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SCHOOL OF MEDICINE AND HEALTH SCIENCES

STROKE: UNDERSTANDING PREVALENCE AND RISK FACTORS AT LEVY MWANAWASA UNIVERSITY TEACHING HOSPITAL (LMUTH)

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A dissertation being submitted in partial fulfillment of the requirements for the degree Bachelor of Science in Medical Sciences

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DECLERATION

I, TEZA KAMPHASA SIKASOTE, declare that this dissertation is an exhibition of my work. It is being submitted for the Bachelor of Science Degree in Medical Sciences at the University of Lusaka. It has never been submitted for any degree at this or other university.

Signature of author:  Date: 11.06.2025

DEDICATION

To my beloved family,

Thank you for your unwavering love, patience, and support throughout this journey. Your encouragement has been my guiding light during challenging times, and your belief in my abilities has inspired me to persevere. This achievement is a testament to your sacrifices and endless faith in me. I am forever grateful for your kindness, understanding, and unconditional love and support.

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LIST OF ABBREVIATIONS AND ACRONYMS

LMUTH - Levy Mwanawasa University Teaching Hospital

NCD -Non communicable disease

TIA - Transiet ischemic attack

CVA - Cerebral vascular accident

GBD - Global burden of disease

DALYS - Disability Adjusted Life Years

HIC - High income countries

LMIC- Lower and middle-income countries

SES - Socioeconomic status

SSA - Sub Saharan Africa

HIV - Human Immunodeficiency Virus

AIDS - Acquired immunodeficiency syndrome

UTH - University Teaching Hospital

GCS - Glasgow Coma score

WHO - World Health Organization

ZNHDS -Zambia National Health and Demographic Survey

FPC - Finite population correction

SPSS - Statistical Package for Social Sciences

UNILUS - University Of Lusaka

NHRA- National Health Research Authority

CT - Computed Tomography

MRI - Magnetic Resonance Imaging

PASCAR- Pan-African Society of Cardiology

DEFINITION OF KEY TERMS AND CONCEPTS

Stroke: clinically defined syndrome of abrupt localized neurological impairment caused by central nervous system vascular injury, either because of infarction and/or haemorrhage (Murphy&Werring, 2020)

Prevalence: The number of cases of a disease, number of infected people, or number of people with some other attribute present during a particular interval of time (National Centre for Health Statistics, 2023).

Risk factors: a characteristic, condition, or behaviour that increases the likelihood of getting a disease or injury (Medicines R&D, 2015)

ABSTRACT

Introduction: A stroke is a potentially fatal condition that occurs when there is insufficient blood flow to a portion of the brain. The most prevalent causes of this are cerebral haemorrhage or an obstructed artery. The brain cells in that region, particularly those distal to the site of injury, begin to die from a lack of oxygen if there isn't a constant flow of blood and this could result in significant disability or even death. Stroke poses a serious public health concern, especially in areas like Zambia with scant epidemiological data.

Aims: This research assessed the prevalence and risk factors of stroke in patients at Lusaka's Levy Mwanawasa University Teaching Hospital (LMUTH).

Methodology: A Cross-sectional study was conducted from October 2024 to March 2025 at Levy Mwanawasa University Teaching Hospital in Lusaka, Zambia. By purposeful sampling, all adult stroke patients admitted to the stroke, male and female medical wards between 1st October 2024 and 31st March 2025 were sampled. Data were collected from the medical records using a structured questionnaire and were analysed using the Statistical Package for the Social Sciences version 22. Descriptive statistics were employed to report the findings. Validity was ensured through pre-testing and expert review, and reliability was ensured through standardized training and data checking. Ethical approval was obtained from all research committees that were relevant.

Results: 137 stroke patients in all were included. The average age was 57.3 years, and 53.3% of the population was female. The most frequently reported condition was hypertension, which was followed by diabetes or concomitant HIV. Fewer patients had family histories of chronic diseases and stroke. While risk factors for lifestyle, such as alcohol consumption (38.7%) and smoking (17.5%), were noted, the documentation was frequently lacking. The history of diet and level of physical activity was not recorded for all but a few. Among stroke patients, sudden weakness or numbness was the most prevalent clinical sign. The study also revealed a 58.5% increase in incident initial stroke cases in the last 13 years, particularly in the last two years, likely due to worsening risk factors like hypertension and diabetes. This trend aligns with global trends, particularly in low- and middle-income countries. Imaging was used in 73.7% of cases and was equally effective in identifying haemorrhagic and ischaemic strokes across classified outcomes. The two biggest modifiable hazards were poor adherence to medication that was prescribed (27%) and undiagnosed HIV or hypertension prior to having a stroke (7.3%).

Conclusion: The results of this investigation validate the multiple causes of stroke and the critical role that both modifiable and non-modifiable factors play. The most common causes of stroke in this patient population were poorly managed hypertension and lifestyle risks (such as smoking and alcoholism). An increasing trend in stroke incidence and Systemic obstacles to diagnostic and preventative care delivery are also shown by the results. In the absence of prompt imaging tests, sufficient documentation, and systematic follow-up, the results will be negative.

Key Words: stroke, prevalence, risk factors

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Stroke is a non-communicable disease (NCD) that is clinically defined as a syndrome of abrupt localized neurological impairment caused by central nervous system vascular injury, either because of infarction and/or hemorrhage (Murphy and Werring, 2020). It is the second most common cause of death and third leading cause of disability globally (Bishen, 2024). According to the Global Burden of Disease (GBD) study, the number of people with cardiovascular disease, including stroke, nearly doubled between 1990 and 2019, rising from 271 million to 523 million (Malesu, 2024). Malesu (2024) study results also demonstrated that global stroke statistics for 2021 showed that there were 93.8 million stroke survivors, 11.9 million new stroke cases, 7.3 million stroke-related deaths, and 160.5 million Disability-Adjusted Life Year's (DALYs) lost because of stroke, which accounted for 10.7% of all fatalities and 5.6% of all DALYs from all causes.

Stroke can be brought on by a variety of risk factors, disease processes, and causes; it is not a single illness. Large artery athero thromboembolism, cardio embolism, and small vessel arteriolosclerosis are the main causes of the majority of strokes, 85%, which are ischemic in nature and about 15% of strokes globally are the result of intracerebral hemorrhage, which can be lobar, cerebellar, or deep (brainstem, basal ganglia) (Murphy and Werring, 2020). Whereas cerebral amyloid angiopathy or arteriolosclerosis are the primary causes of lobar hemorrhages. Deep hemorrhages are typically the consequence of deep perforator (hypertensive) arteriopathy (arteriolosclerosis) (Murphy and Werring, 2020). Venous sinus thrombosis, macrovascular lesions (vascular malformations, aneurysms, cavernomas), and other uncommon causes account for a small percentage (about 20%) of intracerebral hemorrhages (Murphy and Werring, 2020; Habibi-koolae et al., 2018; Nall et al., 2024).

Stroke has serious social and economic repercussions and is a major public health concern. It was once thought to be a disease that only affected affluent nations, but evidence-based control efforts have greatly lessened its prevalence. According to Donker (2018), the burden of stroke is, nevertheless, shifting to developing nations and further stated that in the ensuing decades, it is anticipated that the prevalence of stroke would rise in developing nations because of shifting demographics and health trends towards non-communicable diseases.

In support of this assertion, Malesu (2024) presented a study that demonstrated a glaring geographic difference, with the bulk of stroke burden,including 83.3% of new strokes and 87.2% of stroke deaths, occurring in low- and middle-income countries (LMICs).it further

stated that significant disparities in the prevalence of stroke were noted across high-income and low-income regions, with the greatest rates found in Central Asia, East Asia, and Sub-Saharan Africa, the report added. North America and Australasia, on the other hand, had the lowest incomes.

An article by Feigin and Owolabi (2023) predicts that the number of stroke deaths will rise by 50%, from 6·6 million (6·0 million–7·1 million) in 2020 to 9·7 million (8·0 million–11·6 million) in 2050. Disability adjusted life years will also increase during this time, rising from 144·8 million (133·9 million–156·9 million) in 2020 to 189·3 million (161·8 million–224·9 million) in 2050. It also showed that the burden of stroke-related disability is also significant, and it is rising more quickly in low- and middle-income nations than in high-income ones. Additionally, it also showed that stroke is becoming more common in young and middle-aged individuals (those under 55) worldwide, which is concerning.

Avan et al. (2019) found that poor treatment of modifiable risk factors is responsible for over half of stroke-related deaths, which may be avoidable. The paper makes several recommendations which included the recognition of sociocultural hurdles that are faced by lower-Socioeconomic status (SES) populations. Socioeconomic status is still closely linked to modifiable risk factors and the burden of stroke, despite advancements in general health awareness, healthcare access, and preventative measures. For this reason, identification and understanding of prevalence and risk factors of stroke within the majority low SES status environment is of the utmost importance and urgency (Avan et al., 2019). A peer reviewed study by Pantoja-Ruiz et al. (2024), also concluded that the latest research shows Individuals with low socioeconomic status (SES) are more likely to have a stroke, receive lower quality care, and have poorer outcomes. The study further stated that there are also gaps in knowledge of the underlying mechanisms and the impact of SES in many circumstances, especially in low- and middle-income nations, despite mounting evidence of its association with stroke.

The lack of information on stroke prevalence and risk factors in Zambia makes it difficult to allocate resources and plan for health care effectively. Understanding stroke's prevalence and related risk factors in our local environment is essential due to its impact on patients and healthcare systems. As a tertiary healthcare facility in Lusaka, Zambia, Levy Mwanawasa University Teaching Hospital offers an ideal location for researching the occurrence of stroke and its risk factors, which might inform healthcare practices and policy in comparable contexts, ultimately reducing the burden and occurrence of stroke not only in the country, but also the region.

1.2. Statement of the Problem

Stroke is a major health problem worldwide, causing significant morbidity, mortality and economic burden. While the incidence of stroke is increasing in Zambia, and Lusaka in particular, comprehensive information on frequency and associated risk factors is still scarce in community health facilities like Levy Mwanawasa University Teaching Hospital. Understanding these developments is important to improve patient outcomes and optimize prevention strategies.

Currently, there are no detailed epidemiological data specific to the Lusaka region of stroke prevalence and major risk factors in clinical settings this disparity limits interventions by health professionals and policy makers targeted intervention and effective distribution of resources.

The aim of this study was to investigate the prevalence of stroke among patients at the Levy Mwanawasa University Teaching Hospital and to address these issues by identifying the main risk factors for this condition. In doing so, it seeks to provide the baseline knowledge needed to develop effective public health policies and clinical practices aimed at not only reducing the incidence of stroke, but also improving the quality of care for patients affected by it.

1.3. Research Objectives

1.3.1. General Objectives

This study's primary objective was to determine the prevalence of stroke and the major risk factors linked to it among patients at LMUTH. This will help to improve the disease burden and guide specific stroke prevention and management plans in Zambia.

1.3.2. Specific Objectives

i. To determine the current prevalence of stroke amongst patients admitted to LMUTH.

ii. To identify and analyze the demographic, clinical, and lifestyle-associated risk factors associated with stroke in this population.

iii. To assess the common risk factors associated with stroke among patients at LMUTH, including but not limited to, hypertension, diabetes, smoking, alcohol consumption, and family history of stroke.

1.4. Research Question

How prevalent is stroke, and what are the associated risk factors amongst patients at LMUTH?

1.4.1. Specific Research Questions

i. What is the prevalence of stroke among patients admitted to LMUTH over a specified period?

ii. Which demographic, clinical, and lifestyle-associated risk factors are most prevalent amongst stroke patients at LMUTH?

iii. What can be done to reduce stroke rates and improve prevention measures for high-risk stroke patients at LMUTH?

1.5. Significance of the Study

The lack of statistics on stroke prevalence and threat factors in Zambia makes it difficult to allocate resources and create powerful fitness care plans. Understanding the frequency of stroke and related threat elements in our nearby surroundings is critical due to its effects on people and healthcare systems.

Finding high-risk individuals in the population requires an understanding of Zambia's stroke prevalence and risk factors. Healthcare providers can more accurately identify those who are at a higher risk of having a stroke by researching the prevalence of stroke in Zambia and the particular risk factors that lead to it. This information makes it possible to develop focused screening initiatives and therapies for stroke risk factors. If high-risk individuals are identified early, prompt interventions, lifestyle changes, and medical treatments can help avoid strokes or lessen their severity. In the end, this strategy can enhance the general health and standard of living for Zambians who are at risk of stroke.

Levy Mwanawasa University Teaching Hospital, a tertiary healthcare center in Lusaka, Zambia, facilitates research on the prevalence of stroke and related risk factors. The results will help fill in the gaps in the health care community's knowledge about stroke and help lawmakers and medical professionals develop well-informed measures unique to the needs of the Zambian population to avoid stroke and improve patient outcomes. This study may lead to other national studies on stroke prevention and management.

1.6. Limitations of the Study

Among other limitations, a study of stroke prevalence and risk factors based at Levy Mwanawasa University Teaching Hospital suffered from the potential biases that come with a retrospective or cross-sectional study design; generalization was to some extent limited by sample size and single-center focus. Data quality was undermined by incomplete or inaccurate hospital records of conditions or events, including undiagnosed conditions and underreported behavioral factors of smoking or the use of alcohol. Inaccuracies in the classification of stroke type also arose from limitations in diagnostics and resources, such as the inadequate supply of advanced imaging tools and the shortage of specialist training. Furthermore, lack of standardized documentation of stroke patient medical records as well as uncentrallized and unorganized storage of stroke patients medical records limited the study's full scope.

Infectious illnesses (such as HIV and malaria) and particular environmental exposures that are pertinent to urban Lusaka were not considered as local risk factors. These findings could not be broadly applied to Zambia or any other population due to cultural influences, selection biases, and evolving health policy. This study's capacity to present a comprehensive picture of the effect and management of stroke in this area was limited by the absence of follow-up on long-term outcomes, such as death and recurrence.

1.7. Scope of the Study

The study focused on stroke patients hospitalized at the Levy Mwanawasa University Teaching Hospital. This focused on a specific geographical area and population of patients. The aim of the study was to determine the prevalence of stroke in a defined patient population. In this study, the incidence of depression is calculated for all eligible patients. The aim of the study was to evaluate and analyze risk factors that may increase the risk of stroke. Screening for lifestyle factors (such as diet, smoking and alcohol consumption), medical history (such as diabetes, heart disease and hypertension), and demographic characteristics (such as age, sex and socioeconomic status) were all a part of this.

To determine stroke prevalence and risk factors, the study collected quantitative data from medical records. The study used statistical methods to examine risk factors or relationships in a group of patients. The measures included the data collection period that will be used to enter the data under consideration, such as a specific fiscal year or a specific period (in this case 6 months). By identifying critical areas of intervention or prevention, studies ultimately seek to influence health behaviors, community knowledge, and potential policy decisions.

Overall, the scope entailed systematically comprehending the traits and variables influencing the incidence of strokes within a specific hospital-based cohort in Lusaka.

CHAPTER TWO: LITERATURE REVIEW

2.1. Theoretical Review

According to the fundamental tenets of epidemiology, populations exhibit systematic disparities in the patterns of health and illness, which result from variations in the prevalence of or vulnerability to the precipitating factors (Bhopal, 2016). This theory applies more than in the case of NCDs like stroke and increases the importance of understanding the prevelance and associated risk factors, which are very cardinal in the prevention and reduction in morbidity and mortality due to stroke.

Furthermore, the biopsychosocial theory states that health is influenced by social, psychological, and biological relationships. This approach separates the risk factors for stroke into two categories: those that cannot be changed, such as age, gender, and genetic predisposition, and those that can, such as diabetes, hypertension, and lifestyle variables (Megan, 2021).

Another applicable theory is The Health Belief Model, which emphasizes perceived health risks and the advantages of taking preventative action as key factors influencing health behavior, is another helpful hypothesis. Accordingly, this model would imply that enhancing adherence to medical advice and encouraging preventative actions may need an awareness of patients' views of their risk of stroke (Maiman and Becker, 1974).

2.2. Empirical Review

2.2.1. Global perspective

Stroke continues to rank among the most common causes of public health issues worldwide. Stroke ranks third in terms of disability-related mortality and is the second most common cause of death worldwide, accounting for around 6.5 million deaths per year, according to the Global Burden of Disease Study 2019 by Feigin et al. (2021). The global distribution of stroke incidence and outcomes between high-income countries (HICS) and low- and middle-income countries (LMICS) shows a startling discrepancy. While stroke mortality and incidence have decreased in HICs because of more access, prevention, and treatment options, the incidence has grown in LMICs because of demographic shifts involving population ageing and rising NCD prevalence: hypertension, diabetes, and obesity (Johnson et al., 2016).

Thrombosis, embolism, and small vessel disorders are the main causes of cerebral blood vessel occlusions, which account for approximately 85% of all ischaemic stroke cases globally (Feigin et al., 2021). Even while ischaemic strokes account for the majority of stroke-related deaths, hemorrhagic strokes are more common in people with uncontrolled hypertension who have limited access to emergency medical care (Johnson et al., 2016). Other lifestyle variables that may contribute to the global burden include sedentary lifestyles, poor diets, tobacco use, and excessive alcohol intake, all of which are on the rise globally (WHO, 2021). A study by Yi et al. (2020) concluded that the high-risk stroke population and stroke prevalence were both high among persons in southwestern China who were 40 years of age or older. The results indicate that stroke can be prevented by implementing individual and population-level treatments for the major risk factors of hypertension, dyslipidaemia, and inactivity.

An in-depth literature review by Alemu et al. (2023), which identified 20 studies that met the eligibility criteria, with a total of 980 published articles identified, concluded that lowering the risk of stroke requires recognizing and changing risk factors, and that early risk factor diagnosis and management are essential. It also concludes that to lower the incidence and severity of stroke, early treatments and preventative strategies must be developed and integrated with a better understanding of stroke risk factors.

The combined burden of infectious diseases exacerbates the incidence of stroke in LMICs, which include the majority of sub-Saharan African and South Asian nations. For example, rheumatic heart disease and HIV/AIDS cause distinct stroke aetiologies in different areas (Johnson et al., 2016). Stroke outcomes are influenced by significant disparities in health care infrastructure and access; in most LMICs, the lack of sophisticated diagnostic facilities, qualified medical personnel, and prompt access to life-saving procedures like mechanical thrombectomy or thrombolysis contributes to the higher mortality and disability rates.

2.2.2. Regional perspective

Stroke is becoming more common in Sub-Saharan Africa (SSA) because of continuous demographic and epidemiological changes. According to reports, the fatality rates are as high as 30% within a month of the commencement, but the incidence varies throughout the region between approximately 146-316/100,000 persons annually (Adeloye et al., 2018). The burden is further increased by inadequate acute and rehabilitative care for stroke, poor health infrastructures, and restricted access to diagnostic tools. Despite this, stroke is still underrecognized and underreported in the area, which has created several problems for raising awareness and influencing policy.

Due mostly to uncontrolled hypertension, which surpasses 40% in many areas, the relative proportion of hemorrhagic strokes is higher in SSA than in high-income nations where ischemic strokes are the most common kind (Owolabi et al., 2017). Infectious disorders like malaria and HIV/AIDS are also major causes of stroke. According to several series of publications, HIV infection has been linked to up to 15–20% of stroke cases (Lekoubou et al., 2014). Prothrombotic states, opportunistic infections, and chronic inflammation are some of the hypothesized processes by which these infections raise the risk of stroke.

2.2.3. Local perspective

Research on stroke prevelance and risk factors in Zambia is limited but growing.A study on Stroke Characteristics and Outcomes of Adult Patients Admitted to the University Teaching Hospital (UTH) in Lusaka, Zambia, conducted between July and December 2010 by Atadzhanov et al. (2012), presented the characteristics and outcomes of stroke among adult Zambians that have been admitted to the UTH in Lusaka. Results were from 250 consecutive stroke patients, including 65% with ischemic and 35% with hemorrhagic strokes. Hypertension was the most common risk factor for both strokes, supplemented by alcohol intake, previous stroke, family history of stroke, HIV infection, hypercholesterolemia, and tobacco smoking/sniffing. The inpatient mortality post-stroke was 40%; independent predictors of mortality included female gender, pneumonia,glasgow coma scale (GCS), and severity of stroke at the time of admission. It further showed that stroke among Zambians strikes at relatively younger ages, and intracerebral hemorrhage is relatively more common compared to developed countries.

In Zambia, stroke is one of the main causes of death, and its incidence is rising because of a rise in risk factors such diabetes and hypertension. According to research by Shumba, Mtaja, and Saylor. (2023), stroke is Zambia's eighth most common cause of death, and within the last decade alone, the mortality rate has risen by 27%. This is in line with WHO projections for sub-Saharan Africa, where stroke fatality rates are extremely high because of delayed diagnosis, insufficient access to treatment, and a total lack of rehabilitation.

About 30% of adults in Zambia suffer from hypertension, making it the most common chronic illness in the country, according to the Zambia National Health and Demographic Survey (ZNHDS, 2018). Globally, hypertension is recognized as the most important modifiable risk factor for stroke, and Zambia follows this pattern consistently. According to a Nutakki et al. (2021) study on Risk factors and outcomes of hospitalized stroke patients in Lusaka, Zambia,

it was found that hypertension was the most common risk factor for 80% of all stroke cases and was most common in haemorrhagic stroke.

Similar to what is happening in Zambia, a study carried out in Uganda by Kayima et al. (2013) found that the prevalence of hypertension is increasing throughout East Africa. The prevalence of hypertension and other cardiovascular risk factors is rising among urban dwellers because of changing lifestyle choices such unhealthy eating habits, less exercise, and higher alcohol and cigarette consumption. Zambia's rising stroke rate, especially in Lusaka, is also as a result of this change.

The available statistics on the incidence of stroke in Zambia paint a sobering picture of the growing public health burden and emphasize the need for more research on risk factors and current prevalence.

2.3. Theoretical Framework

The study's proposed theoretical framework integrates elements of the Biopsychosocial Model, the Health Belief Model, and the core principles of epdiemelogy. In determining the prevalence and risk of stroke events among patients treated at Levy Mwanawasa Hospital, the model illustrates the interplay of biologic risks, such as diabetes and hypertension, psychologic variables, such as personal health beliefs, and social determinants of health, such as socioeconomic status and access to healthcare.

According to this theoretical framework, addressing stroke prevention and management in Zambia requires an understanding of both individual and systemic factors. Furthermore, it supports the idea that patient perceptions of stroke risk may be significantly impacted by educational programs designed to change patients' preventative health practices.

2.4. Conceptual Framework

The conceptual framework of this study was adopted and modified from Reshetnyak et al. (2020). The conceptual framework was based on the assessment of various risk factors that influenced stroke prevelance, which were grouped under three domains, namely biological, behavioural and socio-economical, and these factors are elaborated upon and shown in figure 2.1 below. In this regard, the conceptual framework for LMUTH demonstrates that the predisposing factors combine to cause a patient to fall prey to a stroke.

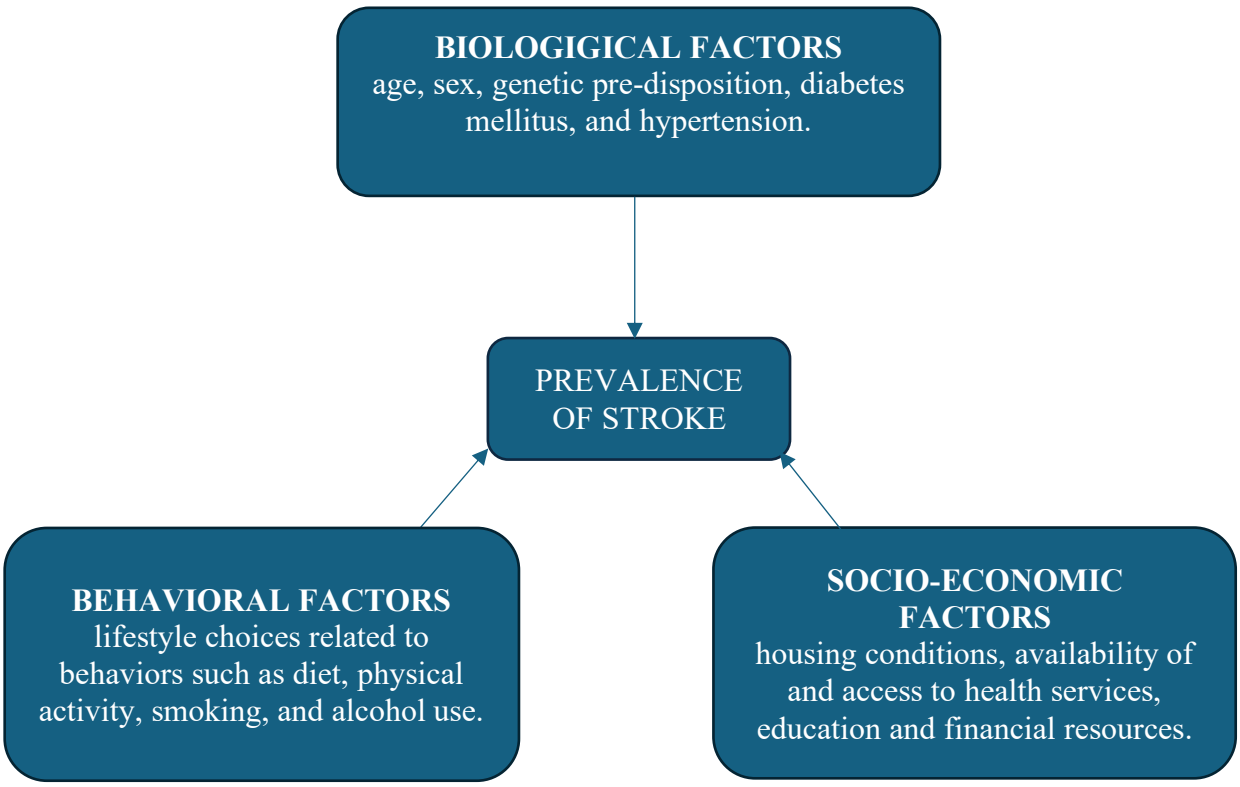

Figure 2.1 1: showing biological, behavioral and socio-economic factors that all influence the prevelance of stroke

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Research Approach

This chapter described the approach that used a variety of data collection strategies to address research difficulties. Emphasis was placed on characteristics including research design, study site, study population, sample size calculation, and sampling technique. Other characteristics that were emphasised included the data management process, data collection instruments, and analysis process. During the study, measures were taken to guarantee validity and reliability, and ethical considerations were described.

3.2. Research Design

The study was carried out at LMUTH over a six-month period using a cross-sectional methodology looking at the period of 1st October 2024 to 31st March 2025. This design made it easier to examine variables and how they related to one another during the study.

3.3. Research Context

The Levy Mwanawasa University Teaching Hospital (LMUTH) was the study's location. Founded in 2011, LMUTH is a public tertiary referral hospital located in Lusaka, Zambia. The hospital serves around 7 million people and has 1100 beds.

The hospital is located in Zambia's capital, Lusaka, along the Great East Road. It is situated in the Chainama neighbourhood, 10 kilometres east of Lusaka City Centre. Its households are spread throughout all income brackets.

3.4. Study Population

All adult patients (18 years and older) diagnosed with stroke and admitted to the LMUTH’s stroke, male and female medical wards throughout the study period were included in the study.

3.4.1. Target Population

Patients in LMUTH's stroke, male and female medical wards comprised the target population. This requirement guaranteed that the study included all patients who have had history of stroke in the study period to be included.

3.5. Sample Size

All stroke patients admitted to the stroke, male and female medical wards during the study period at LMUTH made up the study's sample. The sample size for the study was the complete target population and the minimum sample size was calculated below using the Cochran formula:

Cochran's Formula (1977):

$$\mathrm{N} = (Z^2 * p * (1 - p)) / d^2$$

Where:

N = required sample size

Z = Z-score for 95% confidence level (1.96)

p = estimated prevalence of stroke (0.10)

d = desired margin of error (0.05)

Substituting the values into the formula:

n = (1.96^2 * 0.10 * (1 - 0.10)) / (0.05^2)

n = (3.8416 * 0.10 * 0.90) / 0.0025

n = 0.345744 / 0.0025

n ≈ 138.3

Therefore, the calculated minimum sample size was approximately 139 participants. However, because the expected number of stroke patients at LMUTH over 6 months was less than 300, the finite population correction (FPC) was applied:

n_adj = n / (1 + ((n - 1) / N))

n_adj = 139 / (1 + ((138) / 300))

$n_{adj} = 139 / (1 + 0.46)$

$n_{adj} \approx 95$

Final adjusted sample size = 95 participants.

This smaller sample size was appropriate and manageable given the study's time, scope, and available population. Using a smaller sample population was justified by the population's small size and by the specific hospital-based setting of this study. The study was targeted to only stroke cases verified by LMUTH in a specified period of 6 months (i.e. 1st October 2024 to 31st March 2025) and not to the general population. The eligible number of patients was approximated to be less than 300 and was therefore statistically appropriate to use a corrected smaller sample.

Furthermore, data collecting required manual verification of patient files and medical reports, which took time. A smaller study participant group guaranteed timely and cost-effective data collectiion that was accurate and comprehensive.

With a sample size ranging from 80 to 150 participants, the other similar hospital-based research has produced reliable results. Therefore, the revised sample of about 95 people is both practical and appropriate from a scientific standpoint for this investigation.

3.6. Sampling Techniques

To ensure that individuals with the necessary information (i.e. all adult patients admitted to the stroke, male and female medical wards at LMUTH) were selected to participate in the study, this research used a purposive sampling method examined all admission records in the stroke, male and female medical wards and extracted relevant details such as name, age, sex and file number for all patients that were admitted during the study period with a diagnosis of stroke. A list of pateints was then made from the admission books and was used in the records department to look for the corresponding medical records for each patient listed and these medical records were then individually examined and appropriate information was obtained and recorded in the data collection form (find attached in Appendix 4).

Purposive sampling was selected since the study was targeting a clearly defined population, namely patients with verified strokes from hospital admission registers. Being registered cases of stroke was the entry point, and the method is appropriate in the selection of only the cases that are applicable and meeting the research objectives.

3.6.1 Variables

Both independent and dependent variables were considered.

Table 3.1: shows both independent and dependent variables

Variables	Type of variable	Measure
Age	Independent	Continuous
Gender	Independent	Categorical
Occupation	Independent	Categorical
Documented Diagnosis	Independent	Categorical
Family History of Stroke	Independent	Categorical
Family History of Disease	Independent	Categorical
Smoking Status	Independent	Categorical
Smoking Frequency	Independent	Categorical
Alcohol Consumption	Independent	Categorical
Alcohol Frequency	Independent	Categorical
Diet Type	Independent	Categorical
Physical Activity Level	Independent	Categorical
Date of First Stroke Symptoms	Independent	Date
Documented Stroke Symptoms	Dependent	Categorical
Imaging Utilization	Independent	Categorical
Stroke Type	Dependent	Categorical
Medication non-adherence	Independent	Categorical
New Diagnosis at Stroke (HTN/HIV)	Independent	Categorical
Uncontrolled Hypertension	Independent	Categorical
Risk Notes Documentation	Independent	Categorical

3.6.2. Inclusion Criteria

Participants must be adults,18 years or older, with a stroke diagnosis who have been admitted to the stroke, female and male medical wards during the specified study period.

3.6.3. Exclusion Criteria

Participants below the age of 18 and individuals with various neurological conditions that have not been diagnosed with stroke. Participants who were admitted outsude if the specified study period or admitted in different wards.

3.7 Data Collection

The researcher aimed to collect primary data from clinical information and examine medical records to identify and analyse cases of injuries. A Data collection form/questionnaire was used to gather data on and demographic characteristics (age, gender, and occupation) medical history (documented diagnosis and adherance to medication) and lifestyle (Exercise, drinking alcohol, smoking). Clinical assessment parameters (stroke type, date of first stroke symptoms, documented stroke symptoms, imaging utilisation) were also documented .

3.8. Research Instruments

The primary information was obtained through the use of a structured questionnaire. As noted by Bhandari (2023), a questionnaire is a composite set of questions designed intending to collect information or data from the respondents based on their participation. Both clinical and demographic data were retrieved from the patient records along with stroke risk factors and presentation trends for the study. In order to capture complete data, the instrument comprised of open-ended questions as well as closed-ended with multiple-choice options.

The researcher was able to retrospectively extract relevant information from patient medical records via the structured questionnaire because it offered consistent information gathering and minimized subjective interpretation. Along with defined study objectives, literature concerning recognized risk factors for stroke was reviewed to ensure content relevance and validity of the tool.

3.9. Data Analysis

The Statistical Package for Social Sciences (SPSS) version 22 was used to encode and provide a numerical interpretation of the patient responses that were extracted from the records in order

to conduct primary data analysis. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarise the data.

Frequency distribution and summary of percentages were used to examine categorical factors such as gender, occupation, diagnoses, and lifestyle choices related to alcohol and tobacco use, as well as medication adherence. Measures of central tendency were used to analyse other variables, such as age, which were categorised as continuous.

The data was shown in tabular and graphical formats, including pie charts, bar charts, and histograms, to facilitate interpretation. This approach allowed for the identification of the most prevalent stroke risk variables as well as the patterns of medication non-adherence, hypertension, and stroke onset over time.

3.9.1. Data validity

According to Middleton (2023), validity is the degree to which a technique accurately measures what it is intended to measure. Prior to the actual data collection, the researcher pre-tested the structured questionnaire, and the research supervisor examined it for content validity as a form of verification.

Information about the patient's medical history, lifestyle choices, and stroke risk factors was all incorporated into the instrument to suit the study's goals. In order to improve the accuracy and efficacy of the instrument's design, the pre-test offered confidence regarding the questions' clarity and relevancy. The questions were designed to collect data from the clinical records.

3.9.2. Data reliability

Middleton (2025) defines reliability as a measure's consistency. Since multiple individuals were recruited to collect the data, they were all instructed on how to use the questionnaire uniformly. They all knew and recorded the information in the same manner as a result. To determine whether the questions were clear and easy to grasp, a mini-trial test was also conducted.

The lead investigator randomly checked some of the completed forms for accuracy and consistency in the information as a quality control measure. Differences were discussed and, if required, fixed. These contributed to the outcomes' dependability and credibility.

3.10. Ethical Considerations

Permission to carry out research at LMUTH was requested and obtained. Because this study conformed with ethical guidelines and standards, participants were safeguarded throughout the

research procedure. No identifiers such as names or addresses were recorded in the questionnaire form, which protected participant identities, guaranteeing confidentiality and anonymity. The appropriate Research Ethics Committee (i.e., UNILUS Ethics Committee, LMUTH Research Committee, and the National Health Research Authority (NHRA)) examined this work and provided further guidance and approval for ethical clearance. Therefore, it was important to adhere to established ethical standards while prioritizing the rights and welfare of participants, which was done to the highest standard.

CHAPTER FOUR: RESULTS AND DATA ANALYSIS

4.1. Introduction

This chapter presents the findings of the study on understanding prevalence and risk factors for stroke conducted at Levy Mwanawasa University Teaching Hospital between October 2024 and March 2025. There was a 100% response rate from a sample of 137 respondents. The demographic characteristics, clinical presentation, and risk factors of stroke patients were ascertained through data analysis. The results are shown below in text, tables, and figures.

4.2. Demographic information

The participants' ages ranged from 27 to 86 years, with a mean age of 57.3 years and a standard deviation of 14.3. This indicates that stroke predominantly affects older persons, something affirmed by research conducted globally that age is a major cerebrovascular accident risk factor that cannot be modified. According to a study by Yousufuddin and Young (2019), the elderly are especially at risk because the risk of stroke doubles with each decade beyond the age of 55, and about three-quarters of all strokes happen to people 65 and older. This was further supported by a study by Boehme, Esenwa, and Elkind (2017), which also stated that as people age, the risk of stroke rises; at the age of 55, the risk doubles every ten years. Figure 4.1 below highlights the age distribution of the stroke patients involved in the study, with the ages being grouped into the categories shown on the x-axis in Figure 4.1.

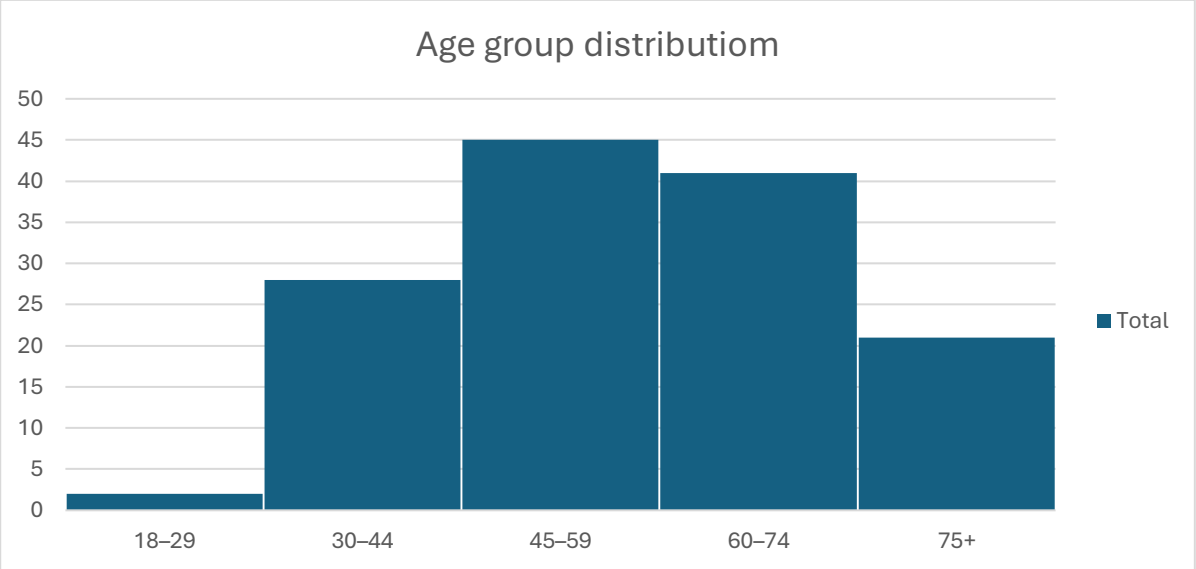

Figure 4.1: Histogram showing age group distribution of stroke patients.

The female-to-male ratio of the participants was 46.0% male and 54.0% female, which is also represented in Figure 4.2. This minimal female surplus is possibly due to the fact that women in the majority of sub-Saharan African nations have increased life expectancies. Studies like Adeloye et al. (2018) have established that although men typically experience more risk exposures at midlife, stroke is more common in older women due to their longer life expectancies.

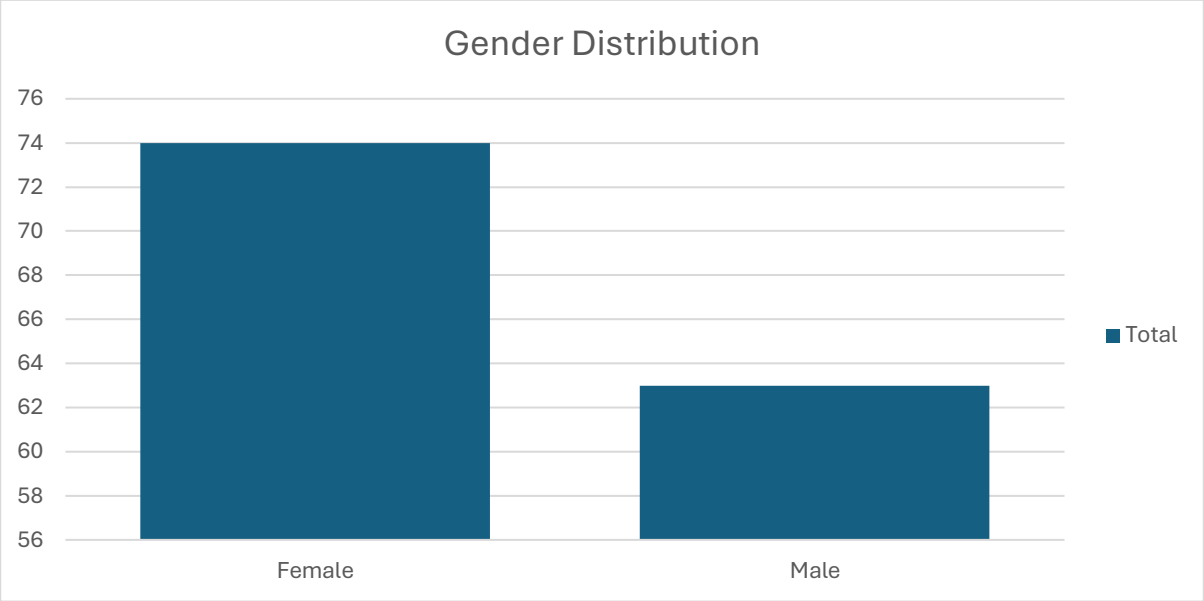

Figure 4.2: Gender distribution of stroke patients.

For simplicity's sake, occupations were grouped into categories. The occupational distribution of stroke patients shows a broad gap in documentation, with a high number of entries, 45%, categorized as "not recorded". This is followed by “unemployed” with 14%, then "business” with 12%, and then "general worker" with 11%, indicating a relationship between the risk of stroke and economic susceptibility. “Farmer” was represented by 7%, and “administration” accounted for 5% of all responses. Additionally, “Driver” and “teacher” both comprised 2% of the respondents each. Finally, “tradesman/woman’ comprised 1% of the entries. These categories are illustrated below as percentages in Figure 4.3 to show the occupational distribution of stroke patients.

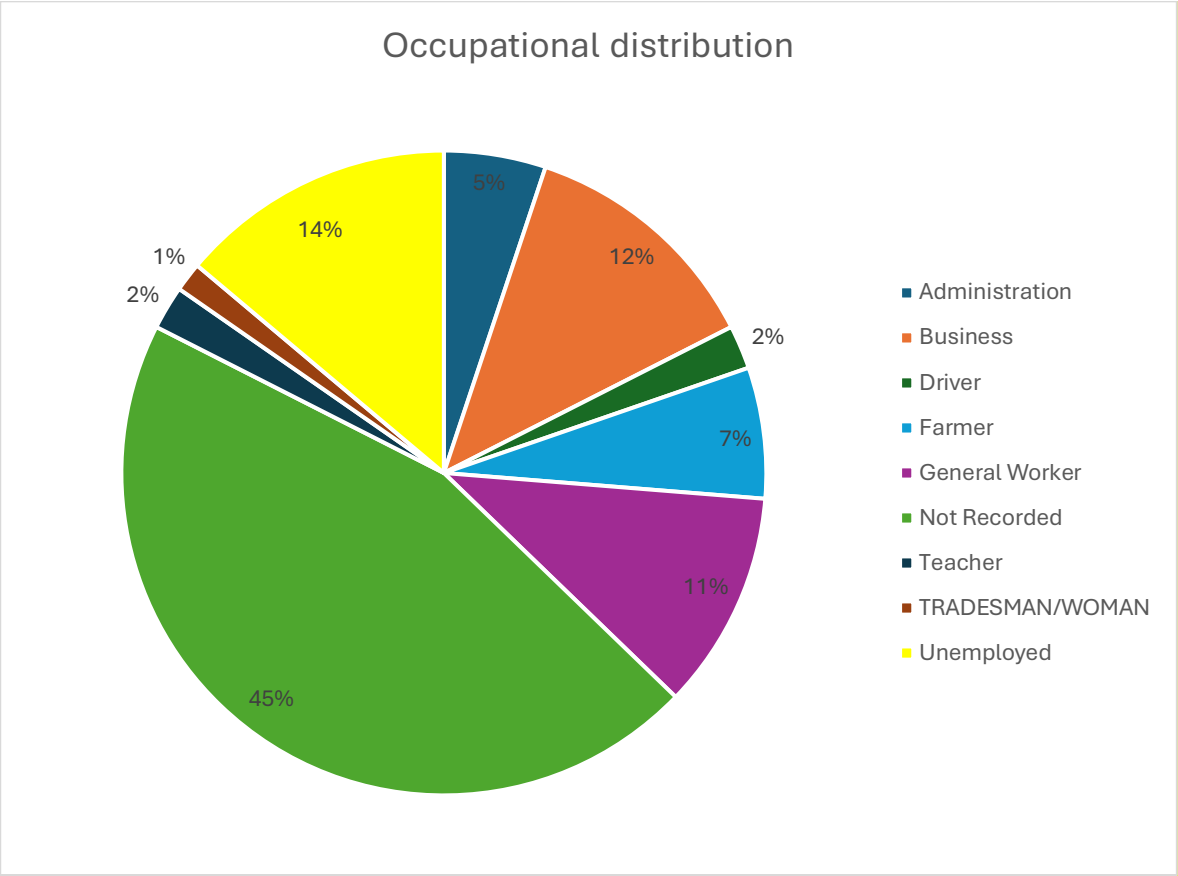

Figure 4.3: Pie Chart showing occupational distribution of stroke patients as percentages.

4.3. Medical history

4.3.1. Documented Diagnosis

Hypertension, at 33.6%, was the most common diagnosis seen in stroke patients. This was followed by comorbidities such as hypertension with HIV and hypertension with diabetes, which were each diagnosed in 44 patients, 32.1%. This means hypertension was present in 65.7% of all documented cases. 12.4% of patients had unknown causes of stroke or comorbidities like adult-onset seizures and epilepsy. 2.2% of patients had known cardiovascular diseases, and 1.5% of patients were known diabetics. Furthermore, 6.6% of patients had no documented diagnosis, and 2.9% of patients had nothing recorded under this section. Lastly, 6.6% of patients had a previous history of stroke.

These results confirm that hypertension, which is frequently exacerbated by other chronic conditions, is the most important modifiable risk factor for stroke. The data was grouped into 9 simpler categories to help summarize the findings and highlight the important takeaways. Figure 4.4 below illustrates the grouped diagnoses in the study population.

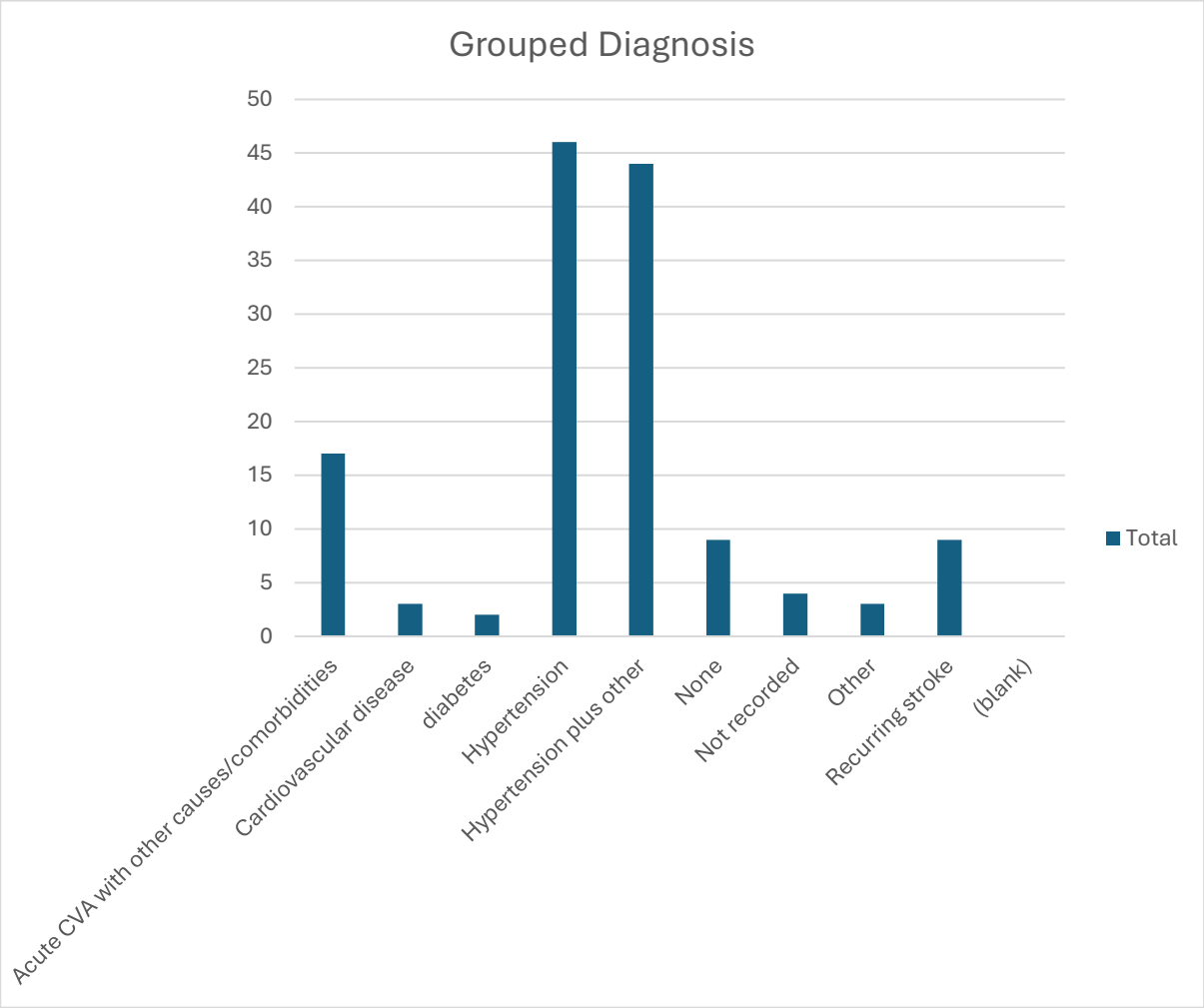

Figure 4.4: Bar graph showing grouped diagnoses in the study population.

4.3.2. Family history of stroke

37.9% of the patients had no family history of stroke, whereas 13.1% had. But the information regarding this attribute was not available for 48.9% of the patients. This data is shown below in Figure 4.5. This high percentage of missing data represents a problem with record-keeping of the patients.

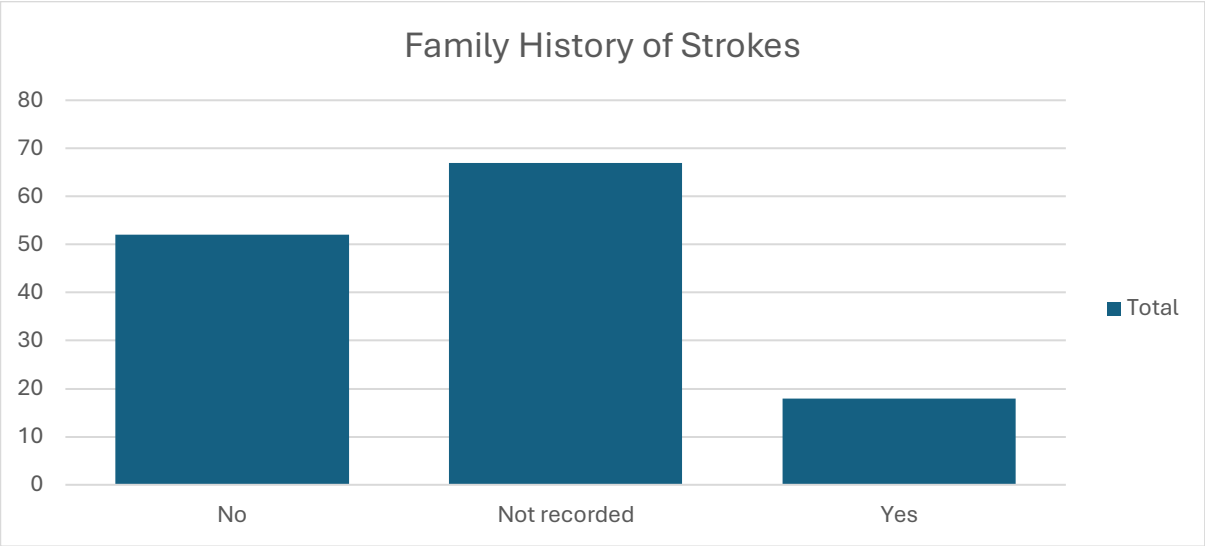

Figure 4.5: Family history of stroke amongst stroke patients.

The precise relationship to the affected relative was not disclosed in 8 of the 14 patients who had a history of stroke in their families. The most frequent first-degree relatives of the remaining answers were close relatives; two of these examples were sisters, and one reported a father, a sibling, a grandmother, and an uncle. These results hint at the role of genetics and family history in stroke risk, especially in cases involving close blood relatives. This is further supported by a study by Ibe.(2023) which provides evidence linking positive family history and higher stroke incidence, supporting the fact that family history is a significant non-modifiable risk factor and usually indicates genetic predisposition.

4.3.3. Family history of disease

For simplicity's sake, the data was grouped into 8 categories. Of the 137, 18.2% did not have a family history of the illness. The most prevalent ailment identified in the remaining data was hypertension, present in 29.1% of responses in total, with 21.2% being just hypertension, 5.1% being hypertension and diabetes, and 2.9% being hypertension, diabetes, and asthma. This was followed by diabetes with 4.4% and then only asthma with 2.9%. Heart disease and diabetes together were present in 3.6% of responses. 41.6% of all the cases had no recorded family history of disease, indicating a possible huge gap in undocumented data. In stroke patients, this trend reveals the inherited pattern of chronic conditions, including diabetes and hypertension. The grouped data is illustrated in Figure 4.6.

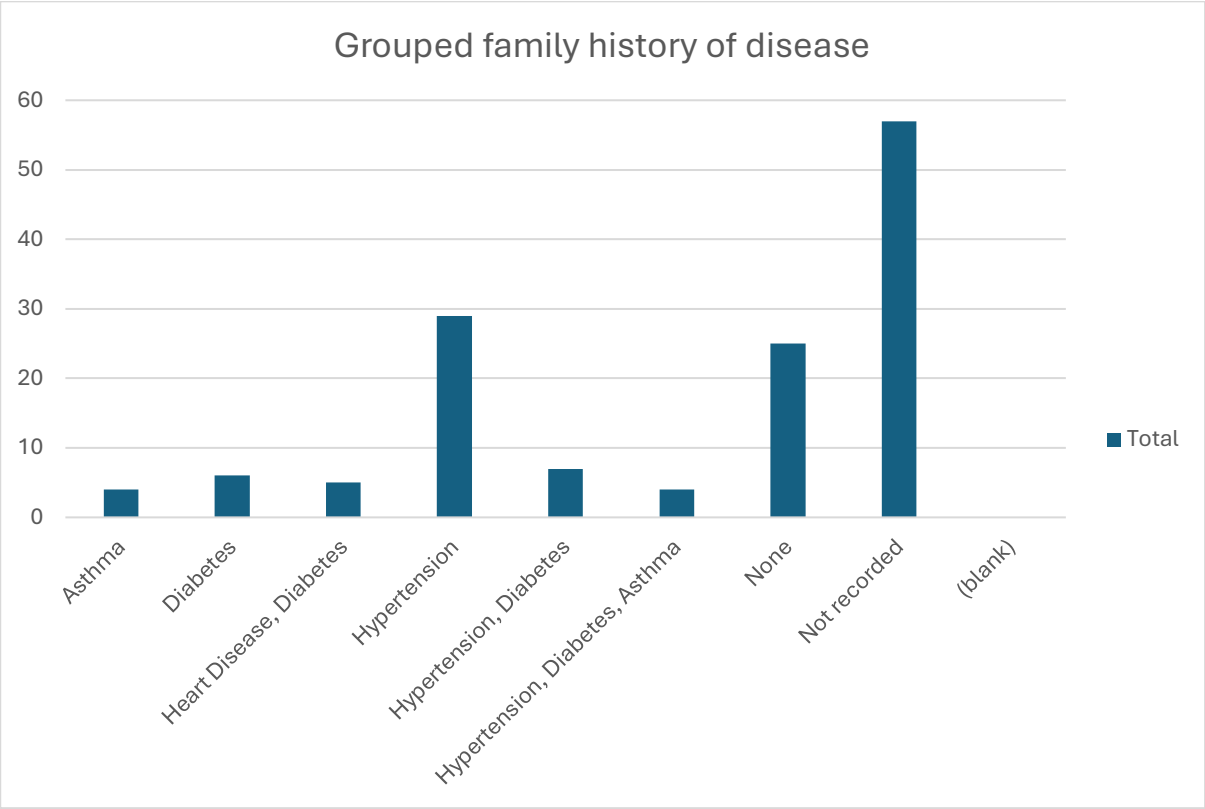

Figure 4.6: Grouped Family history of disease amongst stroke patients

4.4. Lifestyle and Behavioural Risk Factors

4.4.1. Smoking

Of the 137 stroke patients who were canvassed, 22.6% said they smoked, and 62.0% said they didn't. Significant, too, was that there were 15.3% of unreported or unclear responses, which highlight a deficit of systematic reporting about threats to behaviour health. Since smoking has been linked with arterial inflammation, atherosclerosis, and high blood pressure—both risk factors for stroke—it is clinically important that smoking occurs in the sample, though it is not a majority (Feigin et al., 2016). A graphical representation of the smoking status is shown in Figure 4.7 below.

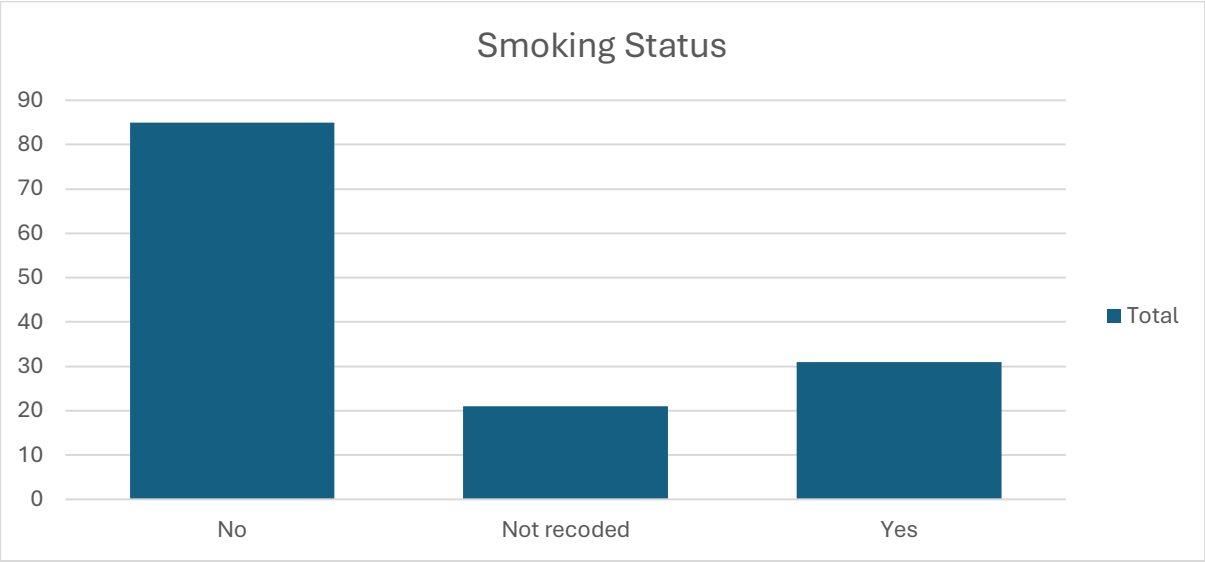

Figure 4.7: Smoking status of stroke patients

Few and sporadic reports were discovered for the daily cigarette smoking of the patients who reported. In a few patient records, the answers were vague, like "Unknown," "Last used in 2018," or "Quit last year in August." A very limited number of the records consisted of numerical answers, like 2, 8, or 19 cigarettes. Three responses were also noted as "Not recorded." This variation reflects a lack of normalizing records relating to the level of tobacco use, which restricts any strong correlation with the nature or severity of stroke, and these responses are highlighted in Figure 4.8.

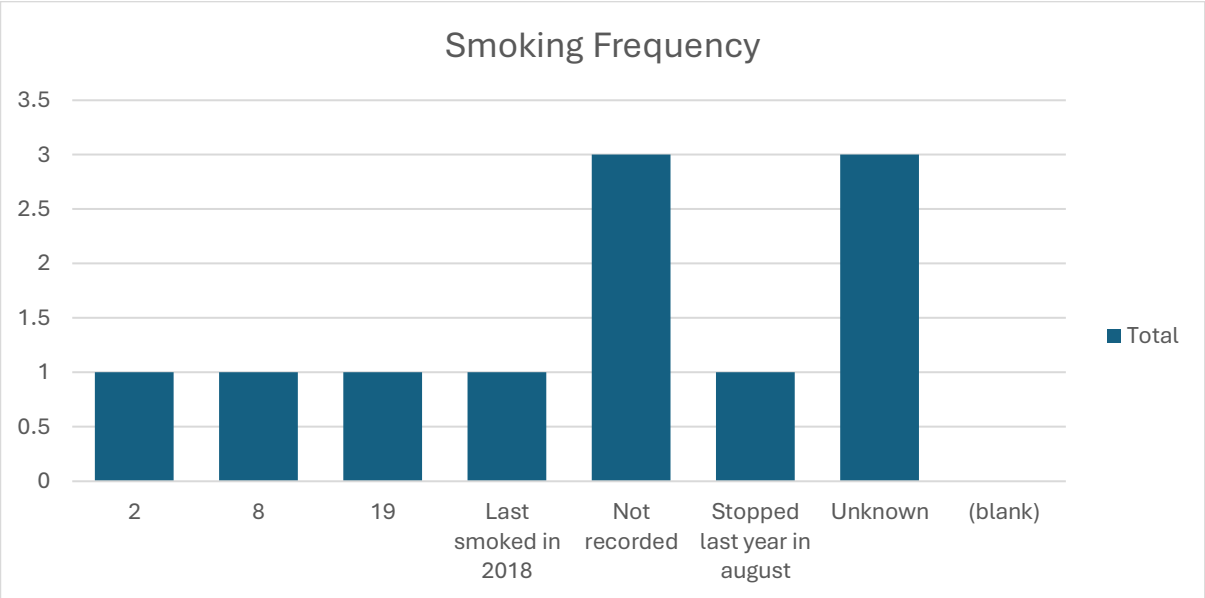

Figure 4.8: Smoking frequency among stroke patients who reported smoking

4.4.2. Alcohol

Of the patients, 44.5% claimed not drinking alcohol, while 40.9% acknowledged drinking. As with smoking, 14.6% of responses were not documented. This high percentage of alcohol users is concerning because excessive or regular alcohol use is known to increase blood pressure and the risk of ischemic and hemorrhagic stroke. However, because the information isn't precise regarding amounts ingested, interpretation is limited beyond frequency. Figure 4.9 represents this information in a graphical manner.

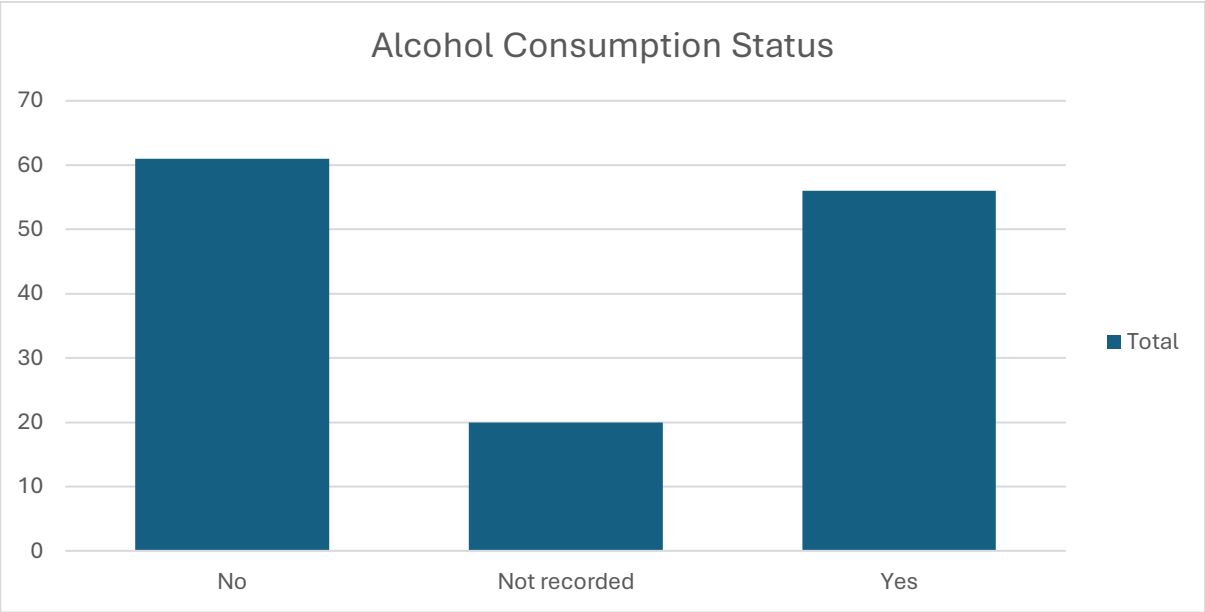

Figure 4.9: Alcohol consumption status of stroke patients

Data on alcohol consumption frequency were recorded for only 14.6% of the 40.9% of patients who said they drank, and these are represented according to frequency, along with the remaining that had no frequency recorded, in Figure 4.10. 6.6% reported drinking once a week, 3.6% reported drinking rarely, 2.9% reported drinking daily, and 1.5% reported drinking monthly. Despite this, 64.3% of the ‘yes to alcohol consumption’ sample were rated as "Not recorded" when it came to the frequency of alcohol consumption. Any degree of alcohol use, especially weekly or daily, is still a significant modifiable risk factor, although few patients report daily use. Once again, the high percentage of missing data restricts interpretation and underscores the value of taking clinical histories on a regular basis.

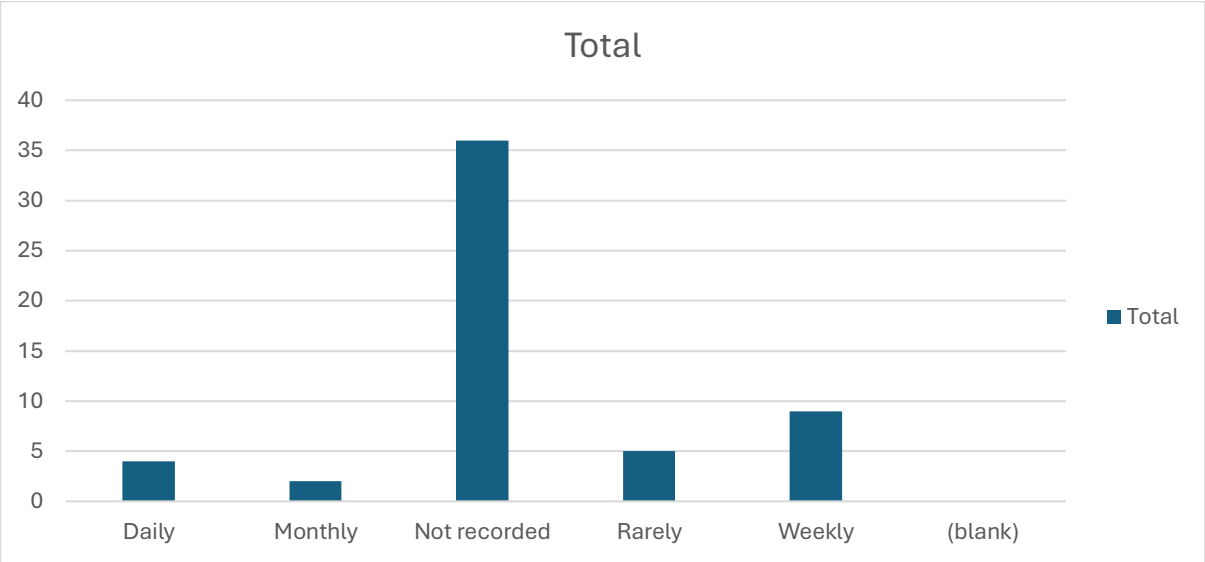

Figure 4.10: Alcohol consumption frequency among stroke patients

4.4.3. Diet

The assessment of dietary habits revealed significant limitations in documentation. 64% of participants had no recorded dietary information, making it challenging to draw strong inferences. Among those with data, 16% of patients reported having a "moderate" diet, 12% a "healthy" diet, and 8% an "unhealthy" diet. While these figures suggest that most documented diets were not overtly unhealthy, the overall lack of dietary data suggests poor nutritional assessment practices in the clinical setting. This data, in percentages, on diet is illustrated below in Figure 4.11.

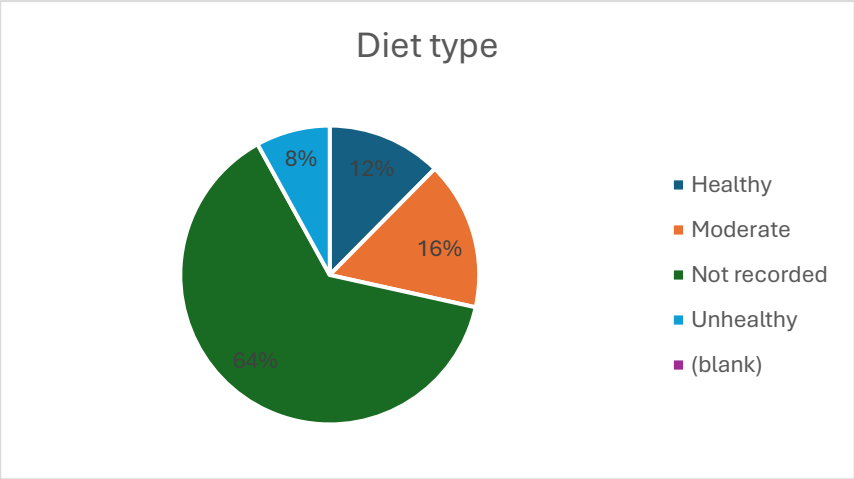

Figure 4.11: Diet type (in percentages) among stroke patients

4.4.4. Physical activity

Information on physical activity was also lacking, with 70% of records absent. Amongst the patients who responded, only 8.0% indicated that they exercised daily, with 12% indicating occasional exercise and 10% indicating rarely engaging in physical activity. From these findings, patients largely lead sedentary lives, and this correlates with evidence from around the world that physical inactivity is amongst the risk factors for stroke and cardiovascular disease. These findings are shown as percentages in Figure 4.12.

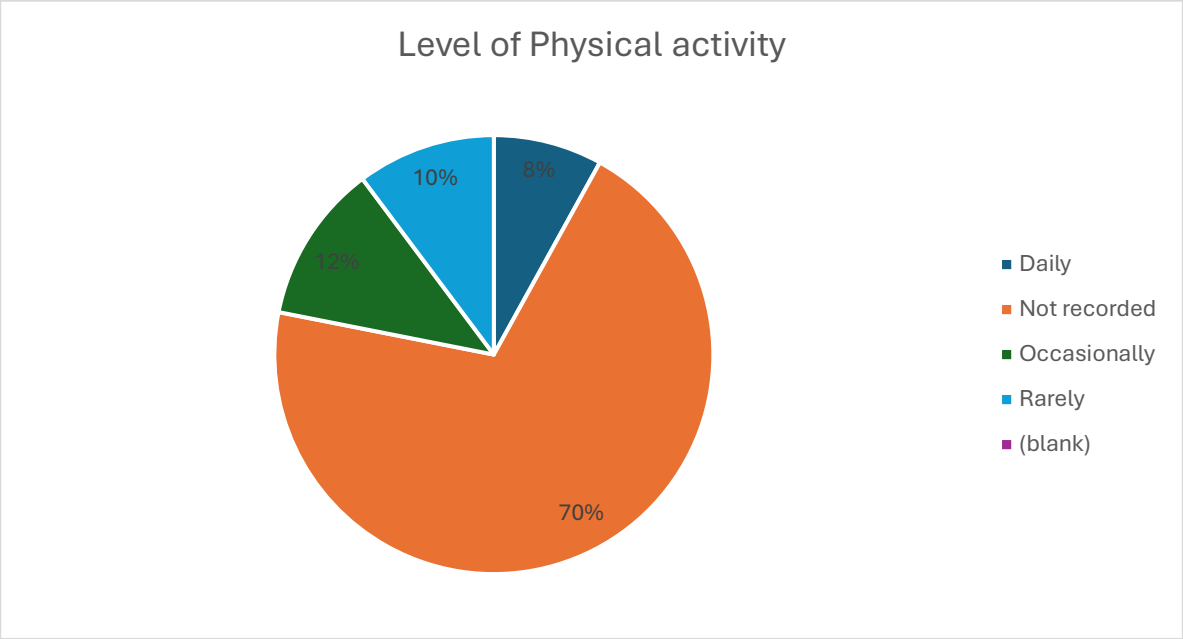

Figure 4.12: Physical activity level among stroke patients

4.5. Clinical Assessment

4.5.1. Date of first stroke

The data set primarily addresses the given research period, that is,1st October 2024 to 31st March 2025, but also provides data on the first known stroke amongst documented patients which dated from as far back as 2012, till 31st March 2025.

0.73% of the patients had their first stroke in 2012. 2018, 2019, and 2020 had 1.46% of patients each having their first stroke during that time. 2.2% had their initial stroke in 2021, and 2.9% had their initial stroke in 2022. In 2023, 15.3% of patients, a significant increase from pervious years.

13.3% patients had their first stroke in 2024 before the study period (before October 1st). During the study period in 2024 (October 1st to December 31st), 32.1% had their first stroke. In 2025, within the study period (January 1st to March 31st), 29.2% had their first stroke.

During the period of study, first-time strokes rose significantly. There was a maximum of 38.7% of patients who suffered first-time strokes before the study period, while 61.3% of patients suffered first-time strokes within the period under study. This represents an increase of over 58%, which highlights a significant rising incidence rate. The increase suggests heightened stroke risk factors as well as improved detection and reporting within the study period. The yearly distribution of first stroke is highlighted in Figure 4.13 below.

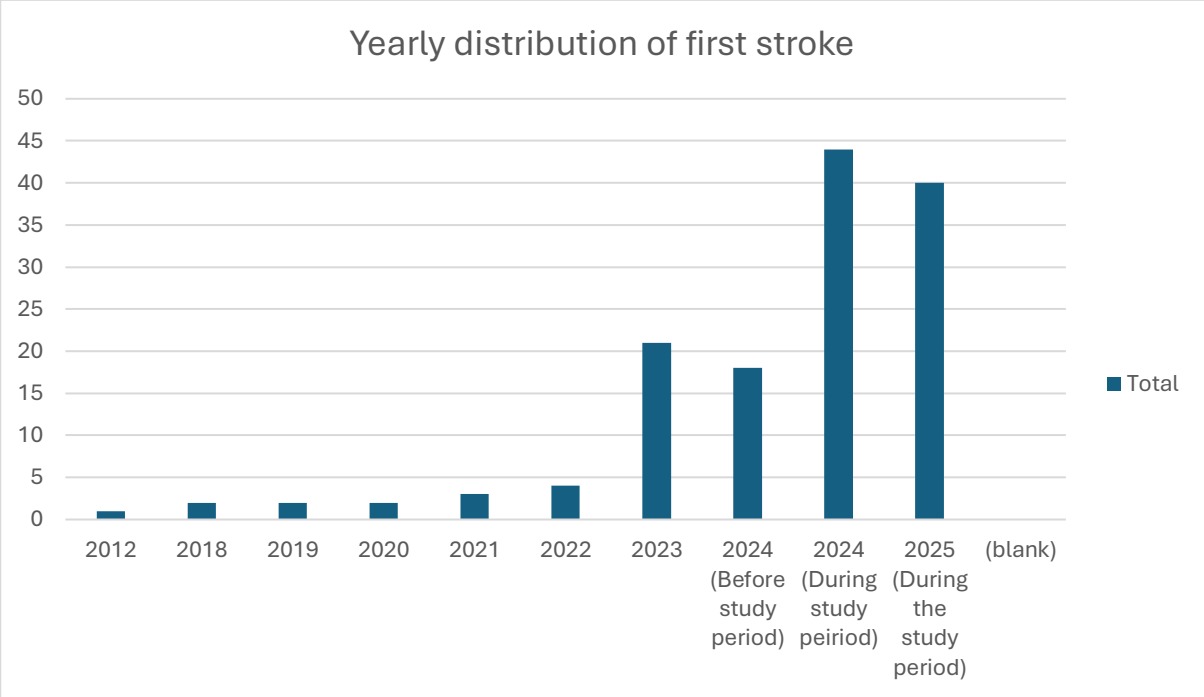

Figure 4.13: Yearly distribution of first stroke amongst stroke patients.

4.5.2. Documented stroke symptoms

Sudden weakness or numbness (in face, arm, or leg) was the most frequent symptom, which was seen in 67.9% of patients. Of these, 27% patients with just sudden weakness or numbness, whereas 41% had this symptom coupled with other symptoms like headache, dizziness, slurred speech, loss of balance etc. 14% patients presented with difficulty speaking/slurring of words and other symptoms like difficulty walking, headache, dizziness, slurred speech, loss of balance etc . 2.2% of patients had difficulty walking/dizziness/loss of balance as their only symptom but 0.73% of patients had this symptom plus other symptoms like headache, sudden numbness, slurred speech, etc. 10.9% of patients in total presented with a headache and 2.9%of these had other symptoms like vomiting, sweating, loss of sight in one eye and loss of

conciousness.Seizures as the documented symptoms was recoreded in 2.9% of pateints. The diveresity and significant overlapping of symptoms may point to the multicasusative and multifactoral evolution of stroke and presentation of multiple symptoms more suggest more severe strokes as multiple areas/systems of the brain and body are affected. 1.5% of instances were, however, noted as "Not recorded". Figure 4.14 illustrates the documented diagnosis among stroke patients in percentages.

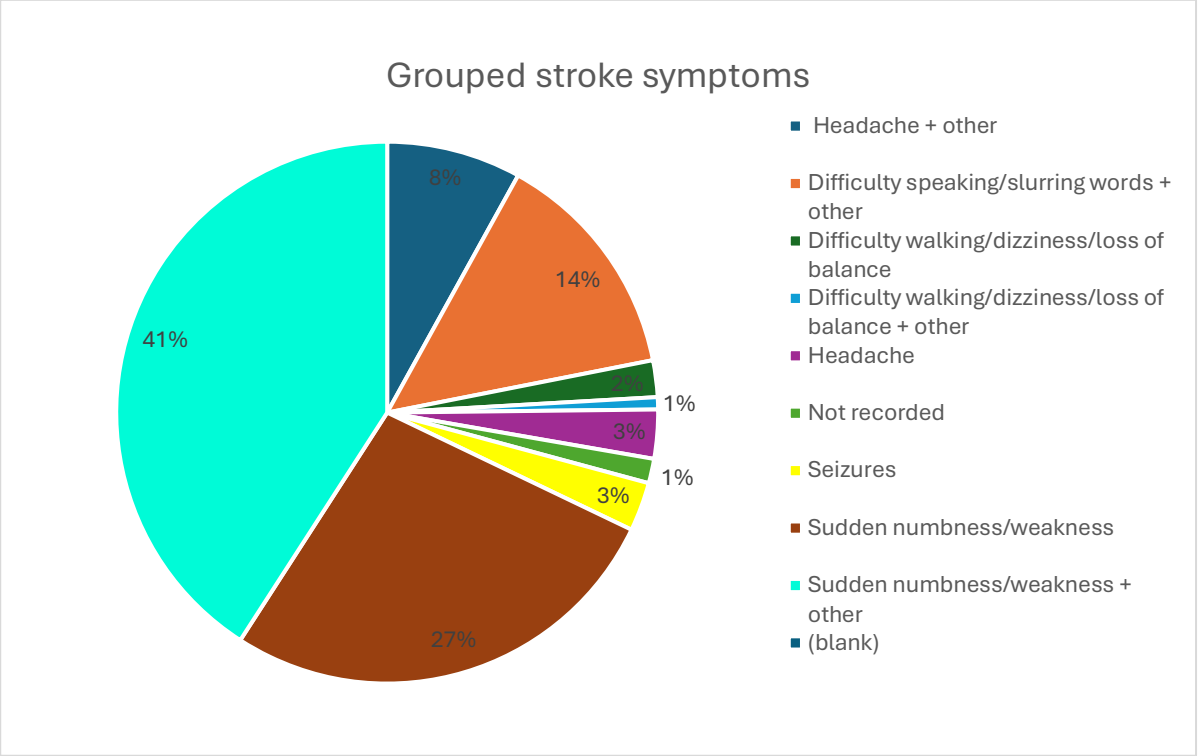

Figure 4.14: Grouped documented diagnosis among stroke patients as percenatages

4.5.3. Imaging Utilization

Out of 137 cases, 74.5% of patients underwent either CT or MRI, aligning with standard stroke management protocols that require imaging to distinguish between ischemic and haemorrhagic events.

However, the fact that 12.4% of patients did not obtain imaging, and another 13.1% of patients had no imaging status recorded at all raised serious concerns. Together, this means that over 25.5% of patients have either no imaging or an unretrieved imaging status. Figure 4.15 represents the data on imaging utilization.

Such disparities suggest structural issues such as inefficient documentation procedures, resource constraints in accessing diagnostic tools, or financial constraints. Imaging access and

protocol writing would have to be stepped up to promote stroke treatment and patient protection in the same clinical practice settings.

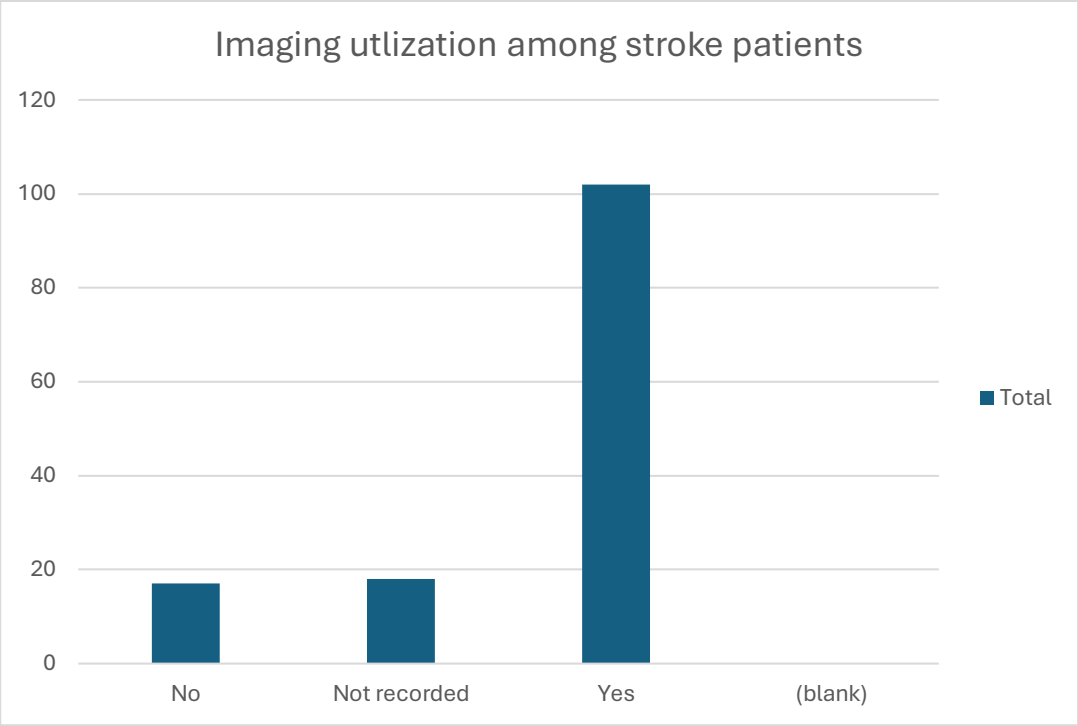

Figure 4.15: Imaging Utilization among Stroke Patients

Among patients who had available imaging summaries, it was discovered that Ischemic strokes occurred in 26.3% of patients and 21.9% of patients were diagnosed with hemorrhagic strokes, mainly with subarachnoid hemorrhage and basal ganglia hematomas as the notable subtypes. However, 8% of those scans were unclassified, maybe due to the inappropriateness of, lack of, or doubt regarding reporting. 13.9% had no recorded findings, even though imaging was done and 4.4% had no sign of stroke on imaging (CT). This information has also been illustrated in Figure 4.16.

The proportionality of ischemia and hemorrhage types among classified cases is comforting to diagnostic equipoise, albeit the high proportion of unclassified information undermines solid conclusions. Further clinical reporting and formal documentation of CT/MRI results will be needed to further subtype strokes in hospital databases.

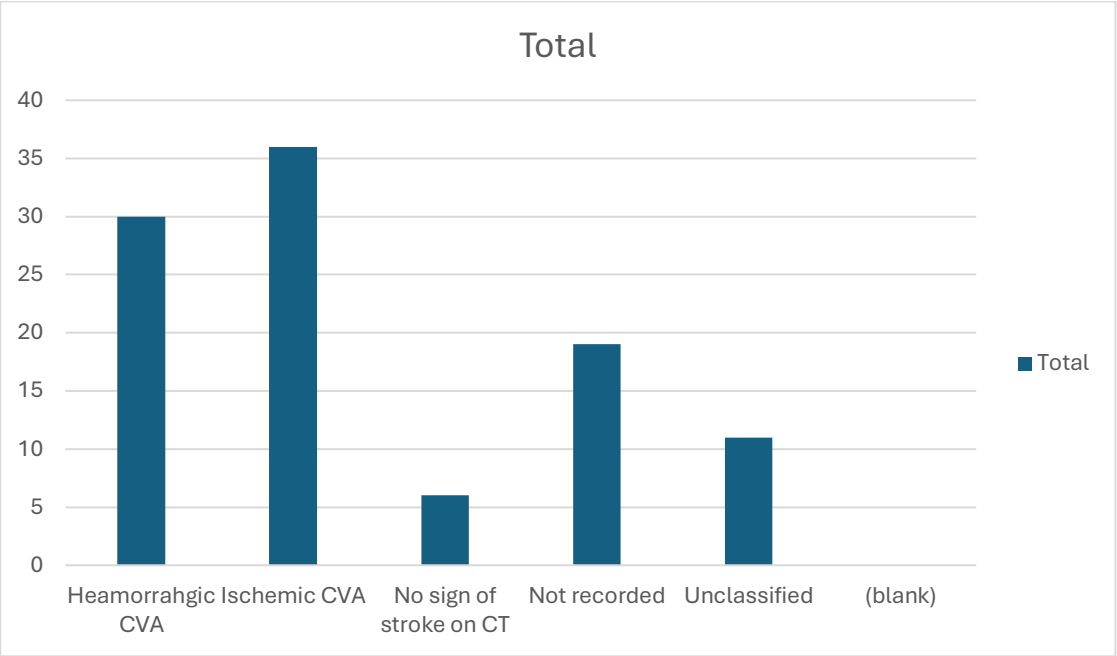

Figure 4.16: Stroke type distribution based on imaging findings

4.5.4. Additional risk notes

There were many significant stroke risk factors beyond routine diagnosis noted in clinician records. The most common of these was poor compliance to medications, and particularly in patients with hypertension and diabetes. This was noted in 39% of patients and was therefore the most frequently documented modifiable risk factor.

Other significant findings included 5% of the patients presenting with previously undiagnosed diseases like hypertension or HIV at stroke presentation, indicating inadequate previous screening or follow-up by health services. Additionally, patients with unknown compliance with anti-hypertensive medications were only found in 2% of cases and 1% of patients had been noted for excessive weight. Furthermore, 2% of entries had no known comorbidities documented. However, 37% of entries had no additional risk notes at all, suggesting a need for more thorough and detailed documentation of risk factors. 14% of entries were grouped into other as these represented risk notes that were covered in other sections, like family history of stroke, CT findings, etc.

These additional notes, which are represented as percentages in Figure 4.17, provide clinical context and highlight key risk patterns to complement structured information, which directs us to significant areas of intervention such as medication adherence programs, early detection, and extensive patient education and documentation.

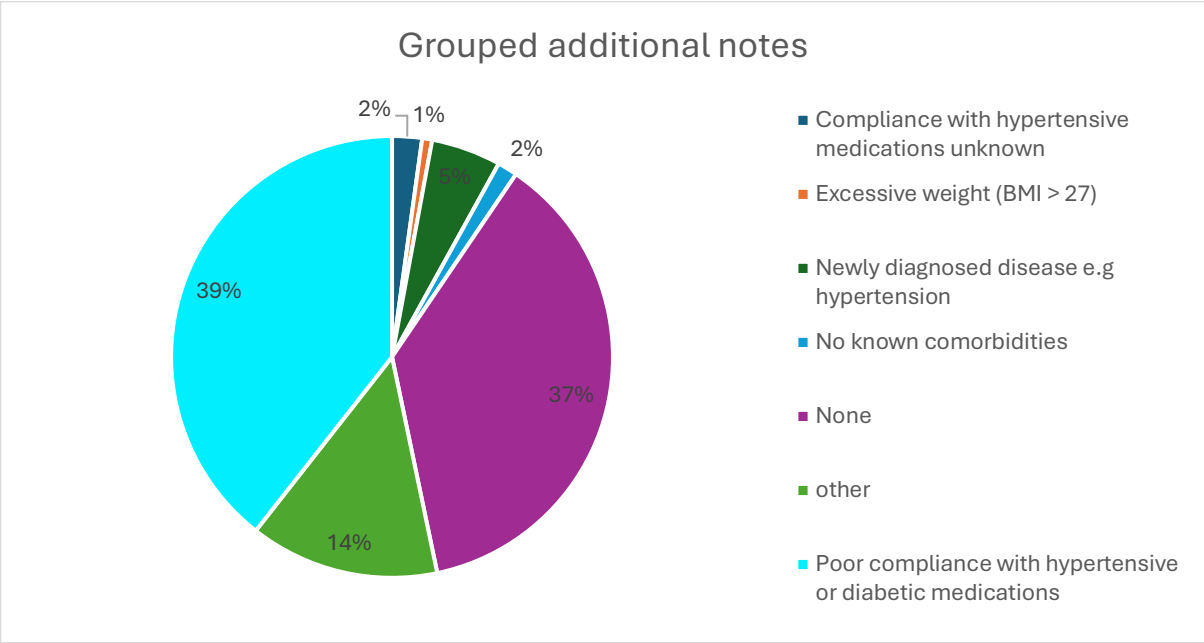

Figure 4.17: Pie chart showing grouped key risk patterns identified in additional notes as percentages.

CHAPTER FIVE: DISCUSSION

5.1. Introduction

The study reviewed 137 stroke patients' records obtained between the months of October 2024 and March 2025. Most of the patients were aged 55 years and above (mean age = 57.3), as is the established relationship between the risk of stroke and age (Yousufuddin and Young, 2019). The patients were predominantly female compared to being male, likely because of women having a longer life expectancy compared to men in sub-Saharan Africa (Akinyemi et al., 2021). The most common diagnosis was hypertension and it usually co-existed with other chronic diseases like diabetes and HIV (Jones et al., 2022).

Behavioural risk factors were also common, most prominently smoking (22.6%) and alcohol use (40.9%). Non-adherence to medication, particularly to antihypertensive and diabetic medications was observed in 39% of the patients, highlighting a key gap in chronic disease management.The study revealed a 58.5% increase in incident initial stroke cases cases in the last 13 years,particularly in the last two years, likely due to worsening risk factors like hypertension and diabetes. This trend aligns with global trends, particularly in low- and middle-income countries. The similarity between the local trends idenitified in this study and the global trends emphasizes the need for effective public health interventions, including early screening, improved health literacy, health education campaigns, and policy reform.

Imaging (CT/MRI) was done in 74.5% of the patients, yet 21.9% of the reports did not include stroke classification or had no recorded findings, reducing diagnostic accuracy and treatment options.

5.2. Demographic and Epidemiological Characteristics

The mean age of 57.3 years indicates that stroke has been concentrated on older adults, as highlighted in Figure 4.1. This supports the findings of a study by Yousufuddin and Young (2019) which stated that the risk of stroke becomes double in every decade after 55 years. The predominance of females, as shown in Figure 4.2, is also in agreement with local demographic trends in which women live longer, thereby advancing their chances of acquiring age-dependent vascular disease (Akinyemi et al., 2021).

Furthermore, Figure 4.3 illustrates that the majority of the patients (82%) within the study had either no recorded occupation (45%) or were unemployed (14%) or did business (12%) or worked as a general worker (11%). This corroborates recent findings by Feigin et al. (2023) that lower socioeconomic status is associated with higher stroke burden. This affirms the

impact of economic vulnerability on health outcomes, especially in low and middle-income countries.

5.3. Medical and Family History

As noted in Figure 4.4, the predominant diagnosis among the document patients with a stroke was hypertension which occurred in greater than 60% of the sample population. The results are consistent with literature that regards hypertension as the most important, treatable, stroke risk factor particularly in African populations (PASCAR, 2017). Acccording to Rajashekar and Liang (2023), chronic hypertension is a major pathophysiological risk factor and increases the likelihood of non-traumatic intracebral hemorrhagic events which can result from either or both schemic and hemorrhagic strokes. Noncompliance to antihypertensive medication, as noted in 39.4% of the cases, which presumably heightened the risk. Findings are in consistency with Owolabi et al. (2023) which emphasized the lack of such specific screening and medication adherence.

Aside from hypertension, diabetes and HIV were the notable comorbidities encountered in some patients, a combination shown to worsen the outcome of stroke (Jones et al., 2022).

There has been underreporting of family history of hypertension and stroke, even if it existed, revealing a genetic predisposition or common exposure. This points to the value of family-level intervention and screening. Ibe (2023) stated that according to research, 15–52% of stroke victims have a family member who has also experienced a stroke. Furthermore, according to a comprehensive systematic study published in 2019, having a parent or sibling who has experienced a stroke may increase the likelihood of having one by 36–44%.

5.4. Behavioral and Lifestyle Risk Factors

Alcohol consumption and smoking continue to be the most common behavioural risk factors, identified in 22.6% and 40.9 % of patients, respectively (Figure 4.7 and Figure 4.9). These harmful behaviours are widely recognised to exacerbate atherosclerosis, hypertension, stroke, and vascular inflammation (Feigin et al., 2016). With consequences such as atrial fibrillation and hypertension, heavy alcohol drinking also increases stroke risk (Patra et al., 2024; WHO, 2024).

Unfortunately, only a small amount of data was available to help to identify patterning of food and activity. The limited data gathered, however, point to a near universal dominance of sedentary lifestyles in concordance with international data about inactivity and stroke (Wang

et al., 2022). The necessity to integrate assessments of lifestyles into routine clinical assessments is thus implied.

5.5. Yearly Trends in the incidence of stroke

The 58.5% increase in incident stroke cases during the study period is one of the most important outcomes reflecting the increasing public health burden. The increase maybe traceable to the coincidental worsening of modifiable risk factors of hypertension, diabetes, non-compliance with medication, lack of physical activity, and dietary modification, along with improved detection and documentation of incident cases over the study period.

However, this outcome is consistent with global trends identified by the Feigin, Murray and Vos. (2024) study, which reported an increased global burden of stroke between 1990 and 2021. According to the same study, the incidence and number of strokes rose, especially in low- and middle-income countries, while some decline in age-standardized death was observed. These study findings were consistent with ours, where resource constraints can heighten diagnostic delay and contribute to suboptimal risk management.

Similarities between local trends identified in our study and global trends reinforce the need for effective public health interventions. Such interventions can involve early screening for hypertension and diabetes, improved health literacy, health education campaigns, and policy reform encouraging healthy behaviors and access to care

5.6. Clinical Management and Diagnostic Gaps

As Figure 4.14 shows, symptoms of weakness, slurred speech, and numbness were characteristic of an acute stroke. The incomplete recording of severity of stroke, imaging utilization and classification, and onset time of the symptoms put appropraite therapy at stake. Though imaging was performed in 74.5% of cases, imaging was inconsistently classified or findings were not recorded in 8% and 13.9% of cases respectively (Figure 4.15 and Figure 4.16), making it virtually impossible to distinguish between ischemic and hemorrhagic stroke (Saver et al., 2013). As noted by Feigin et al. (2023), such diagnostic errors are a sign of systemic issues such as insufficient guidelines for recording and a shortage of resources.

5.7. Medication Adherence and Missed Diagnoses

The most prevalent behavioral risk that was found in clinical records was medication non-compliance in 39% of patients as shown in Figure 4.17. This concurs with other studies

conducted in sub-Saharan Africa where low literacy in health care issues, costly medication, and insecure follow-up systems cause low compliance (Njohjam et al., 2025). The study also found that 5.1% of the patients presented with previously undiagnosed disease like hypertension or HIV at stroke presentation, implying a low rate of preventive screening and primary care integration. Furthermore 37.2% had no additional risk notes at all suggesting a need for more thorough and detailed documenting of risk factor which could uncover more missed diagnosis or unmask underlying causes.

5.8. Conclusion

The findings of this study confirm multifactorial etiologies of stroke and a vital role played by both non-modifiable and modifiable factors. Poor-controlled hypertension and lifestyle hazards (such as alcoholism and smoking) were the most prevalent etiologies of stroke in this group of patients. The findings also demonstrate an increasing trend in stroke incidence and systemic barriers to diagnosis and provision of preventive care. Without timely imaging studies, adequate documentation, and organized follow-up, outcome will be unfavorable.

5.9. Study Limitations

There were a number of potential limitations to this study:

1. Retrospective design: The patient record-based study was conducted in most cases with incomplete or missing data.
2. Patient record storage and access:Patient records were not stored in a central area or organised clearly and access to dead patient records was restricted, therefore a pool of data that was not included in the study.
3. Shortcomings in Documentation: Insufficient documentation of lifestyle history, onset of symptomatology, and imaging classification limited in-depth analysis.
4. As data were gathered in a tertiary hospital setting, it is possible that what is found in other areas of the country may differ.
5. Incomplete laboratory and clinical score data: Risk stratification was hindered by a shortage of stroke severity score and laboratory results.
6. Uncontrolled Confounding Variables: Multivariate analysis of stroke factors was restricted by the lack of socioeconomic indicators and laboratory data (such as cholesterol levels).
7. Bias was also probable: Alcohol and smoking may have been underreported in some variables because of social desirability or a failure to formally take history.

5.10. Recommendations

5.10.1. Clinical practice

- Implement routine screening for hypertension, diabetes, and HIV, particularly in adults over 40 years of age.
- Introduce standardized intake protocols that include lifestyle assessments (diet, physical activity, alcohol, and tobacco use).
- Establish structured medication adherence counseling services and strengthen patient education.
- Improve access to diagnostic imaging and enforce protocols for proper documentation and classification of stroke types.

5.10.2. Health policy

- Implement a national stroke registry to enable surveillance, investigation, and policy making.
- Digitize Patient records at individual facilities to allow more efficient and accurate access for research and policy purposes
- Provide financing to expand community-based non-communicable disease screening programs.
- Subsidize the essential medicines for diabetes and hypertension to reduce non-compliance for reasons of finance.

5.10.3. Future research

- Perform prospective cohort studies of stroke outcome and disease progression of risk factors.
- Explore socio-cultural determinants of adherence to medication through mixed-methods studies.
- Assess the impact of mobile health interventions (such as SMS reminders) on the control of chronic diseases in low-resource setting
- Explore Socioeconomic status and other factors such as income, education level, health literacy, access to healthcare systems, and environmental variables.

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APPENDIX

Appendix 1

TABLE 1: RESEARCH SCHEDULE (GANTT CHART)

ACTIVITY	PERSON RESPONSIBLE	Sept. 2024	Oct. 2024	Nov. 2024	Dec. 2024	Jan. 2025	Feb. 2025	Mar. 2025	Apr. 2025	May. 2025
RESEARCH PROPOSAL PRESENTATION	Researcher	■								
DATA COLLECTION TOOL DEVELOPMENT	Researcher		■	■						
DATA COLLECTION	Researcher			■	■	■				
DATA ENTRY	Researcher					■				
DATA ANALYSIS	Researcher					■	■	■		
FINALIZING DISSERTATION	Researcher								■	
SUBMISSION OF DISSERTATION	Researcher									■

Appendix 2

TABLE 2: PROPOSED RESEARCH BUDGET

	Item	Description of activities	Duration	Amount
1	Pens	Writing	5 months	K20
2	Plain Paper	Writing	5 months	K150

3	Internet bundles	For research, and survey forms. K30/5GB/week	5 months	K480
4	Printing fee	20 copies at K2 per page		K600
5	Lunch	K40 a meal/day	5 months	K4000
6	Transport	K400/per month roundtrip to and from hospital	5 months	K2000
	Total cost			K7250

NOTE: 28 days equals a month.

Appendix 3

INFORMED CONSENT

My name is **Teza Kamphasa Sikasote**, a 5th year medical student, School of Medicine and Health Sciences, I am expected to undertake research as partial fulfilment of my Bachelor of Medical Sciences degree. The topic is entitled "**STROKE: UNDERSTANDING PREVALENCE AND RISK FACTORS AT LEVY MWANAWASA UNIVERSITY TEACHING HOSPITAL (LMUTH)**". You have been purposively selected to help in providing information on this study. This study is purely for academic purposes, and your participation is completely voluntary. Your responses will be treated with utmost confidentiality, and therefore there is no cause for fear. The success of this survey depends on your cooperation and the correctness of the information you provide. There is also no risk in participating in this study, and participants will be free to withdraw from the study at any point with no repercussions.

If you have any questions or need clarification, you are free to contact:

Teza Kamphasa Sikasote

sikasote6teza@gmail.com

INSTRUCTIONS

1. **Do not write your name or any identification mark on this questionnaire**
2. **You are required to tick the option that is applicable to you**
3. **Please answer each question by selecting a single or multiple options as the question instructs.**

Appendix 4

Data Collection questionairre

SECTION A: DEMOGRAPHICS
1. Patient Age: _____
2. Patient Gender: ☐ Male ☐ Female ☐ Other: _____
3. Occupation: _____

SECTION B: MEDICAL HISTORY
4. Documented Diagnosis (Check all that apply):
☐ Hypertension ☐ Diabetes ☐ Heart Disease ☐ Hyperlipidemia (high cholesterol) ☐ Previous stroke or TIA ☐ Not recorded
5. Family History of Stroke: ☐ Yes ☐ No ☐ Not recorded
6. If yes, relationship? _____
7. Family History of Disease (Check all that apply):
☐ Hypertension ☐ Heart Disease ☐ Diabetes ☐ Hyperlipidemia ☐ Not recorded

SECTION C: LIFESTYLE FACTORS
8. Smoker? ☐ Yes ☐ No ☐ Not recorded
9. If yes, number of cigarettes a day: _____
10. Alcohol Consumption? ☐ Yes ☐ No ☐ Not recorded
11. If yes, frequency: ☐ Daily ☐ Weekly ☐ Monthly ☐ Rarely ☐ Not recorded
12. Diet Type: ☐ Healthy ☐ Moderate ☐ Unhealthy ☐ Not recorded
13. Level of Physical Activity: ☐ Daily ☐ 3–5 times/week ☐ Occasionally ☐ Rarely ☐ Not recorded

SECTION D: CLINICAL ASSESSMENT
14. Date of First Stroke Symptoms: _____
15. Documented Stroke Symptoms (Check all that apply):
☐ Sudden numbness/weakness (face, arm, leg)
☐ Confusion or trouble understanding speech
☐ Difficulty speaking/slurring words
☐ Trouble seeing in one/both eyes
☐ Difficulty walking/dizziness/loss of balance
☐ Not recorded
16. Was Imaging (CT or MRI) Done? ☐ Yes ☐ No ☐ Not recorded
17. If yes, summary of findings: _____

SECTION E: ADDITIONAL NOTES
18. Any additional risk factors or notes: _____

- Available at: https://docs.google.com/forms/d/e/1FAIpQLSfu9x0RxOB6lnowjs_m7K7Czs2CvGM72TJyXvf29-UgPVqJ4g/viewform

Appendix 5

Approvals

UNIVERSITY *of* LUSAKA

Passion for Quality Education: Our Driving Force

UNIVERSITY OF LUSAKA RESEARCH ETHICS COMMITTEE (UNILUS-REC)

Plot No. 37413, Off Alick Nkhata Mass Media. P. O Box 36711, Lusaka.
Phone: +260211258505, 258409 Fax +260211233409; Cell +260976075850,961917862,
E-mail:unilus@zamnet.zm,ictar@zamnet.zm

UNILUS-RESEARCH ETHICS COMMITTEE

Ref no: FWA00033228-535(08)/(08)/{2024}

Date: 04 March 2025

STUDENT NAME: **Mr. Teza Sikasote**

Stroke: Understanding prevalence and risk factors

The above research was submitted to the research ethics committee for review. The study has no major ethical problems and is approved subject to the following:

1. The study cannot be changed without express permission of the UNILUS research ethics committee.
2. Approval from the necessary authority should be sought.

Professor Kasonde Bowa

MSc(Glasgow),M.Med(UNZA),FRCS(Glasgow),FACS,FCS,DPH(LSTMH),MPH(UCL)

Chairman- UNILUS REC

Professor of Urology and Consultant Urologist

Deputy Vice-Chancellor – Research and Innovation

Executive Dean - School of Medicine and Health Sciences

NATIONAL HEALTH RESEARCH AUTHORITY

Lot No. 18961/M, off Kasama Road, Chalala, P.O. Box 30075, LUSAKA

Tell: +260211 250309 | Email: znhrasec@nhra.org.zm | www.nhra.org.zm

NHRA8218/10/02/2025 **5th March 2025**

The Principal Investigator,
TEZA KAMPHASA SIKASOTE,
UNILUS,
Lusaka

Dear TEZA KAMPHASA SIKASOTE,

Re: Request for Authority to Conduct Research

The National Health Research Authority Is in Receipt of Your Request for Authority to Conduct Research Titled **"STROKE: UNDERSTANDING PREVALENCE AND RISK FACTORS AT LEVY MWANAWASA UNIVERSITY TEACHING HOSPITAL (LMUTH)"**

I wish to inform you that following submission of your request to the Authority, our review of the same and in view of the ethical clearance, this study has been **approved** on condition that:

1. The relevant Provincial and District Medical Officers where the study is being conducted are fully appraised.
2. Progress updates are provided to NHRA bi-annually from the date of commencement of the study.
3. The final study report is cleared by the NHRA before any publication or dissemination within or outside the country.
4. After clearance for publication or dissemination by the NHRA, the final study report is shared with all relevant Provincial and District Directors of Health where the study was being conducted, University leadership, and all key respondents.

Yours sincerely,

National Health Research Authority

Prof Victor Chalwe,
Director and Chief Executive Officer

All correspondence to be addressed to:
The Senior Medical Superintendent
Tel: +260 211 445101
Fax: +260 211 285462

In reply please quote:

No.....

REPUBLIC OF ZAMBIA

MINISTRY OF HEALTH

LEVY MWANAWASA UNIVERSITY
TEACHING HOSPITAL
P.O. BOX 310084
LUSAKA

21st March, 2025

The Principal Investigator,
Teza Kamphasa Sikasote
UNILUS
Lusaka

Dear Researcher,

PERMISSION TO CONDUCT A RESEARCH STUDY – YOURSELF

Reference is made to your letter requesting for permission to conduct a research study entitled ***"STROKE: UNDERSTANDING PREVALENCE AND RISK FACTORS AT LEVY MWANAWASA UNIVERSITY TEACHING HOSPITAL"***

Management of Levy Mwanawasa University Teaching Hospital wishes to inform you that the hospital has no objection to your request. As a Hospital, we wish to benefit from the study by you contributing materially or financially to suit your overheads as budgeted. Kindly avail us with the final findings.

In your publication, kindly acknowledge the institution and the supervising team in the area of your study.

You may commence with the study when you are ready. By copy of this letter, permission is granted.

Yours faithfully

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