

Mortality Rates Due to Coronary Heart Disease by Specific Sex and Age Groups among Malaysians

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Abstract— The objective of this study is to see the trends of Mortality Rate due to Coronary Heart Disease among Malaysian population by different Age and Sex groups. This is due to statistics report from Department of Statistics Malaysia and Ministry of Health Malaysia that shown the number of Malaysians suffered coronary heart disease has increase every year. This study has been conducted to see current mortality rates from coronary heart disease in Malaysia. This study used Age Specific Death Rate to calculate mortality rates of CHD. This study also aimed to see which age group and gender have most number of death due to coronary heart disease in Malaysia. The data used in this study is secondary time series data from year 2001 to 2013 and were taken from Department of Statistics Malaysia (DOS). Generally, the result shows that the mortality rate of Coronary Heart Disease among Malaysians increases every year. Number of males suffered Coronary Heart Disease are more than females and age group 60 and above are the highest and riskiest group to suffer coronary heart disease.

Index Terms— Coronary Heart Disease, Age Specific Death Rate

I. INTRODUCTION

CORONARY Heart Disease (CHD) is a disease in which a waxy substance called plaque builds up inside the coronary arteries. These arteries supply oxygen-rich blood to our heart muscle. Over time, plaque can harden or rupture (break open). Hardened plaque narrows the coronary arteries and reduces the flow of oxygen-rich blood to the heart. If the plaque ruptures, a blood clot can form on its surface. A large blood clot can mostly or completely block blood flow through a coronary artery. Over time, ruptured plaque also hardens and narrows the coronary arteries. If the flow of oxygen-rich blood to our heart muscle is reduced or blocked, angina or a heart attack can occur. Angina is a chest pain or discomfort. It may feel like pressure or squeezing in our chest. The pain can also occur in our shoulders, arms, neck, jaw, or back. Angina pain may even feel like indigestion. A heart attack occurs if the flow of oxygen-rich blood to a section of heart muscle is cut off. If blood flow isn't restored quickly, the section of heart

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muscle begins to die. Without quick treatment, a heart attack can lead to serious health problems or death.

Cardiovascular disease (CVD) has been the dominant cause of death in Malaysia for many years ago, with coronary heart disease (CHD) and stroke ranking high among leading causes of death. According to the latest data records from the World Health Organization, WHO, the rate of Mortality due to Coronary Heart Disease in Malaysia is increasing and the latest WHO data published in May 2014 Coronary Heart Disease Deaths in Malaysia has reached 29,363 or 23.10% of total deaths. The age adjusted Death Rate is 150.11 per 100,000 of population of Malaysia which is ranked 33 in the world. Coronary Heart Disease became the first ranked cause of death in Malaysia followed by Stroke, Influenza and Pneumonia, Lung Disease, Road Traffic Accidents, Diabetes Mellitus, Breast Cancer, Lung Cancer, HIV/AIDS and Others Injuries. Common factors of CHD are including smoking tobacco, overweight and obesity, high cholesterol in blood and diabetes [3].

II. MORTALITY RATES AND CHD

Mortality is incidence of death in a population. It is measured in various ways, often by the probability that a randomly selected individual in a population at some date and cause would die in some period of time. It is contrasted to morbidity. ("Mortality", 2012). The word "mortality" is derived from "mortal" who came from the Latin "Mors" (death). (Definition of Mortality, 2012). In other words, mortality is death or the state of being mortal (having a finite life). Mortality rate is a measure the number of deaths (in general, or due to specific cause) in a population, scaled to the sized of the population, per unit of time.

Mortality rate is the number of death due to disease divided by the total populations. For example, if there are 25 coronary heart disease deaths in one year in a population of 30,000, then the mortality rate for the population is 83 per 100,000 or 0.0083%. The Mortality rate can be distinguished into crude rate, prenatal mortality rate, the maternal mortality rate, infant mortality rate, child mortality rate, standardized mortality rate and age-specified mortality rate. (Mortality vs Morbidity, 2012).

While, Coronary Heart Disease (CHD) or also known as Ischaemic Heart Disease (IHD), is the collective term for disease that occur when the walls of the coronary arteries

become narrowed by a gradual build-up of fatty material called atheroma. The two main forms of CHD are heart attack (also known as myocardial infarction) and angina. When this condition happened, it will cause a person to die.

So it can be defined that mortality rate of CHD as the total number of deaths in a particular population caused by CHD in some period of time.

III. CHD MORTALITY RATES WORLDWIDE

Coronary heart disease is now the leading cause of death around the world. An estimated 3.8 million men and 3.4 million women die each year from CHD. In developed countries, heart disease is the leading cause of death in men and women and in Europe, CHD accounts for an estimated 1.95 million deaths each year. CHD also is the most common cause of deaths in the UK. An estimated 1 in 5 men and 1 in 6 women died from the disease each year. In 2003, CHD caused around 114,000 deaths in the UK. CHD is responsible for 110,000 deaths in England each year. More than 1.4 million suffer from angina and 275,000 people have a heart attack annually.

In Europe, according to World Health Organization (WHO, 2012), it is recorded that 42 percent of deaths caused by CVD and 41 percent from that was from Coronary Heart Disease (CHD), which is 2,655,364 peoples has died. There is similar ratio for females and males, which is 20 percent of all deaths caused by CVD, respectively. However, case-fatality rates from CHD have decreased substantially over the last 5-10 years but at a differing rates. The differing recent trends have therefore led to increasing inequalities in the burden of CHD between countries. Death rates from CHD are generally higher in Central and Eastern Europe than in Northern, Southern and Western Europe. In some Eastern European countries, including Russia and Ukraine, the mortality rate for CHD for 55-60 year olds is greater than the equivalent rate in France for people 20 years older. Western European countries generally have higher rates than Southern European Countries. For example the death rate for both men and women aged under 65 living in Ireland is 1.7 times higher than in Italy. If we look at the past 30 years death rates from CHD in Europe, which have been consistently falling in most Northern and Western European countries, trends in Central and Eastern European countries have been more mixed, including relative stability in some places for example Bulgaria and rapid increases in countries including Ukraine and Belarus. Between 1999 and 2009, death rates for men aged under 65 living in Iceland and the Netherlands fell by 57 percent and 55 percent, respectively, while in countries such as Ukraine, the Russian Federation and Lithuania, small decreases in death rates for that decade overall (up to 10% decrease from 1999 rates) hide a pattern of steep increases until the mid-2000s, followed by equally steep falls in recent years. In Estonia, women recorded a remarkable decrease of 60 percent in death rates from CHD between 1999 and 2009, while the Netherlands and Norway showed a halving of rates over the same period. Only in Lithuania and Kyrgyzstan were death rates from CHD for women higher in 2009 than in 1999.

Australian also has a higher fatality rate of CHD among

Australians. CHD resulted in more Australians deaths than any other single cause for both men and women. Australian Heart Disease statistics in 2015 reported that cardiovascular disease was responsible for 43,602 deaths in Australia in 2013, including 19,765 deaths from Coronary Heart Disease [4]. However, mortality from heart disease has decreased significantly in recent decades in Australia, as it has in many high-income countries, decreasing by more than 70% since the 1970s. Despite this decrease, CHD is still the cause of a significant burden of mortality, including premature mortality, in Australia. Among women, CHD was responsible for more than three times as many deaths as breast cancer in 2013, and among men, CHD caused more than twice as many deaths as lung cancer. The decreases observed in Australia have been similar to or greater than those in comparable high-income countries. Of all Australians aged 55-64 years, 8.8% reported living with heart, stroke or vascular disease and prevalence increases with age. The self-reported rate of heart, stroke or vascular disease was 17.1% among those aged 65-74 years, 26.0% among those aged 75-84 and 39.5% among those aged 85 years and over [20]. Besides smoking, sugar and fat intake in daily meals are one of the cause of CHD among Australians. Among secondary students, 38 percent of boys and 22 percent of girls consumed four or more cups of sugar-sweetened drinks per week. Less or physical inactivity among Australians also be the factors of CHD.

CHD also recorded a high percentage caused of mortality in Asia. Asian countries and regions such as Japan, the Republic of Korea, the people Republic of China, Hong Kong, Taiwan, and the Kingdom of Thailand have greater rate of mortality from coronary heart disease (CHD), whereas the opposite is true in Western countries. According to the vital statistics, East Asian countries have a lower mortality rate for CHD compare to CHD in other Asian countries and Western countries. . As half of the world's population lives in Asian countries, prevention of CHD in Asian is crucial. Hypertension, diabetes, hypercholesterolemia, and smoking are major risk factors for stroke and CHD in Asia as well as in Western countries. According to the research that was done by researcher in Japan, the stroke incidence decreased as a result of improvements in blood pressure control and reduction in the smoking rate over the past half century but the CHD incidence did not show a clear secular change, probably because the benefits of blood pressure control and smoking cessation were negated by increasing prevalence of both glucose intolerance and hypercholesterolemia.

Although Asian populations have lower serum cholesterol levels than Western populations, the prevalence of hypercholesterolemia has increased during the past half century in Asia. In addition, the smoking rate among Asian men is higher than for Western men. These results underscore that, in addition to blood pressure control, smoking cessation and the management of metabolic risk factors are very important for prevention of CHD in Asia. Took excess of meat and fatty foods in their daily diet became one of the factor how more Asians have high cholesterol especially among ASEAN like Malaysians, Indonesians and Philippines. However, in Japan and

Korean, the statistics of people suffering CHD are lower than other ASEAN countries although CHD became the top cause of death in their countries. It is influenced by their healthy lifestyle and took healthy meals in their daily diet.

IV. CHD MORTALITY RATES IN MALAYSIA

In Malaysia, there are also alarming statistic regarding cardiovascular disease scenario. CVD has been recorded as the leading killer for the past 30 years. The Malaysian burden of disease study conducted in 2000 found CHD to be the biggest cause of death with a total of 22,158 deaths or about one fifth of all deaths (Fauzi A, 2005). Between 1975 and 1989, coronary heart diseases and cerebrovascular diseases were the two leading causes of death in Malaysia [2]. The number of cardiovascular death of CHD cases in Malaysia as reported by Ministry of Health (MOH), has increased from 2556 in 2000 to 2948 in 2005. In 2009, there were 147,843 admissions for cardiovascular diseases at Malaysian government hospitals (6.91% of total admissions) (Ministry of Health, 2010).

From all cardiovascular deaths in 2009 in Malaysia, 16% were due to coronary artery disease, and 8% were due to cerebrovascular accidents making cardiovascular disease the leading cause of death (Ministry of Health, 2010). In 2010, cardiovascular diseases accounted for 24.5% of all deaths at government hospitals (Ministry of Health, 2010). Both men and women have featured CHD in Malaysia. For men, these two diseases contributed 21.5 percent of total years lost to premature deaths, while for women, they are contributed 25.2 percent. The age distribution of deaths due to CHD in this country appears to be similar to that in Western societies, mortality increasing with age. There were, however, 3.2% of 2,713 deaths in patients below the age of 40 years. The ratio for male and female sex was 2.2:1 although varied among the three ethnic groups; 2.5:1, 1.7:1 and 3.0:1 among Malays, Chinese and respectively.

There are several risk factors for heart disease among Malaysians. Some are controllable and others are not. Uncontrollable risk factors include older age, family history, and post-menopausal. For controllable, there are many factors including smoking, physical inactivity, obesity (BMI above 30), diabetes, uncontrolled stress and intake of high cholesterol in foods. Smoking, high cholesterol and physical inactivity or less regular exercises be the main of the leading causes of coronary heart vascular diseases in Malaysia. Global Adult Tobacco Survey (GATS) in 2012, reported that total smoker in Malaysia reached to 4 4.7 Million. One out of four of them are females and the balance are males. That why if we look at the statistics of CHD in Malaysia, the ratio of males suffered CHD are more compared to females.

V. CHD MORTALITY RATES BY AGE AND GENDER

Rates of Coronary Heart Disease are differ by age and sex groups in most of the countries. It also been happen in Europe. In 2014, cardiovascular disease rates recorded 4,082,100 (46%) number of deaths in Europe. Among of that, 1779347 (20%) are from CHD. Total number of deaths due CHD among females is higher than males which is 903,330 (21%) and 876,017 (20%) for females. From the

total deaths of males, 473,501 (18%) are premature-deaths before age 75 and 253,432 (16%) are premature-deaths under 65. For females, 232,683 (16%) are died under age 75 and 77,166 (10%) are died before 65 [13].

In Australian, cardiovascular disease was recorded for 43,602 deaths in 2013. Among of that, 19,765 are from CHD. Men recorded total of deaths 11,015 and women are 8,750. This is a small decreasing from 2012 and 2011 which are recorded 20,045 and 21,522 respectively. However, a small increasing rates of deaths in women due CHD in 2013 compare 2012 with reduce by 388. CHD also is among the top four causes of death for all age groups 35 years and above in Australian. Of all Australian aged 55-64, 8.8 percent reported living with heart, stroke or vascular disease and prevalence increase with age [20]. For Australians aged over 12 years in 2013, 23 percent were former smokers and 61 percent were never smokers. Overall, smoking rates in Australian higher in men and boys than women and girls.

In Malaysia, CHD was not even listed as one of the top 10 principal causes of medically certified deaths in 1955. From 1955 to 1965, it rose to second position and since 1980, has become a leading cause of death in this country. In 1987, CHD accounted for 28.3 percent from 24,549 of medically certified deaths in Peninsular Malaysia which is about 19 deaths a day. The sex ratio between male and female was 2.2:1 according three ethnics groups; 2.5:1, 1.7:1, 3.0:1 among Chinese, Malays and Indians respectively.

The proportion of deaths due to CHD among Malays, Chinese and Indians was 34%, 39% and 26% respectively. For the latest year, according to the latest WHO data published in May 2014 Coronary Heart Disease Deaths in Malaysia reached 29,363 or 23.10% of total deaths.

VI. METHODOLOGY

For this study, we will use cross-sectional data from the year 2001 to 2013. The data number of death due CHD among Malaysians was taken from Department of Statistics Malaysia.

The data used for this study are numbers of death due to CHD in Malaysia in the range 13 years from 2001 to 2013 by difference sex and age groups and no. of population in of Malaysians for the years 2001 to 2013. All data will be obtained from the Department of Statistics (DOS) Malaysia. This research used secondary data.

For this research Age Specific Death Rate by Sex will be used to calculate the rate of mortality due to Coronary Heart Disease by Specified gender and Age Groups among Malaysians. Age-Specific Death Rate by gender is the total number of deaths to CHD of a specific age groups by gender among Malaysians divided by the population of the same age group by gender among Malaysians and multiplied by 100,000. This method used by British Heart Foundation Health Promotion Research Group in Coronary Heart Disease Statistics edition 2010 to calculate Age-specific death rates per 100,000 population from CHD by Sex for the year 1998 to 2008 in the United Kingdom.

Age – Specific Death Rate by gender

$$= \frac{\sum q_x}{\sum m_x} \times 100,000$$

Where,

q_x = No. Deaths in Specified Age Group by gender

m_x = No. Population in the Same Specified Age Group by gender

x = Age Groups 0, 1-4, 5-9,, 80-84, 85 and over.

VII. RESULTS

The results for the mortality rate due to Coronary Heart Disease among Malaysians by age groups and gender are presented by comparing year by year from 2001 to 2013 for male and females, trends of mortality rates due CHD from year 2001 to 2013 for males and females and comparing trends of mortality rates CHD for men and women in Malaysian and United Kingdom from 2001 to 2008 by percentage in year 2001.

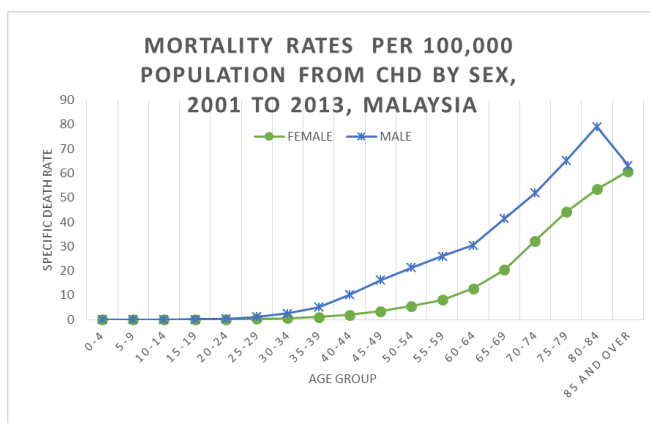


Fig. 1. Mortality Rate per 100,000 Population from CHD by Sex year 2001-2013, Malaysia.

Figure 1 shows the differences pattern of graph mortality rate due CHD between male and female from year 2001 to 2013 among Malaysians. Between ages 0 to 29, the graph shows that mortality rates for male and female are slightly equal which is close to 0. The previous study by Khoo at el, 2001, showed that one of the reasons there was lower rate for CHD at age below 29 is normally most of the males started smoke around aged 15 and above. So, the effect for this smoking will be affected to the smokers after 15 to 20 years later depends on the frequency they smoke in a day.

Starting at aged 30, the graph shows the rate of mortality CHD of males are increasing higher than females. According to [3], this is due to the number of smoker males are higher than females, which is the main factor that causes CHD. Smokers have two to four time greater risk of coronary heart disease than non-smokers. According to the report on smoking status among Malaysians adults by the National Health and Morbidity Survey (NHMS), current smokers in Malaysia were 23.1%, or equivalent to 4.7 million of Malaysians aged 15 years and above. From that

statistic, the prevalence of male current smokers was significantly higher at 43.9%, compared to 1.0% among females. However, for males, starting from aged 80 above, the rate of mortality due CDH decrease. The highest rate of Mortality Male at age group 80-84 which is 79 out of 100,000 or 0.079 % Malaysian' males died from CHD. While for female, the highest Mortality rate of CHD is at age group 85 and above where 61 out of 100,000 or equal to 0.061 % from 2001-2013 Malaysian' Females died due to CHD.

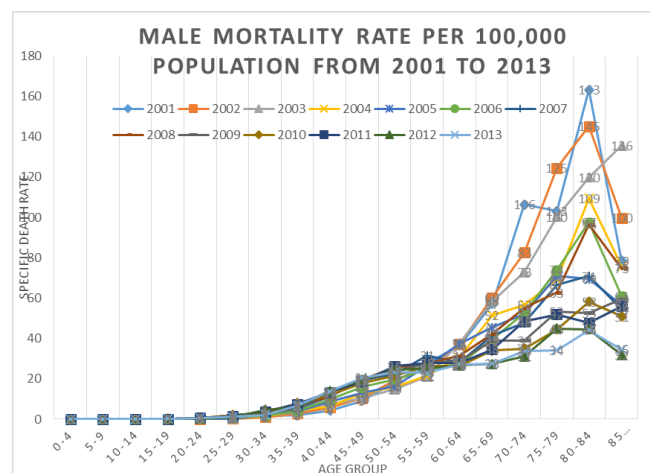


Fig. 2. Trends Males Mortality Rates of Coronary Heart Disease in Malaysia from 2001 to 2013.

Figure 2 shows the trends of Mortality Rate among Malaysian's Males for year 2001 until 2013. From age group 0-4 to 20-24, we can see that the trends are quite similar for all years which are close to zero. From the previous study on the risk factors of coronary heart disease [11], males under aged 25 were less exposed to the factors that bring to CHD such as smoking, high cholesterol, overweight and diabetes. Starting from age 25, the rate of Mortality due CHD among Malaysian's Males increase for all year in difference rate for difference years and age group. For age group 25-29, the mortality rate of CHD still at the same level if we look at the graph, but actually year 2008, 2010, and 2011 recorded the highest mortality rate which is 2 out of 100,000 died caused by CHD. However, it is still in a low rate.

CHD mortality rate at age group 30-34 also at a lower rate, where the highest number of deaths over 100,000 populations is 5 that was recorded in 2012. Same goes to aged group 35-39. Starting from aged group 40-44, the number of death due to CHD shows increasing drastically. A report from the National Cardiovascular Disease Database showed that from 2007 to 2009 among males, there was 29.1% who were under the age of 50 years death caused by CHD. Year 2001 recorded a very high rate at age group 70-74 which is 106 number of death recorded compared to other years and the second highest at year 2002 which is 83. At age group 75-79 year 2002 showed the highest number of death which is 125. But, for age group 80-84, year 2001 be the highest death rate which is 163 deaths. Generally, male mortality rate of CHD among Malaysians increases proportionally with the age, but from year 2001 to 2013, the

number of deaths due to CHD decreases as a whole.

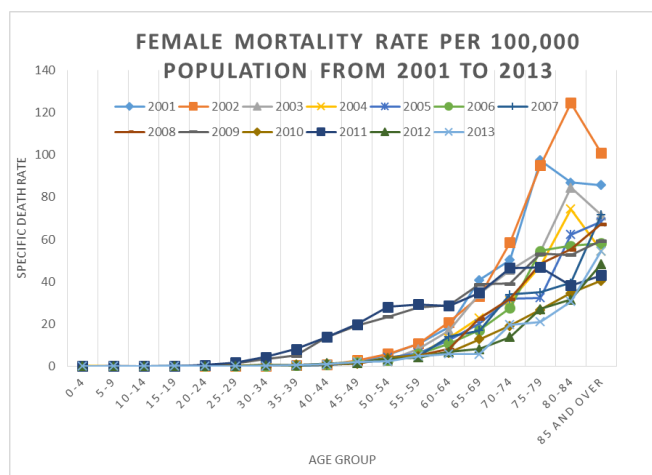


Fig. 3. Trends Females Mortality Rates of Coronary Heart Disease in Malaysia from 2001 to 2013.

Figure 3 shows Malaysian's Females Mortality Rate per 100,000 Population from 2001 to 2013. The graph obviously shown at age group 0-29, mortality rates are almost 0. From a previous study on the risk factors of coronary heart disease [11], Malaysians under aged 25 were less exposed to the factors that bring to CHD such as smoking, high cholesterol, overweight and diabetes. This is because of the effect of those factors normally affect women age 30 and above when they are inactive. Starting at age 30, we can see the rate of mortality of CHD increase for all years except year 2013 that started to increase at age 40.

Furthermore, at age group of 55-85, we can see that in 2001 and 2002, the slope increase rapidly. Towards the end, it decreases to a rate of below 90 for 2001 and rate of 100 for 2002 per 100,000 populations. Then, from the above Figure, it is also shown an increase throughout ages 40 to 85 and over for the year of 2005, 2009, 2010, 2012 and 2013. According to a study by T.Harishah et al., 2011, on the cardiovascular factors, women at aged 40 and above have higher risk to suffer CHD caused by the menopause.

For the year 2003 and 2004, the slope is almost the same throughout the age groups. Both slope increase gradually and reach more than 80 females for 2003 and more than 70 females for 2004 per 100,000 populations before decrease drastically at age group 80-84 years old.

VIII. CONCLUSION

In conclusion, this study has fulfilling the objectives of determining the recent Coronary Heart Disease Mortality Rate over time across different age and gender groups from 2001 to 2013 and also identify which age and sex groups have higher risk On Coronary Heart (CHD) disease in Malaysia. Generally, we can conclude that Mortality Rate due Coronary Heart Disease among Malaysians increase every year. Based on rate of mortality due CHD among Malaysians from 2001 to 2013, number of Males died from CHD is higher than Females. The number of death due CHD also increase when the age increase. Males start to suffer CHD at the age of 30 while for female, they start to

suffer CHD at the age of 40. Age 70 and above is the highest rate of death from CHD among Malaysians males and females. By comparing rates of mortality due to CHD in Malaysia and United Kingdom, we can see an opposite results. In United Kingdom, from 2001 to 2008, rate of mortality from CHD have declined, where in Malaysia, the rates increase over the year.

There are some factors that caused CHD in Malaysia. Smoking is one of the main cause of Coronary Heart Disease among Malaysians. According to the Malaysian government, about 10,000 people die from smoking-related illnesses every year. Then, blood with high cholesterol also can be one of the causes of CHD in Malaysia. Other factors that brought to suffer CHD are obesity and stress.

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