**EXPLORING STROKE KNOWLEDGE AMONG FUTURE EDUCATORS: A STUDY OF SCIENCE EDUCATION STUDENTS IN COLLEGES OF EDUCATION, ENUGU STATE, NIGERIA.**

**ABSTRACT**

The overall purpose of this study was to investigate the knowledge level of stroke amongst education biology students of colleges of education in Enugu state, Nigeria. Descriptive survey research design was employed. The study was carried out in Enugu state. The population consists of 5773 students, which were made up of all the students in the selected colleges of education in Enugu state. The instrument used for data collection was a researcher made questionnaire titled “knowledge of stroke amongst education Biology students of colleges of Education in Enugu state, Nigeria”. The data were analyzed using mean and standard deviation. The findings show that a higher percentage of education biology student have knowledge on stroke including its causes, symptoms, risk age/population, diagnosis/treatment and preventive measures. The recommendations include that Health personnel should visit school from time to time to educate the students more on the dangers of stroke. There should be massive check of blood pressure programme in our local health centers since this is the major cause of stroke. Finally, limitations of the study were highlighted and suggestions for further studies were made.

Key word: Stroke, Biology, Knowledge, Colleges, Education, Enugu.

1. **INTRODUCTION**

The World Health Organization (WHO, 1970) defines stroke as: “rapidly developing clinical signs of focal (at times global) disturbance of cerebral function, lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin” (Üstün et al., 2009). “A stroke is caused by the interruption of the blood supply to the brain, usually because a blood vessel bursts or is blocked by a clot. This cuts off the supply of oxygen and nutrients, causing damage to the brain tissue and resulting to loss of neurological function” (WHO, 2011). The brain controls our movements, stores our memories and is the source of our thoughts, emotions and language. The brain also controls many functions of the body, like breathing and digestion. To work properly, the brain needs oxygen. The arteries deliver oxygen-rich blood and important nutrients to all parts of the brain. If something happens to block the flow of blood, brain cells are either damaged or start to die within minutes, because they cannot get oxygen. Once brain cells die, they generally do not regenerate and devastating damage may occur, sometimes, resulting in physical, cognitive and mental disabilities (stroke). Stroke often occurs with little or no warning, and the results can be devastating. Stroke causes amongst other things, motor deficits, affecting the control and physical movement of limbs, which limit activities of daily livings (ADLs). (Hankey, 2002, MacWalter and Shirley, 2003, Snell, et al, 2009). Physical impairments post-stroke may limit functional independence and increase healthcare burden. Activity limitation is shown to be strongly associated with stroke and chronic health conditions (Gudjonsson, and Henry, 2003) and is correlated with a high risk of severe mobility disability for ADLs (Guralnik et al., 2001, Volpato et al., 2007). Post-stroke disability affects stroke survivors for a long time and often permanently. Wolfe et al reported 10-20% stroke survivors still have moderate to severe disability 10 years post-stroke and about 30% stroke survivors were inactive, and their inactivity was found to increase 8 years after stroke (Wolfe et al., 2011). Physical inactivity is associated with an increase in morbidity, mortality and disabilities after 21 strokes (Kruger et al., 2008). Stroke is a significant global health problem, contributing to major morbidity and mortality for both developing and developed countries. Worldwide, stroke was the second commonest cause of death and the third most common cause of Disability-Adjusted Life-Years (DALYS) Global Burden of Diseases Injuries and Risk Factors Study, (Murray et al. 2012).

Stroke is the biggest single cause of major disability worldwide Mukherjee, and Patil, (2011). It has significant impact on stroke survivors’ lives and health, society and economy, worldwide and nationwide. In 2010, stroke cost about $73.7 billion in both direct and indirect costs in the U.S. alone. American Heart Association (AHA), heart disease and Stroke Statistics, (2010). World Health Organization (WHO) estimates that about15 million people suffer a stroke annually worldwide, 5 million of whom are left permanently disabled, placing a burden on family and community (WHO, 2011). There are over 113,000 strokes every year in the UK (Rothwell et al., 2004) and over 950,000 stroke survivors among people aged 45 years and over. Many of these stroke survivors experience significant and long-term physical and psychological impacts, repeat strokes; transient ischemic attacks (TIAs) and/or death within a year of stroke. About 300,000 people live with post-stroke disabilities in England. Post-stroke conditions directly cost about £2.8 billion to the NHS, and the economy about £2.4 billion for informal care costs, and £1.8 billion income lost to productivity and disability per year. The total annual direct cost of stroke in the UK has been estimated to be about £4 billion or 5.5% of the total UK expenditure on health care. The estimated total annual societal costs are about £8.9 billion (Saka et al., 2013). Stroke care costs about £23,315 per patient, and quality-adjusted life years is 2.54 in the UK. Stroke burdens will increase from around 38 in 1990 to 61 million disability-adjusted life years in 2020 worldwide (WHO, 2011). Hence, managing disabilities post-stroke is an important healthcare focus nationwide and worldwide.

Preventing, treating and managing the resulting illness or death from stroke all carry economic consequences, not just for health care services but also more widely across society (Saka et al.,2013). For example, given that a quarter of all strokes in the UK happen among people of working age, stroke can reduce employment prospects and productivity for society. It can also affect family and friends who are often involved with a stroke survivor’s care and are unpaid in this caring role. This is even more concerning given current and likely ongoing financial pressures on health and social care services, families and other unpaid careers.

An estimate of 135,592 people in the U.S. died from cerebrovascular disease in 2007.  American Heart Association, (2014) in a report titled heart disease and Stroke Statistics.The annual number of strokes and deaths due to stroke increased substantially from 1990 to 2019, despite substantial reductions in age-standardized rates, particularly among people older than 70 years. According to global stroke factsheet 2020, 1 in 6 deaths from cardiovascular disease was due to stroke. Every 40seconds, someone in the United States has a stroke. Every 3.5 minutes, someone dies of stroke. Every year, more than 795,000 people in the United States have a stroke. About 610,000 of these are first or new strokes. About 185,000 strokes—nearly 1 in 4—are in people who have had a previous stroke. About 87% of all strokes are [ischemic strokes](https://www.cdc.gov/stroke/types_of_stroke.htm), in which blood flow to the brain is blocked. Stroke-related costs in the United States came to nearly $53 billion between 2017 and 2018. This total includes the cost of health care services, medicines to treat stroke, and missed days of work. The total cost of stroke from 2005 to 2050 is projected at $379 billion for African Americans. Stroke is a leading cause of death for Americans, but the risk of having a stroke varies with race and ethnicity. Risk of having a first stroke is nearly twice as high for Blacks as for Whites, and Blacks have the highest rate of death due to stroke. African Americans are disproportionately affected by stroke than their Caucasian counterparts (AHA, 2014). African Americans have twice the mortality from stroke and have more severe disabling stroke than their Caucasian counterparts (Go et al., 2013). In South Suburban Cook County, the stroke mortality rate for African Americans (87.1/100,000) was twice the rate for Caucasians (41.0/100,000) in 2005-2007 and 81% higher than the Healthy People 2010 goal of 48.0/100,000 according to Cook County Department of Public Health 2015. Though the stroke mortality rate for South Cook County has decreased (45.2/100,000) and is below the Healthy People 2010 goal of 48.0/100,000, stroke is still the leading cause of adult disability Cavenagh, and Simerson (2022). Even though recent treatments have changed, especially in regard to reperfusion for certain strokes, effective primary prevention remains the best approach to forestall this illness, especially with 76% of strokes being first events (AHA, 2014). Eighty percent of stokes can be prevented by modifying certain risk factors (AHA, 2014). Stroke remains the leading cause of long-term disability with estimated costs of $62.7 billion on combined stroke and disability expenditures (Go et al., 2013). The total cost of stroke from 2005 to 2050 is projected at $379 billion for African Americans. African Americans bear a huge brunt of the burden of stroke in comparison with other racial groups.

Stroke risk increases with age in general, stroke is more prevalent in people 65 years and older (Sallar, et al., 2010), but strokes can and do occur at any age. In 2014, 38%of people hospitalized for stroke were less than 65 years old, (Naveed et al. 2025). According to the American Heart Association (AHA), the age-adjusted mortality rate for 2017 was [37.6 in every 100,000Trusted Source](https://professional.heart.org/idc/groups/ahamah-public/@wcm/@sop/@smd/documents/downloadable/ucm_505473.pdf) stroke diagnoses. Doctors have made a great deal of progress in managing strokes, meaning that this mortality rate is 13.6% lower than it was in 2007.Stroke is so called because of the way it strikes people down. The risk of further episodes is significantly increased for people having experienced a previous stroke. The risk of death depends on the type of stroke. Transient ischemic attacks or TIA – where symptoms resolve in less than 24 hours – have the best outcome, followed by stroke caused by carotid stenosis (narrowing of the artery in the neck that supplies blood to the brain). Blockage of an artery is more dangerous, with rupture of a cerebral blood vessel the most dangerous of all. Stroke is uncommon in people under 40 years; when it does occur, the main cause is high blood pressure. However, stroke also occurs in about 8% of children with sickle cell disease.

The Global Stroke Factsheet released in 2022 reveals that lifetime risk of developing a stroke has increased by 50% over the last 17 years and now 1 in 4 people is estimated to have a stroke in their lifetime. From 1990 to 2019, there has been a 70% increase in stroke incidence, 43% increase in deaths due to stroke, 102% increase in stroke prevalence and 143% increase in Disability Adjusted Life Years (DALY). The most striking feature is that the bulk of the global stroke burden (86% of deaths due to stroke and 89% of DALYs) occur in lower and lower-middle-income countries. This disproportionate burden experienced by lower and lower-middle income countries has posed an unprecedented problem to families with fewer resources. Stroke has a huge public health burden, which is set to rise over future decades because of demographic transitions of populations, particularly in developing countries. This places stroke high on the agenda of public health issues in the 21st century and is an important area for public health research. Without urgent implementation of effective primary prevention strategies, the stroke burden will probably continue to grow across the world, particularly in low-income countries. Despite significant progress in prevention, treatment and rehabilitation, there is still great capacity for further improvements, which in turn could reduce these large economic burdens. Achieving this requires more research, but stroke has received considerably less research investment compared to conditions with similar burdens. For example, the UK annual medical research-spend per stroke patient is £48, compared with £241 per cancer patient and £118 per dementia patient (Luengo-Fernandez et al., 2015).

In view of the economic and social burden of stroke, it is important to explore the way to improve the provision of stroke services. Post-stroke conditions directly cost about £2.8 billion to the NHS, and the economy about £2.4 billion for informal care costs, and £1.8 billion income lost to productivity and disability per year (DH, 2007b). The total annual direct cost of stroke in the UK has been estimated to be about £4 billion or 5.5% of the total UK expenditure on health care. The estimated total annual societal costs are about £8.9 billion (Saka et al., 2013). Stroke care costs about £23,315 per patient, and quality-adjusted life years is 2.54 in the UK. Stroke burdens will increase from around 38 in 1990 to 61 million disability-adjusted life years in 2020 worldwide (WHO, 2011).

The incidence of stroke is decreasing in Caucasians but not in Africa and American population with stroke being the second leading cause of death in these populations (Lackland, et al., 2014). There is strong evidence that modifying the identified or known risk factors of stroke can reduce the incidence of stroke (Howard, et al. 2011). These modifiable risk factors can be addressed by certain behavioral changes which include blood sugar control in diabetes, control of blood pressure in hypertension, atrial fibrillation, family history, smoking cessation, reduced intake of alcoholic beverages, maintain a healthy weight, adequate physical activity and healthy diet (Howard, et al., 2011). However, knowledge or awareness of these stroke risk factors and maintaining healthy behaviors have been found to be lacking in African and American populations as they have ranked higher in negative lifestyles than their Caucasian counterparts (Howard et al., 2011). Lack of knowledge and poor risk factor control is contributing to rise in stroke incidence. Longer term physical stroke rehabilitation in the community remains a challenge to clinicians and stroke survivors. Thus, there is need to ascertain the level of public awareness about stroke which is the reason for this study.

**2. MATERIAL AND METHODS**

**2.1 Area of Study**

The research was conducted in Enugu State, focusing on seven Colleges of Education: Federal College of Education, Eha-Amufu, Enugu State College of Education Technical, Enugu, Peace Land College of Education, Enugu, Institute of ecumenical education Enugu, African thinkers’ community of inquiry college of education Enugu, Our savior institute of science, agriculture and technology college of education Enugu and The College of Education Nsukka. The College of Education Nsukka and Our savior institute of science, agriculture and technology college of education Enugu was excluded from the study as it does not offer Education in Biology. Hence, the Federal College of Education, Eha-Amufu, and the College of Education Technical, Enugu were chosen for the study due to their Education Biology programs for both N.C.E. and Degree students.

**2.2 Research design, the population of the study, sample, and sampling techniques**

This study adopted a descriptive survey design and the reason for this choice was because the study is aimed at collecting data from students considered representative of the population in assessing students’ knowledge level of diarrhea. The population of the study comprised five thousand, seven hundred and seventy-three (5,773 – total population of all students in the two selected colleges of education). The Federal College of Education, Eha-Amufu has a total number of six hundred and forty-five (645) Education Biology students (Nigerian Certificate in Education – 316 & Degree – 329) while Enugu State College of Education Technical has a total of three hundred thirty-six (336) Education Biology students (Nigerian Certificate in Education – 154 & Degree – 182. Both Colleges have a total of 981 Education Biology students. We choose Nigerian Certificate in Education II, Degree II, and Degree III students for this study because they have encountered topics such as “Communicable diseases, Sanitation & Personal Hygiene and Disability” in their previous classes. The sample size of 284 was derived using Taro Yamen’s formula as outlined in Ezugwu, et al. (2025)

Where:

n = Sample size -?

N = Population of the study – 981

e = Level of significance – 0.05;

1 = Theoretical constant – 1.

Substituting the values in the formula:

=284

The instrument for data collection was a questionnaire. Questionnaire items were constructed to afford an answer to the research questions formulated to guide the study. The questionnaire was called Biology Students’ Stroke Knowledge Level (BSSKL). Questionnaire items were constructed by researchers to afford an answer to the research questions formulated to guide the study. The questionnaire consists of four sections. Section A sought information on What causes stroke? Section B sought information on who is at risk? Section C sought information on what are stroke symptoms & how is it diagnosed? Section D sought information on what treatments is available & how it can be prevented? Four-point scale rating of Strongly Disagree (SD), Disagree (D), Agree (A) and Strongly Agree (SA) with values of 1, 2, 3, and 4 respectively. The researchers visited the sampled colleges of education in Enugu state to distribute and collect the data for the study. During the course of the visit, copies of the instrument were administered to the students by the researchers. The administration of the instrument was done once in each school and retrieval of the achievement test was on the spot. The research questions were answered using mean and standard deviation

**2.2 Validity and reliability of the instrument**

The research instrument was subjected to face validation by giving it to an expert from Measurement and Evaluation and another from Biology Education, all in the Federal College of Education, Eha-Amufu. They were asked to validate the instrument concerning the appropriateness of language used in terms of clarity of statement and adequacy of items of the instrument. The experts also checked whether the instrument is capable of answering the questions. Based on the experts, corrections, comments, observations, suggestions, and amendments were made to the instruments before a final copy was produced for the study. The researchers used the Cronbach Alpha method of establishing reliability to obtain reliability co-efficient of 0.086 for the computation which shows that the instrument is reliable.

**2.3 Method of Data Analysis**

The data collected from the respondents were keyed into a Microsoft Excel sheet, and analyses of mean and standard deviation were carried out. A four-point scale of Strong Disagree (SD), Disagree (D), Agree (A), and Strong Agree (SA). The scaling statement and the nominal values are SD= 1; D= 2; A= 3; SA= 4. Therefore, mean = 4+3+2+1 divided by 4 = 2.50. Therefore, 2.50 was the cut-off point for deciding on each item. Any item whose weighted mean was 2.50 and above was considered as agreement while any item that was less than 2.50 was regarded as disagreement.

1. **RESULTS**

The presentation and analysis of data obtained from the Administration of the instrument (questionnaire) of the study. The data were organized into five tables in relevance to the five research.

* 1. **The level of knowledge of students on the causes of stroke in Nigeria.**

Data in Table 1shows that the respondents agreed that hypertension, diabetes mellitus, a blocked artery, alcohol consumption, a temporary disruption of blood flow to the brain, Inflammation and infection, including leaking or bursting of a blood vessel causes stroke, due to the fact that they are having mean values above the bench mark 2.50. these indicates that colleges of education science students are very knowledgeable on the causes of stroke.

* 1. **Symptoms of stroke and diagnosis.**

From the table 2, the responses from the respondents shows that loss of balance or the inability to walk, confusion, disorientation or memory loss, abnormal or slurred speech, dizziness, nausea or vomiting and head ache are the symptoms of stroke. They also agree that it can be diagnosed by Blood Tests and Electrocardiogram (ECG) with a decision rule of over 2.50 using the Likert rule. While they disagree that it can be diagnosed using Computer tomography (CT), Magnetic Resonance Imaging (MRI).

* 1. **The extent of student’s knowledge on the symptoms of stroke**

Table 3 shows that males, females, people of 45 Years and above, people of 55 Years and above, those from family with stroke record, those that use birth control pills or hormone therapies that include estrogen have an increased risk, overweight and persons suffering from high blood pressure have a high chance of getting stroke. From the responses of the respondent there is a disagreement on the races having a high chance of getting stroke. It can be equally observed as insignificant from the table as its value is less than the bench mark 2.50.

* 1. **Available treatments for stroke.**

Table 4 shows that stroke can be treated through the application of the following; clipping, coil embolization, draining excess fluid that collect in the brain and blood transfusion, the information can be also considered valid because the mean values/ scores are above the bench mark of 2.50.

* 1. **Preventive measures of stroke.**

Responses from table 5 shows tha**t** control blood pressure, control diabetes, eating healthy foods and drink, avoidance of smoke and limit alcohol, keeping a healthy weight, check of cholesterol and get regular physical activity are measures for preventing stroke.

**Table 1: Responses on** the level of knowledge of students on the causes of stroke in Nigeria.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S/N | Questionnaire item | SA (4) | A (3) | D (2) | SD (1) | ∑f x\N | N | x̄ | STD | Decision |
|  |  |  |  |  |  |  |  |  |  |  |
| 1 | Hypertension | 90 | 80 | 86 | 28 | 800 | 284 | 2.8 | 1.6 | Agreed |
| 2 | Diabetes mellitus | 98 | 89 | 50 | 47 | 806 | 284 | 2.8 | 1.6 | Agreed |
| 3 | A blocked artery | 90 | 88 | 52 | 54 | 782 | 284 | 2.7 | 1.4 | Agreed |
| 4 | Alcohol consumption | 80 | 91 | 49 | 64 | 755 | 284 | 2.6 | 1.6 | Agreed |
| 5 | A temporary disruption of blood flow to the brain | 92 | 90 | 60 | 42 | 800 | 284 | 2.8 | 1.4 | Agreed |
| 6 | Inflammation and infection | 97 | 89 | 52 | 46 | 805 | 284 | 2.8 | 1.3 | Agreed |
| 7 | Leaking or bursting of a blood vessel | 82 | 93 | 65 | 44 | 781 | 284 | 2.7 | 1.6 | Agreed |

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**Table 2: Responses on symptoms of stroke and how it can be diagnosed.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S/N | Questionnaire item | SA  (4) | A  (3) | D  (2) | SD  (1) | ∑f x\N | N | x̄ | STD | Decision |
|  |  |  |  |  |  |  |  |  |  |  |
| 1 | Loss of balance or the ability to walk | 90 | 93 | 50 | 51 | 790 | 284 | 2.8 | 1.6 | Agreed |
| 2 | Confusion, disorientation or memory loss | 98 | 91 | 60 | 35 | 820 | 284 | 2.9 | 1.7 | Agreed |
| 3 | Abnormal or slurred speech | 91 | 95 | 50 | 48 | 797 | 284 | 2.8 | 1.6 | Agreed |
| 4 | Dizziness, nausea or vomiting and head ache | 97 | 88 | 57 | 42 | 808 | 284 | 2.8 | 1.6 | Agreed |
| 5 | Computer tomography (CT) | 27 | 67 | 91 | 99 | 590 | 284 | 2.0 | 1.4 | Disagreed |
| 6 | Magnetic Resonance Imaging (MRI) | 28 | 71 | 89 | 96 | 599 | 284 | 2.1 | 1.4 | Disagreed |
| 7 | Blood Tests and Electrocardiogram (ECG) | 92 | 98 | 60 | 34 | 816 | 284 | 2.8 | 1.6 | Agreed |

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**Table 3: Mean rating and standard deviation on the extent students know the symptoms of stroke**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S/N | ITEMS | SA (4) | A (3) | D (2) | SD (1) | ∑f x\N | N | x̄ | STD | DECISION |
|  |  |  |  |  |  |  |  |  |
| 1 | Males | 80 | 91 | 49 | 64 | 755 | 284 | 2.6 | 1.6 | Agreed |
| 2 | Females | 83 | 90 | 48 | 63 | 761 | 284 | 2.6 | 1.6 | Agreed |
| 3 | people 45 Years and above | 64 | 40 | 90 | 90 | 646 | 284 | 2.2 | 1.4 | Disagreed |
| 4 | people 55 Years and above | 92 | 88 | 57 | 47 | 793 | 284 | 2.8 | 1.6 | Agreed |
| 5 | Blacks | 88 | 89 | 70 | 37 | 796 | 284 | 2.0 | 1.4 | Disagreed |
| 6 | Whites | 30 | 41 | 94 | 115 | 546 | 284 | 1.7 | 1.3 | Disagreed |
| 7 | Those from family with stroke record | 89 | 91 | 58 | 46 | 796 | 284 | 2.7 | 1.6 | Agreed |
| 8 | Those that use birth control pills or hormone therapies that include estrogen have an increased risk. | 95 | 92 | 68 | 29 | 821 | 284 | 2.8 | 1.6 | Agreed |
| 9 | Person suffering from high blood pressure and high cholesterol | 86 | 96 | 58 | 44 | 736 | 284 | 2.5 | 1.5 | Agreed |
| 10 | Being overweight or obese | 97 | 86 | 68 | 33 | 815 | 284 | 2.8 | 1.6 | Agreed |
|  |  |  |  |  |  |  |  |  |  |  |

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**Table 4: Responses on treatments that are available for stroke**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S/N | ITEMS | SA (4) | A (3) | D (2) | SD (1) | ∑f x\N | N | x̄ | STD | DECISION |
| 1 | Tissue Plasminogen Activator | 98 | 90 | 77 | 19 | 835 | 284 | 2.9 | 1.7 | Agreed |
| 2 | Surgery | 97 | 88 | 57 | 42 | 808 | 284 | 2.8 | 1.6 | Agreed |
| 3 | Angioplasty and Stenting method | 93 | 95 | 73 | 23 | 826 | 284 | 2.9 | 1.7 | Agreed |
| 4 | Aneurysm clipping | 96 | 89 | 71 | 28 | 821 | 284 | 2.9 | 1.7 | Agreed |
| 5 | Coil embolization | 92 | 88 | 57 | 47 | 793 | 284 | 2.8 | 1.6 | Agreed |
| 6 | Draining excess fluid that collect in the brain | 89 | 92 | 67 | 36 | 802 | 284 | 2.8 | 1.6 | Agreed |
| 7 | Blood transfusion | 95 | 94 | 71 | 24 | 828 | 284 | 2.9 | 1.7 | Agreed |

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**Table 5: Responses on stroke preventive measures.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S/N | Questionnaire item | SA (4) | A (3) | D (2) | SD (1) | ∑f x\N | N | x̄ | STD | Decision |
|  |  |  |  |  |  |  |  |  |  |  |
|  | |  |  | |  | |  |  |  |
| 1 | Control blood pressure | 98 | 90 | 77 | 19 | 835 | 284 | 2.9 | 1.7 | Agreed |
| 2 | Control diabetes | 84 | 88 | 68 | 44 | 780 | 284 | 2.7 | 1.6 | Agreed |
| 3 | Choose healthy foods and drink | 85 | 90 | 50 | 59 | 769 | 284 | 2.7 | 1.6 | Agreed |
| 4 | Don’t smoke and limit alcohol | 79 | 68 | 70 | 67 | 727 | 284 | 2.5 | 1.5 | Agreed |
| 5 | Keep a healthy weight | 84 | 72 | 65 | 63 | 745 | 284 | 2.6 | 1.6 | Agreed |
| 6 | Check cholesterol | 89 | 92 | 67 | 36 | 802 | 284 | 2.8 | 1.6 | Agreed |
| 7 | Get regular physical  Activity | 77 | 86 | 89 | 32 | 776 | 284 | 2.7 | 1.6 | Agreed |

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Key

SA - Strongly agree

A - Agree

D - Disagree

SD – Strongly disagree

STD- Standard deviation

x̄ - Mean

N - Total number

F – Frequency

X – Likert decision rule allocated number.

1. **DISCUSSION**

The result of the study shows that Education Biology students have high level of knowledge about the causes of stroke. Many of the students surveyed were able to correctly identify the causes of stroke.

Similarly, the study found out that quite a number of students are aware of the symptoms of stroke. These symptoms include loss of balance or the ability to walk, confusion, disorientation or memory loss, abnormal or slurred speech, dizziness, nausea or vomiting and head ache. The result also pointed out that the respondents are aware that blood test and electrocardiogram are the means of diagnosing stroke but not aware that electrocardiogram and computer tomography are means of diagnosing stroke. This result is in disagreement with the study carried out by Ojagbemi C. et al (2022) and Akosile, et al (2022) which state that generally, the knowledge of stroke warning signs was found to be poor for 50.68% of participants in their which reported that above 70% of participants know about hypertension as a risk factor for stroke.

More so, thestudy shows that the students have high in debt knowledge on the risk of the age/population of stroke which are people of 55 Years and above, those from family with stroke record, those that use birth control pills or hormone therapies that include estrogen have an increased risk, overweight and persons suffering from high blood pressure have a high chance of getting stroke. This study is in line with the findings of Olorukooba, et al. 2018 and Obembe et al. (2014) which revealed that the knowledge level of stroke warning signs among high-risk individuals was found to be generally poor as one out of every two participants had poor knowledge of stroke warning signs. This was alarming in a sample with respondents that were at increased risk for stroke and with a high proportion of fairly or well-educated individuals. It would seem that available stroke awareness programmes are inadequate in terms of content, availability, or accessibility and this might have contributed to the observed knowledge gap. The most frequently identified warning signs were the sudden weakness of the face, arm, or leg, especially on one side of the body. Previous studies have also reported the majority of the participants being able to identify sudden unilateral weakness as a warning sign of stroke Jones and Jenkinson, (2010).

The study also shows that stroke can be diagnosed through Tissue Plasminogen Activator, surgery, angioplasty and Stenting method, Aneurysm clipping, coil embolization and draining excess fluid that collect in the brain.

**4.1 Conclusion**

Enhancing stroke knowledge among future educators in colleges of education in Enugu state, Nigeria is a critical step toward improving overall community health and well-being. It is important to invest in education by providing the necessary resources, empowering future educators to be advocates for health and create a lasting impact on students and communities. Though, some students may possess a baseline understanding of stroke, there appears to be a significant opportunity for further education of our wards to improve awareness, treatment understanding, and prevention strategies among the younger population which the students fall within. Enhancing knowledge in these areas can empower students to act swiftly and effectively in the event of a stroke, thereby potentially improving outcomes for affected individuals

**4.2 Recommendations**

From the study, we recommend that

1. Health personnel should visit school from time to time to educate the students more on the dangers of stroke.

2. About 75 percent of stroke cases are caused by high blood pressure therefore student, parents and aged ones should frequently visit their local or nearby health centers to check their blood pressure level and also eat healthy foods and drink, avoid smoking and limit alcohol, keep a healthy weight, checking of cholesterol and get regular physical activity in order to prevent stroke.

3. More awareness program such as seminars, workshop and conferences should be provided in the school to help increase the students’ knowledge on stroke.

**4.3 Implications of the study**

There is need for educational programmes adapting transformational learning and strategies by National commission for colleges of education (NCCE) such as developing students friendly and continuous information regarding stroke as part of health promotion strategies and the needs of holistic approach, parents and community active participation, teachers continuous training, curriculum development and cooperation is important to impart knowledge and foster good practices in the prevention and controlling stroke and amongst students, communities and the society at large, not only in schools but trigger good practice among the students and the community in general.

**Disclaimer (artificial intelligence)**

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during writing or editing of this manuscript

**Consent**

Not applicable.

**Ethical approval**

Not applicable.

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