

ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE, SCHOOL OF MEDICINE, DEPARTMENT OF NEUROLOGY

Pre-Stroke Knowledge, Attitude and Practice of Lifestyle Modification Among Stroke Survivors at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia: A Cross-sectional Analytic Study (2026)

Principal Investigator: Dr. Tsion Thomas

April 2026

Addis Ababa, Ethiopia

DECLARATION

I, Dr Tsion Thomas (GSR/8306/15), hereby declare that this specialization research thesis titled "Pre-Stroke Knowledge, Attitude and Practice of Lifestyle Modification Among Stroke Survivors at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia: A Cross-sectional Analytic Study (2026)" has been developed by me and has not been submitted to any other institution for award of any academic qualification. The content of the thesis has not been plagiarized and where works of other researchers have been used, they have been appropriately cited.

Candidate's Name	**Signature**	**Date**
_____	_____	_____

Pre-Stroke Lifestyle Modification Knowledge, Attitude and Practice Among Stroke Survivors at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia: A Cross-sectional Analytic Study,2026

By: Dr. Tsion Thomas

A SPECIALIZATION THESIS PROPOSAL SUBMITTED TO ADDIS ABABA UNIVERSITY COLLAGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE, DEPARTMENT OF NEUROLOGY

APPROVED BY BOARD OF EXAMINERS

This is to certify that we have read this research proposal and that in our opinion; it is fully adequate, in scope and quality, as a thesis proposal for the fulfilment of Certificate of Specialization in Neurology

Advisor

Name _____Signature_____ Date_____

Advisor

Name _____Signature_____ Date_____

Examiner

Name _____Signature_____ Date_____

Examiner

Name _____Signature_____ Date_____

Chairperson

Name _____Signature_____ Date_____

ACKNOWLEDGMENT

First of all, I am grateful to God for all his blessings. I would like to express my deepest gratitude to Addis Ababa University College of Health Sciences, Department of Neurology for allocating the budget and giving me the chance to do this research. I would also like to extend my acknowledgement to my advisors, Dr Amanuel Amare, Dr Hanna Demissie, Dr Selam Kifelew, Professor Jemal Haidar who encouraged, supported and advised me throughout this research.

TABLE OF CONTENT

DECLARATION I
ACKNOWLEDGMENT II
TABLE OF CONTENT III
LIST OF TABLES V
LIST OF TABLES VI
LIST OF FIGURES VII
ABBRIVATION VIII
ABSTRACT IX
CHAPTER 1: INTRODUCTION 1
1.1 BACKGROUND 1
1.2. STATEMENT OF THE PROBLEM 3
1.3 SIGNIFICANCE OF THE STUDY 4
CHAPTER 2: LITERATURE REVIEW 5
2.1. HISTORICAL BACKGROUND OF STROKE 5
2.3 EPIDEMIOLOGY AND RISK FACTOR OF STROKE 6
2.4. STROKE AND NON-MODIFIABLE RISK FACTORS 8
2.5. STROKE AND LIFESTYLE MODIFICATION 9
2.7. CONCEPTUAL FRAMEWORK 10
3.1. GENERAL OBJECTIVE 11
3.2. SPECIFIC OBJECTIVE 11
CHAPTER 4: METHODS 12
4.1. STUDY SETTING AND PERIOD 12
4.2 STUDY DESIGN 12
4.3 SAMPLE SIZE AND SAMPLING TECHNIQUE 12
4.4 ACHIEVED SAMPLE SIZE 14
4.5 INCLUSION AND EXCLUSION CRITERIA 15
4.5.1 Inclusion Criteria: *15*
4.5.2 Exclusion Criteria: *15*
4.6 DATA COLLECTION 15
4.7 OPERATIONAL DEFINITIONS 16
4.9 DATA ANALYSIS 21
4.10. ETHICAL CONSIDERATION 21
CHATPER 5:RESULT 22
5.1. SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS 22
5.2. CLINICAL PROFILE AND COMORBIDITY BURDEN 23
5.3. PRE-STROKE KNOWLEDGE OF LIFESTYLE MODIFICATION 24

5.4. PRE-STROKE ATTITUDE TOWARD LIFESTYLE MODIFICATION....25
5.6. PRACTICE OF PRE-STROKE LIFESTYLE MODIFICATION....26
5.6.1. Tobacco Use Practice....28
5.6.2. Alcohol Consumption Practice....28
5.6.3. Khat Practice....29
5.6.4. Dietary Practice....29
5.6.5. Physical Activity Practice....30
5.6.6. Body weight, Health Checks and Medication Practice....30
5.7 BIVARIATE ANALYSIS....32
5.7.1. Factors Associated with Knowledge....32
5.7.2. Factors Associated with Attitude Level....33
5.7.3. Factors Associated with Practice Level....35
5.8. MULTIVARIATE ANALYSIS....37
5.8.1. Independent factors which affect Knowledge....37
5.8.2. Independent factors which affect Attitude....38
5.8.3. Independent factors which affect Practice....39
5.9. THE INTERRELATIONSHIP BETWEEN KNOWLEDGE, ATTITUDE, AND PRACTICE....39
5.10. PERCEIVED BARRIERS AND SUPPORT....40

CHAPTER 6: DISCUSSION....41

6.1. KNOWLEDGE....41
6.2. ATTITUDE....42
6.3. PRACTICE....42
6.4. COMPARISON WITH OTHER KAP STUDIES....43
6.4.1. Knowledge Attitude Practice Gap....44
6.4.2. Strength of the Study....44
6.4.3. Limitations....44

CHAPTER 7: CONCLUSION AND RECOMMENDATION....46

REFERENCE....48

LIST OF TABLES

TABLE 1: SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS(N=176), TASH,2026 22
TABLE 2: CLINICAL PROFILE AND COMORBIDITY BURDEN (N=176),2026, TASH 24
TABLE 3: LEVEL OF PRESTROKE KNOWLEDGE OF LIFESTYLE MODIFICATION AMONG PARTICIPANTS (N=176) 25
TABLE 4: LEVEL OF PRESTROKE ATTITUDE OF LIFESTYLE MODIFICATION AMONG PARTICIPANTS (N=176) 26
TABLE 5: DISTRIBUTION OF PRE-STROKE LIFESTYLE MODIFICATION PRACTICE (N=176) 27
TABLE 6: PRE-STROKE LIFESTYLE MODIFICATION PRACTICES ACROSS THE DOMAINS AMONG STROKE PATIENTS (N=176) 27
TABLE 7: FACTORS ASSOCIATED WITH KNOWLEDGE LEVEL (BIVARIATE ANALYSIS) (N=176).....32
TABLE 8: FACTORS ASSOCIATED WITH ATTITUDE LEVEL (BIVARIATE ANALYSIS)(N=176).....34
TABLE 9: FACTORS ASSOCIATED WITH PRACTICE LEVEL (BIVARIATE ANALYSIS)(N=176) 36
TABLE 10: FACTORS ASSOCIATED WITH KNOWLEDGE LEVEL (MULTIVARIATE ANALYSIS)(N=176) ...37
TABLE 11: FACTORS ASSOCIATED WITH ATTITUDE LEVEL (MULTIVARIATE ANALYSIS)(N=176).....38

LIST OF TABLES

TABLE 1: SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS(N=176), TASH,2026 22
TABLE 2: CLINICAL PROFILE AND COMORBIDITY BURDEN (N=176),2026, TASH 24
TABLE 3: LEVEL OF PRESTROKE KNOWLEDGE OF LIFESTYLE MODIFICATION AMONG PARTICIPANTS (N=176) 25
TABLE 4: LEVEL OF PRESTROKE ATTITUDE OF LIFESTYLE MODIFICATION AMONG PARTICIPANTS (N=176) 26
TABLE 5: DISTRIBUTION OF PRE-STROKE LIFESTYLE MODIFICATION PRACTICE (N=176) 27
TABLE 6: PRE-STROKE LIFESTYLE MODIFICATION PRACTICES ACROSS THE DOMAINS AMONG STROKE PATIENTS (N=176) 27
TABLE 7: FACTORS ASSOCIATED WITH KNOWLEDGE LEVEL (BIVARIATE ANALYSIS) (N=176).....32
TABLE 8: FACTORS ASSOCIATED WITH ATTITUDE LEVEL (BIVARIATE ANALYSIS)(N=176).....34
TABLE 9: FACTORS ASSOCIATED WITH PRACTICE LEVEL (BIVARIATE ANALYSIS)(N=176) 36
TABLE 10: FACTORS ASSOCIATED WITH KNOWLEDGE LEVEL (MULTIVARIATE ANALYSIS)(N=176) ...37
TABLE 11: FACTORS ASSOCIATED WITH ATTITUDE LEVEL (MULTIVARIATE ANALYSIS)(N=176).....38

List of Figures

FIGURE 1: CONCEPTUAL FRAMEWORK 10

ABBRIVATION

AAU	Addis Ababa University
BMI	Body Mass Index
BP	Blood Pressure
CHS	College of Health Sciences
CNS	Central Nerves System
DALYs	Disability Adjusted by Life Years of lost
FBG	Fasting Blood Glucose
FPG	Fasting Plasma Glucose
GBD	Global burden of Disease
ICH	Intracranial Hemorrhage
LMICs	Low- and middle-income countries
MD	Medical Doctor
NCD	Non-Communicable Disease
OPD	Outpatient Department
SAH	Subarachnoid Hemorrhage
SNNPR	South Nations Nationalities and Peoples Region
SBP	Systolic Blood Pressure
TASH	Tikur Anbessa Specialized Hospital
WSO	World Stroke Organization

ABSTRACT

Background

Stroke is one of the leading causes of mortality and long-term disability worldwide, with a particularly increasing burden in low- and middle-income countries like Ethiopia. A substantial proportion of stroke cases are attributable to modifiable lifestyle-related risk factors such as unhealthy diet, physical inactivity, smoking, and alcohol consumption. Despite this, the level of knowledge, attitude, and practice (KAP) toward lifestyle modification among stroke survivors remains insufficiently explored in Ethiopia. Understanding these factors is essential for improving secondary prevention strategies.

Methodology

A hospital-based cross-sectional analytic study was conducted among stroke survivors attending the outpatient department of Tikur Anbessa Specialized Hospital (TASH), Addis Ababa, Ethiopia. Data were collected using a structured questionnaire through face-to-face interviews. The questionnaire assessed socio-demographic characteristics and pre-stroke knowledge, attitude, and practice regarding lifestyle modification. Data was entered and analyzed using SPSS version 30. Both bivariate and multivariate analyses were performed to identify factors associated with knowledge, attitude, and practice. Statistical significance was considered at $p < 0.05$.

Results

A total of **176 stroke survivors** were included in the study. The majority (**80.7%**) had poor knowledge of stroke risk factors and lifestyle modification. Similarly, most participants (**88.6%**) demonstrated a non-favorable attitude toward lifestyle modification. Regarding practice, **63.6%** of participants were categorized as having good overall lifestyle modification practice. However, domain-specific analysis revealed that good practice was mainly driven by passive behaviors such as non-smoking (**81.8%**) and non-binge alcohol consumption (**67.6%**).

Conclusion

The study found that stroke survivors had limited knowledge and generally unfavorable attitudes toward lifestyle modification. While overall practice levels seemed relatively good, this was mainly due to passive behaviors such as avoiding smoking and alcohol. In contrast, essential active preventive measures—such as maintaining a healthy diet, engaging in regular physical activity, and attending clinical follow-up—were inadequately practiced.

These findings highlight the need for targeted interventions focusing on improving awareness, reshaping attitudes, and promoting active engagement in preventive behaviors to reduce stroke recurrence.

Keywords: Stroke survivor, Life style modification, Knowledge, Attitude, Practice

CHAPTER 1: INTRODUCTION

1.1 Background

Stroke is a leading cause of disability and death globally and is defined as a neurological deficit attributed to an acute focal injury of the central nervous system (CNS) due to a vascular cause, including cerebral infarction, intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH) (Sacco et al., 2013). Historically, the term "stroke" was introduced in 1689 by William Cole, replacing the earlier term "apoplexy," which had been used since the time of Hippocrates in 400 BC to describe sudden loss of neurological function. Over time, advances in medical understanding led to the introduction of related concepts such as transient ischemic attack (TIA), describing brief, reversible episodes of cerebral dysfunction associated with vascular pathology.

Stroke is the third most common cause of death worldwide, after COVID-19 and ischemic heart disease, according to the Global Burden of Disease (GBD) 2021 study. Approximately 12.2 million new cases of stroke occur annually, and there are already over 101 million stroke survivors globally (WSO, 2022). According to estimates, one in four people will have a stroke at some point in their lives due to a 50% increase in the lifetime risk of stroke during the previous 17 years (WHO, 2022). Notably, persons under the age of 70 account for over 62% of stroke cases, underscoring the increasing burden within the economically productive population.

About 62% of stroke incidents worldwide are ischemic stroke, making it the most prevalent subtype. Ischemic stroke is a major cause of long-term disability and lost productivity, affecting over 77 million individuals globally. Over 63 million disability-adjusted life years (DALYs) are lost annually because of ischemic stroke, which has a significant negative influence on both health and the economy (WSO, 2022; Pu et al., 2023).

Over the past few decades, the prevalence of stroke has significantly increased in Africa. A crude incidence rate of 26 per 100,000 people was reported in early data from the Ibadan Stroke Registry (1973–1975), while more recent research shows substantially higher age-standardized incidence rates of up to 316 per 100,000 people. Additionally, prevalence rates vary greatly throughout the continent, from 48.17 per 100 in Madagascar to 0.61 per 100 in Zimbabwe. Increasing exposure to vascular risk factors is driving an epidemiological transition, as evidenced by studies from Ghana and Tanzania that show increased incidence rates (Owolabi et al., 2015; Akinyemi et al., 2021; Gisele A. et al., 2024).

The prevalence of stroke is high in Ethiopia and is still rising. Ischemic and hemorrhagic strokes account for 51.40% and 46.42% of instances, respectively, according to a meta-analysis and systematic review (Abate et al., 2021). Alarmingly high rates of modifiable risk factors, such as dyslipidemia (20.99%), alcohol usage (24.96%), and hypertension (49%), are present in stroke patients. Further research has revealed that 10%, 8%, and 47% of stroke patients, respectively, have atrial fibrillation, diabetes mellitus, and hypertension, which all contribute to poor outcomes and higher mortality. Ethiopia's total in-hospital stroke death rate is predicted to be 18%, with significant geographical variation (Alene et al., 2020).

Stroke is mostly caused by controllable risk factors worldwide. According to GBD 2019 estimates, behavioral factors account for 47% of stroke-related DALYs, metabolic risk factors for 71%, and overall modifiable risk factors for roughly 87% of the burden. High systolic blood pressure, high body mass index (BMI), higher fasting plasma glucose, smoking, and an unhealthy diet are important causes (WSO, 2022). According to O'Donnell et al. (2016), the INTERSTROKE study also showed that ten modifiable risk factors account for approximately 90% of the population-attributable risk of stroke across varied groups, highlighting the disease's avoidable character..

Despite this evidence, significant gaps in stroke prevention persist in Ethiopia. Although the prevalence of hypertension among adults is approximately 16% (NCD Risk Factor Collaboration, 2021), awareness, treatment, and control rates remain low. Dietary practices often involve high salt intake, with traditional meals frequently accompanied by salty condiments, while fruit and vegetable consumption remains below recommended levels (EPHI, 2021). Urbanization has contributed to increasing physical inactivity, and risk behaviors such as smoking and khat chewing remain prevalent. These factors contribute to the rising incidence and poor outcomes of stroke in the country.

While several studies in Ethiopia have evaluated knowledge, attitude, and practice (KAP) regarding stroke among the general population or high-risk groups, there is a lack of evidence specifically assessing pre-stroke lifestyle modification KAP among stroke survivors. This population provides a unique opportunity to understand real-world prevention failures.

First, stroke survivors represent a critical “teachable moment” group whose pre-event experiences can reveal gaps in knowledge, attitudes, and behaviors that contributed to the occurrence of stroke.

Retrospective assessment of their lifestyle practices in the months preceding the event allows identification of missed opportunities for prevention.

Second, understanding pre-stroke KAP is essential for improving secondary prevention strategies. Identifying specific deficiencies—whether in knowledge, beliefs, or behaviors—enables the development of targeted interventions rather than relying on generalized education approaches.

Third, this approach allows exploration of the "know–do gap," referring to the discrepancy between awareness of risk factors and actual implementation of preventive behaviors. This gap may be influenced by socioeconomic constraints, cultural practices, or limited access to health-promoting resources, and is difficult to capture through conventional population-based studies.

Therefore, this study aims to assess the pre-stroke knowledge, attitude, and practice of lifestyle modification among stroke survivors attending Tikur Anbessa Specialized Hospital, and to identify factors associated with these outcomes. It is hypothesized that a majority of stroke survivors will demonstrate poor pre-stroke knowledge and unfavorable attitudes toward lifestyle modification, with suboptimal preventive practices such as inadequate physical activity and unhealthy dietary habits. Furthermore, it is anticipated that educational status and socioeconomic factors will be significantly associated with KAP levels.

The findings of this study are expected to provide evidence-based insights for designing targeted and context-specific secondary prevention strategies to reduce the burden of stroke in Ethiopia.

1.2. Statement of the problem

The global DALYs of stroke rose from 144.0 million (137.0–150.0) in 2010 to 160.4 million (148.0–171.7) in 2021.3, with 11.9 million incident cases, 93.8 million prevalent cases, and 7.3 million stroke-related deaths, according to the GBD (Global Burden of Disease) 2021 research. Stroke was the fourth most prevalent cause of disability-adjusted life years (DALYs) and the third most common GBD level 3 cause of death globally in 2021 (based on total fatalities). This analysis shows that in all low-income and middle-income countries (LMICs) combined, there were 83.3% incidence strokes, 76.7% prevalent strokes, 87.2% fatal strokes, and 89.4% stroke-related DALYs in 2021. This study found that high BMI (88.2%), high fasting plasma glucose (32.1%), diet high in sugar-sweetened beverages (23.4%), low

physical activity (11.3%), and high systolic BP (6.7%) were all associated with significant increases in DALYs.(Global and regional stroke burden, 1990-2021)

The combined burden of hemorrhagic and ischemic stroke was 46.42% and 51.40%, respectively, in the systemic review and meta-analysis conducted in Ethiopia to evaluate the burden of stroke and modifiable risk factors. Among stroke patients, the total prevalence of modifiable risk factors for alcohol use, dyslipidemia, and hypertension was 24.96%, 20.99%, and 49%, respectively (Abate et al., 2021b).

Finding modifiable risk factors and proving the effectiveness of risk reduction initiatives are necessary to lower the prevalence of stroke in the general population (Boehme et al., 2017c). Keystroke preventive strategies include changing one's behavior and lifestyle, which frequently prevents or improves control of other stroke risk factors such diabetes, hypertension, and hyperlipidemia. Even though the general ideas are straightforward and supported by a wealth of data, patients and clinicians still find it difficult to adopt and maintain these important behavioral and lifestyle adjustments. Patients face a variety of obstacles to changing their behavior, such as a lack of understanding or awareness of how lifestyle choices affect their health, a lack of self-efficacy or confidence in their capacity to alter their behavior, social and environmental barriers (such as financial constraints, work and family obligations, or access to nutritious foods), a lack of motivation, and other physical, emotional, and cognitive factors. Lack of resources and the challenges of creating and carrying out efficient, coordinated interventions that address prevention counseling, health education, and behavioral change strategies for stroke prevention in diverse populations continue to be obstacles for health care systems and providers (Sur et al., 2023b).

1.3 Significance of the study

It is noted that life style modification is one of the major preventing methods of cerebrovascular diseases. So far there is no study done in Ethiopia to assess the knowledge, attitude and practice of lifestyle modifications as primary prevention among stroke survivors before the occurrence of the incident yet. The result of this study will help us to know the knowledge, attitude and practice of lifestyle modification in society and to enlighten the responsible public health sector in this aspect. This research can also contribute to enhancing stroke prevention efforts and it can also help in improving the overall well-being of stroke survivors

CHAPTER 2: LITERATURE REVIEW

2.1. Historical Background of stroke

Prior to the Common Era, Hippocrates recorded that occlusion of the "stout" carotid artery resulted in unconsciousness (Caplan, 2016). At the time, apoplexy was the term used to describe stroke symptoms. In 1658, Johann Jacob Wepfer reported that apoplexy was caused by occlusion of the carotid or vertebral artery or bleeding into the brain. Following the work of Giovanni Battista Morgagni, John Cheyne, and other scientists, between 1682 and 1836, they were able to correlate clinical presentations of stroke with morbid anatomical findings of the brain. In 1828 John)

John Abercombie divided apoplexy into three categories in 1828: primary apoplexy (focal deficit or stupor with large intracranial hemorrhages or infract), probable subarachnoid hemorrhages (with stupor and headache but no focal deficit), and small infarct or hemorrhage with focal deficit (Caplan, 2016). The development of computerized tomographic scanning (CT) and magnetic resonance imaging in the last century made it possible to identify the location of brain infarction and hemorrhage. Later, functional imaging techniques allowed for the assessment of cerebral perfusion and metabolism, which made it possible to establish stroke units that provide effective care for stroke patients and survivors (Temesgen et al., 2018).

2.2 Theoretical Framework: Explaining Pre-Stroke Knowledge, Attitude, and Practice

According to the Knowledge-Attitude-Practice (KAP) model, knowledge causes attitude, which in turn causes behavior to change. Nevertheless, this pathway is frequently inadequate; individuals may continue to smoke despite being aware that smoking causes stroke. The Health Belief Model (HBM) (Janz & Becker, 1984) and the Theory of Planned Behavior (TPB) (Ajzen, 1991) are two well-known ideas that explain why people don't make preventive lifestyle changes before having a stroke.

The HBM states that perceived susceptibility (personal risk of stroke), perceived severity (seriousness of stroke), perceived advantages (efficacy of lifestyle modification), and perceived barriers (cost, discomfort, cultural habits) all influence behavior change. According to the TPB, attitude, subjective norms (what family or community expects), and perceived behavioral control (belief in one's capacity to change) all influence behavioral intention.

These theories predict a separation between passive and active preventive actions when applied to pre-stroke behaviors. Strong cultural or religious subjective norms—a "cue to action" that functions independently of individual health knowledge or attitude—are frequently the driving force behind passive behaviors (such as abstaining from smoking and consuming alcohol in moderation). On the other hand, great perceived advantages, low perceived barriers, and strong felt behavioral control are necessary for active behaviors (healthy diet, frequent physical activity, clinical follow-up). Therefore, passive habits may seem appropriate while active practices continue to be inadequate, even in groups with weak information and negative attitudes. This pattern, which emphasizes the necessity for domain-specific assessment, is exactly in line with theoretical expectations: low knowledge and attitude but good composite practice inflated by passive actions.

2.3 Epidemiology and risk factor of stroke

According to the most recent Global Burden of Disease (GBD) 2021 stroke burden estimates, stroke r emains the second most common cause of death globally (approximately 7 million), and among non-communicable diseases (NCDs), it is the third most common cause of death and disability combined (measured by disability-adjusted life-years lost, or DALYs; more than 160 million DALYs).
Between 1990 and 2021, the number of stroke victims, stroke deaths, and stroke
related disability increased dramatically worldwide: incidence strokes increased by 70% (95% UI 66 t o 75), stroke deaths climbed by 44% (32 to 56), and DALYs increased by 32% (22 to 43).

Low-income and low-middle-income countries (LMICs) accounted for the majority of the global stroke burden (87.2% of deaths and 89.4% of DALYs). Stroke is predicted to cost the global economy around US$890 billion annually, or 0.66 percent of GDP, and is predicted to almost triple by 2050. Over 16% of all strokes occur in those between the ages of 15 and 49, over 62% occur in those under 70, 47% occur in males, and 53% occur in women. One in four adults over the age of 25 will have a stroke at some point in their lives. The World Stroke Organization estimates that there are currently over 101 million stroke survivors globally and six and a half million stroke deaths annually.

22% of stroke survivors are between the ages of 15 and 49, according to WSO (2025). Sixty-seven percent of stroke survivors are under seventy years old. Of individuals who have survived a stroke, 44% are men. Slightly over half (56%) of stroke victims globally are women. Approximately 6% of stroke

deaths occur in people between the ages of 15 and 49. 34% of stroke-related deaths occur in those under the age of 70. 51% of stroke-related deaths occur in men. 49% of stroke-related deaths occur in women.

The total number of stroke-related DALYs caused by risk factors increased from 91.5 million to 125.0 million between 1990 and 2019 due to a decrease in high-income countries (from 16.4 million to 13.1 million in 2019) and an increase in LMIC (from 75.1 million in 1990 to 111.0 million in 2019) (Table 5). High body mass index (BMI) was responsible for the biggest (almost four-fold) increase in age-standardized stroke-related DALYs globally.

Smoking (17.6%), high BMI (24.3%), high fasting plasma glucose (FPG; 20.2%), ambient particulate matter pollution (20.1%), and high systolic blood pressure (SBP; accounting for 55.5% of all stroke DALYs) were the top five risk factors for stroke.

Metabolic risks (high blood pressure, high body mass index, high FPG, high LDL cholesterol, and kidney dysfunction) accounted for 73% of stroke-related DALYs (70.3 in females and 70.1% in males); dietary risks (diet high in sodium and red meat, diet low in fruits, vegetables, whole grains, and alcohol consumption) accounted for 30%; Thirty-seven percent were caused by environmental factors (air pollution cluster, low ambient temperature, high ambient temperature, and lead exposure) and forty-six percent were caused by behavioral risks (smoking and food hazards). Behavioral, dietary, and environmental risks contributed significantly less between 1990 and 2019 (5.4%, 7.9%, and 8.2%, respectively), while metabolic risks contributed significantly more (8.4%), particularly because of the rise in high BMI (52.7%) and high FBG (39.3%).

Between 1990 and 2019, the contribution of environmental, dietary, and behavioral risks decreased significantly (5.4%, 7.9%, and 8.2%, respectively), while the contribution of metabolic risks increased significantly (8.4%), primarily as a result of the rise in high FBG (39.3%) and high BMI (52.7%).

In Africa, the prevalence of stroke is observed to be rising. The pooled crude incidence of stroke per 100,000 people was 106.49, according to a meta-analysis of 14 studies, and the point estimate of the crude incidence rate was greater in men than in women. Another meta-analysis of six research revealed that the sub-Saharan area has a high stroke recurrence rate (2 to 25%).

A cross-sectional study conducted at Yirgalem Hospital between January 1, 2017, and December 30, 2019, found that 3016 patients were hospitalized. Out of 3016 hospitalized patients, 3.15 percent (n =

95) had a stroke. Of the 95 stroke cases, 58.9% were men, and 69.5% were city dwellers. 62.1% (59/95) of the stroke patients had an ischemic stroke, while 37.9% (36/95) had a hemorrhagic stroke.

The incidence of ischemic stroke were considerably higher than those of hemorrhagic stroke in those who were 65 years of age or older, smoked, had high blood pressure, and had type II diabetes (62.7% vs. 30.5%, $p = 0.008$), 49.1% vs. 11.1%, $p \geqslant 0.0001$, and 71.2% vs. 13.9%, $p < 0.0001$). On the other hand, compared to people with ischemic stroke, those with hypertension had a significantly higher rate of hemorrhagic stroke (88.9% vs. 61%, $p = 0.003$) (Agazhe et al., 2021).

A prospective hospital-based study that included all adult patients diagnosed with stroke who were admitted to Hawassa University Referral Hospital between April 2013 and April 2014 found that 163 stroke patients were enrolled, of whom 82 (50.3%) had an ischemic stroke and 81 (49.7%) had a hemorrhagic stroke. Cigarette smoking (4.9%), alcohol (10.4%), diabetes mellitus (7.4%), heart disease (16.6%), hypertension (50.9%), and tuberculous meningitis (3.1%) were among the risk factors for stroke. Hospital stroke mortality was 14.7%. The main indicators of in-hospital stroke mortality were hemorrhagic stroke, seizure, decreased consciousness, and stroke severity at admission (Deresse et al., 2015).

2.4. Stroke and non-modifiable risk factors

Taking into account the results A systematic review and meta-analysis found that an unmodifiable risk factor for recurrent stroke was advanced age (PHR = 1.03 [95% CI 1.02–1.04]). In terms of older age, obesity, and hypertension, the heterogeneity calculation showed homogeneity among studies ($I2 < 50\%$), according to (Ricvan et al. (2023). After the age of 55, the incidence of stroke doubles every ten years, according to (Roger et al. (2012). The average age of an ischemic stroke in 2005 was 69.2 years. The incidence and prevalence of ischemic stroke in the 20–54 age group, however, have been increasing, going from 12.9% in 1993–1994 to 18.6% in 2005, according to recent statistics (Kissela et al., 2012). There is clear evidence of racial disparities in stroke (Cruz-Flores et al., 2011).

African Americans have a higher stroke fatality rate and are twice as likely to have an incident stroke than white people (Cruz-Flores et al., 2011; Zahuranec et al., 2006). Hispanic/Latino Americans are also more likely to have a stroke in some groups. The stroke incidence gap is highlighted by the much higher risk of intracerebral and subarachnoid hemorrhage in younger Black people compared to age-matched

white adults (Kleindorfer et al., 2006, Kissela et al., 2004). Furthermore, American Indians have a higher risk of stroke than non-Hispanic whites (Zhang et al., 2008).

2.5. Stroke and lifestyle modification

The 2025 stroke fact sheet states that modifiable risk factors account for more than 80% of strokes. Systolic hypertension (57%), smoking (14%), high cholesterol (13%), a diet high in salt (11%), high fasting plasma glucose (10%), a diet poor in fruits and vegetables (6%), and alcohol intake (5%) are among them (WSO, 2025).

Many strokes can be prevented, according to the American Stroke Association, by controlling blood pressure, giving up smoking, getting regular exercise, eating a nutritious diet low in sodium (salt), trans fat, and saturated fat, maintaining a healthy weight, limiting alcohol intake to one drink per day for women and two for men, taking prescription medications as directed, managing blood pressure, reducing stress, and getting enough sleep. While kids should receive more, adults should strive for seven to nine hours each night. The American Stroke Association's recommendations are also supported by the findings of a recent multinational case-control study (INTERSTROKE) involving 22 nations (Boehme et al., 2017)..

Changing one's lifestyle is crucial to preventing strokes because most strokes are caused by modifiable behavioral and metabolic risk factors. Nearly 90% of the global stroke risk is explained by factors like hypertension, smoking, unhealthy diet, abdominal obesity, physical inactivity, diabetes, and psychosocial stress, according to the INTERSTROKE study, a large multinational case-control investigation (O'Donnell et al., 2016). Randomized controlled trials have directly demonstrated that structured lifestyle interventions considerably reduce the risk of stroke.

When compared to a low-fat control diet, a Mediterranean diet supplemented with almonds or extra-virgin olive oil dramatically decreased major cardiovascular events, including stroke, in the PREDIMED trial (Estruch et al., 2018). Systematic reviews of lifestyle intervention programs further support the consistent improvements in key intermediate outcomes such as blood pressure, lipid profile, body weight, and glycemic control—factors that, when sustained over time, cumulatively reduce the risk of stroke (Kheirouri & Alizadeh, 2021). Additionally, it has been separately shown that regular physical activity, moderate alcohol consumption, and quitting smoking all significantly reduce the incidence of both ischemic and hemorrhagic stroke (Pan et al., 2019). The results combined demonstrate a significant

negative relationship between the incidence of stroke and healthy lifestyle habits, supporting the inclusion of comprehensive lifestyle-modification programs in primary and secondary stroke-prevention strategies.

2.6. Knowledge, Attitude and Practice Studies in Low and Middle Income Countries(LMICs)

Evidence from LMICs constantly shows inadequate lifestyle choices and a lack of awareness, especially when it comes to nutrition and exercise. Good knowledge, attitude, and practice are most consistently predicted by educational status (Gebremariam et al., 2020; Owolabi et al., 2014; Tran et al., 2019; Saleh et al., 2018; Jafar et al., 2016).

2.7. Conceptual framework

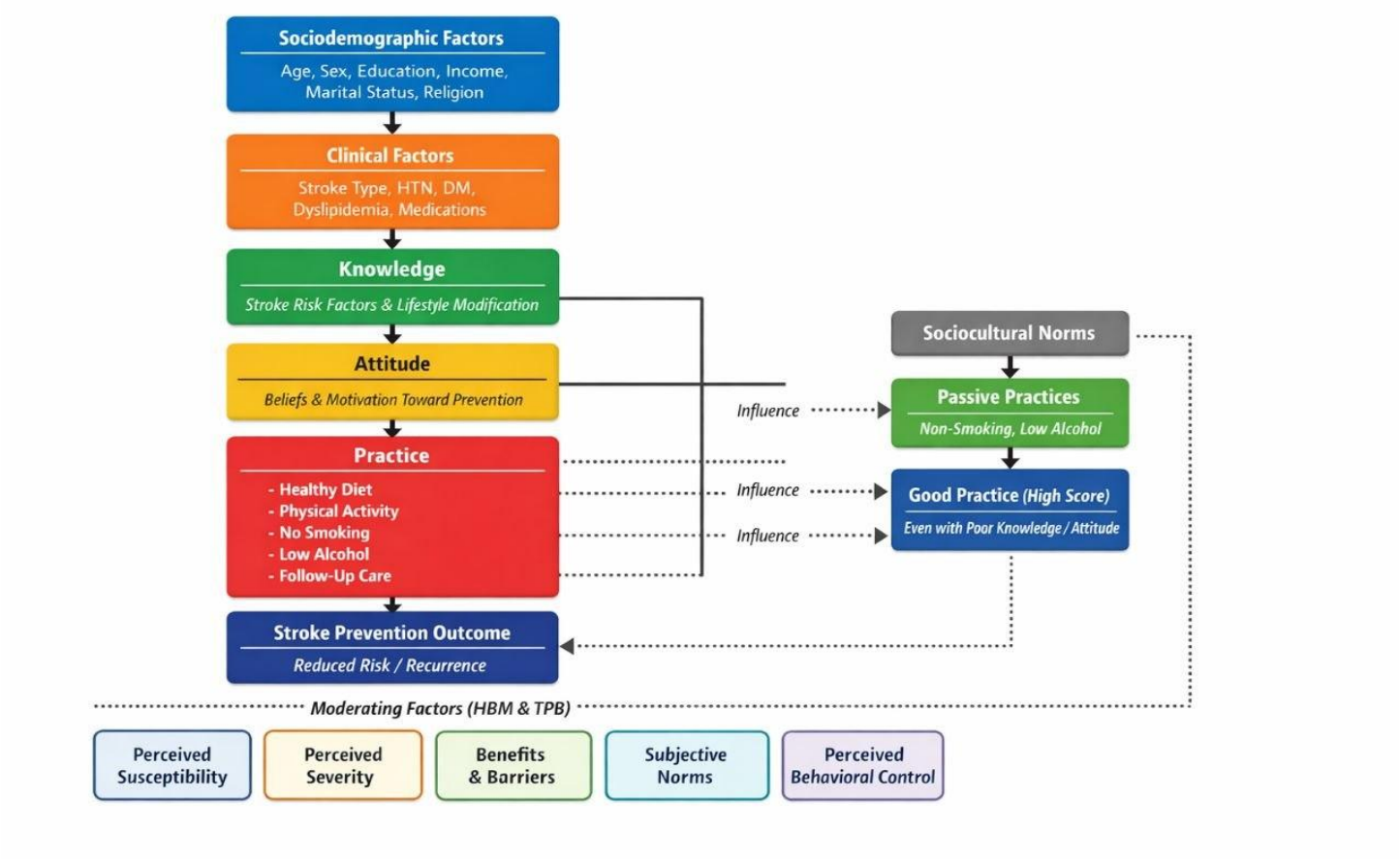


Figure 1: Conceptual framework

CHAPTER 3: OBJECTIVE

3.1. General Objective

To assess knowledge, Attitude and practice pre-stroke lifestyle modification and associated factors among stroke survivors from April 2025 to February 2026 in TASH Neurology OPD

3.2. Specific Objective

- To assess pre-stroke knowledge of lifestyle modification among stroke survivors at Tikur Anbessa Specialized Hospital
- To evaluate pre-stroke attitude of lifestyle modification among stroke survivors at Tikur Anbessa Specialized Hospital
- To assess pre-stroke practice of lifestyle modification among stroke survivors at Tikur Anbessa Specialized Hospital
- To identify factors associated with knowledge, attitude and practice of pre-stroke lifestyle modification among stroke survivors at Tikur Anbessa Specialized Hospital

CHAPTER 4: METHODS

4.1. Study setting and period

Quantitative study was conducted at the stroke clinic Tikur Anbessa Specialized Hospital, from April 2025 – February 2026. Tikur Anbessa Specialized Hospital located in Addis Ababa and was established in 1964. It is Ethiopia's largest tertiary referral hospital total bed number of approximately 700 and is now a major training center for treatment and advanced training in most disciplines.

It is the first and largest Neurology training center which is Staffed with specialist and sub-specialist Neurologists, giving Neurology specialty programs for residents and pediatrics fellows since 2006. The department has different clinics which provide services from Monday to Friday. Stroke clinic is among these clinics which is held every Friday and an average of 30-40 patients per week are seen during this Friday clinic. The department has stroke unit which is established in September 2022. The unit contains 4 beds and a treating team consisting of Neurologists, Neurology residents and trained nurses.

Study population

Stroke survivors attending the neurology stroke clinic at Tikur Anbessa Specialized Hospital during the data collection period (December 2025 to February 2026)

4.2 Study design

An institution based cross sectional analytical study was employed by using structured questionnaire google sheet format from stroke survivors who attend neurology stroke clinic from December 2025 to February 2026

4.3 Sample Size and Sampling Technique

In this study, a total population (census) approach was applied. All stroke survivors who fulfilled the inclusion criteria and attended the Tikur Anbessa Specialized Hospital (TASH) stroke clinic between December 2025 and February 2026 were consecutively enrolled. A formal sampling frame was not used, and no random sampling technique was applied. A total of 176 patients were enrolled in the study.

- Rationale of census approach

The decision to include all eligible patients, rather than relying on a calculated minimum sample size, was guided by several practical and methodological considerations:

1. Feasibility within the study period

On average, 30–40 stroke patients attend the TASH clinic each week. Over a three-month period, this corresponds to approximately 360–480 visits. However, based on clinical experience and the applied exclusion criteria, it was estimated that approximately 40–45% of patients attending the clinic (about 144–216 patients) would fulfill the eligibility criteria. A conventional sample size calculation (outlined below) would require 384 participants, which exceeds the number of patients realistically available during the data collection period.

2. Lack of prior local data for estimation

There are no previous Ethiopian published studies assessing pre-stroke knowledge, attitude, and practice (KAP) of lifestyle modification among strokesurvivorss. As a result, it was not possible to make a reliable estimate of the expected proportion or effect size.

Using standard assumptions—50% expected proportion (to maximize variability), 5% margin of error, 95% confidence level, and a design effect of 1—the required sample size would be:

$n = (1.96^2 \times 0.5 \times 0.5) / 0.05^2 = 384$

Given the available patient volume and study timeframe, achieving this number was not feasible.

3. Reduction of sampling errors

By including all eligible patients during the study period, the census approach eliminates sampling error for the source population—namely, stroke survivors attending the TASH clinic. Although this limits external generalizability, it allows for a complete and accurate description of the clinic population without the uncertainty introduced by sampling.

4. Consecutive enrollment to reduce selection bias

Participants were recruited consecutively over a fixed three-month period rather than through convenience or selective sampling. This approach helps minimize selection bias, including potential

variations related to specific days of the week or seasonal patterns, as all eligible patients presenting during the study period were included.

4.4 Achieved Sample Size

After applying the inclusion and exclusion criteria, a total of 176 stroke survivors were enrolled during the three-month data collection period (December 2025 to February 2026). Because a census approach was employed, this sample represents all eligible and consenting patients who presented to the TASH stroke clinic during the study period.

To contextualize the completeness of enrollment, a pre-study clinical estimate of the expected eligible population was made. Based on an average weekly clinic attendance of 30–40 patients over 12 weeks, total patient visits were estimated at 360–480. Considering the predefined inclusion and exclusion criteria and based on clinical experience, it was anticipated that approximately 40–45% of attendees would be eligible, yielding an expected range of 144–216 patients.

The actual enrollment of 176 participants falls within this estimated range, supporting the validity of the initial assumptions. When compared to the midpoint of the expected range (180), the achieved sample represents approximately 97.8%, indicating that the study captured nearly all of the anticipated eligible population. This percentage is presented to contextualize the completeness of enrollment rather than as a measure against a predetermined sample size, as the study employed a census approach. Minor variation from the upper bound may reflect normal fluctuations in clinic attendance, including missed appointments. Importantly, as a census of all consecutively presenting eligible patients was conducted, the final sample size reflects the total accessible study population rather than a proportion of a predetermined target.

To minimize recall bias, participants were instructed to report their behaviors specifically during the12-month period preceding the stroke event. To reduce social desirability bias, participant anonymity was ensured and confidentiality was strictly maintained. Additionally, all questions were phrased in a neutral and non-judgmental manner, and trained interviewers were used to maintain a neutral tone throughout data collection.

4.5 Inclusion and Exclusion Criteria

4.5.1 Inclusion Criteria:

- All patients attending the stroke clinic during the study period excluding the exclusion criteria

4.5.2 Exclusion Criteria:

- Patients with Age less than 18 years old.
- Patients who are not capable of giving written consent due to severe cognitive decline or impairment in consciousness status
- Patients with recurrent stroke
- Patients who have aphasia
- Pre-existing disability preventing physical activity
- Patients with index stroke > 5 years prior

4.6 Data collection

Data were collected from stroke survivors attending the Tikur Anbessa Specialized Hospital (TASH) stroke clinic between December 2025 and February 2026. A structured questionnaire was used, adapted from the WHO STEP wise approach to NCD risk factor surveillance (STEPS), the WHO Global Physical Activity Questionnaire (GPAQ), and the WHO NCD module.

The questionnaire was prepared in Google Forms to ensure standardized data entry and smooth data management. Face-to-face interviews were conducted by trained data collectors to maximize understanding and accuracy of responses. The tool was administered in Amharic, while the English version was used as a reference to maintain consistency.

Before the interviews, participants were provided with information about the study and gave informed consent to participate. The questionnaire included sections on socio-demographic characteristics, past medical history, and pre-stroke general health status. It also assessed participants' knowledge and attitudes toward lifestyle modification, as well as practices related to physical activity, substance use, weight management, and dietary habits. Additionally, participants were asked about barriers and facilitators they encountered when attempting to adopt healthier lifestyle behaviors.

4.7 Operational Definitions

- **Stroke Survivor**: Any individual who has experienced a clinically diagnosed cerebrovascular accident (stroke) and is currently alive and undergoing medical follow-up or rehabilitation.
- **Lifestyle Modification**: Adoption of behavioral changes intended to reduce the risk of stroke. In this study, it includes practices such as regular physical activity, healthy dietary habits (e.g., low salt and fat intake), cessation of smoking, moderation of alcohol intake, weight management
- **Prior to the Incident**: For the purpose of this study, the term "prior to the incident" refers to the 6–12 months preceding the stroke event. Participants were asked to recall their lifestyle behaviors, knowledge, and attitudes within this defined period. The selection of this time frame was based on both clinical and methodological considerations. Lifestyle modifications such as dietary changes, increased physical activity, smoking cessation, and reduction in alcohol intake generally require several months before producing measurable physiological effects on blood pressure, glycemic control, lipid levels, and body weight (Winkler et al., 2022). Shorter recall periods may capture behaviors that are too recent to have meaningful clinical impact, whereas longer recall periods increase the likelihood of recall decay. A 6–12 month interval provides a reasonable balance between recall accuracy and behavioral stability. Evidence suggests that recall of discrete behaviors such as smoking and alcohol use remains relatively reliable for up to one year, while recall of more complex behaviors such as diet declines over time (Natarajan et al., 2010). This time frame is also consistent with prior KAP studies in chronic disease populations. To minimize recall bias, structured and behavior-specific questions were used, and all items were phrased neutrally to reduce socially desirable responses.
- **Regular Physical Activity:** Engaging in moderate physical exercise (such as brisk walking, jogging, cycling) exercise for at least 150 minutes per week or 75 minutes of vigorous intensity exercises (such as swimming laps, fast cycling, running) per week as recommended by the WHO.
- **Healthy Dietary:** A dietary pattern low in saturated fats(lean proteins and plant-based proteins), salt, and added sugars, and rich in fruits, vegetables, whole grains, and lean protein sources. Atleast 2 servings per day of fruits and 2 to 3 servings /day of vegetables is recommended (a total of 400gm/day)
- **Reduction of salt: taking less than or equal to 5gm(1 tea spoon)per day in non hypertensives and less than or equal to 2.5gm(Half tea spoon)per day in hypertensives**
- **Cigarette Smoking Status**: Classified as "non-smoker," "former smoker" (quit at least 12 months

before the incident), or "current smoker" (still smoking up to the time of stroke incident).

- **Alcohol Consumption**: moderate alcohol use is defined as no more than one alcoholic drink per day(10gm/d) for women and two drink per day(20gm/day) for men.
- **Blood Pressure level**: the pressure of the blood against the inner wall of the blood vessel; where normal BP is BP level of <139/<89 and Hypertension is when Systolic blood pressure is >or= to 140 and or Diastolic blood pressure is >or=90
- **Knowledge**: is the fact or condition of knowing or having sufficient information about the lifestyle modification by stroke survivor patients
- **Good Knowledge**: Knowledge was defined as the participant's factual understanding of stroke risk factors and the role of lifestyle modification—including diet, physical activity, smoking, and alcohol use—in stroke prevention. A composite knowledge score was calculated based on four items. Each correct response was assigned a score of 1, while incorrect or "don't know" responses were scored as 0, resulting in a total score ranging from 0 to 4. Participants were categorized as follows:
- Good knowledge: ≥ 2 correct responses (≥ 50%)
- Poor knowledge: < 2 correct responses (< 50%)

The use of a 50% cutoff is consistent with established practice in KAP research (SAGE Open Nursing, 2023). Although some studies employ a three-tier classification (poor, moderate, and good), a binary classification was selected to enhance interpretability and applicability for intervention planning. In addition, given the relatively low overall knowledge observed in this population, a three-category system would have resulted in uneven group distribution. The four knowledge items included in this study represent essential and clinically relevant aspects of stroke prevention, selected to balance comprehensiveness with feasibility in a clinical setting.

- **Attitude**: is a complex mental status involving beliefs, feelings and values regarding lifestyle modification among stroke survivors. There are five measurement scales for each administered question to assess the attitude of the stroke survivor patients towards the lifestyle modifications Attitude was assessed using **four positively worded statements** measured on a 5-point Likert scale. Participants rated their agreement with each statement as follows:

Response	Score
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

The total attitude score was calculated by summing the scores from all four items, resulting in a possible range of **4 to 20**.

- Participants were categorized as:

  Favorable attitude: ≥ 15 (≥ 75% of total score)

  Non-favorable attitude: < 15 (< 75%)

  A cutoff of 75% was selected to ensure that only clearly positive attitudes were classified as favorable. This decision was supported by the high proportion of neutral responses observed during preliminary analysis, which could otherwise lead to overestimation of favorable attitudes if a lower threshold were used.

  This threshold is consistent with published KAP studies, where scores above 75% are commonly used to define favorable attitudes (SAGE Open Nursing, 2023). Conceptually, a stricter cutoff is justified, as attitude is a stronger predictor of behavior compared to knowledge. The attitude items included in this study addressed perceptions related to lifestyle modification, blood pressure control, smoking cessation, and the importance of regular health check-ups.

- **Practice**: is to do or perform the component of lifestyle modification among stroke survivor patients.

A composite practice score was calculated across six domains: tobacco use, alcohol consumption, khat chewing, physical activity, dietary habits, and clinical management (including medication adherence and weight monitoring). Each domain was scored as 1 (good practice) or 0 (poor practice), resulting in a total score ranging from 0 to 6.

Participants were categorized as:

Good practice: ≥ 3 domains (≥ 50%)

Poor practice: < 3 domains (< 50%)

- The 50% cutoff follows common practice in KAP research (SAGE Open Nursing, 2023). However, this composite measure should be interpreted with caution, as it may be influenced by passive behaviors such as non-smoking or non-alcohol use. For this reason, domain-specific findings are presented as the primary indicators of practice, while the composite score serves as a summary measure.
- NB: Traditional interpretation of servings and alcoholic beverages is provided in the annex at the end of the thesis

4.8. Data quality assurance

To maintain the accuracy, consistency, reliability, and validity of the data, comprehensive quality assurance measures were applied during the questionnaire development, data collection, and data analysis phases of the study.

4.8.1 Pre-Data Collection Quality Control

- **Instrument Development and Review:** The structured questionnaire was adapted from standardized WHO tools, including the WHO STEPS instrument, WHO Global Physical Activity Questionnaire (GPAQ), and WHO NCD modules. The tool was reviewed by advisors to ensure content validity, clarity, and clinical relevance.
- **Translation Procedure:** The questionnaire was prepared in English and translated into Amharic to improve participant understanding and maintain consistency during interviews.
- **Training of Data Collectors:** Trained data collectors with prior interview experience received orientation on the objectives of the study, ethical considerations, confidentiality, neutral interviewing techniques, and standardized administration of the questionnaire.

- **Pretesting:** a formal pilot study was not performed in this study because:
  - ✓ Limited patient volume: The stroke clinic sees only 30-40 patients per week. Taking 20–30 patients for a pilot would have reduced the potential final sample by approximately 5–10% of the total eligible population, given the expected clinic volume over the three-month study period.
  - ✓ Short data collection window: My residency schedule allowed only three months for data collection. Adding a pilot month would have meant either extending the period (not possible) or reducing the main sample further.

- In place of a formal pilot study, the first two days of data collection were used as a pretesting phase to assess clarity, understanding, and feasibility of the questionnaire. Necessary minor modifications were made accordingly.

4.8.2 Intra-Data Collection Quality Control

- **Supervision and Completeness Checks:** Data collection was closely supervised throughout the study period. Completed questionnaires were reviewed daily for completeness, consistency, and missing information. Any unclear or incomplete responses were corrected immediately through clarification with participants when possible.
- **Standardized Interview Process:** Face-to-face interviews were conducted in Amharic using a neutral and non-judgmental approach to minimize interviewer and social desirability bias.
- **Confidentiality and Coding:** Participant confidentiality was maintained by avoiding personal identifiers and using coded questionnaires during data collection and entry.

4.8.3 Post-Data Collection Quality Control

- **Data Entry and Cleaning:** Data collected through Google Forms were exported and analyzed using SPSS version 30. Frequency distributions, consistency checks, and validation procedures were performed to identify missing values, outliers, and data entry errors.
- **Reliability Assessment:** Inter-rater reliability was assessed by independently interviewing five participants, which showed 94% agreement between data collectors, indicating good consistency of data collection procedures.
- **Psychometric Reliability Assessment:** Internal consistency was assessed using Cronbach's alpha. The knowledge and attitude domains showed acceptable reliability, with Cronbach's alpha values of 0.664 and 0.682, respectively, indicating moderate internal consistency among the questionnaire items.

4.9 Data analysis

The collected data was entered and analyzed using SPSS version 30. Descriptive statistics, including frequency, mean, median and percentages, were used to summarize the characteristics of the stroke survivors. The findings were presented using tables to facilitate interpretation.

In addition to descriptive analyses, bivariate and multivariate analyses were conducted to explore associations between variables. Pearson's Chi-square test (χ^2) was used to assess relationships between categorical variables, and binary logistic regression was applied to identify independent predictors of outcomes while controlling for potential confounders.

4.10. Ethical consideration

The study was carried out following widely accepted ethical principles to ensure the safety and dignity of all participants. Autonomy was respected by providing clear explanations about the purpose, procedures, and importance of the study, and participants gave informed consent before taking part. Beneficence guided the research design, ensuring that participation could offer potential benefits while minimizing any risks. Confidentiality and anonymity were carefully maintained by securely storing all data in a safe place accessible only to the research team. Non-maleficence was observed throughout the study, ensuring that no participant experienced physical or psychological harm.

Ethical approval was obtained from the Neurology Department Research Review Committee and the Addis Ababa University Institutional Review Board, ensuring formal oversight and adherence to high ethical standards.

CHATPER 5: RESULT

5.1. Sociodemographic Characteristics of Participants

A total of 176 stroke survivors were included in the study, with a near-equal distribution of sex: 89 (50.6%) were female and 87 (49.4%) were male. The study population was predominantly elderly, with nearly half of the participants (48.3%) aged over 60 years.

Regarding marital and social structures, the majority of the participants were married (51.7%) and identified as Orthodox Christian (43.2%). Educational attainment was generally low; 39.2% had only completed primary school, while 23.8% had no formal education.

Economically, the cohort was primarily composed of retirees (26.7%) and self-employed individuals (21.6%). A significant proportion of the population fell into the lower-middle-income bracket, with 35.8% earning between1,000–5,000 ETB and 47.2% earning between 5,000–10,000 ETB monthly (Table 1).

Table 1: Sociodemographic Characteristics of Participants(N=176), TASH,2026

Variable	Category	Frequency (n)	Percentage (%)
Sex	Female	89	50.6
	Male	87	49.4
Age Group (years)	18–30	2	1.1
	31–45	30	17.0
	46–60	59	33.5
	> 60	85	48.3
Education Level	No formal education	42	23.8
	Primary school	69	39.2
	Secondary school	39	22.2
	College/University	26	14.8
Marital Status	Married	91	51.7
	Widowed	61	34.7
	Divorced	19	10.8

	Single	5	2.8
Occupation	Retired	47	26.7
	Housewife	48	27.3
	Self-employed	38	21.6
	Government/NGO	28	15.9
	Other	15	8.5
Monthly Income (ETB)	1,000–5,000	63	35.8
	5,000–10,000	83	47.2
	> 10,000	30	17.0
Religion	Orthodox Christian	76	43.2
	Protestant Christian	46	26.1
	Catholic Christian	29	16.5
	Muslim	25	14.2

5.2. Clinical Profile and Comorbidity Burden

Among the 176 stroke survivors, the majority suffered from Ischemic stroke (71.0%), while 28.4% experienced Hemorrhagic stroke.

The clinical history of participants revealed significant pre-existing disease burdens. Hypertension was the most common comorbidity, diagnosed in 71.0% of the cohort. Conversely, the prevalence of Diabetes Mellitus and Dyslipidemia was lower, at 13.1% and 6.8%, respectively.

Regarding other chronic health profiles, 13.1% of the participants reported having other chronic medical illnesses Among the 23 patients who reported having other chronic morbidities, Retroviral Infection (RVI) was the most frequent condition, identified in 9 (39.1%) cases. Chronic Rheumatic Valvular Heart Disease (CRVHD) followed, accounting for 6 (26.1%) of these cases, while Hypertensive Heart Disease (HHD) was present in 3 (13.0%).

Among the study groups 41.5% reported a history of medication usage prior to their stroke event. The vast majority of these patients (71, 97.3%) were prescribed antihypertensive agents. Antidiabetic

medications were used by 16 (21.9%) of the treated cohort, while antiretroviral therapy (HAART) was documented in 6 (8.2%) instances (Table 2).

Table 2: Clinical Profile and Comorbidity Burden (N=176),2026, TASH

Clinical Characteristic	Category	Frequency (n)	Percentage (%)
Stroke Type	Ischemic	126	71.6
	Hemorrhagic	50	28.4
Hypertension	Yes	125	71.0
	No	51	29.0
Diabetes Mellitus	Yes	23	13.1
	No	153	86.9
Dyslipidemia	Yes	12	6.8
	No	164	93.2
Other Chronic Illnesses	Present	23	13.1
	Absent	153	86.9
Medication History (Pre-stroke)	Regular Usage	73	41.5
	No Regular Usage	103	58.5

5.3. Pre-stroke Knowledge of Lifestyle Modification

The overall pre-stroke knowledge of lifestyle modifications was assessed using 4 questions. The composite knowledge score ranged from 0 to 4.Out of 176 stroke survivors, only 34 (19.3%) demonstrated good knowledge, while the vast majority, 142 (80.7%), had poor knowledge of stroke risk factors and lifestyle modifications. The mean was 0.79 (±1.1) and Median was 0 with IQR (0-1) .Only 30.1% of respondents correctly identified high blood pressure as a stroke risk factor, while 69.9% lacked correct knowledge. Awareness of smoking as a risk factor was even lower (14.2% correct vs. 85.8% incorrect/unknown). Similarly, only 22.2% recognized the protective effect of physical activity, and 12.5% identified high-salt intake as a risk factor, indicating overall poor knowledge of stroke risk factors (Table 3).

Table 3: Level of Prestroke Knowledge of Lifestyle Modification among participants (N=176)

I. Domain-Specific Knowledge	**True n (%)**	**False/Don't know n (%)**
Knowledge of Hypertension as a risk factor	53 (30.1)	123 (69.9)
Knowledge of Physical Activity benefits	39 (22.2)	137 (77.8)
Knowledge of Smoking risks	25 (14.2)	151 (85.8)
Knowledge of High-salt diet risks	22 (12.5)	154 (87.5)
II. Composite Knowledge Scores	**Statistic**	
Median Score (IQR)	0 (0 – 1)	
Mean Score (±SD)	0.79 (± 1.1)	
III. Overall Knowledge Categorization	**Frequency (n)**	**Percentage(%)**
Good Knowledge (Score ≥ 50%)	34	19.3
Poor Knowledge (Score < 50%)	142	80.7

5.4. Pre-stroke Attitude toward Lifestyle Modification

The majority of the study participants demonstrated a non favorable attitude toward pre-stroke lifestyle modifications. Out of 176 stroke survivors, 156 (88.6%) had a non favorable attitude (scoring < 75%), while only 20 (11.4%) had favorable attitude. The mean attitude score was 13.11 (±1.6). The median was 13 with IQR (12-14).

The majority of participants expressed a "Neutral" to "Agree" stance across all categories. Notably, there was a total absence of "Strongly Disagree" responses, and "Disagree" responses were limited to only 12.5% and 0.6% in the areas of smoking cessation and general lifestyle changes respectively (Table 4).

Table 4: Level of Prestroke Attitude of Lifestyle Modification among participants (N=176)

I. Individual Attitude Items	**Strongly Agree n (%)**	**Agree n (%)**	**Neutral n (%)**	**Disagree n (%)**
Lifestyle changes could reduce my risk	9 (5.1)	21 (11.9)	145 (82.4)	1 (0.6)
I could control my BP through healthy habits	10 (5.7)	89 (50.6)	77 (43.8)	0 (0.0)
Stopping smoking would reduce risk	4 (2.3)	5 (2.8)	145 (82.4)	22 (12.5)
Regular check-ups were important	12 (6.8)	34 (19.3)	130 (73.9)	0 (0.0)
II. Summary Statistics	**Value**			
Mean Score (± SD)	13.11 (± 1.6)			
Median Score (IQR)	13 (12 – 14)			
III. Overall Attitude Level	**Frequency (n)**		**Percentage (%)**	
Favorable Attitude (Score ≥ 75 %)	20		11.4%	
Non-favorable Attitude (Score < 75 %)	156		88.6%	

5.6. Practice of Pre-stroke Lifestyle Modification

The study assessed participants' pre-stroke lifestyle practices across six key domains: tobacco use, alcohol consumption, khat chewing, dietary habits, physical activity levels, and medical adherence (weight management and medication). A composite practice score was calculated by summing the binary scores (0 = Poor, 1 = Good) from each of these six domains.

The findings revealed that the majority of participants, 112 (63.6%), demonstrated good practice regarding pre-stroke lifestyle modifications. Conversely, 64 (36.4%) of the participants were found to have poor practice in managing their stroke risk factors prior to their clinical event. The overall practice score for the study population had a mean of 2.75 (± 1.3) and a median of 3.0 (IQR: 2.0–4.0) (Table 5).

Table 5: Distribution of Pre-stroke Lifestyle Modification Practice (N=176)

	Category	Frequency (n)	Percentage (%)
Practice Status	Good Practice (≥3)	112	63.6
	Poor Practice (< 3)	64	36.4
Score Statistics	**Mean (±SD)**	2.75	1.3
	Median (IQR)	3.0	2.0 – 4.0

When analyzing individual domains, Tobacco use showed the highest level of adherence, with 144 participants (81.8%) classified as having good practice because they were non-users of any tobacco product in the twelve months preceding their stroke. Similarly, high rates of good practice were observed in khat chewing, where 122 participants (69.3%) were non-chewers, and in alcohol consumption, where 119 participants (67.6%) were either total abstainers or non-binge drinkers.

In sharp contrast, the domains requiring "active" effort and consistent behavioral modification showed alarmingly low levels of adherence. Clinical management, which includes weight management and medication adherence, was adequate in only 54 participants (30.7%), while the remaining 122 participants (69.3%) fell into the poor practice category. In the Physical activity domain, only 23 participants (13.1%) meet the World Health Organization threshold of 600 MET-minutes per week. The lowest adherence was found in dietary habits, where only 22 participants (12.5%) maintained good overall practices, and the vast majority (87.5%) failed to meet the required nutritional thresholds (Table 6).

Table 6: Pre-stroke Lifestyle Modification Practices across the domains among Stroke Patients (N=176)

Practice Domain	Good Practice n (%)	Poor Practice n (%)
1. Tobacco Use	144 (81.8%)	32 (18.2%)
2. Alcohol Consumption	119 (67.6%)	57 (32.4%)

3. Khat Chewing	122 (69.3%)	54 (30.7%)
4. Physical Activity	23 (13.1%)	153 (86.9%)
5. Dietary Habits	22 (12.5%)	154 (87.5%)
6. Clinical Management	54 (30.7%)	122 (69.3%)

Prestrock lifestyle modification practice across among Strock patient

5.6.1. Tobacco Use Practice

The pre-stroke tobacco use practice of participants was assessed as a composite binary variable. A majority of the study participants, 144 (81.8%), demonstrated Good Practice (defined as being a non-user of any tobacco products in the 12 months preceding the stroke). Conversely, 32 (18.2%) of the participants were categorized as having Poor Practice, representing active smokers or smokeless tobacco users at the time of their stroke.

Regarding the lifetime history of tobacco use 34 (19.3%) of the participants reported having ever smoked tobacco products in their lifetime. Similarly, in the 12 months immediately preceding the stroke, the prevalence of current smoking was 32 (18.2%), comprising both daily and occasional smokers.

Among the current smokers (n=32), an equal proportion of these smokers, 43.8% reported smoking 1– 5 cigarettes and 6– 10 cigarettes per day, respectively. A smaller segment of the smoking population (12.5%) , reported a higher intensity of 11– 20 cigarettes per day. Notably, there was no reported use of smokeless tobacco products among the study participants.

Among the subset of participants who were identified as current smokers, the vast majority of these smokers, 90.9%, reported that they had not made any formal attempt to quit smoking during this period.

5.6.2. Alcohol Consumption Practice

The alcohol consumption practice of participants was evaluated based on the presence or absence of high-risk drinking patterns in the 12 months preceding the stroke. A majority of the study participants, 119 (67.6%), demonstrated Good Practice, representing those who were either total abstainers. Conversely, 57 (32.4%) were identified as having Poor Practice.

Among the total participants 71(40.3%) reported to consume any alcoholic drink in the 12 months before their stroke. Among the participants who reported alcohol consumption in the 12 months prior to their stroke (n=71), the frequency of drinking varied significantly. The most common frequency reported was less than once per month, accounting for 31.0% of the drinkers. However, a high-frequency pattern was also notable; 16.9% reported drinking daily, and 26.4% reported consuming alcohol 5– 6 days per week. The remaining participants drank 1– 2 days per week (16.9%) or 1– 3 days per month (9.8%).

Among the current drinkers (n=71), the majority63.8.% (n=46) reported consuming more than 2 standard drinks on a typical drinking day. Meanwhile, 30.6% (n=22) consumed more than 1 standard drink. These results indicate that nearly 70% of the drinking population in this study exceeds the threshold for moderate consumption.

The majority of the study participants, 119 (67.6%), were individuals who either never engaged in high risk drinking or were total abstainers. Conversely, 57 (32.4%) of the participants were reporting binge drinking.

5.6.3. Khat Practice

Among the 176 participants ,122(69.3%) don’ t chew khat and the rest 54(30.7%) chew khat.

5.6.4. Dietary Practice

The overall dietary practice of the participants was determined by combining three key nutritional components: protective intake (adequate fruit and vegetable consumption), fat/oil restriction, and salt intake adherence. A participant was categorized as having "Good Dietary Practice" only if they met the recommended clinical thresholds for all three components simultaneously.

Based on this comprehensive assessment, the vast majority of participants, 154 (87.5%), demonstrated Poor Dietary Practice. Only 22 participants (12.5%) were found to have maintained good overall dietary habits in the year preceding their stroke.

Fruit and vegetable

In this study, only 36 participants (20.5%) meet the minimum requirement for protective dietary intake. The vast majority of the stroke patients, 140 (79.5%), were consuming fewer than five servings of fruits and vegetables daily in the year preceding their stroke.

Dietary High fat

Out of the 176 participants, 172 (98.9%) demonstrated reported infrequent intake of high-fat foods in the year preceding their stroke. Conversely, 2 participants (1.1 %) indicated for taking a high-frequency intake of fats and oils.

Dietary Salt Intake Practices

Among the participants without a prior diagnosis of hypertension, salt intake was evaluated against a threshold of one teaspoon per day. A total of 29 participants (56.9%) reported an intake of one teaspoon or less daily.

For participants with a known history of hypertension, a stricter threshold of half a teaspoon per day was applied. In this high-risk group, 41 participants (32.8%) followed Good Practice by consuming half a teaspoon or less daily. However, the majority of this group, 84 participants (67.2%), reported a "Poor Practice" of consuming more than half a teaspoon of salt per day.

5.6.5. Physical Activity Practice

153 (86.9%) participants demonstrated poor physical activity practices, falling below the World Health Organization (WHO) recommended threshold of 600 MET-minutes per week. Only a small fraction of the study population, 23 (13.1%), engaged in sufficient vigorous or moderate work-related physical activity.

Only 9 (6.8%) of the participants were engaged in vigorous-intensity work activities (such as carrying heavy loads or farm labor) for 3– 5 days per week. Regarding moderate-intensity work, 22 (12.5%) of the participants reported regular engagement.

All participants (100%) reported walking or cycling for at least 10 minutes continuously to get to and from places. Only 15 (8.6%) of the participants reported participating in any sports, fitness, or recreational exercise activities in the year preceding their stroke.

5.6.6. Body weight, Health Checks and Medication Practice

The majority of participants demonstrated suboptimal clinical engagement. A total of 122 (69.3%) participants were classified as having Poor Clinical Practice (scoring < 50% on the weighted assessment). Only 54 (30.7%) participants achieved Good Clinical Practice (>=50%).

Body Weight

Regarding weight management practices prior to the stroke, the vast majority of participants, 164 (93.2%), reported that they were not making any active effort to manage their body weight. Only a small minority of the cohort, 12 (6.8%), were engaged in weight management, either by attempting to lose weight or maintain their current weight.

Health checks

More than half of the participants, 99 (56.2%), reported never measuring their blood pressure before the stroke occurred. Furthermore, only 8 participants (4.5%) maintained checking their BP on a monthly basis. The remaining participants reported infrequent monitoring, with 58 (33.0%) checking every 3– 6 months and 11 (6.3%) checking only once per year.

Of the 176 participants, 23 (13.1%) were living with diabetes prior to their stroke .Among this diabetic subgroup, monitoring practices were suboptimal. Only 14 patients (60.9%) practiced regular monitoring (Daily or Weekly), while 9 patients (39.1%) checked their blood sugar monthly or less frequently, including 3 (13.0%) who reported never checking their levels despite their diagnosis.

Medication Adherence

Among the 176 participants, 125 (71%) had hypertension medication. The analysis of this group reveals an alarmingly low level of treatment adherence.

Only 1 participant (0.8% of the hypertensive group) reported "Always" taking their blood pressure medication as prescribed. In contrast, 56 participants (44.8%) reported "Never" taking their prescribed medication, while the remaining 68 participants (54.4%) demonstrated inconsistent adherence, varying between "Often," "Sometimes," and "Rarely."

For statin medications

subgroup analysis was conducted on participants with a pre-existing history of lipid profile disease (n=12). Within this diagnosed group, 7 participants (58.3%) were taking statins, while 5 participants (41.7%) with a confirmed diagnosis remained untreated at the time of their stroke.

5.7 Bivariate analysis

5.7.1. Factors Associated with Knowledge

The bivariate analysis identified several critical determinants of stroke-related knowledge among survivors. **Educational status** was the most significant sociodemographic predictor(P< 0.001); participants with college or above education were significantly more likely to demonstrate "Good Knowledge" (46.2%) compared to those with no formal education . Similarly, **Monthly Income** was a significant factor (P = 0.008) , with higher income categories showing a higher proportion of good knowledge (Table 7).

Table 7: Factors Associated with Knowledge Level (Bivariate Analysis) (N=176)

Variable	Category	Good Knowledge (%)	Poor Knowledge (%)	p-value
Sex	Male	17.2	82.8	0.49
	Female	21.3	78.7	
Age(Years)	≤ 45	21.9	78.1	0.85
	46-60	20.3	79.7	
	>60	17.6	82.4	
Education Level	No formal education	7.1	92.9	**<0.001***
	Primary education	10.1	89.9	
	Secondary education	30.8	69.2	
	Collage and above	46.2	53.8	
Monthly Income (ETB)	1,000–5,000	9.5	90.5	**0.008***
	5,000–10,000	20.5	79.5	
	> 10,000	36.7	63.3	
Occupation	Unemployed	35.7	64.3	0.498
	Self employed	21.1	78.9	

	Government employed	20.7	79.3	
	House wife	14.6	85.4	
	Retired	17.0	83.0	
Marital Status	Married	22	78	0.299
	Widowed	25	75	
	Divorced	13.1	86.9	
Religion	Orthodox	19.7	80.3	0.783
	Catholic	20.7	79.3	
	Protestant	21.7	78.3	
	Muslim	12	88	0.885
Stroke Type	Ischemic	19	81	
	Hemorrhagic	20	80	
Hypertension	Yes	21.6	78.4	**0.230**
	No	13.7	86.3	
DM	Yes	30.4	69.6	**0.148**
	No	17.6	82.4	
Dyslipidemia	Yes	33.3	66.7	**0.203**
	No	18.3	81.7	
Other chronic medical illness	No	19.6	80.4	0.802
	Yes	17.4	82.6	
Medication usage	No	15.5	84.5	**0.131**
	Yes	24.7	75.3	

5.7.2. Factors Associated with Attitude Level

Educational Level ($p < 0.001$) showed a clear positive correlation with attitude. Those with College education and above demonstrated the highest rate of favorable attitudes (42.3%), whereas those with no formal education or only primary education had negligible favorable scores (2.4% and 1.4%,

respectively). Monthly Income ($p < 0.001$) is also a strong predictor of attitude. Participants earning > 10,000 ETB were significantly more likely to have a favorable attitude (30%) compared to those in the lowest bracket of 1,000–5,000 ETB, where only 4.8% reported favorable views (Table 8).

Table 8: Factors Associated with Attitude Level (Bivariate Analysis)(N=176)

Variable	Category	Favorable Attitude (%)	Non favorable attitude (%)	p-value
Sex	Male	10.3	89.7	0.813
	Female	12.4	87.6	
Age(Years)	≤ 45	15.6	84.4	0.26
	46-60	15.3	84.7	
	>60	7.1	92.9	
Education Level	No formal education	2.4	97.6	**<0.001**
	Primary education	1.4	98.6	
	Secondary education	17.9	82.1	
	Collage and above	42.3	57.7	
Monthly Income (ETB)	1,000– 5,000	4.8	95.2	<**0.001**
	5,000–10,000	9.6	90.4	
	> 10,000	30	70	
Occupation	Unemployed	21.4	78.6	0.16
	Self employed	18.4	81.6	
	Government employed	13.8	86.2	
	House wife	4.2	95.8	
	Retired	8.5	91.5	
Marital Status	Married	12.1	87.9	0.167
	Widowed	20.8	79.2	

	Divorced	6.6	93.4	
Religion	Orthodox	11.8	88.2	0.26
	Catholic	17.2	82.8	
	Protestant	13.0	87	
	Muslim	0	100	
Stroke Type	Ischemic	13	89.7	0.488
	Hemorrhagic	14	86	
Hypertension	Yes	11.2	88.8	0.92
	No	11.8	88.2	
DM	Yes	13	87	0.78
	No	11.1	88.9	
Dyslipidemia	Yes	16.7	83.3	0.4
	No	11	89	
Other chronic medical illness	No	13	87	0.78
	Yes	11.1	88.9	
Medication usage	No	12.3	87.7	0.73
	Yes	10.7	89.3	

5.7.3. Factors Associated with Practice Level

A very strong association was observed with sex (P < 0.001), with 89.9% of females demonstrating good practice compared to only 36.8% of males. Younger survivors (<=45 years) had the highest rate of good practice at 84.4%, while those aged 46–60 showed the lowest at 54.2% (P = 0.016).

Employment status was significantly associated with practice (P< 0.001). Housewives reported the highest level of good practice (89.6%), whereas retired individuals reported the lowest (46.8%). Married individuals showed significantly better adherence (74.7%) compared to widowed (37.5%) or divorced (57.4%) participants (P = 0.002).In addition, income levels showed a significant relationship (P =

0.026). Interestingly, those in the highest income group (> 10,000 ETB) had the lowest percentage of good practice (43.3%).

There was a significant association (P = 0.009). Participants without hypertension actually showed higher rates of good practice (78.4%) than those with the condition (57.6%). The presence of other chronic medical illnesses was significantly associated with better practice (P = 0.013). Those with additional illnesses had a 87% good practice rate, compared to 60.1% for those without (Table 9).

Table 9: Factors Associated with Practice Level (Bivariate Analysis)(N=176)

Variable	Category	Good Practice (%)	Bad Practice (%)	p-value
Sex	Male	36.8	63.2	**<0.001**
	Female	89.9	10.1	
Age(Years)	≤ 45	84.4	15.6	**0.016**
	46-60	54.2	45.8	
	>60	62.4	37.6	
Education Level	No formal education	69	31	0.5
	Primary education	60.9	39.1	
	Secondary education	69.2	30.8	
	Collage and above	53.8	46.2	
Monthly Income (ETB)	1,000–5,000	63.5	36.5	**0.026**
	5,000–10,000	71.1	28.9	
	> 10,000	43.3	56.7	
Occupation	Unemployed	64.3	35.7	**<0.001**
	Self employed	52.6	47.4	
	Government employed	62.1	37.9	

	House wife	89.6	10.4	
	Retired	46.8	53.2	
Marital Status	Married	74.7	25.3	**0.002**
	Widowed	37.5	62.5	
	Divorced	57.4	42.6	
Religion	Orthodox	52.6	47.4	0.21
	Catholic	58.6	41.4	
	Protestant	54	46	
	Muslim	36	64	
Stroke Type	Ischemic	67.5	32.5	0.094
	Hemorrhagic	54	46	
Hypertension	Yes	57.6	42.4	**0.009**
	No	78.4	21.6	
DM	Yes	60.9	39.1	0.76
	No	64.1	35.9	
Dyslipidemia	Yes	50	50	0.3
	No	64.6	35.4	
Other chronic medical illness	No	60.1	39.9	**0.013**
	Yes	87	13	
Medication usage	No	64.1	35.9	0.88
	Yes	63	37	

5.8. Multivariate Analysis

5.8.1. Independent factors which affect Knowledge

Only educational status reached statistical significance. Participants with an education level up to high school were significantly less likely to have good knowledge compared to those with a College+ education (AOR = 0.13; 95% CI: 0.05–0.38; $p < 0.001$) (Table 10).

Table 10: Factors Associated with Knowledge Level (Multivariate Analysis)(N=176)

Variables	**Category**	**AOR(95% CI)**	**P Values**
Education	Up to high school	0.13(0.05-0.38)	**<0.001**
	College +	1	
Income(ETB)	<5000	0.66(0.17-2.7)	0.55
	5000-10000	1.04(0.36-3.02)	
	>10000	1	
Hypertension	Yes	1.96(0.69-5.6)	0.204
	No	1	
DM	Yes	1.64(0.38-7.15)	0.5
	No	1	
Dyslipidemia	Yes	1.13(0.15-8.54)	0.9
	No	1	
Medication	No	0.41(0.16-1.06)	0.066
	Yes	1	

5.8.2. Independent factors which affect Attitude

Based on the analysis, **marital status** was the only variable that reached statistical significance in predicting attitude. Participants who were **divorced** were significantly less likely to have good attitude compared to widowed groups. (**AOR = 0.05**; **95% CI: 0.003–0.8**; **P = 0.035**) (Table 11).

Table 11: Factors Associated with Attitude Level (Multivariate Analysis)(N=176)

Variables	**Category**	**AOR(95% CI)**	**P Values**
Education	Upto high school	0.28(0.032-2.5)	0.25
	College +	1	
Income(ETB)	<5000	6.8(0.2-214)	0.27
	5000-10000	1.5(0.1-22)	0.75
	>10000	1	
Marital Status	Married	1.42(0.07-28.4)	0.82
	Divorced	0.05(0.003-0.8)	**0.035**
	Widowed	1	

5.8.3. Independent factors which affect Practice

Participants with a monthly income of 5000–10,000 ETB were nearly four times more likely to have good lifestyle modification practices compared to those earning >10,000 ETB (AOR = 3.92; 95% CI: 1.07–14.37; P = 0.040). Being married was strongly associated with positive outcomes, with these individuals having over six times higher odds of good practice compared to widowed participants (AOR = 6.21; 95% CI: 1.80–21.46; P = 0.004). In addition, Being male was associated with a significant reduction in the odds of good practice. Men were 97% less likely to engage in good lifestyle modifications compared to females (AOR = 0.03; 95% CI: 0.01–0.12; P < 0.001)

Participants with hypertension were significantly less likely to have good lifestyle modification practices, showing a 71% reduction in odds compared to those without the condition (AOR = 0.29; 95% CI: 0.09–0.90; P = 0.033) (Table 12).

Variables	**Category**	**AOR (95% CI)**	**P-Value**
Occupation	Unemployed	1.43 (0.29–7.11)	0.659
	Employed	2.20 (0.24–20.47)	0.487
	Housewife	1	
Income	<5000	2.26 (0.52–9.83)	0.28
	5000-10000	3.92 (1.07–14.37)	**0.040***
	>10000	1	
Marital Status	Married	6.21 (1.80–21.46)	**0.004***
	Divorced, Single	0.44 (0.08–2.40)	0.35
	Widowed	1	
Sex	Male	0.03 (0.01–0.12)	**<0.001***
	Female	1	
Hypertension	Yes	0.29 (0.09–0.90)	**0.033***

Table 12: Factors Associated with Practice Level (Multivariate Analysis) (N=176)

5.9. The Interrelationship Between Knowledge, Attitude, and Practice

A Chi-square test of independence was performed to evaluate the relationship between the participants' knowledge levels and their attitudes toward lifestyle modification. The analysis reveals a highly statistically significant association between these two domains. The test yielded a p-value of < 0.001,

indicating an extremely strong statistical link between knowledge and attitude. Among participants with adequate knowledge (1.00), 52.9% (18 out of 34) also possessed a favorable attitude.

Although the relationship between knowledge and practice did not reach the threshold for statistical significance (P = 0.083), a notable descriptive trend was observed. Among participants with adequate knowledge, a high proportion (76.5%) also demonstrated good lifestyle modification practices. There was no statistical significant relation shown in our model between Attitude and practice.

5.10. Perceived barriers and support

Lack of Knowledge of participants (83.5%) followed by Cultural Habits(44.9%) and Cost of Healthy Food(27.3%) were the most barriers identified.

The most common reasons patients mentioned that would have helped them adopt a healthier lifestyle were family support(39.2 %), health worker counseling (36.9%), and community programs(15.3%).

CHAPTER 6: DISCUSSION

This study assessed pre-stroke knowledge, attitude, and practice (KAP) and associated factor toward lifestyle modification among stroke survivors

6.1. Knowledge

The present study revealed that the majority of participants (80.7%) had poor knowledge of stroke risk factors and lifestyle modification. This is consistent with previous facility-based evidence in Ethiopia, which also identified significant gaps in stroke literacy among high-risk populations (Gebremariam et al., 2020).

This finding aligns with evidence from Sub-Saharan Africa, where awareness of modifiable stroke risk factors remains critically low despite a rising disease burden (Gisele Abissegue et al.,2024, Owolabi et al.,2015). Regionally, studies have shown that while the clinical burden is high, public health literacy regarding prevention and early warning signs hasn't kept pace (Owalabi et al.,2015, Akinyami et al.,2021).

While the INTERSTROKE study demonstrated that 90% of the global stroke burden is attributable to ten modifiable risk factors (O'Donnell et al.,2016), our findings highlight a critical knowledge gap. Despite the immense preventable nature of the disease, 80.7% of our participants lacked the basic knowledge required to act on these modifiable factors before their stroke occurred

Factors Associated with Knowledge

In the bivariate analysis, educational status and income were significantly associated with knowledge. However, in the multivariate analysis, only educational status remained an independent predictor, with participants having lower education significantly less likely to demonstrate good knowledge.

This finding is consistent with both regional and global evidence, which highlights education as the most important determinant of health literacy and awareness of pre stroke risk factors (Owolabi et al.,2014, Jafar et al.,2016).

6.2. Attitude

The study demonstrated that a large proportion of participants (88.6%) had a non-favorable attitude toward lifestyle modification. Most respondents expressed neutral responses rather than strong agreement, indicating weak perception of the benefits of preventive behaviors.

This finding aligns with national and regional studies showing that individuals often underestimate their personal risk of stroke and lack strong motivation for lifestyle change (Gebremariam et al.,2020). Cultural beliefs, low perceived susceptibility, and inadequate exposure to health promotion messages may contribute to these unfavorable attitudes in African settings (Akinyemi et al.,2021, Owolabi et al.,2015).

Factors Associated with Attitude

The bivariate analysis identified education and income as significant predictors of attitude. However, in the multivariate analysis, marital status was the only significant factor, with divorced participants being significantly less likely to have a favorable attitude.

This suggests that social support systems play a critical role in shaping health attitudes, which is supported by global literature indicating that individuals with stronger social networks demonstrate better health perceptions and motivation toward preventive behaviors (Jafar et al.,2016).

6.3. Practice

The study found that 63.6% of participants were categorized as having good practice. However, domain-specific analysis revealed substantial variation. High adherence was observed in passive behaviors such as non-smoking (81.8%) and low alcohol consumption (67.6%). In contrast, active preventive behaviors were markedly poor, including physical activity (13.1%) and healthy dietary practices (12.5%).

This finding is consistent with national evidence showing poor adherence to lifestyle modification in Ethiopia despite high prevalence of risk factors (Abate et al.,2021). Clinical studies in Ethiopia have also reported inadequate engagement in preventive behaviors among stroke patients (Temesgen et al.,2018, Agazhe et al.,2021).

Regionally, Sub-Saharan Africa is experiencing increasing exposure to lifestyle-related risk factors, including sedentary behavior and unhealthy diets, contributing to the rising burden of stroke (Gisele Abissegue et al.,2024, Akinyemi et al.,2021).

Factors Associated with Practice

The bivariate analysis showed that multiple factors were significantly associated with practice, including sex, occupation, marital status, income, hypertension status, and presence of other chronic illnesses.

Several factors were associated with practice. In the multivariate analysis, males were less likely to demonstrate good practice, while married individuals showed better engagement in lifestyle modification, further highlighting the importance of social support. Income was also positively associated with practice, suggesting that financial capacity may influence the ability to adopt healthier lifestyles. In contrast, the presence of hypertension was negatively associated with good practice, which is particularly concerning given that these individuals are at higher risk. This finding is consistent with previous studies showing gaps in risk factor management even among high-risk populations (Alene et al.,2020, Abate et al.,2021). Overall, these findings support existing evidence that health behaviors are shaped by a combination of socioeconomic factors, gender roles, and social support systems (Holt-Lunstad J,et al.,2010, Courtenay WHet al.,2000, WHO,2003).

6.4. Comparison with Other KAP Studies

The findings of poor knowledge and unfavorable attitudes are consistent with other studies conducted in Ethiopia and Sub-Saharan Africa, which report low awareness and poor perception of stroke risk factors (Abate et al.,2021, Gisele Abissegue et al.,2024, Gebremariam et al.,2020).

However, the relatively higher overall practice observed in this study differs from some reports. This discrepancy may be due to differences in measurement approaches, particularly the inclusion of passive behaviors such as non-smoking, which may inflate practice scores.

6.4.1. Knowledge Attitude Practice Gap

A key finding of this study is the discrepancy between knowledge, attitude, and practice. While knowledge and attitude were poor, practice appeared relatively better. This inconsistency can be explained by several factors including the dominance of passive behaviors in practice scoring, structural barriers such as cost of healthy food (27.3%),cultural habits (44.9%) and lack of knowledge (83.5%) This aligns with global evidence showing that behavior change is influenced not only by knowledge and attitude but also by environmental and socioeconomic constraints (O'Donnell et al.,2016, Jafar et al.,2016). The lack of a significant relationship between attitude and practice suggests that behavior is influenced by external factors beyond personal beliefs, including accessibility, cost, and social environment (O'Donnell et al.,2016).

6.4.2. Strength of the Study

This study has several strengths. It is the first in Ethiopia to assess pre-stroke knowledge, attitude, and lifestyle modification practices among stroke survivors, addressing an important national evidence gap. The census approach with consecutive enrollment minimized selection bias and eliminated sampling error. Use of WHO-adapted validated tools (STEPS, GPAQ, and NCD modules) strengthened content validity and comparability.

The domain-based analysis of practice, separating passive behaviors (e.g., non-smoking, moderate alcohol use) from active preventive behaviors (diet, physical activity, and follow-up), provided more detailed insights than composite scores alone. Integration of clinical and behavioral variables enabled robust multivariate analysis, while identified barriers and facilitators offer practical intervention targets. With 176 participants representing nearly all eligible patients at Tikur Anbessa Specialized Hospital, the findings are highly representative and relevant for secondary stroke prevention in this setting.

6.4.3. Limitations

Recall bias may have affected the accuracy of self-reported pre-stroke behaviors. Social desirability bias may have led to overestimation of good practices. Additionally, the study was conducted in a single center, which may limit generalizability and lacks pilot study.

Furthermore, in the overall practice assessment, it was found that most patients have good practice, but this result is inflated by passive behaviors. Although overall practice appears acceptable, active preventive behaviors (e.g., diet, exercise) are practiced very poorly. Therefore, the classification of "good practice" may not accurately reflect true preventive behavior.

CHAPTER 7: CONCLUSION AND RECOMMENDATION

Conclusion

This study highlights a critical gap in pre-stroke knowledge, attitude, and meaningful lifestyle modification practices among stroke survivors at Tikur Anbessa Specialized Hospital. While some level of practice was observed, it was largely driven by passive behaviors, masking a substantial deficiency in active preventive measures such as physical activity, healthy diet, weight control, and routine medical follow-up.

These findings emphasize that stroke prevention efforts cannot rely solely on the presence of favorable behaviors but must focus on promoting informed, active, and sustained lifestyle changes. There is a clear need for targeted, context-specific interventions that strengthen health education, reshape attitudes, and address structural barriers to behavior change.

Recommendation

For Healthcare Providers

- Strengthen patient education programs focusing on stroke risk factors and lifestyle modification.
- Emphasize active preventive behaviors, particularly physical activity, healthy diet, and medication adherence.
- Integrate structured counseling sessions into routine follow-up care for stroke patients.

2. For Health Institutions

- Develop and implement standardized lifestyle modification counseling protocols for stroke patients.
- Establish multidisciplinary rehabilitation and prevention programs involving physicians, nurses, nutritionists, and physiotherapists.
- Promote regular monitoring systems for blood pressure, blood sugar, and other risk factors.

3. For Public Health Authorities

- Design and implement national awareness campaigns on stroke prevention and modifiable risk factors.
- Strengthen community-based health education programs targeting high-risk populations.
- Incorporate lifestyle modification strategies into existing non-communicable disease (NCD) prevention programs.

4. For Patients and the Community

- Encourage individuals to adopt active lifestyle changes, including regular physical activity and healthy dietary habits.
- Promote routine health check-ups and adherence to prescribed medications.
- Increase awareness about the importance of early prevention and risk factor control.

5. For Future Researchers

- Conduct larger-scale and longitudinal studies to better understand changes in knowledge, attitude, and practice over time.
- Explore intervention-based studies to evaluate effective strategies for improving lifestyle modification.
- Investigate barriers to behavioral change**,** particularly in adopting active preventive practices.

REFERENCE

1. Abate, T. W., Zeleke, B., Genanew, A., & Abate, B. W. (2021b). The burden of stroke and modifiable risk factors in Ethiopia: A systemic review and meta-analysis. PLoS ONE, 16(11), e0259244. https://doi.org/10.1371/journal.pone.0259244

2. Adams SA, Matthews CE, Ebbeling CB, et al. The effect of social desirability and social approval on self-reports of physical activity. American Journal of Epidemiology. 2005;161(4):389-398

3. Agazhe M, Eshetu D, Arsicha A, et al. Incidence and pattern of stroke among patients admitted to medical ward at Yirgalem General Hospital, Sidama Regional State, Southern-Ethiopia. SAGE Open Medicine. 2021;9. doi:10.1177/20503121211001154

4. Ajzen I. The theory of planned behavior. Organizational Behavior and Human Decision Processes. 1991;50(2):179-211.

5. Akinyemi, R.O., Ovbiagele, B., Adeniji, O.A. et al. Stroke in Africa: profile, progress, prospects and priorities. Nat Rev Neurol 17, 634–656 (2021). https://doi.org/10.1038/s41582-021-00542-

6. Alene M, Assemie MA, Yismaw L, Ketema DB. Magnitude of risk factors and in-hospital mortality of stroke in Ethiopia: a systematic review and meta-analysis. BMC Neurol. 2020 Aug 19;20(1):309. doi: 10.1186/s12883-020-01870-6. PMID: 32814556; PMCID: PMC7437163.

7. Bettinghaus EP. Health promotion and the knowledge-attitude-behavior continuum. Preventive Medicine. 1986;15(5):475-491.

8. Boehme AK, Esenwa C, Elkind MS. Stroke Risk Factors, Genetics, and Prevention. Circ Res. 2017 Feb 3;120(3):472-495. doi: 10.1161/CIRCRESAHA.116.308398. PMID: 28154098; PMCID: PMC5321635.

9. Caplan LR. Caplan's stroke a clinical approch. ; fifth edit. Philadelphia: Elsevier Ltd; 2016.

10. Courtenay WH.Soc Sci Med.2000;50(10):1385-401

11. Cruz-Flores S, Rabinstein A, Biller J, Elkind MS, Griffith P, Gorelick PB, et al. Racial-ethnic disparities in stroke care: The american experience: A statement for healthcare professionals from the american heart association/american stroke association. Stroke. 2011;42:2091–2116. doi: 10.1161/STR.0b013e3182213e24. [DOI] [PubMed] [Google Scholar]

12. Deresse B, Shaweno D. Epidemiology and in-hospital outcome of stroke in South Ethiopia. J Neurol Sci. 2015 Aug 15;355(1-2):138-42. doi: 10.1016/j.jns.2015.06.001. Epub 2015 Jun 3. PMID: 26059446

13. Estruch, R., Ros, E., Salas-Salvadó, J., et al. (2018). Primary prevention of cardiovascular disease with a Mediterranean diet supplemented with extra-virgin olive oil or nuts.New England Journal of Medicine, 378(25), e34.

14. GBD 2021 Stroke Collaborators. Global, regional, and national burden of stroke and its risk factors, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. The Lancet Neurology. 2023;22(12):1109-1135.

15. Gebremariam SA, Ayele BH, Marie Y, et al. Knowledge of stroke risk factors and warning signs among hypertensive patients in Ethiopia: a cross-sectional study. BMC Neurology. 2020;20(1):214.

16. Gisele Abissegue, Seidina Iliasu Yakubu, Aiswarya Seema Ajay, Faatihah Niyi-Odumosu, A systematic review of the epidemiology and the public health implications of stroke in Sub-Saharan Africa, Journal of Stroke and Cerebrovascular Diseases, Volume 33, Issue 8, 2024,

17. Global, regional, and national burden of stroke and its risk factors, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019Feigin, Valery L et al.The Lancet Neurology, Volume 20, Issue 10, 795 - 820

18. Holt-Lunstad J,et al.PloS Med.2010;7(7):e1000316

19. Jafar TH, Islam M, Bux R, et al. Awareness, treatment and control of hypertension and its relation to stroke risk in Pakistan: a cross-sectional study. BMJ Open. 2016;6(3):e010406.

20. Janz NK, Becker MH. The Health Belief Model: A decade later. Health Education Quarterly. 1984;11(1):1-47.

21. Jones SP, Jenkinson AJ, Leathley MJ, Watkins CL. Stroke knowledge and awareness in the UK: a systematic review. International Journal of Stroke. 2018;13(3):248-257.

22. Hickey A, O'Hanlon A, McGee H, et al. Stroke awareness in the Irish general population: a cross-sectional study. European Stroke Journal. 2018;3(2):156-163.

23. Kheirouri, S., & Alizadeh, M. (2021). Lifestyle modification and stroke prevention: A systematic review of randomized trials.Preventive Medicine Reports, 24, 101567.

24. Kissela B, Schneider A, Kleindorfer D, Khoury J, Miller R, Alwell K, et al. Stroke in a biracial population: The excess burden of stroke among blacks. Stroke. 2004;35:426–431. doi: 10.1161/01.STR.0000110982.74967.39. [DOI] [PubMed] [Google Scholar]

25. Kissela BM, Khoury JC, Alwell K, Moomaw CJ, Woo D, Adeoye O, et al. Age at stroke: Temporal trends in stroke incidence in a large, biracial population. Neurology. 2012;79:1781–1787. doi: 10.1212/WNL.0b013e318270401d. [DOI] [PMC free article] [PubMed] [Google Scholar].

26. Kleindorfer D, Broderick J, Khoury J, Flaherty M, Woo D, Alwell K, et al. The unchanging incidence and case-fatality of stroke in the 1990s: A population-based study. Stroke; a journal of cerebral circulation. 2006;37:2473–2478. doi: 10.1161/01.STR.0000242766.65550.92. [DOI] [PubMed] [Google Scholar]

27. Mijajlović MD, Pavlović A, Brainin M, et al. Post-stroke dementia – a comprehensive review. BMC Medicine. 2017;15(1):11.

28. Natarajan, L., Pu, M., Fan, J., et al. (2010). Measurement error of dietary self-report in intervention trials. Cancer Epidemiology, Biomarkers & Prevention, 19(10), 2504-2512.

29. O'Donnell, M. J., Chin, S. L., Rangarajan, S., et al. (2016). Global and regional effects of potentially modifiable risk factors associated with acute stroke in 32 countries (INTERSTROKE): A case-control study.The Lancet, 388(10046), 761-775.

30. Owolabi, M., Akarolo-Anthony, S., Akinyemi, R., Arnett, D., Gebregziabher, M., Jenkins, C., Tiwari, H., Arulogun, O., Akpalu, A., Sarfo, F., Obiako, R., Owolabi, L., Sagoe, K., Melikam, S., Adeoye, A., Lackland, D., &Ovbiagele, B. (2015). The burden of stroke in Africa: a glance at the present and a

glimpse into the future: review article. Cardiovascular Journal of South Africa/Cardiovascular Journal of Southern Africa, 26(2), S27–S38. https://doi.org/10.5830/cvja-2015-038

31. Owolabi MO, Akarolo-Anthony S, Akinyemi R, et al. Community-based stroke knowledge assessment in Nigeria: a cross-sectional study. Journal of the Neurological Sciences. 2014;346(1-2):247-252.

32. Pan, B., Jin, X., Jun, L., Qiu, S., Zheng, Q., & Pan, M. (2019). The relationship between smoking, physical inactivity, and risk of stroke: A meta-analysis of prospective cohort studies.Journal of Stroke and Cerebrovascular Diseases, 28(4), 1076-1083.

33. Patrick DL, Cheadle A, Thompson DC, Diehr P, Koepsell T, Kinne S. The validity of self-reported smoking: a review and meta-analysis. American Journal of Public Health. 1994;84(7):1086-1093.

34. Peduzzi P, Concato J, Kemper E, Holford TR, Feinstein AR. A simulation study of the number of events per variable in logistic regression analysis. Journal of Clinical Epidemiology. 1996;49(12):1373-1379.

35. Pu, L., Wang, L., Zhang, R., Zhao, T., Jiang, Y., & Han, L. (2023). Projected global trends in ischemic stroke incidence, deaths and Disability-Adjusted life years from 2020 to 2030. Stroke, 54(5), 1330–1339. https://doi.org/10.1161/strokeaha.122.040073

36. Ricvan Dana Nindrea, Asni Hasanuddin, Non-modifiable and modifiable factors contributing to recurrent stroke: A systematic review and meta-analysis, Clinical Epidemiology and Global Health, Volume 20, 2023, 101240,ISSN 2213-3984, https://doi.org/10.1016/j.cegh.2023.101240 (https://www.sciencedirect.com/science/article/pii/S2213398423000271)

37. Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, Borden WB, et al. Executive summary: Heart disease and stroke statistics--2012 update: A report from the american heart association. Circulation. 2012;125:188–197. doi: 10.1161/CIR.0b013e3182456d46. [DOI] [PubMed] [Google Scholar]

38. Sacco, R. L., Kasner, S. E., Broderick, J. P., Caplan, L. R., Connors, J., Culebras, A., Elkind, M. S., George, M. G., Hamdan, A. D., Higashida, R. T., Hoh, B. L., Janis, L. S., Kase, C. S., Kleindorfer, D. O., Lee, J., Moseley, M. E., Peterson, E. D., Turan, T. N., Valderrama, A. L., & Vinters, H. V. (2013). An updated definition of stroke for the 21st century. Stroke, 44(7), 2064–2089.

https://doi.org/10.1161/str.0b013e318296aeca

39. SAGE Open Nursing. (2023). Scale categories for participants' KAP toward stroke. SAGE Open Nursing, 9, 23779608221150717.

40. Saleh AK, El-Sheikh M, Abdelrahman S. Predictors of lifestyle modification among stroke survivors in Upper Egypt: a KAP study. Egyptian Journal of Neurology, Psychiatry and Neurosurgery. 2018;54(1):22.

41. Sur, N. B., Kozberg, M., Desvigne-Nickens, P., Silversides, C., Bushnell, C., Goldstein, L. B., Saver, J., Broderick, J., Gokcal, E., Merino, J. G., Wadhwa, M., Kamel, H., Elkind, M. S. V., Ovbiagele, B., Neisen, K. B., Ziegler, P. D., Gurol, M. E., Selim, M. H., Reddy, H., . . . Morgan, J. R. (2023). Improving stroke risk factor management focusing on health disparities and knowledge gaps. Stroke, 55(1), 248–258. https://doi.org/10.1161/strokeaha.122.040449

42. Temesgen TG, Teshome B, Njogu P. Treatment Outcomes and Associated Factors among Hospitalized Stroke Patients at Shashemene Referral Hospital, Ethiopia. Stroke Res Treat [Internet]. 2018;2018. Available from: https://doi.org/10.1155/2018/8079578

43. Tran DT, Nguyen QT, Phan HT, et al. Knowledge, attitude and practice towards stroke prevention among stroke survivors in Vietnam: a cross-sectional study. Journal of Stroke and Cerebrovascular Diseases. 2019;28(7):1943-1950.

44. Winkler, J. K., et al. (2022). Enhancing patient outcomes through pharmacist-led counseling in type 2 diabetes and hypertension. International Journal of Pharmaceutical and Allied Medical Sciences, 8(2), 45-52

45. WHO.Adherence to long-term therapies.2003

46. World Health Organization. (2012). Guideline: Sodium intake for adults and children. Geneva: World Health Organization.

47. World Health Organization. (2020). WHO guidelines on physical activity and sedentary behaviour. Geneva: World Health Organization.

48. WHO.2022 World Stroke Day 2022, Southeast Asia,Sirilanka. https://www.who.int/srilanka/news/detail/29-10-2022-world-stroke-day-2022

49. WSO.2022 Global stroke Fact Sheet 2022. https://www.world stroke.org/assets/downloads/WSO_Global_Stroke_Fact_Sheet.pdf

50. Zahuranec DB, Brown DL, Lisabeth LD, Gonzales NR, Longwell PJ, Eden SV, et al. Differences in intracerebral hemorrhage between mexicanamericans and non-hispanicwhites. Neurology. 2006;66:30–34. doi: 10.1212/01.wnl.0000191402.41914.d2. [DOI] [PubMed] [Google Scholar]

51. Zhang Y, Galloway JM, Welty TK, Wiebers DO, Whisnant JP, Devereux RB, et al. Incidence and risk factors for stroke in American Indians: The strong heart study. Circulation.2008;118:1577–1584. doi:10.1161/CIRCULATIONAHA.108.772285. [DOI] [PMC free article] [PubMed] [Google Scholar]

Appendix 1: Information Sheet

Greetings; I am Dr. Tsion Thomas; third-year neurology resident and I am conducting a research with the aim of assessing your knowledge, attitude and practice of pre-stroke of lifestyle modification among stroke survivors.

Title of the study: Knowledge, Attitude and Practice of Pre-stroke Lifestyle Modification among Stroke survivors in TASH OPD

Objective: The aim of this study is to determine the knowledge, attitude and practice of pre-stroke lifestyle modification and associated factors among stroke survivors

Benefits: This study will not give direct benefit to the participants; but the information you provide us helps to assess understanding and practice of life style modification in our society. The finding of the study will also help to guide and recommend the responsible public health sector officials in making policies and strategies to address problems related to life style modification.

Risk: The participants will not face any harm by participating in this study

Right of the respondents: Every respondent will participate in this study voluntarily. The respondent can escape the question that makes him/her uncomfortable and even they can quit at all.

Confidentiality: We would like to assure you that confidentiality will be strictly maintained throughout the study. The respondent's answer will not be given for third party' and their identity will not be mentioned on study report.

Whom to contact: If you will have any questions about the research or need further information, please contact the following research team member from the College of Health Sciences of Addis Ababa University.

Dr. Tsion Thomas, Phone +251946388825, Email: zionabaema@Gmail.com

Appendix II: Consent form

I will confirm that it is with a clear understanding of the objectives and conditions of the study that I give my consent to be part of the study. I have been given the necessary information about the study in a language I understand.

Participant Signature__

Date____

የመግቢያ ሰላምታ!

እኔ ዶ/ር ጽዮን ቶማስ በነርቭ እና ህብለ ሰረሰር ህክምና ትምህርት ክፍል ውስጥ የ3ተኛ አመት ስፔሻላይዜሽን ተማሪ ስሆን ስትሮክ ታካሚዎች ህመሙ ከመከሰቱ በፊት የነበራቸ ውን የአኗኗር ልማድ ለውጥ ተግባሮች ለመመርመር ጥናት እያካሄድኩ ነው።

የጥናቱ አላማ፡

ይህ ጥናት የሚያተኩረው በስትሮክ የታመሙ ሰዎች ከህመሙ በፊት የአኗኗር ልማድ ለውጥ ተግባራትን እንዴት ተግባራዊ አድርገው እንደነበር ለመገምገም ነው።

የጥናቱ ጥቅሞች፡

ይህ ጥናት ለተሳታፊዎች በቀጥታ የሚሰጠው ጥቅም የለም። ይሁን እንጂ የምትሰጡት መረጃ የአኗኗር ልማድ ለውጥ ጽንሰ-ሀሳብ በህብረተሰቡ ዘንድ ምን ያህል የታወቀ እና ተግባራዊ እንደሆነ ለመረዳት እድል ይሰጣል። የጥናቱ ውጤቶች ደግሞ ተገቢውን የህዝብ ጤና ፖሊሲዎችን እና ስልቶችን በማዘጋጀት የአኗኗር ልማድ ለውጥ ጋር ተዛማጅ የሆኑ ክፍተቶችን እና ችግሮችን ለመቅረፍ ለሚመለከተው አካል ግብአት ሊሆኑ ይችላሉ።

የጥናቱ ስጋቶች፡

በዚህ ጥናት ውስጥ በመሳተፍ ምንም አይነት ችግር አይደርስባችሁም።

የመረጃ ሚስጥራዊነት፡

የሰጡት ምላሽ ሙሉ በሙሉ የተጠበቀ ነው። የምትሰጡት መልሶች ለጥናቱ ቡድን በስተቀር ለማንም አይቀርቡም። በተጨማሪም በጥናቱ ውጤቶች ውስጥ የእርስዎ ማንነት አይገለጽም።

የተሳታፊዎች መብቶች፡

ጥናቱ በሙሉ ፈቃደኛነት ላይ የተመሠረተ ነው። ማንኛውንም ጥያቄ ለመመለስ ካልፈለጉ መተው ወይም መጠየቁን በየትኛውም ጊዜ ማቆም ይችላሉ።

ለበለጠ መረጃ፡

ስለ ጥናቱ ጥያቄ ካለዎት ወይም ተጨማሪ መረጃ ለማግኘት በሚከተለው አድራሻ ይጠቀሙ ።

ዶ/ር ጽዮን ቶማስ

ስልክ፡ +251946388825

ኢሜይል፡ zionabaema@gmail.com

አባሪ II: የፈቃድ መስጫ ፎርም

በዚህ ጥናት ውስጥ በፈቃዴ እንደምሳተፍ እገልጻለሁ።በጥናቱ ዓላማዎች እና ሁኔታዎች ላይ ግልፅ የሆነ ግንዛቤ ካለኝ በኋላ በዚህ ጥናት ውስጥ እንደምሳተፍ ፈቃዴን አሳይቻለሁ። ስለ ጥናቱ በምረዳው ቋንቋ ገለፃ ተደርጎልኛል ።

የተሳታፊ ፊርማ____

ቀን ____

Appendix III: Questionnaire: Knowledge, Attitude and Practice of pre-stroke lifestyle Modification Among Stroke Survivors

Section A: Demographic Information

1.Age:

- 18-30
- 31-45
- 46-60
- >60
- 2.Sex
- Male
- Female

3.Educational Level

- No formal education
- Primary school
- Secondary school
- Collage/University
- Post Graduate

4.Occupational status(before the stroke)

- Unemployed
- Self employed

- NGO
- Governmental Organization
- Others(specify)

5.Monthly Income:

- <1000
- 1000-5000
- 5000-10,000
- >10000

6.Marital status

- Single
- Married
- Divorced
- Widowed

7. Religion

- Orthodox Chrstian
- Catholic Chrstian
- Protestant Chrstian
- Muslim
- Others(specify)

SECTION B — CLINICAL HISTORY

B1. Date of stroke: __

B2. Stroke type (if known): ☐ Ischemic ☐ Hemorrhagic ☐ Unknown

B3. Hypertension before stroke diagnosis: ☐ Yes ☐ No

B4. Diabetes before stroke diagnosis: ☐ Yes ☐ No

B5. Dyslipidemia before stroke: ☐ Yes ☐ No

B6. Any other known chronic medical illness befrore stroke

B6. Medications used before stroke (BP drugs, statins, diabetes meds): ____

SECTION C — TOBACCO USE (WHO STEPS – Tobacco Module)

C1. Before your stroke, did you EVER smoke any tobacco product (cigarettes, shisha, pipe)?

☐ Yes ☐ No

C2. In the 12 months before your stroke, did you smoke tobacco?

☐ Daily ☐ Less than daily ☐ Not at all

C3. On average, how many manufactured cigarettes did you smoke per day?

☐ 0 ☐ 1–5 ☐ 6–10 ☐ 11–20 ☐ >20

C4. Did you use smokeless tobacco (chewing tobacco, snuff) before your stroke?

☐ Daily ☐ Less than daily ☐ Not at all

C5. Did you try to quit smoking in the year before your stroke?

☐ Yes ☐ No

SECTION D — ALCOHOL CONSUMPTION (WHO STEPS – Alcohol Module)

D1. Did you consume any alcoholic drink in the 6-12 months before your stroke?

☐ Yes ☐ No

If YES:

D2. How often did you have a drink containing alcohol?

☐ Daily

☐ 5–6 days/week

☐ 1–2 days/week

☐ 1–3 days/month

☐ Less than once/month

D3. On a typical drinking day, how many standard drinks did you consume?(for females <or = 1 standard drinks and for males <or =2 standard drinks or > 2 standard drinks)?

D4. How often did you have binge drinks?(for females >or=4 standard drinks and for males>or=5 standard drinks)

☐ Never ☐ Monthly ☐ Weekly ☐ Daily/Almost daily

Did you chew Khat in the last 6-12 months before the stroke incident?

SECTION E — DIET & NUTRITION (WHO STEPS – Diet Module)

E1. In the year(6-12 months) before your stroke, how many servings of fruits did you usually eat per day?

☐ >2 or =2 servings/day ☐ <2 servings/day

E2. How many servings of vegetables did you usually eat per day?

☐ >3or =3 servings/day ☐ <3 servings/day

E3. How often did you eat foods high in fat/oil (fried foods, processed meats)?

☐ Daily ☐ 4–6×/week ☐ 1–3×/week ☐ Rarely/Never

E4. How much salt did you add to your food in the last 6-12 months before stroke?(for non hypertensive patients)?

☐ <or =1 tea spoon/day ☐ >1 tea spoon/day

E5. How much salt did you add to your food in the last 6-12 months before stroke?(for hypertensive patients)?

☐ <or = half tea spoon/day ☐ >half tea spoon/day

SECTION F — PHYSICAL ACTIVITY (GPAQ – Adapted for Pre-stroke Period)

Think of your usual activities before the stroke(in the last 6-12 months prior to stroke)

Work-related physical activity

F1. Did you do any vigorous-intensity activities at work (carrying heavy loads, farm labour, construction)?

☐ Yes ☐ No

If YES:

F2. On how many days per week? __ days

F3. For how many minutes per day? __ minutes

F4. Did you do any moderate-intensity activities at work (brisk walking, carrying light loads, cleaning)?

☐ Yes ☐ No

If YES:

F5. Days per week: __

F6. Minutes per day: __

Travel-related physical activity

F7. How many days per week did you walk or cycle for at least 10 minutes continuously to get to and from places?

__ days

F8. On those days, how many minutes did you usually spend walking or cycling?

__ minutes/day

Recreational physical activity

F9. Did you do any sports, exercise, or fitness activities?

☐ Yes ☐ No

If YES:

F10. Days per week: __

F11. Minutes per day: __

Sedentary behaviour

F12. How many hours per day did you usually spend sitting (work, TV, rest)?

☐ <2 hrs ☐ 2–4 hrs ☐ 5–7 hrs ☐ >7 hrs

SECTION G — BODY WEIGHT, HEALTH CHECKS & MEDICATION (WHO STEPS)

G1. Before your stroke, were you trying to manage your weight?

☐ Yes, losing weight

☐ Yes, maintaining weight

☐ No

G2. How often did you measure your blood pressure before your stroke?

☐ Weekly ☐ Monthly ☐ Every 3–6 months ☐ Once/year ☐ Never

G3. If diagnosed with hypertension, did you take your BP medications as prescribed?

☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐ Not applicable

G4. If you had diabetes, how often did you check your blood sugar?

☐ Daily ☐ Weekly ☐ Monthly ☐ Rarely ☐ Never ☐ Not applicable

G5. Before your stroke, were you taking a statin (cholesterol medication)?

☐ Yes ☐ No ☐ Don’t know

SECTION H — KNOWLEDGE & ATTITUDE (from WHO NCD modules)

Knowledge (True / False / Don’t know)

H1. High blood pressure increases the risk of stroke.

☐ True ☐ False ☐ Don’t know

H2. Smoking increases the risk of stroke.

☐ True ☐ False ☐ Don't know

H3. Regular physical activity reduces the risk of stroke.

☐ True ☐ False ☐ Don't know

H4. Eating high-salt foods increases stroke risk.

☐ True ☐ False ☐ Don't know

Attitudes (Likert scale)

1 = Strongly disagree … 5 = Strongly agree

H5. I believed lifestyle changes could reduce my risk of stroke. 1 2 3 4 5

H6. I believed I could control my blood pressure through healthy habits. 1 2 3 4 5

H7. I believed stopping smoking would reduce my stroke risk. 1 2 3 4 5

H8. I believed regular check-ups were important to prevent stroke. 1 2 3 4 5

SECTION I —BARRIERS & SUPPORT

I1. What prevented you from healthier behaviours before your stroke? (select up to 3)

☐ Lack of knowledge

☐ Cost of healthy food

☐ Lack of time

☐ Cultural habits

☐ Lack of family support

☐ No access to exercise facilities

☐ Medical/physical limitation

☐ Other: _____

I2. What would have helped you adopt healthier habits?

☐ Health worker counseling

☐ Family support

☐ Community programs

☐ Educational materials

☐ Reminders (phone/sms)

☐ Other: _____

አባሪ III: መጠይቅ — በስትሮክ ታካሚዎች መካከል ከስትሮክ በፊት የነበረ የአኗኗር ልማድ ለውጥ እውቀት፣ አመለካከት እና ተግባር

ክፍል A — የህዝብ መረጃ

1. ዕድሜ፡

- 18–30
- 31–45
- 46–60
- >60

2. ፆታ፡

- ወንድ
- ሴት

3. የትምህርት ደረጃ፡

- መደበኛ ትምህርት የለም
- አንደኛ ደረጃ
- ሁለተኛ ደረጃ
- ኮሌጅ/ዩኒቨርሲቲ
- ድህረ ምረቃ

4. የስራ ሁኔታ (ከስትሮክ በፊት)፡

- ስራ የሌለ
- ራሱን የሚቀጥር

- መንግስታዊ ያልሆነ ድርጅት
- የመንግስት ተቋም
- ሌላ

5. ወርሃዊ ገቢ፡

- <1000
- 1000–5000
- 5000–10,000
- >10,000

6. የጋብቻ ሁኔታ፡

- ያላገባ
- ያገባ
- የተፋታ
- መበለት

7. ሃይማኖት፡

- ኦርቶዶክስ ክርስቲያን
- ካቶሊክ ክርስቲያን
- ፕሮቴስታንት ክርስቲያን
- ሙስሊም
- ሌላ

ክፍል B — የሕክምና ታሪክ

B1. የስትሮክ ቀን፡ _____

B2. የስትሮክ አይነት፡

- የደም ዝውውር መቋአረጥ
- የደም መፍሰስ
- ያልታወቀ

B3. ከስትሮክ በፊት የደም ግፊት ችግር፡

- አዎ
- አይ

B4. ከስትሮክ በፊት የስኪር በሽታ፡

- አዎ
- አይ

B5. ከስትሮክ በፊት የስብ ችግር፡

- አዎ
- አይ
- ከ እስትሮክ በፊት ሌላ ህመም ነበረ፡

B6. ከስትሮክ በፊት ይወስዱአቸው የነበሩ መድሃኒቶች፡ _____

ክፍል C — የትምባሆ መጠቀም(ከስትሮክ በፊት ባሉት 6-12 ወራት)

C1. ከስትሮክ ህመም በፊት ትምባሆ/ሲጋራ አጭሰው ያውቃሉ?

- አዎ
- አይ

C2. ስትሮኩ ከመከሰቱ 6-12 ወራት ውስጥ ሲጋራ አጭሰው ነበር፡

- በየቀኑ
- አልፎ አልፎ
- አይ

C3. ከስትሮክ ህመም በፊት በቀን ምን ያክል ሲጋራ ያጨሱ ነበር፡(በፍሬ)

- 0
- 1–5
- 6–10
- 11–20
- >20

C4. ከስትሮክ ህመም በፊት ጭስ አልባ ትምባሆ/ሲጋራ ይጠቀሙ ነበር(የሚታገኝክ ወይም የሚሸተት)፡

- በየቀኑ
- አልፎ አልፎ
- አይ

C5. ማጨስን ለመተው ሞክረው ያውቃሉ?

- አዎ
- አይ

ክፍል D — የአልኮል መጠቀም

D1. ስትሮክ ከመከሰቱ በፊት ባሉት 6-12 ወራት አልኮል ጠጥተዋል?

- አዎ
- አይ

D2. አዎ ከሆነ መልሶት የመጠጥ ድግግሞሽ፡

በየቀኑ

- 5–6 ቀናት በሳምንት
- 1–2 ቀናት በሳምንት
- 1–3 ቀናትበወር
- ከወር በታች

D3. ከስትሮክ ህመም በፊት በሚጠጡበት ጊዜ ምን ያህል መደበኛ መጠጦች ይጠቀሙ ነበር፡(ለ ሴቶች>1 ወይም >1, ለወንዶች >2, 2 ወይም <2)

D4. ከስትሮክ ህመም በፊት ከ >=4 መጠጦች (ለ ሴቶች), >=5 በላይ መጠጦች (ልወንዶች)ምንያህል ጊዜ ተጠቅመዋ ያውቃሉ፡

በፍጹም አይ

- በወር
- በሳምንት
- በየቀኑ

- ጫት ይቅሙ ነበር ስትሮክ ከመታመምዎ በፊት ባሉት 12ወራት?

ክፍል E — አመጋገብ

E1. ከስትሮክ ህመም በፊት ምን ያህል ፍራፍሬ፡(በቀን የሚጠቀሙት)

- ምንም
- >=2
- <2

E2. ከስትሮክ ህመም በፊት ምን ያህል አትክልት(በቀን የሚጠቀሙት)

ምንም

- >=3
- <3

E3. ከስትሮክ ህመም በፊት ምን ያህል በስብ የበለፀጉ ምግቦች ያጠቀሙ ነበር፡ በየቀኑ / 4–6×/ሳምንት / 1–3×/ሳምንት / እምብዛም

E4. ከስትሮክ ህመም በፊት ምን ያህል ጨው በቀን ይጠቀሙ ነበር (በሻይ ማንኪያ) የደም ግፊት ለሌለባቸውታካሚዎች

- 1 የሻይ ማንኪያ
- ከ 1 በላይ

ከስትሮክ ህመም በፊት ምን ያህል ጨው በቀን ይጠቀሙ ነበር(በሻይ ማንኪያ) የደም ግፊት ላለባቸው ታካሚዎች

- ½ የሻይ ማንኪያ

- ከ ½ በላ

F1. ከስትሮክ ህመም በፊት ከባድ እንቅስቃሴ በስራ ቦታዎ ደርጉ ነበር(ምሳሌ፡ ከባድ እቃ መሸከም፣ ከባድእርሻ ስራ፣ ግንባታ ወዘተ)

፡ አዎ / አይ

F2. አዎ ከሆነ መልሶት

በሳምንት ለስንት ቀናት ___

F3. በቀን ለስንት ደቂቃ ___

F4. ከስትሮክ ህመም በፊት መካከለኛ እንቅስቃሴ በስራ ቦታዎ ያደርጉ ነበር፡ (ምሳሌ፡ ጽዳት፣ እርሻ ስራ ወዘተ)

አዎ / አይ

F5. መልሶት አዎ ከሆነ

በሳምንት ለስንት ቀናት___

F6. በቀን ለስንት ደቂቃ ___

F7. በሳምንት ለስንት ቀናት ለ10 ደቂቃ ያህል በእግር ይጉአዙ ወይም ሳይክል ይነዱ ነበር ከስትሮክ ህመም በፊት ___

F9. ከስትሮክ ህመም በፊት ስፖርታዊ የመዝናኛ እንቅስቃሴዎች ያደርጉ ነበር

፡ አዎ / አይ

F10. አዎ ከሆነ መልሶት በሳምንት ለስንት ቀናት ___

F11. በቀን ለስንት ደቂቃ ___

F12.በቀን ምንያክል ሰአት በመቀመጥ ያሳልፉ ነበር ከስትሮክ ህመም በፊት

- <2 ሰዓት

- 2–4 ሰአት
- 5–7 ሰአት
- >7ሰአት

ክፍል G — ክብደት እና መድሃኒት

G1. ስትሮክ ከመታመምዎ በፊት ክብደትዎን ለመቆጣጠር ሞክረዋል ፡

- አዎ ለመቀነስ ሞከሬአለው
- አዎ እንዳለ ለመጠበቅ ሞክሬአለው
- አይ አልሞከርኩም

G2. ስትሮክ ከመታመምዎ በፊት ምን ያህል ጊዝ የደም ግፊት ተመርምረው ያውቃሉ፡

- በየሳምንት /
- በወር
- በየ 3–6 ወር
- በዓመት
- በፍጹም አይ

G3. ስትሮክ ከመያዞት በፊት የደም ግፊት እንዳለቦት ተነግሮት ከነበረ መድሃኒት በየስንት ጊዜ ይወስዱ ነበር፡

- ሁልጊዜ
- አንዳንድ ጊዜ
- እምብዛም

- በፍጹም አይ
- አይመለከተኝም

G4. ስትሮክ ከመታመምዎ በፊት የስኩአር ሀመም ከነበረበት የደም ስኪር መጠን ምርመራ በየስንት ጊዘው ያደርጉ ነበር፡

- በየቀኑ
- በየሳምንት
- በየወሩ
- እምብዛም
- በፍጹም አይ
- አይመለከተኝም

G5. ስትሮክ ከመታመምዎ በፊት የ ስብ ማቅልጫ መድሃኒት ይወስዱ ነበር፡

- አዎ
- አይ
- አላውቅም
- አይመለከተኝም

ክፍል H — እውቀት እና አመለካከት

H1. ከፍተኛ የደም ግፊት የስትሮክ አደጋ ይጨምራል፡ እውነት / ሐሰት / አላውቅም

H2. ማጨስ የስትሮክ አደጋ ይጨምራል፡ እውነት / ሐሰት / አላውቅም

H3. የሰውነት እንቅስቃሴ የስትሮክ አደጋ ይቀንሳል፡ እውነት / ሐሰት / አላውቅም

H4. ጨው ማብዛት የስትሮክ አደጋ ይጨምራል፡ እውነት / ሐሰት / አላውቅም

ጫት መቃም የስትሮክ አደጋ ይጨምራል፡ እውነት / ሐሰት / አላውቅም

H5–H8: አመለካከት 1–5

አመለካከት መለኪያ (Likert መለኪያ)

1 = በጣም እቃወማለው 2=አቃውማለው 3= ታቅቦ 4= እስማማለው 5 = በጣም እስማማለሁ

H5. የእኔን የአኗኗር ልምዶች መቀየር የስትሮክ አደጋዬን ሊቀንስ ይችል ነበር ብዬ እመናለሁ። 1 2 3 4 5

H6. በጤናማ ልምዶች የደም ግፊቴን መቆጣጠር እችላለሁ ብዬ እመናለሁ። 1 2 3 4 5

H7. ማጨስን ማቆም የስትሮክ አደጋዬን ይቀንሳል ብዬ እመናለሁ። 1 2 3 4 5

H8. መደበኛ የጤና ምርመራዎች ስትሮክን ለመከላከል አስፈላጊ ናቸው ብዬ እመናለሁ። 1 2 3 4 5

ክፍል I —ጤናማ የህይወት ልምምዶች ለማጎልበት የሚረዱ ድጋፎች እና እንቅፋቶች

I1. —ጤናማ የህይወት ልምምዶች እንዳያጎለብቱ ያቀቦት እንቅፋቶች የትገኞቹ ናቸው;

- የእውቀት እጥረት
- የምግብ ዋጋ መናር

- ጊዜ ማጣት
- ባህል
- የቤተሰብ ድጋፍ አለመኖር
- ቦታ እጥረት
- አካላዊ ገደብ
- ሌላ

I2. —ጤናማ የህይወት ልምምዶች እንዲያጎለብቱ ሊረዳዎት የሚችሉ ድጋፎች የትኞቹ ናቸው

- የጤና ባለሙያ ምክር
- የቤተሰብ ድጋፍ
- የማህበረሰብ ተኮር ፕሮግራሞች
- ትምህርታዊ ቁሳቁሶች
- አስታዋሽ(አላርም መቅጠር በስልክ ወይም ማስታወሻዎች)
- ሌላ

Interpretation of Standard Terms for the Ethiopian Context (with References)

I. Fruit Serving Equivalents

According to the national Food-Based Dietary Guidelines (Ethiopian Public Health Institute, 2022; Ministry of Health, Ethiopia, 2022), a varied intake of 100–200 g of fruits and vegetables daily is recommended. Based on local consumption patterns, one serving of fruit is equivalent to:

1 wedge of papaya (triangularly sliced)

1 wedge of watermelon (triangularly sliced)

1 medium mango

1 medium banana

1 medium orange

10 seeds of grape

1 small apple Same

½ cup of fruit juice (no added sugar)

II. Vegetable Serving Equivalents

One serving of vegetables is equivalent to (Ethiopian Public Health Institute, 2022; Ministry of Health, Ethiopia, 2022):

1 cup of raw salad vegetables

½ cup of lentils (misir)

½ cup of broccoli

½ cup of carrot

½ cup of pumpkin

¼ plate of cooked vegetables

½ medium sweet potato

1 potato

1 soup spoon of vegetables

III. Standard Drink Equivalents

A standard drink is defined based on typical alcohol by volume (ABV) of commercial and traditional Ethiopian alcoholic beverages (Debebe et al., 2016; Fentie et al., 2013; Lee et al., 2015; The Reporter Ethiopia, 2022; WHO estimates via The Reporter, 2022).

Commercial beer (Waliya, Bedele, Amber, Dashen, Harar, Meta Premium, St. George) 1 bottle 4.5–5.5% (WHO estimates via The Reporter (2022))

Wine 100 ml glass

Spirits (whisky, gin, vodka) 30 ml

Tej (honey wine) 100 ml (half a birile) 7–11% ; Fentie et al. (2013))

Areke (distilled spirit) 1 melekia 34–45% (avg.) (Debebe et al. (2016); Fentie et al. (2013))

Tela (unfiltered) 1 cup (200–350 ml) 2–4% (WHO via The Reporter (2022); Lee et al. (2015))

Tela (filtered) ¾ cup 5–6% (WHO via The Reporter (2022))

References

· Debebe, A., et al. (2016). Total contents of phenolics, flavonoids, tannins and antioxidant capacity of selected traditional Ethiopian alcoholic beverages.

· Ethiopian Public Health Institute. (2022). Ethiopia: Food-Based Dietary Guidelines Booklet–2022. Addis Ababa, Ethiopia.

· Fentie, E. G., et al. (2013). Preparation and physicochemical analysis of some Ethiopian traditional alcoholic beverages. African Journal of Food Science.

· Lee, M., et al. (2015). Uniqueness of Ethiopian traditional alcoholic beverage of plant origin, tella. Journal of Ethnic Foods.

· Ministry of Health, Ethiopia. (2022). Ethiopia: Food-Based Dietary Guidelines–2022.

· The Reporter Ethiopia. (2022, April 23). New markets beckon revival of Tej, Tela.