

# Development of a questionnaire on Prevention and Risk of Metabolic Syndrome among a rural population in Kelantan.

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**Abstract**—The number of metabolic syndrome is increasing, necessity an assessment of knowledge to avoid this population growing. The aims of this study were to develop and validate Malay questionnaire on knowledge of prevention and risk on metabolic syndrome. **Methodology:** Cross sectional study was done among 200 samples from three villages in Bachok, Kelantan by face-to-face interview. Twenty-eight items were developed by a group of public health experts. To assess test retest reliability, 62 from all respondents were re-interviewed for the second time after two weeks interval. **Result:** Respondents were aged between 18 to 84 years old. Majority of the subjects were Malay (98%) and female (89%). Two items from the original questionnaire were deleted due to low correlations and after being judge unduly influence item. The factor loading using principal component analysis with varimax rotation was ranged from 0.41 to 0.84. Internal consistency of the components using cronbach's alpha was ranged from 0.403 to 0.809. Intra Class Correlation (ICC) test was performed for test-retest reliability with the coefficient at 0.95. **Conclusion:** An acceptable questionnaire was developed for measuring the knowledge on prevention and risk of metabolic syndrome. The feasibility was present and the internal consistency and ICC were excellent. It can be used to explore the baseline of knowledge of metabolic syndrome before tailoring any health education or promotion for preventing metabolic syndrome in Malaysia.

**Index Terms** Metabolic syndrome, validation, questionnaire, knowledge, factor analysis.

## I. INTRODUCTION

Definition of metabolic syndrome was initially introduced in 1998 by WHO. After that, several agencies such as International Definition Federation (IDF) and National Cholesterol Education Program Adult Treatment Panel III (NCEP/ATP III) have proposed their own definition. Generally, metabolic syndrome is characterized by constellation of insulin resistance, hyperlipidaemia, central obesity and high blood pressure [1].

Prevalence of metabolic syndrome is accelerating not only in western country, but also in asian countries. Using NCEP/ATP III definition, 28.4% are reported of having metabolic syndrome in Jakarta, Indonesia [2]. Meanwhile, in India and China, based

to IDF definition, prevalence of metabolic syndrome is 43.2% [3] and 33.9% [4] respectively. Using the same definition, the prevalence of metabolic syndrome in Malaysia is 37% [5]. It is high in urban as well as in rural community [5, 6, 7].

Prevention by primary intervention such as exercise regularly and eating healthy diet are very important to benefit for this disease not accelerating in the future. Thus, assessing their knowledge on this syndrome is very useful for planning intervention especially for health education and promotion, so that the intervention is more specific.

Questionnaire is one of the common tools has been used to assess knowledge and it can measure knowledge effectively. To ensure a questionnaire is valid, it must go through a validation process for assessing their ease of comprehension, relevance to their intended topics, effectiveness in providing useful information, and the degree to which the questions are interpreted and understood by different individual [8].

There were several studies in measuring knowledge on diseases that are related to metabolic syndrome in Malaysia [9, 10], but, there are no available questionnaires that measure knowledge on prevention and risk of metabolic syndrome using Malaysian local language. This study is aim to develop and validate a Malay language questionnaire to measure the knowledge on prevention and risk of metabolic syndrome.

## II. METHODOLOGY

This cross-sectional study was done among rural community in Bachok, Kelantan. Houses were chosen randomly using simple random sampling and only one respondent from each house was selected to be the respondents. Malaysian who at least 18 years and understand Malay language could participate in this study.

Criteria considered in calculating sample size were subjects-to-variable ratio, internal consistency, and confident interval width for test retest reliability. After consider 20% of non-response, sample size was determined at 214.

### A. Design of the Questionnaire

The questionnaire began with socio-demographic characteristics including gender, age, race and education level. Then followed

by 28 items about the risk and prevention of disease that related to metabolic syndrome. The questionnaire was structured in Malay language for face-to-face interview. It was developed based on reviews of International recommendation and guidelines for treatment or prevention of metabolic syndrome [11,12]. A group of experts from University Science of Malaysia (USM) which consist of four endocrinologists, one epidemiologist, one dietician, one family medicine specialist and one diabetic epidemiologist were involve to create the items.

The questions need to be answered as “True”, “False” or “Do not know”. Score were given as zero for incorrect answer, one for “don’t know” answer, and two for correct answer.

Pre-test (n=6) and pilot studies (n=35) were done prior to the study. After that, minor revisions were made in response to respondents’ suggestion and the initial version of the questionnaire was finalized. There were two interviewers in collecting the data, therefore discussion was made between the interviewers to standardized the way to interview. Besides that, 36 from the total respondents were selected by simple random sampling to be interviewed two times by different interviewer. Finally, to test the reliability of the questionnaire test-retest was done among 62 respondents who were re-interviewed again after two weeks’ interval by the same interviewer.

### III. RESULT

A total of 200 respondents age ranged between 19 to 70 years old (mean (SD):46 (17) agreed to participate consequential the response rate of 93%. Majority of the respondents were female (80%) and Malays (98%). Meanwhile, with regards of education, 41% had secondary education meanwhile 20% had tertiary education.

#### A. Item level descriptive statistics

The mean values of 28 items ranged from 0.41 to 1.9 (Table 1).

Table 1: Descriptive analysis of each item.

Items	Mean score (SD)	Correct answer no (%)
1	1.6 (0.67)	132 (66.0)
2	1.5 (0.76)	135 (67.5)
3	1.7 (0.55)	145 (72.5)
4	1.5 (0.80)	133 (65.5)
5	1.4 (0.84)	125 (62.5)
6	1.6 (0.55)	131 (65.5)
7*	1.8 (0.42)	132 (66.0)
8	1.8 (0.51)	160 (80.0)
9	1.8 (0.46)	166 (83.0)
10	1.7 (0.56)	155 (77.5)
11	1.6 (0.55)	132 (66.0)
12	1.7 (0.54)	140 (70.0)
13*	1.8 (0.45)	164 (82.0)
14	2.0 (0.24)	191 (95.5)

#### B. Statistical Analysis

All statistical analyses in this study were conducted by using SPSS 20. Descriptive statistics were used to describe demographic characteristics and for each item by calculating the mean (SD) and frequency (%). Principle Component Analysis (PCA) extraction method with direct varimax rotation was conducted on the items to determine the factor structure of the scale. To verify that the data set is suitable for factor analysis, the Kaiser–Meyer–Olkin Measure of Sampling Adequacy (KMO) [13] and the Bartlett’s test of sphericity [14] were applied. The criteria used to select the number of factors and the number of items within a factor, exploratory factor analysis included: eigenvalue greater than 1; item-factor loading of at least 0.4 [15]. Test-retest data was used to assess the stability of the questionnaire by using intra class correlation (ICC) analysis. Cronbach’s alpha for internal consistency and Kappa statistics is for inter-viewer reliability.

#### C. Ethical approval

The study was approved by Medical Research and Ethics Committee Ministry of Health, Malaysia. This study also approved by Research Ethics Committee (Human), USM.

15	1.8 (0.46)	162 (81.0)
16	1.2 (0.90)	106 (53.0)
17	1.5 (0.70)	122 (61.0)
8*	1.8 (0.50)	169 (84.5)
19	1.7 (0.61)	158 (79.0)
20	1.8 (0.42)	169 (84.5)
21	1.6 (0.73)	149 (74.5)
22	1.5 (0.75)	120 (60.0)
23*	1.7 (0.63)	157 (78.5)
24*	0.4 (0.77)	35 (17.5)
25	1.9 (0.27)	191 (95.5)
26	1.4 (0.85)	131 (65.5)
27	0.7 (0.66)	<b>39 (19.5)</b>
28*	1.7 (0.62)	153 (76.5)

\* The items were excluded in the final analysis

#### B. Factor Analysis

Six items were removed due to low correlation with the other items resulting only 22 items left to be continued for further analysis. Factor loading is shown in Table 2 and Fig. 1. Scree plot indicated that a five solution was appropriate. The five factors accounted for 50.73% of the total variance. All items loaded at greater than or equal to 0.407. The KMO value was 0.73 and Bartlett's Test of Sphericity was significant ( $p$  value= $<0.001$ ). All the factors had 0% of floor and ceiling effect

#### C. Analysis for Consistency

Cronbach's coefficient alphas were calculated for each factor to assess internal consistency of the factors. Table 2 shows the range of Cronbach's alpha for was from 0.403 to 0.809. Intra class correlation (ICC) was 0.95 for test re test reliability. Meanwhile, Kappa statistics was performed among 36 samples for inter-rater reliability and value is ranged from 0.65 to 0.96 for all items.

Table 2: Validity and reliability analysis.

Total items	Factor loading	Cronbach's alpha	ICC (CI) n=62
6	0.57-0.79	0.809	0.95 (0.93, 0.97)
7	0.41-0.79	0.688	
3	0.56-0.84	0.653	
3	0.61-0.75	0.522	
3	0.52-0.74	0.403	

Scree Plot

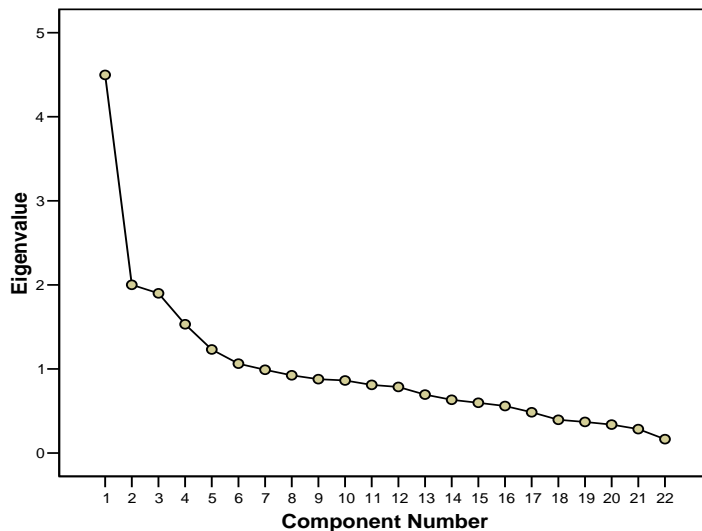


Figure 1: Scree plot

#### IV DISCUSSION

The sample size of this validation study was enough to perform factor analysis. This was support by all the KMO values were above 0.5 and the Bartlett's tests were significant for all factor analysis.

The results from PCA reveal that the items was divided to five factors with the eigenvalue more than one. The five factors identified were

- Preventive measures of heart disease
- Diabetes mellitus and hypertension control measures
- Diseases related with metabolic syndrome
- Diseases not related with metabolic syndrome.

- Weight management.

All domains produced acceptable cronbach's alpha ranged from 0.403 to 0.809. Intra class correlation (ICC) for both test retest and inter-rater reliability has at least moderate reliability.

The questionnaire has achieved the content validity through question development steps. Face validity was ensure during the pre-test among six people from different level of education. Factor analysis has indicated acceptable construct validity. Reliability of this questionnaire was good by showing acceptable Cronbach's alpha and excellence intraclass correlation (ICC). Kappa statistic was used in measuring inter rater reliability in current study. The results shown there was excellent inter-rater reliability with the value is more than 0.5.

This questionnaire has gone through the face validity process, acceptable factor loading, and excellent test retest and inter rate reliability. Even though one of the domain has internal consistency less than 0.5, but the items are very useful in conducting metabolic syndrome education programs.

This questionnaire is acceptable to measure knowledge on prevention and risk of metabolic syndrome, but it can be improved by included suburban and urban population as the respondents. Therefore, it can be used for Malaysian population to measure knowledge on prevention and risk of metabolic syndrome.

#### I. CONCLUSION

In conclusion, this questionnaire is acceptable to be used in measuring the knowledge on metabolic syndrome among rural population in Malaysia.

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