PERFORMANCE EVALUATION OF FOOD AND BEVERAGES INDUSTRY IN MALAYSIA USING GRA MODELS

FACTORS AFFECTING THE DIAGNOSIS OF ISCHEMIC HEART DISEASE

OPTIMAL VITAMINS INTAKE TO MAINTAIN A HEALTHY DIET USING WEIGHTED GOAL PROGRAMMING

SELECTION OF INSTITUTE FOR PUBLIC HIGHER EDUCATION (IPTA) AMONG FIRST-YEAR STUDENTS USING FUZZY AHP

A STUDY ON FACTOR AFFECTING THE DIAGNOSIS OF ISCHEMIC HEART DISEASE USING LOGISTIC REGRESSION MODEL

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1. Introduction

Ischemic heart disease (IHD) known as coronary heart disease is the most common form of heart disease. IHD occurs when the major blood vessels supplying the coronary arteries with blood, oxygen and nutrients to the heart become narrow by plaque. In addition, plaque forming by cholesterol also reduces the blood flow to the heart. Initially, a reduced blood flow may not cause any symptoms of IHD. However, as the plaque continues to build up in coronary arteries it may develop signs and symptoms of IHD such as feeling extremely fatigue, shortness of breath, chest pain and pressure, swelling in leg and feet, and difficulty sleeping. In addition, from 56.9 million deaths worldwide in 2016, more than half (54%) were due to the top 10 causes including IHD. IHD and stroke are the world's biggest killers, accounting for a combined 15.2 million deaths in 2016. These diseases have remained the leading causes of death globally in the last 15 years.

The number of patients who suffered of IHD has progressively increased in the upcoming year. The age in groups 20 to 40 years old has fewer chances of the heart disease prevalence, while 51 to 60 years old are at risk of ischemic heart disease (Bhatti et al., 2006). A high body mass index (BMI) also is associated with an increased risk of mortality from coronary heart disease (CHD), however, a low BMI may also be associated with an increased mortality risk (Canoy et al., 2013). In addition, previous research had found that family medical history is a major risk factor of IHD. This can be supported by a study at Tehran Heart Center (University of Tehran Medical Sciences) where among 6399 patients who suffer IHD, 953 of them had a positive family history of coronary artery disease (Hoseini et al., 2008). Based on (Špinar, 2012), systolic blood pressure is more important than diastolic blood pressure since it give the best idea of human risk of having a stroke or heart attack. In general, systolic blood pressure plays a crucial role in diagnosis of IHD. According to the 2014 Surgeon General's Report on smoking and health, smoking is a major cause of cardiovascular disease (CVD) and causing approximately one of every four deaths from CVD. Mostly, the research in CHD risk in diabetes focused on type 2 diabetes and insulin resistance. A diabetic woman is 4 to 6 times at risk of developing IHD compared to 2 to 3 times increased risk in a diabetic man age 27 to 29 years old.

Therefore the present study uses logistic regression analysis to determine factors that contribute significantly to the diagnosis of ischemic heart disease. In this study, the researcher examines the causes of IHD and to investigate a few independent variables which are age, systolic blood pressure, diastolic blood pressure, BMI, family medical history, tobacco use and diabetes mellitus.

2. Methodology

The data that was used in this study was secondary data which was taken from one of the general hospital in Negeri Sembilan. These data was selected from cardiology department. The data set is comprised on dependent variable which was the diagnosis of IHD and six independent variables which were age, BMI, family medical history, systolic blood pressure, diastolic blood

pressure, tobacco use and diabetes mellitus.

This study consisted of one dependent variable which is the diagnosis of IHD and a few independent variables. The independent variable included this study is age, BMI, family medical history, systolic blood pressure, diastolic blood pressure, tobacco use and diabetes mellitus.
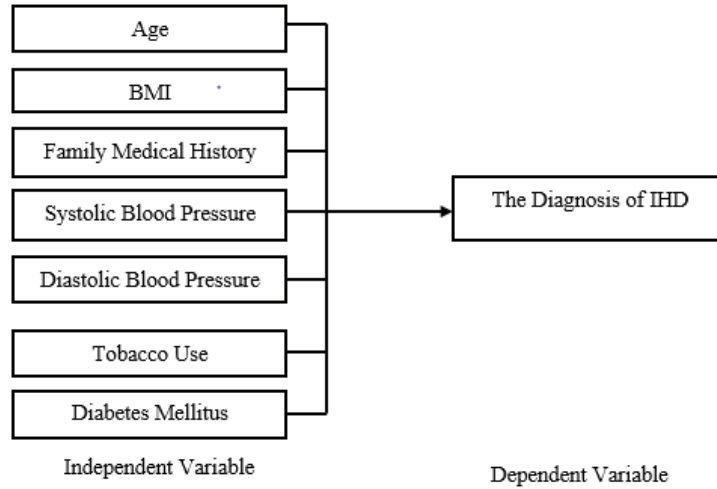

Figure 1: Factor Affecting the diagnosis of Ischemic Heart Disease

Logistics regression analysis was used to determine whether all determinants give a significant effect to the diagnosis of IHD. This technique is use instead of linear regression analysis because of the level of measurement in dependent variable is binary. Therefore the logistic regression is suitable for this research. There are four assumptions to be fulfilled in logistic regression technique which are; the dependent variable must have binary outcome, one or more of the independent variables are continuous, ordinal or categorical and lastly no multicollinearity exists between independent variables.

The logistic regression model is:

$$
\begin{aligned}
\text{Logit}(p) &= \text{Log}\left[\frac{p(x)}{1-p(x)}\right] \\
&= \beta_0 x_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k
\end{aligned}
\tag{1}
$$

3. Result and Discussion

Based on the methodology described, there are seven variables were selected to evaluate the diagnosis of IHD. Based on Table 1, Family Medical History, Systolics Blood Pressure (UBP), Diastolic Blood Pressure (LBP) and Diabetes Mellitus were statistically significant when the p-value for these variables were less than significance level.

$$
\begin{aligned}
\text{Logit}(Y=1) = \; &\text{-3.1333} + 0.0258\,\text{Age} + 0.0973\,\text{BMI} + 1.2540\,\text{Family Medical History} \\
&- 0.0417\,\text{Systolic Blood Pressure} + 0.0370\,\text{Diastolic Blood Pressure} \\
&+ 0.4829\,\text{Tobacco Use} + 1.4758\,\text{Diabetes Mellitus}
\end{aligned}
\tag{2}
$$

4. Conclusion and Recommendation

This study aimed to investigate the factors that contribute significantly to the diagnosis of ischemic heart disease and to obtain the best logistic model in diagnosis of IHD in general popula-

Table 1: Model Coefficient

Variables	Estimate Coefficient	Standard Error	p-Value
Age	0.0258	0.0155	0.0966
BMI	0.0973	0.0631	0.1229
Family Medical History	1.2540	0.4680	0.0074
Systolic Blood Pressure (UBP)	-0.0417	0.0122	0.0006
Diastolic Blood Pressure (LBP)	0.0370	0.0185	0.0456
Tobacco Use	0.4829	0.4724	0.3067
Diabetes Mellitus	1.4758	0.4894	0.0026
Constant	-3.1333	1.8888	0.0971

tion. From the result of this research, the factors that will affect the diagnosis of IHD are family medical history, systolics blood pressure (UBP), diastolic blood pressure (LBP) and diabetes mellitus. As recommendation, these four variables should be the physicists' concern when the patients want to do check up to detect the IHD in early stage.

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