

Study On Correlating Factors That Affect The Health Status Among Obesity In Elderly: A Preliminary Study

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Abstract: The aim of this paper is to examine all possible association among all the studied factor which influencing the health status among the elderly at Rumah Seri Kenangan (RSK), Pengkalan Chepa, Kelantan and RSK Bedong, Kedah. RSK is a government-funded public sheltered home for the elderly suffering from a lack of financial and family support. In this paper, four different methods have been applied in order to determine all the possible association which probably has a higher tendency towards the health status. Chi-square Analysis (CA), Binary Logistic Regression (BLR) and Multilayer Perceptron (MLP) were selected statistical tools for the factor determine as for the elderly at Rumah Seri Kenangan (RSK). The significant variable from CA will be used for the BLR analysis, for assessing the odd ratio. The next analysis is to conform (validate) the relationship between the dependent and independent variables. To achieve that the MLP procedure is applied. This methodology discovers the relationship between the target variable and the predictors for assessing health status among the elderlies. The obtained results from these analyses will be used as an indicator for improving the level of quality given to the elderly. In conclusion, there are two factors that contribute to the health status of the elderlies, gender factor, and duration of the stay at the RSK. The female elderly is more healthy compared to the male elderly. According to the duration of the stay, the elderly who had stayed more than 60 months is much healthier compared to the elderly who had to stay less than 60 months.

Index Terms: Chi-Square Analysis (CA), Binary Logistic Regression (BLR) and Multilayer Perceptron (MLP), Gender, Elderlies, Duration of Stay, Health Status.

1. INTRODUCTION

HEALTH status comprises of physical, civil, and psychological health. Evaluation of disease, like signs, symptoms, determine the illness, functional status, and mental stress assessment are entrenched in the conception of health status [1]. Evaluation of the health status has been proposed as a vital health determinant with preference being given to health promotion and prevention [2]. Nevertheless, aging is an immensely distinctive way which ramification, the health status of elder, there is evidence that elderly health status is integrated with an association of risk factors of psychological stress, morbidity, cognitive deterioration, high body mass index (BMI), smoking, fewer physical activities and fewer civil contacts [3]. The elderly persists to represent one of the rapid viable portions of the population in developed countries [4]. Obesity is also growing rapidly and is now established as a pivotal global public health problem. Thus, it is possibly surprising that more consideration has not been given to the issue of obesity in the elderly [5]. Visser et al. documented that people over 65 years of age, body fat was not only pertinent to mobility-related issues, but it also anticipated the development of complications in those without disabilities [6]. There is a dearth of information on health status, influenced factors and

health behavior among obesity elderly peoples. Identification of risk factors that cause a low health status to have a pivotal role for address unmet health demands and counselling community efforts to guidance improve health status among the population [7].

2 MATERIAL, METHODS AND RESULTS

There was a total of 174 respondents who participated in this research. They are consisted of 87 elderly from RSK Pengkalan Chepa and 87 elderly in RSK Bedong.

TABLE 1
DATA DESCRIPTION OF THE SELECTED VARIABLE IN THE STUDY

Num.	Variables	Explanation of user variables
1.	Health Status	1 = Not Healthy, 0 = Healthy
2.	Gender	0 = Male, 1 = Female
3.	Duration of Stay	1 = Less than 60 Months, 0 = More than 60 Months
4.	Married Status	0 = Yes, 1 = No
5.	Denture Hygiene	0 = Good, 1 = Moderate, 2 = Poor
6.	Dental Hygiene	0 = Excellent, 1 = Good, 2 = Fair, 3 = Poor
7.	Loss Appetite	0 = Severe Loss of Appetite 1 = Moderate Loss of Appetite 2 = No Loss of Appetite

Table 1 has shown data description of the selected variable in the study. Several variables have been identified as a dependent variable and an independent variable.

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The aim of this research to find out the most factor which has a high association with the health of the elderly. The structural framework of the proposed analysis is given in Fig 1 as follows:

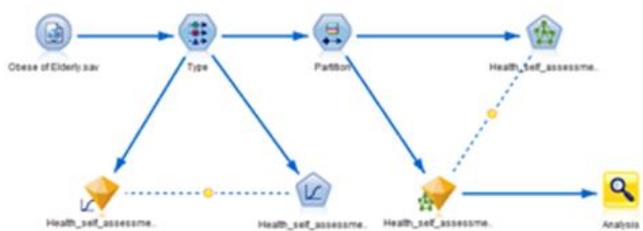


Fig. 1. Conceptual framework of the analysis using SPSS Modeler

These framework structures consist of three main analyses. The first analysis is focused on the method of chi-square analysis. Second analysis referring to the binary logistic regression. Through this analysis, there are two factors were influencing the most to health status. The third analysis is the multilayer perceptron. This methodology discovers the relationship between the target variable and the predictors and to assess the ability of neural networks as an assistant tool for the most significant factor that influences health status among the elderly.

Phase I: Chi-Square Analysis

TABLE 2
ASSESSING THE ASSOCIATION BETWEEN STUDIED FACTORS USING CHI-SQUARE ANALYSIS

Variable	Health Status		χ^2 (df)	p-value
	Yes n (%)	No n (%)		
Gender				
Male	14(27.5%)	10(7.1%)	3.28(1)	< 0.05*
Female	22(43.1%)	5(9.80%)		
Duration of Stay				
Less than 60 Months	11(21.6%)	11(21.6%)	7.89(1)	<0.05*
More than 60 Months	25(49.0%)	4(6.80%)		
Married Status				
Married	12(23.5%)	6(11.8%)	0.23(2)	0.89
Widow	14(25.5%)	5(9.8%)		
Single	10(19.6%)	4(7.8%)		
Denture Hygiene				
Good	1(4.30%)	0(0.0%)	1.145(2)	0.75
Moderate	8(34.8%)	5(21.7%)		
Poor	7(30.4%)	2(8.7%)		
Dental Hygiene				
Fair	1(3.60%)	0(0.00%)	0.42(1)	0.52
Poor	19(67.9%)	8(28.6%)		
Loss Appetite				
No Loss of appetite	27(52.9%)	8(15.7%)	3.93(2)	0.12
Moderate Loss of appetite	9 (17.6%)	6(11.8%)		
Severe Loss of appetite	0 (0.00%)	1(2.00%)		

*Significant at 0.05

Table 2 shows the results of the chi-square test for association between studied factors with the health self-assessment among obesity elderly. In this paper, there were present of genders. ($\chi^2(1)=3.28, p < 0.05$) was significant association with health assessment among elderly. Health status among male (27.5%) and female (43.1%). Regarding duration of stay, it was found that there was a statistically significant association with health status assessment among elderly

($\chi^2(1)=7.89, p < 0.05$). There is a high percentage among healthy elderly which are resident in more than 60 month (49.0%). Besides that, the finding, married status ($\chi^2(2)=0.23, p > 0.05$), denture hygiene ($\chi^2(2)=1.145, p > 0.05$), dental hygiene ($\chi^2(2)=0.42, p > 0.05$) and loss appetite ($\chi^2(2)=3.93, p > 0.05$) were no statistically significant association with health self- assessment among elderly. The result also shows that the healthy elderly which having no loss of appetite is about (15.7%), moderate (11.8%) and severe loss of appetite (2%). According to the obtained result, unhealthy elderly was found to have moderate (21.7%) and poor (8.7%) denture hygiene. For the case of dental hygiene, the percentage of poor dental hygiene was found among unhealthy elderly which is 28.6%. Regarding all the possible pairs of chi-square analysis, there were two important factors that have an association with health assessment among elderly which is gender ($\chi^2(2)=3.28, p < 0.05$) and the duration of stay ($\chi^2(2)=7.89, p < 0.05$) ($X^2 = 7.89(1), p < 0.05$).

Phase II: Binary Logistic Regression (BLR)

Multiple logistic regressions are a technique for modeling and studying an association between several variables. To explore the underlying between health status and the selected explanatory variables, one set about logistic regression is fitted in this section. According to the finding, the duration of the stay is the most factor that influences most to health status. The second factor is the gender factor.

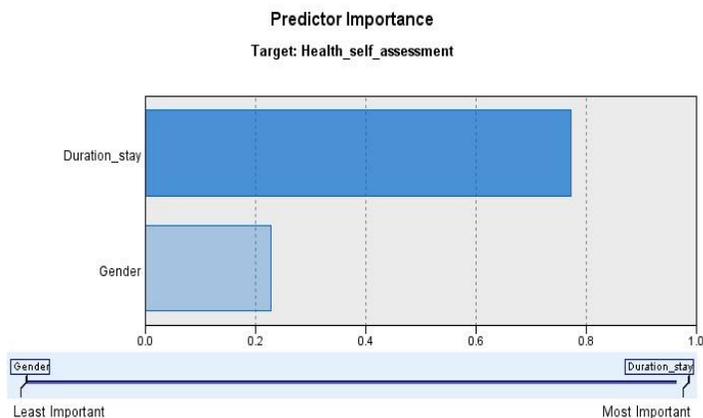


Fig. 2. Predictor importance using regression through SPSS Modeler

TABLE 3
Model Fitting Information

Model	Model Fitting Criteria		Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.	
Intercept Only	22.597				
Final	10.212	12.385	2	0.002	

Table 3 show the model fitting information for the model, ($\chi^2(2)=12.385, p < 0.05$). It is clearly observed that, the results of the model fitting is significant.

TABLE 4
HOSMER AND LEMESHOW TEST

Step	Chi-square	df	Sig.
1	0.017	2	0.991

The Chi-Square ($\chi^2(2) = 0.017, p > 0.05$), in this case the p-value is 0.991. It is not significant and does not reject the null hypothesis. Therefore, the model is well fits.

TABLE 5
CLASSIFICATION TABLE

Observed	Predicted	Self assessment of health status		Percentage Correct
		Not Healthy	Healthy	
Health status	Not Healthy	7	8	46.7
	Healthy	3	33	91.7
Overall Percentage				78.4

The classification table shows that 78.4% of cases are predicted correctly whether the elderly have the healthy status or not. 78.4% or above is considered as a good model. The following table is the output for the output for the parameter estimation.

TABLE 6
PARAMETER ESTIMATES

Health_self_assessment*	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower	Upper
Healthy	Intercept	0.662	0.561	1.394	1	0.238		
	[Gender=0.000]	-1.469	0.740	3.937	1	0.047*	.230	0.054 0.982
	[Gender=1.000]	0*	.	0
	[Duration_stay=0.000]	2.071	0.749	7.647	1	0.006*	7.936	1.828 34.451
	[Duration_stay=1.000]	0*	.	0

*Significant at 0.05

Phase III: Multilayer Perceptron (MLP) Analysis

MLP was created based on the two selected variables and also the recommendation proposed by IBM SPSS Modeler 18.0 [10]. The accuracy of MLP was 71.4%, which is a good level of accuracy.

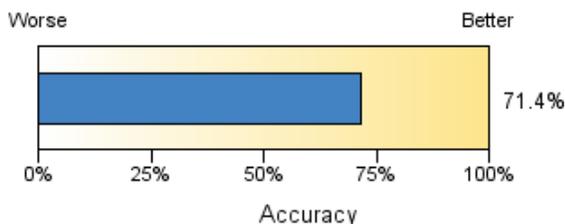


Fig 4. The Multilayer Perceptron (MLP)

The MLP architecture is consists of input, hidden and output nodes. There are two independent variables which are

considered as input for this analysis [9]. Figure 4 shows the architecture of the best (MLP) model with two hidden layers and one output layer which is referred to as the health status. Data were partitioned into two which is training (60%) and testing (40%) Below is the MLP result of the health status.

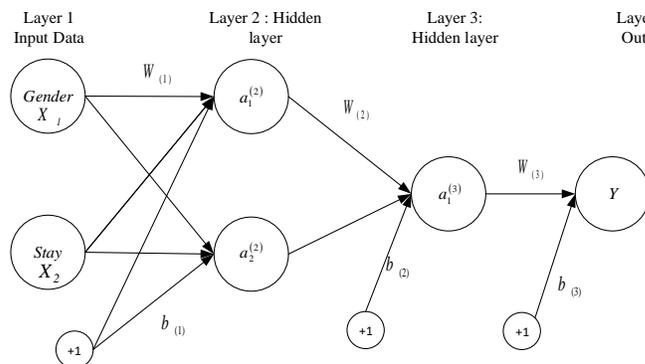


Fig.5 The architecture of the best (MLP) model with two input variables, two hidden layer and one output node

Fig 5 show the architecture of the best (MLP) which is considers two independent variables as inputs and one dependent variable which is health status as the output (output node).

TABLE 7

THE RESULTS OF CORRECT, WRONG AND MEAN CORRECT FOR TRAINING AND TESTING

Input Variables:	Training	Testing
Psychological Stress		
Weight Loss		
Correct	71.43%	69.57%
Wrong	28.57%	30.43%
Mean Correct	76.30%	78.80%
100% Accuracy Above	82.60%	82.60%

Table 7 summarizes the training and testing from the proposed MLP model. To see the MLP propose is well generalize or not, it can be measured through training and testing. In this case, the performance of the MLP was evaluated as shown in Table 7. The training dataset for Correct is given as (71.43%) and the measures of accuracy are relatively similar to the testing dataset (69.57%). The purpose of the current study is to examine from the view of the MLP model the most significant factor that influences health status among the elderlies. The significant variables from the binary logistic regression (LR) model are used as the input variables of the MLP neural network model. The binary logistic regression of the health status among the elderly showed that sex and duration of stay in RSK were significant factors that affects the health status among the elderly. Using the selected significant variables, the binary logistic regression model was built and the performance of the MLP neural network model for being tested. The performance of MLP has evaluated four different criteria of training and testing/out-sample. Hence, two variables which were gender and duration of stay in RSK were the most influential of health status from the view of (MLP) neural network model.

3 SUMMARY AND DISCUSSION

The main focus of this paper is to reveal the main factor which related to health status. Using Chi-Square analysis, there are two factors were associated to the health status. The main factor which contribute most to the health status is duration of stay ($\chi^2(1) = 7.89(1), p < 0.05$) in RSK 77%, while gender factor ($\chi^2(1) = 3.28, p < 0.05$) is contributing 23%. In this paper three different methods have been used: (i) chi-Square analysis (ii) binary logistic regression model (iii) multilayer perceptron. It is surprising that in all these models, it appears that gender and duration of stay is the most dominating factor in explaining the health status. These two factor were validated through the MLP procedure. This methodology discovers the relationship between the target variable and the predictors for assessing health status among the elderlies. According to the finding, the health among the elderlies is better after 60 months of being a resident RSK. Female (43.1%) having are healthier compared to male (27.5%). As conclusion, these promising techniques had led to successful research and give the best results for decision making especially for the decision-maker among the caregivers.

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