 06 | 2.1 |
| | Cohabitation | 01 | 0.3 |
| **Occupation** | Retired | 86 | 29.5 |
| | Housewife | 70 | 24 |
| | Farmer | 64 | 21.9 |
| | Shopkeeper | 38 | 13 |
| | Civil servant | 22 | 7.5 |
| | Other | 12 | 3.1 |
| **HTN** | Yes | 190 | 65 |
| | No | 102 | 35 |
| **Alcohol consumption** | Yes | 79 | 27.1 |
| | No | 291 | 72.9 |
| **Diabetes mellitus** | Yes | 65 | 22,3 |
| | No | 227 | 77,7 |
| **Previous stroke** | Yes | 45 | 15,4 |
| | No | 247 | 84.6 |
| **Heart diseases** | Yes | 39 | 13.3 |
| | No | 253 | 86.7 |
| **Tobacco consumption** | Yes | 33 | 11.3 |
| | No | 259 | 88.7 |

HTN: Hypertension

Motor or sensory deficits (238, 89.2%), as well as impaired consciousness (121, 41.4%) and language disorders (92, 31.2%) were the main reasons for

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consultation. Impaired consciousness was light to moderate for 154 (52.7%). Hemiplegia (183, 70.1%) was the main motor deficit found. Sensory involvement (102, 41.6%) was found in less than half of the cases included. Myotatic reflexes were increased for more than 3/4 of patients (206, 76.6%) while the Babinski's sign was found in almost two-thirds (175, 62.6%) of the cases. Table II shows the distribution of neurological data for the patients.

More than half (150, 51.4%) of the participants had at least one intra-hospital complication. The most common complications were pneumonia (42, 29.7%), pressure ulcers (30, 21.1%) and malaria (26, 18.3%). The median hospital stay was 8 days (IQ = 6-9). The extremes ranged from 1 to 17 days. Table III shows the distribution of management data and outcomes.

### Brain CT-scan data

There was a delay in performing a brain scan in 271 (92.8%) cases. More than two-thirds of the participants underwent a brain CT-scan between 24 and 72 hours after their admission (Figure 1). Cerebral infarctions accounted for almost two-thirds (194, 66.4%). These infarcts more frequently affect the sylvian superficial (66, 37.7%), the anterior cerebral (48, 26.2%) and the total sylvian (25, 13.7%) arteries. In addition, hemorrhagic strokes were found in 91 cases. They affected more deep structures (40, 44%), the parietal (26,28.5%) and the temporal lobe (13, 14.3%). These data are presented in Table II.

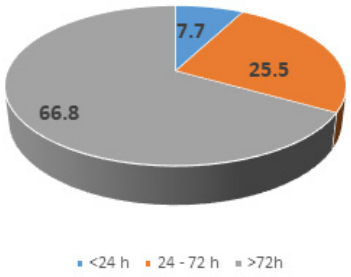


**Figure 1**: distribution of brain scan completion times

### Death-related data:

We recorded 63 cases of death in the files. This enabled us to establish an in-hospital mortality rate of 21.6% (CI = 16.8 - 26.4). For the factors associated with death, we defined cases as patients who died patients who died of stroke, while controls were patients who were discharged alive. Cases and controls were matched for age and sex. We matched one case to one control i.e. 63 cases for 63 controls. The chi-square test of independence or Fisher's exact test was used to determine the association between the factors investigated and death.

After multivariate analysis, only a Glasgow coma score ≤ 8 (aOR: 3.65 [ 95% CI 1.1-12.1], p=0.034), a previous stroke (aOR: 3.7 [95% CI 1.2- 11.9], p = 0.02), a pneumonia (aOR: 5.43 [ 95% CI 1.54-19], p= 0.008) and haemorrhagic stroke (aOR: 20.7 [ 95% CI 4.7-90.4], p < 0.001) were associated with deaths.

**Table II**: clinical and paraclinical characteristics of the population

| Variables | Terms | number (n) | Percentage (%) |
|---|---|---|---|
| Consultation time > 06H (n= 253) | Yes | 154 | 60.9 |
| | No | 99 | 39.1 |
| Motor deficit | | | |
| | Yes | 238 | 81.5 |
| | No | 54 | 18.5 |
| Consciousness disorders | | | |
| | Yes | 121 | 41.4 |
| | No | 171 | 58.6 |
| Language disorders | | | |
| | Yes | 92 | 31.2 |
| | No | 201 | 68.8 |
| Convulsion | | | |
| | Yes | 9 | 3.1 |
| | No | 283 | 96.9 |
| Glasgow score | | | |
| | ≤ 8 | 56 | 19.2 |
| | 9-14 | 154 | 52.7 |
| | 15 | 82 | 28.1 |
| Muscle weakness | Yes | 261 | 89.4 |
| | No | 31 | 10.6 |
| Type of deficit | Hemiplegia | 183 | 70.1 |
| | Hemiparesis | 78 | 29.9 |
| Sensory impairment (n= 245) | Yes | 102 | 41.6 |
| | No | 143 | 58,4 |
| Myotatic reflexes (n= 269) | Normal | 29 | 10.8 |
| | Increased | 206 | 76.6 |
| | Decreased | 34 | 12.6 |
| Babinski sign (n= 281) | Yes | 175 | 62.3 |
| | No | 106 | 37.7 |
| Type of stroke | Ischaemic stroke | 194 | 66.4 |
| | Haemorrhagic stroke | 98 | 33.6 |
| Infarcts location ( n=183) | Superficial Sylvian | 66 | 37.7 |
| | Anterior cerebral | 48 | 26,2 |
| | Total Sylvian | 25 | 13,7 |
| | Deep Sylvian | 23 | 12,6 |
| | Other | 21 | 11,5 |
| Hematoma location (n=91) | Deep | 40 | 44 |
| | Parietal | 26 | 28,5 |
| | Temporal | 13 | 14,3 |
| | Other | 12 | 13,2 |

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**Table III**: in-hospital evolution of patients

| Variables | Terms | Number (n) | Percentage (%) |
|---|---|---|---|
| Bedridden complications | Yes | 150 | 51.4 |
| | No | 142 | 48.6 |
| Complications type | Pneumonia | 42 | 29.7 |
| | Pressure Ulcers | 30 | 21.1 |
| | Malaria | 26 | 18.3 |
| | Urinary tract infections | 18 | 12.7 |
| | Constipation | 17 | 12 |
| | Other | 9 | 6.3 |
| Length of hospital stay | < 7 | 134 | 45.9 |
| | ≥ 7 | 158 | 54.1 |

**Table IV:** factors associated with death among people with stroke at the DRAH

| Variables | Modality | Dead | Alive | cOR | p-value | aOR | a p-value |
|---|---|---|---|---|---|---|---|
| Consultation delay > 6H | Yes | 41 (65.1) | 38 (62.3) | 1.12 (0.54-2.34) | 0.85 | 2.0 (0.7-6.0) | 0.2 |
| | No | 22 (34.9) | 23 (37.7) | | | | |
| GCS ≤ 8 | Yes | 30 (47.6) | 5 (7.9) | 5.16 (2.1-12.6) | <0.001 | 3.65 (1.1-12.12) | 0.034 |
| | No | 33 (52.4) | 58 (92.1) | | | | |
| Pneumonia | Yes | 22 (34.9) | 6 (9.5) | 6.7(2.3-19) | <0.001 | 5.42 (1.54-19) | 0.008 |
| | No | 41 (65.1) | 57 (90.5) | | | | |
| Stroke history | Yes | 41 (66.1) | 54 (85.7) | 3.07 (1.3-7.4) | 0.010 | 3.7 (1.2-11.9) | 0.025 |
| | No | 21 (33.9) | 9 (15.1) | | | | |
| Hemorrhagic Stroke | Yes | 47 (74.6) | 11 (17.5) | 11.8 (5-27.6) | < 0.001 | 20.7 (4.7-90.4) | <0.001 |
| | No | 16 (25.4) | 52 (82.5) | | | | |

GCS: Glasgow Coma Score.

## Discussion

This study aimed to estimate mortality and identify the factors associated with death in patients admitted for stroke to the Internal Medicine Department of the DRAH. We conducted a retrospective, longitudinal, in-hospital study with two components: a descriptive component and an analytical component (nested case-control). Consecutive and exhaustive sampling was carried out. We collected 292 records of patients who presented with a stroke during the study period. The brain CT-scan was performed late in 92.8% of the participants. Ischaemic strokes accounted for 66.4 %. In-hospital mortality was 21.6%. Factors associated with in-hospital death were: previous stroke, Glasgow score ≤ 8, haemorrhagic stroke and pneumonia.

Similar to the large data sets from Cameroon and Africa, neurological deficits were the most common reason for consultation [9,15]. The frequency of language disorders is similar to that found in Cameroon and elsewhere [9,10,16]. However, the frequency of consciousness disorders is higher in this study than in others. That may be due to the high frequency of cortical lesions that might be associated with consciousness impairment.

Ischaemic strokes were seen in almost two-thirds of this population. A similar result was found by Kuate et al. (in Cameroon, 63%) and Traore et al. (in Burkina Faso, 63.1%) [16,17]. However, there is a discrepancy between these findings and the majority of the Cameroonian studies. Most of these patients experienced a higher frequency of cerebral haemorrhages, probably linked to severe high blood pressure [11,12,18]. However, some of these studies suffer from recruitment bias: cases are recruited entirely or partially from intensive care units.

Almost all the patients underwent a late brain CT scan. This result is not consistent with urban findings by Bengono et al., who found almost two-thirds of participants performing the CT-Scan within the first 24 hours [12]. This difference can be explained by the fact that, unlike our study, that of Bengono et al. was carried out in hospitals at the central level of the Cameroonian health pyramid, where neuroimaging examinations such as CT scans are available and at that moment, there was no CT scan in this town; the patients were obliged to travel 50 Km further to get a scan. It would therefore be necessary to improve the management of stroke cases by making brain scans available at the DRAH.

In-hospital mortality was 21.6%. Similar results were found in several Cameroonian and African studies. Mapouré et al. in a General hospital had an in-hospital mortality of 27.6% while, in the same town, but a lower-level hospital, Kuaté et al. had the same result (27.8%) [11,15]. Touré et al. in Senegal (24.8%) and Diagana et al. in Mauritania (29.3%) also found similar results [10,19]. In addition, low mortality rates were found in Western countries: 3.3% in Denmark and 6.9% in Canada [7,8]. The low in-hospital mortality observed in Western countries can be explained by the availability of resources and a good policy for the management of cases of stroke. However, there are several reasons for the high mortality in our context. Key factors include lack of access to healthcare, limited resources for diagnosis and treatment limited resources for diagnosis and treatment, lack of social security and high cost of treatment complications described in several literatures [20]. It is, therefore, necessary to improve stroke mortality in our context by improving the technical facilities in hospitals, recruiting staff specialised in stroke care, and improving the cost of stroke care in our hospitals.

A recurrent stroke can cause death in several ways. Firstly, each new stroke can cause further damage to

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the brain, secondly, each new stroke can cause further damage to the brain, and thirdly, each new stroke can cause further damage to the brain, and fourthly, each new stroke can cause further damage to the brain, and fourthly, each new stroke can cause further damage to the brain, thereby increasing neurological deficits and the risk of serious complications such as cerebral oedema. In addition, recurrent stroke may indicate a more serious underlying cause, such as cardiovascular disease, which may also contribute to the risk of death. Finally, recovery from a recurrent stroke can be difficult, and complications such as respiratory infections can occur, further increasing the risk of death. We, therefore, need to prevent recurrent strokes in our hospitals by implementing a good policy for preventing recurrent stroke [21,22]. The results corroborate those of Touré et al. in Senegal [10].

Coma and its role in the death of patients admitted for stroke have been the subject of several research studies. The coma in stroke victims may be the result of the extent of damage caused to the brain, notably from the stroke itself or from complications arising from the stroke, such as cerebral oedema or intracranial hypertension. In some cases, a coma can result from the cessation of cerebral function due to prolonged oxygen deprivation. The death can occur when brain damage is so severe that vital functions can no longer be can no longer be maintained, or if the complications associated with the stroke cannot be or if the complications associated with the stroke cannot be successfully treated. It is therefore important to assess the state of consciousness of all patients admitted to our hospitals for stroke daily and to improve the quality of our intensive care services in order to improve the management of comatose patients [12,23]. Thus, our findings corroborate those of several research studies in England [24], Denmark [25] and in Senegal in 2010 [10]. Similar results were found in other series in Cameroon by Mapoure et al. and Kuate et al. [15,26].

The association between haemorrhagic and patient death has also been the subject of several studies around the world. This relationship could be explained by the fact that haemorrhagic stroke leads to intracranial hypertension, which can lead to cerebral involvement, resulting in death [27]. Our results are identical to the findings of previous studies [18,28]. However, contrary to our results, some studies did not find any association between the type of stroke and mortality (in Congo and Cameroon) [12,29]. This discrepancy could be due to the recruitment site or the population recruited.

Finally, pneumonia also played a role in the deaths of patients with stroke in this study. Pneumonia is a major cause of death in patients with stroke, seriously compromising lung function. They are secondary to stasis of alveolar fluid due to decubitus and/or secondary to a false route. Infection causes inflammation of the lungs, leading to breathing difficulties, reduced oxygenation of the blood. In severe cases, this can lead to septic shock, respiratory failure or multi-visceral failure, eventually leading to death. It is, therefore, necessary to prevent them and to look for them in all patients with stroke. This result corroborates several studies in Cameroon and elsewhere [15,30–32].

This study provides us with the first information on the factors associated with the deaths of patients with stroke in the DRAH. The strengths of this study are that it has enabled us to investigate the factors associated with the intra-hospital deaths of stroke patients. Identifying these factors will make it possible to prevent in-hospital mortality associated with these conditions. However, because of the poor quality of the records and the failure to carry out certain complementary examinations when patients were admitted, we were unable to find all the variables we wanted to explore. Taking this into account in future studies could improve the quality of the results obtained. The single-centre nature of this study means that the results cannot be extrapolated to other sites. The small sample size in this study did not allow us to have a good representation of the population studied. Then, one of the important biases was the lack, at the time of this study, of a CT scan in this area.

## Conclusion

This study aimed to estimate stroke-related mortality and to identify the factors associated with death in patients admitted for stroke to the Internal Medicine Department of Dschang Regional Annex Hospital. Ischaemic strokes accounted for more than half of the cases found. They affect more the superficial Sylvian, anterior cerebral and total Sylvian territories. Haemorrhages affected deeper structures and the parietal lobe more. More than 2 out of 10 patients included in this study died. The main factors predicting mortality were a previous stroke, a Glasgow score of Glasgow score ≤ 8, haemorrhagic stroke and pneumonia.

**Declarations**

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**Competing Interest**: The authors declare that they have no competing interests.

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**Authors' contributions**: SRSN, AA, JA, and SPC were involved in designing the study, data collection, and statistical analyses. SRSN, CNO, JRMT wrote the manuscript. SRSN and CMT supervised the project. FKL, YFF, CKT, YMN, and

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SPC contributed to the review of the manuscript. All authors contributed to the revision and approved the final version of the submitted manuscript.

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**Abbreviations**:

**aOR**: adjusted Odds Ratio

**CI**: confidence interval

**cOR**: crude Odds Ratio

**CT-scan**: Computed Tomography scan

**DRAH**: Dschang Regional Annex Hospital

**GCS**: Glasgow Coma Scale

**HTN**: Hypertension

**NIHSS**: NIH Stroke Scale

## References


1. Stroke. https://www.who.int/news-room/fact-sheets/detail/stroke
2. Sacco RL, Kasner SE, Broderick JP, Caplan LR, Connors JJB, Culebras A, et al. An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2013;44(7):2064–89.
3. Hatano S. Experience from a multicentre stroke register: a preliminary report. Bull World Health Organ. 1976;54(5):541–53.
4. GBD 2019 Stroke Collaborators. Global, regional, and national burden of stroke and its risk factors, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Neurol. 2021;20(10):795–820.
5. Béjot Y, Touzé E, Jacquin A, Giroud M, Mas J-L. [Epidemiology of stroke]. Med Sci MS. 2009;25(8–9):727–32.
6. Feigin VL, Brainin M, Norrving B, Martins SO, Pandian J, Lindsay P, et al. World Stroke Organization: Global Stroke Fact Sheet 2025. Int J Stroke. 2025;20(2):132–44.
7. Andersen KK, Andersen ZJ, Olsen TS. Predictors of early and late case-fatality in a nationwide Danish study of 26,818 patients with first-ever ischemic stroke. Stroke. 2011;42(10):2806–12.
8. Saposnik G, Jeerakathil T, Selchen D, Baibergenova A, Hachinski V, Kapral MK, et al. Socioeconomic status, hospital volume, and stroke fatality in Canada. Stroke. 2008 Dec;39(12):3360–6.
9. Ouédraogo PV, Bagbila WPAH, Sagna Y, Koanda M, Séré IS, Millogo A. Facteurs associés aux accidents vasculaires cérébraux selon le type et le genre au Centre Hospitalier Universitaire Sourô Sanou de Bobo-Dioulasso, Burkina Faso: Factors associated with stroke by type and gender at Sourô Sanou teaching hospital of Bobo-Dioulasso, Burkina Faso. Ann Afr Med. 2023;16(4):e5344–50.
10. Touré K, Diagne S, Seck L, Sow A, Ndiaye M, Diop M, et al. Facteurs predictifs de mortalite par accident vasculaire cerebral (AVC) a la Clinique Neurologique du chu de Fann, Dakar - Senegal. Afr J Neurol Sci. 2011;29(2):29–36.
11. Mapoure NY, Tchaleu Nguenkam CB, Mbatchou Ngahane HB, Dzudie A, Coulibaly A, Mounjouopou NG, et al. Predictors of in-hospital mortality for stroke in Douala, Cameroon. Stroke Res Treat. 2014;2014:681209.
12. Bengono Bengono R, Amengle A, Ndikontar R, Kona Ngondo S, Gouag, Iroume C, et al. Aspects Cliniques et Pronostiques des Accidents Vasculaires Cérébraux en Réanimation au Cameroun. Health Sci Dis. 2023;24(2 Suppl 1). https://www.hsd-fmsb.org/index.php/hsd/article/view/4263
13. Kuate Defo B, Mbanya JC, Kingue S, Tardif J-C, Choukem SP, Perreault S, et al. Blood pressure and burden of hypertension in Cameroon, a microcosm of Africa: a systematic review and meta-analysis of population-based studies. J Hypertens. 2019;37(11):2190–9.
14. Simeni Njonnou SR, Eyenga Bangbang CFG, Ouankou CN, Lekpa FK, Ngako CD, Mfeukeu-Kuate L, et al. Prevalence and determinants of hypertension in a semi-urban population: a cross-sectional study in Dschang (West Region of Cameroon). Pan Afr Med J. 2024;48(157). https://www.panafrican-med-journal.com/content/article/48/157/full
15. Callixte K-T, Yacouba M-N, Lauriane G-M, Jacques D, Gustave N-D, Ii DJ, et al. Mortalité par Accident Vasculaire Cérébral et ses déterminants dans un Hôpital de référence de Douala (Cameroun). Health Sci Dis. 2016 ;17(1). https://www.hsd-fmsb.org/index.php/hsd/article/view/585
16. Kuate-Tegueu C, Dongmo-Tajeuna JJ, Doumbe J, Mapoure-Njankouo Y, Noubissi G, Djientcheu VDP. Management of blood pressure in acute stroke: Comparison of current prescribing patterns with AHA/ASA guidelines in a Sub-Saharan African referral hospital. J Neurol Sci. 2017;382:137–41.
17. Traoré I, Kaboré R, Ki K, Millogo A, Ouédraogo N. Morbidité et mortalité chez les patients admis pour accident vasculaire cérébral dans une unité de réanimation en Afrique subsaharienne. Rev Afr Anesth Med Urg. 2013;18(4):59.
18. Njall P, Djientcheu VDP, Eboumbou C, Tchatchoua, G. Prognostic Factors of Cerebrovascular Accidents Received in the Acute Phase in the Intensive Care Unit of Laquintinie Hospital Douala. Rev Afr Anesth Med Urg. 2013;18:60.
19. Diagana M, Traore H, Bassima A, Druet-Cabanac M, Preux P-M, Dumas M. Apport de la tomodensitométrie dans le diagnostic des Accidents Vasculaires Cérébraux à Nouakchott, Mauritanie. Med. Trop Madr. 2002 ;62.
20. Mapoure Njankouo YM, Tegue CK, Kouna PEBA, Namme HL, Sone AM, Kongnyu AN. Coût des Accidents Vasculaires Cérébraux à l'Hôpital Général de Douala. Health Sci Dis. 2014 ;15(3). https://www.hsd-fmsb.org/index.php/hsd/article/view/425
21. Lackland DT. Racial Differences in Hypertension: Implications for High Blood Pressure Management. Am J Med Sci. 2014 Aug;348(2):135–8.
22. Writing Group Members, Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, et al. Heart Disease and Stroke Statistics-2016 Update: A Report From the American Heart Association. Circulation. 2016;133(4):e38-360.
23. Barber M, Wright F, Stott DJ, Langhorne P. Predictors of early neurological deterioration after ischaemic stroke: a case-control study. Gerontology. 2004;50(2):102–9.
24. Mohan KM, Crichton SL, Grieve AP, Rudd AG, Wolfe CDA, Heuschmann PU. Frequency and predictors for the risk of stroke recurrence up to 10 years after stroke: the South London Stroke Register. J Neurol Neurosurg Psychiatry. 2009;80(9):1012–8.
25. Kammersgaard LP. Survival after stroke. Risk factors and determinants in the Copenhagen Stroke Study. Dan Med Bull. 2010;57(10):B4189.


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26. Mapoure YN, Yone EWP, Bevela JY, Ba H, Simeni Njonnou SR, Ngahane HBM, et al. Les complications médicales à la phase aiguë des accidents vasculaires cérébraux. Rev. Médecine Pharm. 2016;6(1):515–22.

27. Hood RJ, Beard DJ, McLeod DD, Murtha LA, Spratt NJ. Intracranial pressure elevation post-stroke: Mechanisms and consequences. Front Stroke. Frontiers; 2023;2. ttps://www.frontiersin.org/journals/stroke/articles/10.3389/fstro.2023.1119120/full

28. Mapoure NY, Tchaleu Nguenkam CB, Mbatchou Ngahane HB, Dzudie A, Coulibaly A, Mounjouopou NG, et al. Predictors of in-hospital mortality for stroke in Douala, Cameroon. Stroke Res Treat. 2014;2014:681209.

29. Longo-Mbenza B, Ngimbi RM, Ngoma DV, Fuele SM, Buassa-bu-Tsumbu B. Facteurs de risque d'accident vasculaire cérébral chez les diabétiques hypertendus noirs congolais de type 2. Ann Cardiol Angéiologie. 2008;57(1):37–43.

30. Walker RW, Rolfe M, Kelly PJ, George MO, James OFW. Mortality and recovery after stroke in the Gambia. Stroke. 2003;34(7):1604–9.

31. Teh WH, Smith CJ, Barlas RS, Wood AD, Bettencourt-Silva JH, Clark AB, et al. Impact of stroke-associated pneumonia on mortality, length of hospitalization, and functional outcome. Acta Neurol Scand. 2018;138(4):293–300.

32. Mapoure Y, Walter P, Bevela JY, Hamadou B, Sylvain Raoul SN, Mbatchou Ngahane BH, et al. Les complications médicales à la phase aiguë des accidents vasculaires cérébraux. 2016; Revue de Médecine et Pharmacie.2016;6(1):515 -522.

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