AWARENESS TOWARDS HEART ATTACK AND STROKE AMONG THE COMMUNITY OF BATU MAUNG, PENANG.

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by

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research, and promotional purposes.

Signature

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Nur Alisha Binti Shaik Daud

Date: 12/6/2025

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ABSTRAK

Penyakit kardiovaskular (CVD) seperti serangan jantung dan strok merupakan penyebab utama kematian di seluruh dunia dan juga di Malaysia. Walaupun penyakit ini meluas, ramai individu masih kurang kesedaran terhadap simptom dan tindakan yang perlu diambil. Kajian ini bertujuan untuk menilai tahap kesedaran dan tindakan terhadap serangan jantung dan strok dalam kalangan komuniti di Batu Maung, Pulau Pinang, serta menentukan hubungan antara ciri sosiodemografi terpilih dengan tahap kesedaran. Reka bentuk keratan rentas deskriptif telah digunakan, dan data dikumpul menggunakan borang soal selidik yang telah disahkan kesahihannya daripada 215 responden. Hasil kajian menunjukkan bahawa 56.3% responden mempunyai tahap kesedaran yang tinggi terhadap simptom serangan jantung. Sebanyak 44.2% responden menunjukkan tahap kesedaran yang tinggi terhadap simptom strok. Tiada hubungan yang signifikan antara umur atau tahap pendidikan dengan tahap kesedaran terhadap serangan jantung dan strok ($p > 0.05$). Dapatan kajian mencadangkan bahawa komuniti lebih peka terhadap simptom serangan jantung berbanding strok, namun tahap kesedaran terhadap strok masih berada pada tahap sederhana. Oleh itu, intervensi pendidikan yang disasarkan disyorkan bagi meningkatkan kesedaran terhadap strok.

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ABSTRACT

Cardiovascular diseases (CVDs) such as heart attacks and strokes are leading causes of death globally and in Malaysia. Despite their prevalence, many people still lack adequate awareness of the symptoms and appropriate actions to take. This study aimed to assess the level of awareness and actions toward heart attack and stroke among the community in Batu Maung, Penang, and to determine the relationship between selected sociodemographic characteristics and awareness levels. A descriptive cross-sectional design was used, and data were collected using a validated questionnaire from 215 respondents. The results showed that 56.3% of respondents demonstrated a high level of awareness regarding heart attack symptoms. 44.2% of respondents showed a high level of awareness regarding stroke symptoms. There was no significant association between age or education level and awareness level for both heart attack and stroke ($p > 0.05$). The findings suggest that while the community is relatively more aware of heart attack symptoms, stroke awareness is still moderate. Targeted educational interventions are recommended to improve stroke awareness.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Cardiovascular diseases (CVDs) affect the heart and blood vessels. According to the World Health Organization (WHO), approximately 17.9 million people died from cardiovascular diseases in 2019, with heart attacks and stroke responsible for 85% of these deaths (WHO, 2021). These conditions primarily result from obstructions that prevent blood flow to the heart or brain, leading to severe health issues and often death (Pallangyo et al., 2024).

1.2 Background of Study

A heart attack, also known as myocardial infarction (MI), occurs when the blood flow to the heart muscle is severely reduced or obstructed, typically due to the accumulation of lipids within the arteries. In Malaysia, ischemic heart disease remains the leading cause of death after it recorded 18515 deaths, 17% of the total medically certified deaths in the country. It has been Malaysia's principal cause of death for over two decades, recording an increment from 11.6% in 2000 to 17% in 2020 (Jabatan Perangkaan Malaysia, 2021). Chief Statistician Datuk Seri Mohd Uzir Mahidin said that unhealthy lifestyles and food intake are among the contributors to heart disease deaths. This is supported by the statement from the Ministry of Health, saying that the country is not categorized as a healthy country based on low health awareness among the people and the high rate of heart disease.

A stroke happens when the blood flow to part of the brain is disrupted or reduced, preventing brain tissue from receiving sufficient oxygen and nutrients. There are two types of strokes, which are blockage of the blood vessel (ischemic

stroke) or rupture of the blood vessel (hemorrhagic stroke) (WHO, 2020). In Malaysia, stroke is the third leading cause of death, following ischemic heart disease and lower respiratory infection. In 2019, strokes resulted in 19,928 deaths, representing 13.9% of the total deaths in the nation. Moreover, there were 47,911 newly reported stroke cases and 443,995 individuals living with disabilities due to strokes (Kay, 2022). Stroke depicts a significant burden not only in terms of mortality but also in terms of long-term disability, making it a crucial public health issue in Malaysia. Like heart attacks, stroke is preventable through a healthy lifestyle and the management of conditions such as hypertension and diabetes (WHO, 2021).

The burden of CVD, including both heart attacks and strokes, is significant and is expected to increase over the coming years. In 2020, ischemic heart disease accounted for 20.6% of all medically certified deaths, while stroke contributed 13.9%. Furthermore, the mortality risk due to major adverse cardiac events (MACE), including heart attacks and strokes, is expected to increase by 3 to 5 times for patients with comorbidities by 2025, potentially resulting in 31000 deaths annually due to CVD (Fong et al., 2023). Between 2011 and 2019, diabetes rates increased from 15.2% to 18.3%, and hyperlipidemia rates increased significantly (Fong et al., 2023). These two risk factors explain the high correlation between heart attacks and strokes in the population. Therefore, people who suffer from a heart attack are at high risk of stroke and vice versa due to the same vascular health problems. This study aims to assess the level of awareness and actions towards heart attack and stroke, and to examine their association with selected sociodemographic characteristics such as age and level of education.

1.3 Problem Statement

Heart attacks and strokes continue to remain significant public health challenges, both worldwide and in Malaysia. Despite advancements in medicine and public health initiatives, many people still hesitate to seek medical attention when they notice symptoms associated with these conditions. Studies have consistently shown that prompt medical intervention greatly improves outcomes for patients experiencing heart attacks and strokes, leading to decreased mortality rates and long-term disabilities (Ahmed et al., 2020). Nevertheless, the delayed recognition of symptoms and the reluctance to take action are barriers that result in poor health outcomes.

In Malaysia, cardiovascular diseases, especially ischemic heart disease and stroke, rank as the primary causes of mortality (Wan & Heng, 2024). However, despite these concerning statistics, public awareness of the symptoms related to heart attacks and strokes remains limited. Many people, particularly in suburban locales like Batu Maung and Penang, may not entirely understand the severity of these symptoms or the urgency of seeking medical help. This lack of awareness contributes to slower response times, reducing the efficacy of time-sensitive treatments, such as stroke thrombolysis or percutaneous coronary intervention for heart attacks (Luan et al., 2021).

Existing studies suggest that even when individuals recognize some symptoms, they may not respond appropriately due to misunderstandings, fear, or a lack of confidence in identifying life-threatening situations (Pallangyo et al., 2024). This gap between awareness and action is particularly alarming because it directly delays receiving necessary treatments, which worsens health outcomes.

This study aims to evaluate both the levels of awareness and the actions taken in response to heart attack and stroke symptoms among the community in Batu Maung. The findings of this research will help inform targeted health interventions to enhance public knowledge and emergency response behaviors, reducing the burden of cardiovascular diseases within the community.

1.4 Research Questions

The research questions for this study are as follows:

1. What is the level of awareness of heart attack symptoms among the community of Batu Maung, Penang?

2. What is the level of awareness of stroke symptoms among the community of Batu Maung, Penang?

3. Is there an association between selected sociodemographic characteristics (age, level of education) and the level of awareness towards heart attack and stroke symptoms among the community of Batu Maung, Penang?

1.5 Research Objectives

1.5.1 General Objective

The general objective of this study is to assess the awareness of heart attacks and strokes among the community of Batu Maung, Penang.

1.5.2 Specific Objectives

The specific objectives for this study are as follows:

1. To determine the level of awareness towards heart attack symptoms among the community of Batu Maung, Penang.

2. To determine the level of awareness towards stroke symptoms among the community of Batu Maung, Penang.

3. To identify the relationship between selected sociodemographic characteristics (age, level of education) and the level of awareness towards heart attack and stroke symptoms among the community of Batu Maung, Penang.

1.6 Research Hypothesis

Hypothesis 1 **(H_0):** There is no significant association between selected sociodemographic characteristics (age, level of education) and the level of awareness towards heart attack and stroke among the community in Batu Maung, Penang.

(H_1): There is a significant association between selected sociodemographic characteristics (age, level of education) and the level of awareness towards heart attack and stroke among the community in Batu Maung, Penang.

1.7 Significance of study

This study is significant as it will help improve public health by identifying gaps in the Batu Maung community's awareness regarding the symptoms of heart attacks and strokes. By gaining insights into the public's knowledge of these health issues and their responses, public health campaigns can be more effective in targeting

specific knowledge gaps. These efforts will focus on educating the community on recognizing symptoms and encouraging prompt actions, which is crucial for reducing treatment delays and ultimately saving lives. Studies indicate that lack of awareness and delayed reactions are significant contributors to poor outcomes for patients suffering from heart attacks and strokes (Ahmed et al., 2020). This will help in reducing the adverse effects of heart attacks and strokes within the community.

Furthermore, this study will support healthcare professionals, especially nurses, in developing more effective educational programs that teach individuals on when and how to act during cardiovascular emergencies. The outcomes will also provide valuable information for policymakers to improve health regulations and emergency response systems in Batu Maung. In addition, the results will serve as the groundwork for future research, assisting other related studies in other communities and contributing to broader efforts to reduce the burden of heart attacks and strokes nationwide (Luan et al., 2021). This study will improve local health education and contribute to long-term strategies for preventing and managing cardiovascular diseases (Pallangyo et al., 2024).

1.8 Definitions of Operational Terms

The operational terms used in this research proposal are shown below:

Table 1.1 Operational and Conceptual Definitions

Terms	Conceptual Definition	Operational Definition
Stroke	It occurs when the blood flow to the brain is blocked or when a blood vessel in the brain bursts or is blocked (WHO, 2020).	This study will be measured by asking the community to identify stroke symptoms using a self-administered questionnaire adopted from Ahmed et al., (2020).

Heart Attack	It occur when the blood supply to part of the heart muscle is blocked, causing damage (WHO, 2021).	This study will be measured by asking the community to identify heart attack symptoms using a self-administered questionnaire adopted from Ahmed et al., (2020).
Awareness	Understanding or knowledge of heart attack and stroke symptoms.	This study assess level of awareness among the community using a self-administered questionnaire adopted from Ahmed et al., (2020).
Community	The people living in one particular area or people who are considered as a unit because of their common interests, social group, or nationality (Cambridge Dictionary, 2024).	In this study, the community that lives in Batu Maung, Penang was assessed for their level of awareness.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review focuses on cardiovascular diseases, especially heart attacks and strokes, which are significant contributors to mortality worldwide and in Malaysia. These medical emergencies require immediate response and prompt action to reduce mortality and prevent long-term disabilities. The sooner medical treatment is received, the better the chances of a successful outcome (Anjana Devi et al., 2023).

2.2 Heart Attack

A heart attack, or also known as myocardial infarction, occurs when the blood flow to the heart is reduced or blocked, leading to damage or death of heart muscle tissue. This blockage is typically caused by a buildup of fat, cholesterol, or other substances forming a plaque in the coronary arteries (Fong et al., 2023). When the plaque bursts, it can lead to the formation of a blood clot, which obstructs the blood flow and oxygen supply to the heart muscle.

The signs and symptoms of a heart attack can vary between individuals but often include chest pain or discomfort, which may feel like pressure, tightness, or a squeezing sensation. This pain can radiate to the arms, neck, jaw, or back. Other symptoms might include shortness of breath, nausea, vomiting, cold sweats, and dizziness. Notably, some people, particularly women, might experience less typical symptoms, such as fatigue, indigestion, or upper back pain, which can delay seeking treatment (Fong et al., 2023).

Treatment for a heart attack focuses on restoring blood flow to the affected area of the heart as quickly as possible. This may involve emergency procedures like

angioplasty, where a balloon is used to open the blocked artery, often followed by placing a stent (Fong et al., 2023). Medications such as aspirin, thrombolytic, or blood thinners may also be administered to dissolve clots and prevent further blockages. Long-term treatment includes lifestyle modifications, medications to manage risk factors like cholesterol and hypertension, and cardiac rehabilitation programs to improve heart health and prevent recurrence (Fong et al., 2023).

2.3 Stroke

Stroke is a serious medical condition that occurs when the blood supply to part of the brain is interrupted or reduced, leading to a lack of oxygen and nutrients to brain tissue (Cheah et al., 2016). There are two primary types of stroke: ischemic, caused by a blockage in a blood vessel supplying the brain, and hemorrhagic, resulting from the rupture of a blood vessel. Stroke is a significant health concern globally, including in Malaysia, where it ranks as a leading cause of death and disability (Cheah et al., 2016).

The symptoms of a stroke can be sudden and vary depending on the affected area of the brain. Common signs include weakness or numbness on one side of the body, difficulty speaking or understanding speech, vision problems, dizziness, and severe headaches. The acronym FAST (Face drooping, Arm weakness, Speech difficulty, Time to call emergency services) is commonly used to help identify and act quickly during a stroke emergency (Cheah et al., 2016).

Treatment for stroke focuses on restoring blood flow in ischemic strokes, often using clot-busting medications like tissue plasminogen activator (tPA) or mechanical thrombectomy. For hemorrhagic strokes, treatment may involve managing blood pressure, surgery to repair blood vessels, or other interventions to stop bleeding. Early

rehabilitation is essential for stroke recovery and includes physical, occupational, and speech therapies to help regain lost functions and improve quality of life.

2.4 Awareness Towards Heart Attack

The awareness of heart attack symptoms is crucial for ensuring prompt treatment and improving survival rates. Heart attack typically presents as chest pain, discomfort in arms, neck, jaw, or back, and shortness of breath (Abdullah et al., 2020). Worldwide, the awareness of these symptoms is often inadequate. For example, a study in China found that, on average, participants only recognized 2.6 out of 6 common heart attack symptoms (Luan et al., 2021).

In Malaysia, the level of public awareness regarding heart attack symptoms is also low. A study by Ahmed et al. (2020) found that merely 71.65% of participants recognized chest pain as a symptom, while other symptoms, such as discomfort in the arms or neck, were less frequently acknowledged. This suggests that many individuals might fail to recognize a heart attack when experiencing unusual symptoms, delaying their reaction and reducing the probability of receiving timely treatment.

In terms of action, the same study emphasized that only 35.6% of respondents would call an ambulance if they or someone else showed heart attack symptoms, with many choosing to consult a doctor later. This delay in seeking immediate help can have severe consequences, as treatments for heart attacks, such as percutaneous coronary intervention (PCI), are most effective when administered shortly after symptom onset (Ahmed et al., 2020).

A study conducted in Kuantan, Malaysia, revealed that awareness of heart attack risk factors such as smoking, hypertension, and diabetes was also low, with fewer than 10% of participants recognizing the significance of regular physical

activity as a preventive measure (Abdullah et al., 2019). Improving public education on heart attack symptoms and emphasizing the need for urgent action can reduce the delay in seeking life-saving medical care.

2.5 Awareness Towards Stroke

Awareness of stroke is equally vital, as strokes are the second leading cause of mortality worldwide and in Malaysia. Symptoms of strokes include sudden weakness or numbness on one side of the body, confusion, difficulty speaking, and loss of balance (Sirisha et al., 2021).

Several studies have found that public awareness of stroke symptoms is low. A study by Pallangyo et al. (2024) reported that less than 1% of participants had satisfactory knowledge of stroke symptoms, with the majority only capable of recognizing one or two signs, such as numbness or speech difficulty. In Malaysia, Ahmed et al. (2020) found similar findings, where many participants failed to identify critical symptoms like sudden loss of balance or vision disturbances. This lack of awareness significantly contributes to delays in seeking medical help, which is particularly critical since treatments for stroke, such as thrombolysis, are most effective within a few hours of onset.

Actions in response to stroke symptoms are often inadequate as well. Studies suggest that many individuals are unaware that they should call an ambulance immediately when they or someone else exhibits stroke symptoms. For example, Luan et al. (2021) found that 34% of participants would not seek a doctor immediately, and 59% would recommend seeing a doctor later rather than seeking emergency medical services. In Malaysia, the need to enhance stroke awareness is highlighted by the National Stroke Association of Malaysia (NASAM) reports, which reveal that stroke

prevalence continues to rise, partly due to insufficient public education (Abdullah et al, 2019). Improving awareness of stroke symptoms and the urgency of immediate action is crucial for reducing the burden of this disease. Educating the public about the FAST (Face, Arms, Speech, Time) method to recognize strokes and act quickly has been proven to save lives by ensuring timely medical intervention.

2.6 Relationship Between Selected Sociodemographic Characteristics and Awareness Towards Heart Attack and Stroke

Understanding how various background characteristics, such as age, gender, level of education, employment status, and marital status, affect people's actions when faced with heart attack or stroke symptoms is essential for improving emergency response. According to research, these elements significantly impact whether people recognize symptoms and take the appropriate actions.

2.6.1 Age

Age has a significant effect on how people respond to heart attack and stroke symptoms. Elderly people sometimes delay seeking medical attention because they mistake symptoms like chest discomfort, weakness, or dizziness for other age-related diseases, such as arthritis or fatigue, rather than a life-threatening emergency (Ramli et al., 2024). Furthermore, they may not recognize the seriousness of the issue or might reduce the symptoms, resulting in a slower response time. As a result, elderly people are more prone to suffer negative outcomes as a result of delays in seeking timely medical care.

Younger people, on the other hand, might have trouble recognizing symptoms for various reasons. They may underestimate the severity of the symptoms because heart attacks and strokes are commonly seen as diseases affecting older persons

(Sirisha et al., 2021). This mindset might cause people to ignore early warning signals, such as minor chest pain or sudden weakness, as temporary or stress-related symptoms, leading to delays in seeking medical attention. Addressing age-related perception differences is essential for raising awareness and promoting prompt responses among all age groups.

2.6.2 Level of Education

Individuals' ability to detect and respond to heart attack and stroke symptoms is significantly affected by their level of education. People with higher levels of education are more likely to recognize the signs and appreciate the significance of taking immediate action, such as calling emergency services (Pallangyo et al., 2024). They may also have better access to health information and have participated in health education programs, allowing them to recognize symptoms better. This knowledge can significantly increase the likelihood of prompt treatment and improved outcomes.

On the other hand, individuals with lower education levels may not have the same level of knowledge about health or access to health information that helps identify symptoms. As a result, people may be more hesitant to seek help or underestimate the severity of the emergencies, causing delays in action (Ahmed et al., 2020). This knowledge gap can be a significant barrier to successful treatment and recovery. Thus, it is essential to prioritize educational programs that are accessible and understood to people from varied educational levels.

2.7 Theoretical and Conceptual Framework

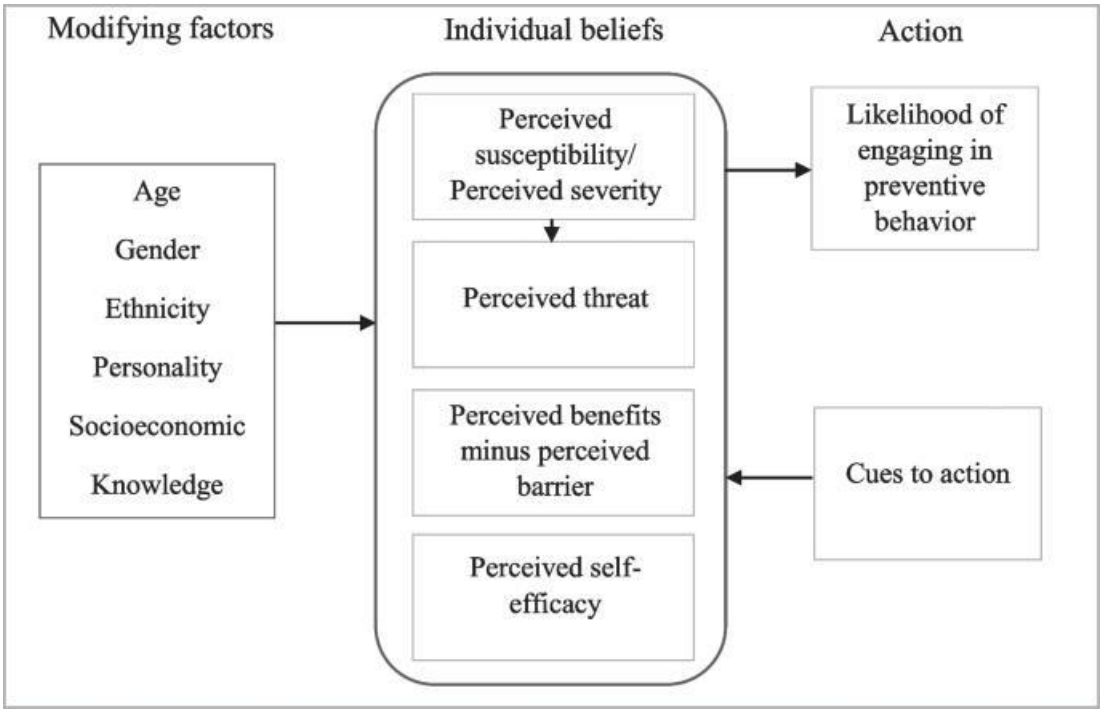

Figure 2.1 Structure of the Health Belief Model (Rosenstock, 1974)

The Health Belief Model (HBM) serves as the conceptual framework for this study. The HBM was developed in the 1950s by social psychologists at the United States Public Health Service to help explain why so many people refused to participate in disease prevention and detection campaigns. The HBM suggests that a person's health behavior is influenced by perceived susceptibility, perceived severity, perceived benefits, and perceived barriers, cues to action, and self-efficacy.

This study uses the HBM to explore how the community in Batu Maung responds to heart attack and stroke symptoms. Modifying factors such as age and level of education might affect individuals' belief, including perceived susceptibility, benefits, barrier, and self-efficacy. Based on figure 2.1, perceived susceptibility shows how the community's belief in their likelihood of experiencing heart attacks or strokes.

While, perceived benefits focus on the advantages of early detection and prompt action. However, perceived barriers, such as lack of knowledge about the symptoms or fear of taking unnecessary action, may delay their response, even if they recognize the severity of the situation (Ahmed et al., 2020). Next, perceived self-efficacy measures confidence in recognizing symptoms and acting promptly, such as identifying chest pain or sudden numbness as warning signs. Lastly, cues to action, such as health campaigns, personal experience, or professional advice, serve as external triggers to encourage behavioral changes.

By applying the HBM, this research will assess how awareness and beliefs influence actions during cardiovascular emergencies in Batu Maung. It will also identify barriers that prevent timely responses and explore ways to improve the community's awareness of recognizing symptoms and taking appropriate action.

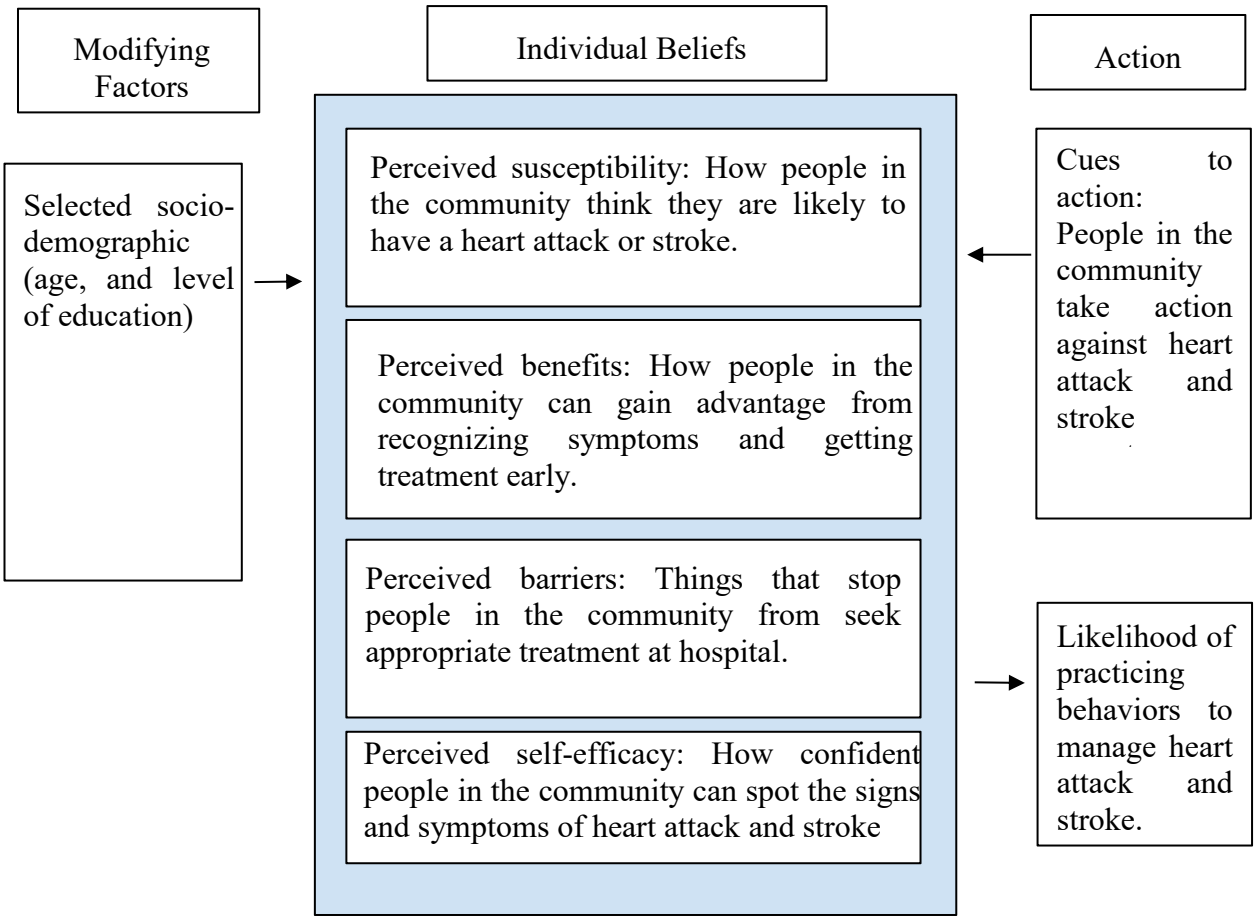

Figure 2.2 The adapted theory of Health Belief Model (Rosenstock, 1974)

CHAPTER 3

METHODOLOGY

3.1 Research Design

This study employed a cross-sectional design to assess the level of awareness of heart attack and stroke among the community in Batu Maung, Penang. A cross-sectional design is suitable for this study as it allows data to be collected from a population at a single point in time, which is ideal for measuring awareness levels and identifying associations between variables.

3.2 Research Location

The study was conducted in Batu Maung, a semi-urban area in Penang, Malaysia. According to Jabatan Perangkaan Malaysia (2020), the area is inhabited by approximately 15,000 people. This location was chosen because of its diverse population and accessibility.

Figure 3.1 The map of the Batu Maung, Penang area.

3.3 Research Duration

The study was conducted over one year (October 2024 - August 2025). Data collection was carried out over 3-month period (Jan - March 2025).

3.4 Population

The target population comprised individuals residing in Batu Maung, Penang.

3.4.1 Sample criteria

Several criteria were specified and set to ensure that the subject's data were suitable for research purposes and can attain the targeted goals at the end of the study to meet the research's objective.

3.4.1(a) Inclusion criteria

The specific eligibility requirements for inclusion in this study required that each participant must be:

- Age 18 years and above.
- Able to understand and respond in Malay.
- Individuals who live in Batu Maung, Penang.

3.4.1(b) Exclusion criteria

Subjects are excluded from this study if they:

- Individuals with a history of heart disease or stroke.
- Individuals with mental illness

3.5 Sampling Plan

3.5.1 Sample Size Estimation

Objective 1

The sample size for the first objective (To determine the level of awareness towards heart attack among the community of Batu Maung, Penang.), the sample size was determined using a single proportion formula.

$$n = \left[\frac{z}{\Delta}\right]^2 p(1-p)$$

Whereby,

n = required sample size

z = value representing the desired confidence level, $Z_{0.05}$, 1.96

Δ = desired level of precision, $\pm$ 5%

P = anticipation population proportion = 94.6% (Serafi et at., 2022)

$$n = \left[\frac{1.96}{0.05}\right]^2 0.946(1-0.946)$$

$$n = 79 + 10\%$$

$$n = 79 + 8$$

$$n = 87$$

The minimal sample size was 79; after considering the 10% dropout, the calculated sample size was 87.

Objective 2

The sample size for the second objective (To determine the level of awareness towards stroke among the community of Batu Maung, Penang.) was determined using a single proportion formula.

$$n = \left[\frac{z}{\Delta}\right]^2 p(1-p)$$

Whereby,

n = required sample size

z = value representing the desired confidence level, $Z_{0.05}$, 1.96

Δ = desired level of precision, $\pm$ 5%

P = anticipation population proportion = 14.6% (Sirisha et al., 2021)

$$n = \left[\frac{1.96}{0.05}\right]^2 0.146(1 - 0.146)$$

$$n = 192 + 10\%$$

$$n = 192 + 20$$

$$n = 212$$

The minimal sample size was 192, and after considering the 10% dropout, the calculated sample size was 212.

Objective 3

The sample size for the third objective (To identify the relationship between selected sociodemographic characteristics (age, level of education) and the level of awareness towards heart attack and stroke among the community of Batu Maung, Penang) was determined using a two-proportion formula.

Age (Van Hooser et. al., 2020)

Sample Size Calculator (web)

2 proportions - Hypothesis Testing

Epidemiological study design:	Cross-sectional
Proportion of factor in non-diseased (without outcome) (p_0):	0.081
Proportion of factor in diseased (with outcome) (p_1):	0.427
Prevalence of disease (outcome) (p):	0.5
Significance level (α):	0.05 Two-tailed
Power (1 - β):	80 %
Expected dropout rate:	10 %
Calculate / Reset	
Sample size, n_1 for diseased =	24
Sample size, n_0 for non-diseased =	24
Sample size (with 10% dropout), $n_{1\ drop}$ for diseased =	27
Sample size (with 10% dropout), $n_{0\ drop}$ for non-diseased =	27
Total sample size, n =	48
Total sample size (with 10% dropout), n_{drop} =	54

Figure 3.2 Sample Size Calculation for Sociodemographic Characteristics (Age)

n = 24 participants per group

n = 48 participants per 2 groups

The minimal sample size was 24 per group, and after considering a 10% dropout, the sample size calculated was 54.

Level of Education (Van Hooser et al., 2020)

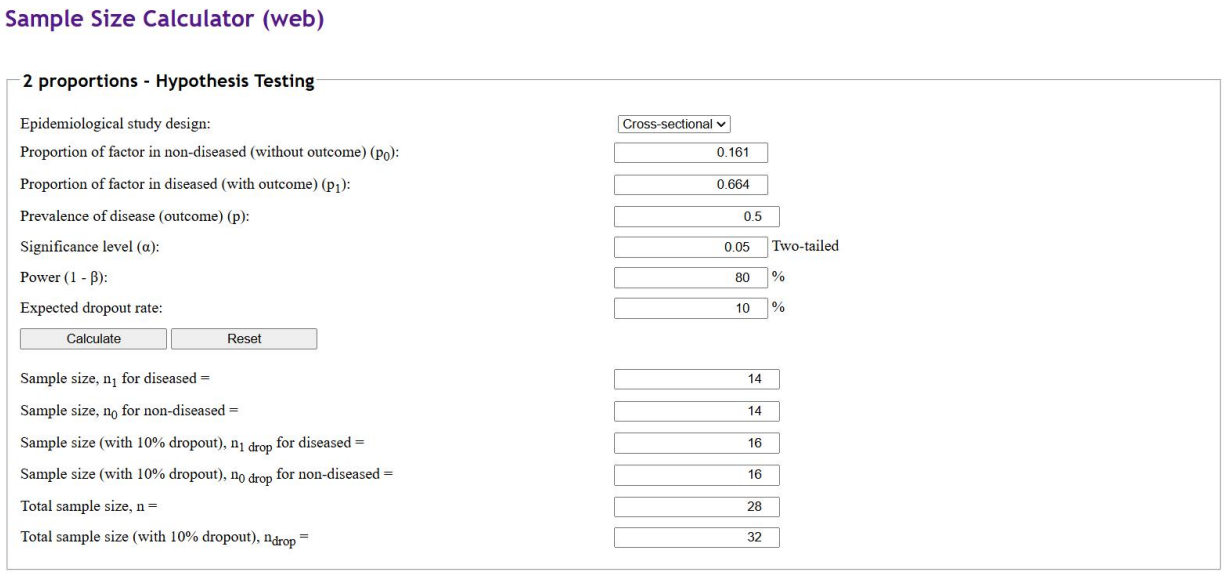

Figure 3.3 Sample Size Calculation for Sociodemographic Characteristics (Level of Education)

n = 14 participants per group

n = 28 participants per 2 groups

The minimal sample size was 14 per group, and after considering a 10% dropout, the sample size calculated was 32.

3.5.2 Sampling Methods

The sampling method for this study was convenience sampling, which involved selecting participants who were readily accessible and willing to participate. This approach is practical and cost-effective. Participants were approached through face-to-face interactions, social networks or online platforms and the questionnaire was distributed using Google Form or paper. Convenience sampling is suitable for this study due to its focus on general awareness towards heart attack and stroke, allowing for the inclusion of a diverse group of respondents that meet the inclusion criteria. The estimated sample size is 212 respondents.

3.6 Instrumentation

3.6.1 Questionnaire

One set of questionnaires was used to obtain relevant data on awareness of heart attack and stroke among the community of Batu Maung, Penang. This questionnaire was adapted from Ahmed et al. (2019), and permission was granted. The questionnaire was divided into four parts as explained as follows:

Section A: Sociodemographic Characteristics

This section includes age, gender, marital status, nationality, race, level of education, employment status, and average monthly income.

Section B: Evaluation of Awareness and Action towards Heart Attack Symptoms

Comprises 10 items assessing awareness of heart attack symptoms and appropriate action. This section was adapted from a validated instrument by Ahmed et al. (2019), covering domains such as knowledge of signs of hear attack such as chest

pain, jaw discomfort and actions to take such as calling emergency services. Responses were in three options: “Yes”, “No”, or “I don’t know”.

Section C: Determination of the Awareness of Stroke Signs and Symptoms and Risk Factors

Includes 7 items measuring awareness of stroke symptoms and response actions. This section was adapted from the instrument used by Ahmad et al. (2019), focusing on stroke-specific warning signs such as facial droop, speech difficulty and action. Responses were similarly scored as in Section B.

3.6.2 Translation of instrument

The original version of the questionnaire was established in English. As Malay is Malaysia's primary language, Ahmed et al. (2019) translated the questionnaire into Malay using a pilot study. Thus, the instrument was administered in two languages, English and Malay, for easy understanding among Batu Maung, Penang communities.

3.6.3 Validation and reliability of instrument

The reliability of the questionnaire was determined using Cronbach’s alpha of 0.75 (Ahmed et al., 2019) for awareness of heart attack and with 0.7 (Al Khathaami et al., 2021) for awareness of stroke, indicating acceptable internal consistency. The validity of the questionnaire was ensured through a pilot study conducted with 10 to 20 participants representative of the target population in Batu Maung. The pilot study was used to assess the clarity, and relevance of the questionnaire. Additionally, Section B (Social Habits and Lifestyle) was removed from the questionnaire as it was not directly relevant to the study’s objectives.

3.7 Variables

Variables are those attributes that are measured or manipulated in a study. The independent and dependent variables in this research study are shown in Table 3.1.

Table 3.1 Independent and Dependent Variables

Independent variable	● Sociodemographic characteristics (age, and level of education).
Dependent variable	● Awareness towards heart attack and stroke.

3.7.1 Measurement of Variables and Variable Scoring

Measurement and scoring variables are crucial in this study. It is to ensure meaningful and reliable results. The process of operationalization involves defining how variables are measured. This is to determine if a nominal, interval, ordinal, or ratio scale is used.

Independent Variable: Sociodemographic Characteristics

This study's sociodemographic characteristics include age, and education level. Age will be measured by classifying participants into age groups, such as 18-29, 30-39, 40-49, and 50 years and older. This classification allows the exploration of possible variations in awareness across various age categories. The level of education will be evaluated based on the highest educational qualification achieved by the individuals, sorted into groups such as primary education, secondary education, diploma, bachelor’s degree, and higher. This approach seeks to determine if an individual's educational background correlates with their awareness levels regarding heart attack and stroke symptoms.