# Study on Smoking and Myocardial Infarction in Malaysia

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**Abstract.** Myocardial Infarction is the number one cause of death in Malaysia. Among all individuals who have Myocardial Infarction, lower income households are the most affected group by this disease. Smoking will increase the risk of having Myocardial Infarction. Smokers are usually found in the lower income group. Lower income households who suffer Myocardial Infarction will face economic burden since the cost of Myocardial Infarction treatment is high. Due to financial constraints, many lower income individuals are not able to participate in insurance or takaful product. Moreover, smoking will increase the rate of premium for insurance and takaful hence increase the difficulty for the individuals to join the insurance or takaful scheme. The objective of this study is to investigate the association of smoking with Myocardial Infarction in Malaysia. This study used a narrative literature review to review paper related to smoking and Myocardial Infarction. From this study, we found that there are many controllable risk factors of Myocardial Infarction. Smoking status is the most significant risk factor of Myocardial Infarction. Smoking will increase the risk of an individual to have Myocardial Infarction. Other than that, most of the smokers were lower income group. B40 income group in Malaysia use 2.3% of their income for alcoholic beverage and tobacco. This is high compared to the M40 and T20 income group. Smoking not only triggered the risk of having Myocardial Infarction but also bring other dangerous effects such as respiratory disease and cancer. A further study on modelling the risk of myocardial infarction related to smoking and myocardial infarction is needed to understand the real association of smoking with Myocardial Infarction especially among lower income individuals in Malaysia.
***Keyword:*** Myocardial infarction, Ischaemic heart disease, cardiovascular disease, risk factors, smoking

## Introduction

Ischaemic heart disease (IHD) is the number one cause of death worldwide and in Malaysia. It is the number one cause of cardiovascular disease (CVD). Myocardial Infarction (MI) is the symptom of IHD. 3.8 million men and 3.4 million women died due to IHD yearly [1].

IHD is the condition when there is a development of waxy substance or plaque inside the coronary arteries. This condition will result in difficulty to supply the heart's tissue with blood. MI will occur if this condition reduces and block the blood supplies to the heart's tissue [1].

In Malaysia, number of CVD cases in National Heart Institute (NHI) increases by 5% every year. There were 10,000 cases of cardiology and hypertension and 4,000 cases of heart surgery in one year [2].

Smoking is a significant risk factor of IHD. 43% of men in Malaysia were smokers and 59% of men aged 21 to 30 years old were smokers [3]. Smoking was the most preventable cause of death worldwide and it has caused 5 million premature death globally each year [4].

### *Problem Statement*

MI is the main cause of death in Malaysia. The number of people who died due to MI had increased by 54% from 2007 to 2017 [5].

There is a high rate of tobacco consumption in Malaysia. 5 million smokers in Malaysia were classified as children or younger than 18 years old. More than 50% of male students in secondary schools were smokers [6]. Other than that, more than 30% of smokers smoke more than 25 cigarettes per day [3].

Smokers were likely to be found from the lower income group in Malaysia [6]. B40 household spend 2.3% of their monthly income for tobacco and alcoholic beverage, higher than T20 household. Around RM70 per month spend for tobacco [7].

The participant of lower income household in family takaful or life insurance is lower compared to higher income household. The reason of people taking insurance or takaful because they want to cover financial need if any unexpected loss happens in the future. Insurance or takaful act as financial security if such loss occurs [8]. Hence this study would like to investigate the association of smoking with myocardial infarction to emphasis the need of insurance in order to cover the high cost of medical expenses due to myocardial infarction.

*Objective*

To investigate the association of smoking with myocardial infarction.

## Methodology

This study used a narrative literature review to review paper related to smoking and Myocardial Infarction.

## Results and Discussions

*Myocardial Infarction Definition*

CVD is the disease related to the heart and blood circulatory system [9]. The most common CVD cases are IHD and stroke [10].

IHD is the condition when there is a development of waxy substance or plaque inside the coronary arteries. This will result in difficulty to supply the heart's tissue with oxygen. MI or heart attack will occur if this condition continues. If the blood flow to the heart does not recover, the section of the heart's tissue that does not have enough oxygen will die and this will result in serious health problems or death [1].

Generally, MI differentiates into two types which are ST-segment elevation MI (STEMI) and non-ST-segment elevation MI (NSTEMI). Those two definitions describe MI by the modification shown on the ECG [11].

Based on the clinical and prognostic variations, diagnosis, and anatomy there are several types of MI. Table 1 gives a summary of the type of MI.

**Table 1.** Myocardial infarction definition [12]

| Type | Description |
|---|---|
| Type 1: Spontaneous MI | MI linked to blockage of a coronary artery due to breaking up, erosion, fistulation, or dissection of atherosclerotic plaque that results in intraluminal thrombus in the coronary artery. |
| Type 2: MI secondary to an ischaemic imbalance | MI due to condition other than IHD resulting in increased demand for oxygen and reduced availability of oxygen such as anaemia, arrhythmias, hypertension, and hypotension. |
| Type 3: MI resulting in death when biomarkers are unavailable | Sudden unexpected cardiac death with symptoms of myocardial ischemia and new ECG changes figure but death occurs before biomarker results or before biomarker rise. |
| Type 4a: MI related to the percutaneous coronary intervention (PCI) | MI related to PCI is defined by Cardiac troponin (cTn) increase in patients with typical baseline cTn values more than 5 times 99th percentile or cTn increase above 20 per cent in patients with high cTn baseline values plus, symptoms of ischemia, new ischemic ECG changes, angiographic evidence and imaging evidence. |

| | |
|---|---|
| Type 4b: MI related to stent thrombosis | MI detected by coronary angiography or autopsies above the 99th percentile URL, with the rise or fall of cardiac biomarkers. |
| Type 5: MI related to coronary artery bypass grafting (CABG) | Defined as the increase of cTn in patients with normal cTn baseline values above 10 times 99th percentile URL with Pathological Q-waves development on ECG, angiographic evidence and imaging evidence. |

*Myocardial Infarction Death Trends*

IHD is the number 1 cause of death in Malaysia. 15.8% of total death in the world are due to IHD. Philippines shows the highest record of IHD death by 18.2%. Malaysia have 13.2% of death due to IHD and Thailand record the lowest percentage of IHD death by 11.2%.

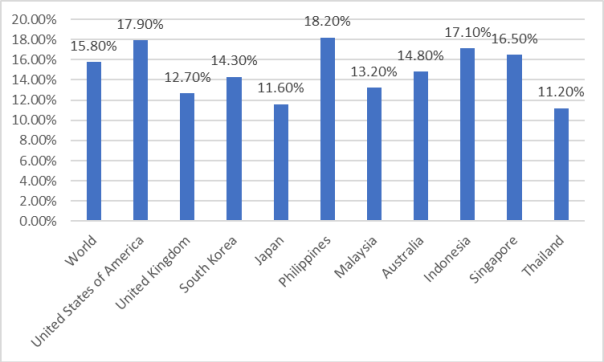


**Figure 1.** Percentage of death due to IHD [5]

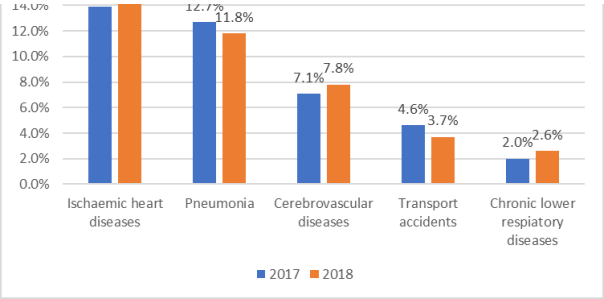


**Figure 2.** Five principal cause of death in Malaysia [5]

The rate of CVD death in Malaysia have increases every year. Report from Department of Statistics state that IHD is the number one cause of death in every state in Malaysia except for Sabah and Perlis. Melaka record the highest percentage of IHD with 19.3% while Johor and Putrajaya record the highest increase in percentage of IHD death by 3.5% and 3.1% each [13].

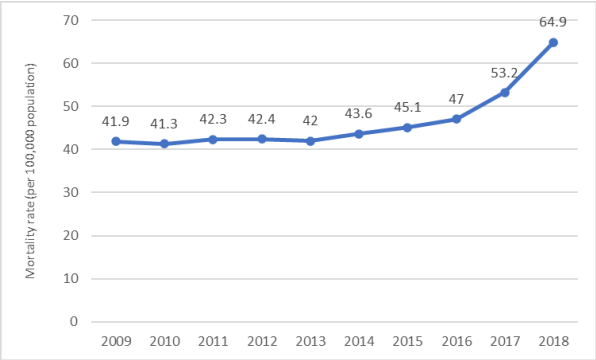


**Figure 3.** CVD death trend in Malaysia [5]

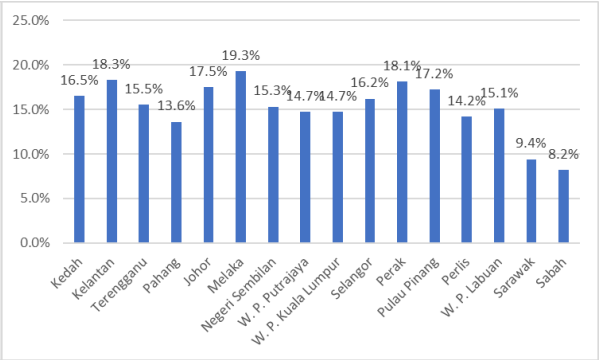


**Figure 4.** Percentage of IHD death in every states [5]

*Risk Factors Associated with Myocardial Infarction*

There are many risk factors involve in the development MI include smoking status, psychosocial factors, diabetes mellitus, hypertension, abdominal obesity, alcohol consumption, irregular physical activities and daily diet [14]. Smoking cigarette is one of the significant risk factors of IHD and it is controllable. MI patients who stop smoking after the first MI have 50% lower probability of dying compared to patients that continue to smoke [15].

In Malaysia, diabetes, high cholesterol and hypertension are the main risk factors of CVD. Smoking and Body Mass Index (BMI) level also have significant effect on MI. there are 1.7 million Malaysians have three major CVD risk factors while 3.4 million Malaysians have two major risk factors. Controlling these risk factors can reduce the risk of having MI in the future [10].

6.4 million peoples have hypertension. From those who have hypertension, only half of them know that they are living with the disease. From those who aware with having the disease, 90% of them are having treatment but only 45% have controlled blood pressure [10].

8 million adults have raised total cholesterol level. Among them, one in four are unaware of having such disease. Only 80% of high cholesterol patients seeking for medication but on 63% have their cholesterol level control. Mostly, people age 40 years and above are unaware of having high blood cholesterol conditions [10].

3.9 million people aged 18 years and above have diabetes. Among them, 8.9% do not know they have diabetes. Within the states in Malaysia, Negeri Sembilan, Perlis and Pahang record the highest prevalence of diabetes with 33.2%, 32.6% and 25.7% respectively [10].

Half of adults are overweight or obese and half of adults have abdominal obesity. Abdominal obesity is condition when waist circumference greater than 90 cm for men and 80 cm for women. [10].

21.3% of Malaysian are smokers. 21% of smokers smoke cigarette while 5% of smokers smoke E-cigarette. Other than that, one in two people claim they are expose to second-hand smoker at restaurant without air conditioning. 31% of population claim they expose to second -hand smoke at home, 27% at workplace and 9% at restaurant with air conditioning [10].

*The Harmful of Smoking*

Smoking cigarette was found to be the largest risk factors of premature death among developing countries. Approximately 3 million deaths were reported per year due to the smoking related diseases [16].

In Malaysia, there are about 5 million smokers aged below 18 years old. The research also found that 1 in 10 Malaysians aged between 13 to 17 years old were smokers. More than 50% of secondary schools' male students were caught to be smokers. Other than that, Malaysia's lower income population tends to possess a higher rate of smokers compared to the upper income population [6].

B40 household spend 2.3% of their monthly income on tobacco and alcoholic beverage which is higher than T20. It is estimated around RM70 per month will be used to buy tobacco [7].

Other than CVD, smoking can cause cancer, respiratory diseases, and chronic obstructive pulmonary diseases [17].

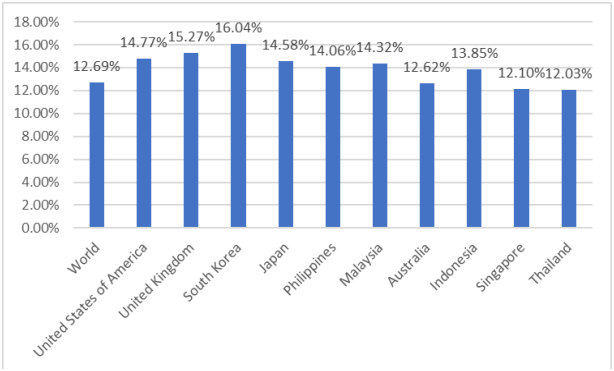


**Figure 5.** Percentage of death due to smoking [16]

In 2019, there are 21.3% of smokers in Malaysia. The trend of smokers in Malaysia is decreasing for the past year. Around 4.8 million peoples age 15 years and above in Malaysia are smoker. Most of

smokers in Malaysia are living in rural area. In average, people smoke 12.4 cigarette per day. Majority of male smokers smoked 15 to 24 cigarette per days while majority of female smokers smoked less than 5 cigarette per days [10].

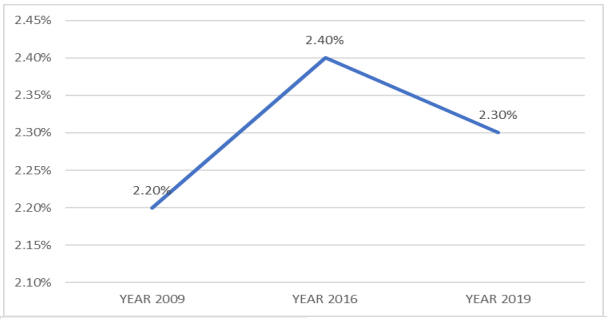


**Figure 7.** Smoking trend in Malaysia [10]

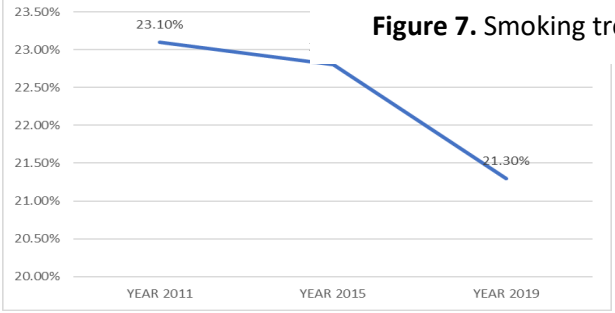


**Figure 6.** Malaysians monthly expenditure on tobacco and alcohol [7]

*Prevention of Myocardial Infarction*

Control blood pressure below 140/90, eat a healthy diet, maintain healthy weight, exercise regularly, stop smoking and reduce harmful use of alcohol can reduce the probability of having non-communicable diseases [10].

Having a healthy lifestyle such often consumption of fruit and vegetables, smoking cessation and regular exercise can reduce risk of MI [14].

Physical activities reduce the risk of MI. having 30 minutes per week of exercise is suggested to reduce the risk of MI [19].

Quitting smoking is one of the ways to prevent having MI. it was found that around 40% of smokers tried to quit smoking but only 4% to 6% succeed in their struggle[20].

## Conclusions

CVD is the main cause of death worldwide. Among all the disease in CVD, MI and stroke are the most common cases appear in the society.

There are many risk factors that contribute to the high number of death due to CVD. Hypertension, cholesterol level and diabetes are the main risk factors of CVD in Malaysia followed by BMI level and smoking.

Smoking is the main risk factors of premature death worldwide and one of the significant risk factors of MI. It is a controllable risk factor of MI. Controlling the amounts of cigarettes smoked can reduce the MI risk.

There are many ways to reduce the risk of CVD such as quitting or reducing smoking, having a healthy diet with regular consumption of fruits and vegetables, and having physicals activities such as sport, jogging and so on. Islam also encourage the people to have a healthy physical and spiritual, and taking enough nutrients to have a healthy body.

A further study on modelling the risk of myocardial infarction related to smoking and myocardial is needed to understand the real association of smoking with Myocardial Infarction especially among lower income individuals in Malaysia

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