

Development, validity and reliability of a questionnaire on knowledge, attitude and practice (KAP) towards whole grain among primary school children in Kuala Lumpur, Malaysia

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Abstract

This study aimed to develop and validate whole grain KAP questionnaire among children. A guided self-administered questionnaire was developed. In this cross sectional study, a total of 207 children aged 9 to 11 years in Kuala Lumpur, Malaysia were recruited. Knowledge domain was considered as optimal level of difficulty and able to discriminate performance of good and poor children. Construct validity was assessed using exploratory factor analysis with principle components method and varimax rotation. Four factor-solutions emerged for attitude domain whereas 3 factor-solutions were constructed for practice domain. Internal consistency was acceptable for knowledge (KR20=0.70), attitude (CA=0.72) and practice (CA=0.73). Test-retest reliability intra-class correlation coefficients for knowledge, attitude and practice domains were 0.80, 0.78 and 0.79 ($p < 0.001$), respectively. This is a feasible questionnaire which can be a useful tool for measuring whole grain KAP and assessment tool to evaluate the effectiveness of whole grain intervention among children in Malaysia.

Keywords

Children
Malaysia
Reliability
Validity
Whole grains

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Introduction

Whole grains include cereal grains that consist of cracked, ground or intact grain which incorporate all the components of the natural grain, including endosperm, bran and germ. The mentioned components are present in the same relative proportions in wholegrain cereals as they exist in the intact grain (American Association of Cereal Chemist, 2009). Endosperm is composed mostly of starch and small amounts of protein and lipids. Germ and bran are a rich source of B vitamins, protein, fiber and minerals (Slavin, 2004). Wholegrain products include wholegrain ready-to-eat cereals (RTECs), cooked cereals, wheat germ, bran, corn, brown rice and brown bread (Liu, 2003).

Whole grains are good source of B vitamins, complex carbohydrate, dietary fiber, resistant starch, minerals, phytochemicals and other substances (Liu, 2003). The 2010 Dietary Guidelines for Americans recommended 3 servings of whole grains consumed daily to help with weight maintenance (USDA, 2010). Whereas in Malaysia, Malaysian Dietary Guideline recommended one's daily diet should comprise adequate amounts of whole grains, with

daily recommendations of 2-4 servings (NCCFN, 2010). Adolescents who consumed more than 1 serving per day of whole grains have a lower waist circumference (WC) and body mass index (BMI) than their peers who consumed lower quantities of whole grains (Zanovec *et al.*, 2010). Another study revealed that increasing the intake of whole grains as part of an overall healthy lifestyle may be beneficial for children to achieve and maintain a healthy weight, as the outcome of the study showed that whole grains intake was inversely associated with BMI z-score (Choumenkovitch *et al.*, 2013).

The assessment of whole grains consumption at a population level is only available for a handful of countries worldwide, it can be due to a lack of whole grains-related questionnaire. The outcome of The Continuing Survey of Food Intakes by Individual (CFSII 1994-1996, 1998) reported low levels of whole grains consumption in United State children (Harnack *et al.*, 2003). The only published data on whole grains consumption for the Southeast Asia region related to Singaporean adults in which the average intake was reported to be 26 g per day in 2010 (HPB, 2010).

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targeting children is required to implement whole grain recommendations (Harnack *et al.*, 2003). A survey on knowledge, attitude and practice (KAP) towards whole grain may provide a suitable format to evaluate this particular public health intervention. To measure such KAP, the questionnaire needs to be reliable and valid so that the findings are not biased by the shortcomings of the questionnaire. In addition, using reliable and valid questionnaire to measure these constructs can contribute to a better quality data that can be the basis for whole grain promotion efforts. To our best knowledge, there is no published questionnaire on KAP towards whole grain for primary school-aged children that has been developed with validity and reliability ensured in Malaysia at this juncture. Therefore, the purpose of this present study is to develop and examine the validity and reliability of the questionnaire on KAP towards whole grain among school children aged 9 to 11 years or studying Years 4 and 5 in Kuala Lumpur, Malaysia.

Materials and Methods

Study design

It was a cross sectional study and was aimed to develop and examine the validity and reliability of the questionnaire on KAP towards whole grain among children aged 9 to 11 years old studying in Years 4 and 5 in primary schools in Kuala Lumpur, Malaysia. Formal permission to conduct the study in the selected schools was obtained from the Ministry of Education, Malaysia and Kuala Lumpur Federal Territory Education Department. The study protocol was reviewed and approved by the Universiti Kebangsaan Malaysia Human Research and Ethics Committee. Parental consent was obtained for all children prior to participation. Verbal assent was also obtained from the school children before the data collection.

Questionnaire development

Literature searches were carried out using journal databases (Science Direct, Scopus, PubMed, Cochrane database and Medline), several keywords such as “whole grains”, “type of wholegrain foods consumed by Malaysian school children”, “whole grains awareness” and “KAP towards whole grain” were used. The existing report, studies and books from Malaysia (NCCFN, 2013; NSM, 2013), Singapore (HPB, 2010) and United State (Kantor *et al.*, 2001; Rogers, 2002; Harnack *et al.*, 2003; Ujszaszy *et al.*, 2004; Burgess-Champoux *et al.*, 2007) helped the research team in identifying types of wholegrain

foods consumed by Malaysian school children, as well as the factors that were associated with the whole grain intake. The retrieved information was included in attitude and practice domains. Following this, a guided self-administered questionnaire in Malay language, which comprised of 24 demographic factors, 15 knowledge items, 15 attitude items and 10 practice items was developed. Items were generated with emphasis on Malaysian dietary habits.

The developed questionnaire was reviewed by a team of expert panel comprising of two dietitians, a community nutritionist, two parents with children aged 10 and 11 years, a teacher-in-charge of Years 4, a teacher-in-charge of Years 5 and a researcher who had conducted validation study and had published a KAP questionnaire. It was to confirm content validity. These experts reviewed the questionnaire individually and rated based on four categories: content relevance, clarity, simplicity and ambiguity (Chen *et al.*, 2013). To confirm face validity, ten school children aged 9 to 11 years from a randomly selected primary school were recruited to check on the readability, feasibility and the general formatting of the questionnaire (Chen *et al.*, 2013). Entire comments from content and face validation were considered and thoroughly discussed by the research team. The items were either edited, removed or remain unchanged after extensive discussion among the researchers. The revised questionnaire would then proceed to examine the construct validity and test-retest reliability.

The overall questionnaire consisted of three main domains namely knowledge, attitude and practice. Knowledge items reflects general nutrition and whole grains information including food pyramid, source of carbohydrate, definition of whole grain, source of whole grain, nutritional content of whole grain and the advantages of whole grain consumption. This domain consisted of 15 multiple choice items. Each item had two answer options and “Not Sure” option. Only one of the options was the correct answer. Correct answer received one point, incorrect and “Not Sure” answers received zero points. Possible scores for knowledge domain ranged from 0 to 15.

Attitude items defined as school children’s opinions and belief towards whole grain consumption, awareness and socio-cultural perspective. This domain comprised of 15 Likert scale items. School children could indicate their degree of agreement towards the statement given. Likert scale of five points will be used to represent the scores, as such “Strongly Agree”, “Agree”, “Not Sure”, “Disagree” and “Strongly Disagree”. Numerical scores 5, 4, 3, 2 and 1 will be given to category “Strongly agree”,

“Agree”, “Not Sure”, “Disagree” and “Strongly Disagree” respectively. For those items which were negatively phrased, scores will be re-coded as 5, 4, 3, 2, and 1 for category “Strongly Disagree”, “Disagree”, “Not Sure”, “Agree” and “Strongly Agree”. Possible scores for attitude domain ranged from 15 to 75.

Practice items corresponded to school children’s practice towards whole grain consumption such as the frequency of intake of wholegrain ready-to-eat cereal, wholegrain bread, corn, wholegrain biscuit, oat, barley and brown rice. This domain comprised of ten items assessed by “Everyday”, “Always” (1-6 days in a week), “Sometimes” (14 days in a month), “Seldom” (not in the category of “Always” and “Sometimes”) and “Never” category, scored as 5, 4, 3, 2 and 1. Possible scores for practice domain ranged from 10 to 50. A higher score indicated good knowledge, positive attitude and good practice.

Sample size and sampling method

A list of primary schools in Kuala Lumpur was obtained from the Kuala Lumpur Federal Territory Education Department. One-stage cluster sampling method was adopted to randomly select two primary schools from the list. All school children of the selected primary schools who met the inclusion criteria were invited to participate in this present study. The inclusion criteria were both sexes, Malaysian school children aged 9 to 11 years or studying in Years 4 and 5, able to read, write and understand Malay. School children with mental disabilities and who were unable to read were excluded from the study. Guilford (1954) suggested that the total sample size for factor analyses regardless number of variables is 200. A total of 207 school children were recruited in this present study. To ensure the completeness of the questionnaire, the researcher would check and returned the questionnaire on the spot to clarify with the children any discrepancy.

The school children were informed on the objective of the study before guided self-administered questionnaire was distributed. Each item was read by the researcher, children were asked to choose and write the answers on the questionnaire. The school children could immediately clarify any issues with the researcher while answering the questionnaire. No time restriction was given but the school children had to complete and return the questionnaire on the same day. Knowledge items were asked as the initial part, followed by the attitude and practice items. It took around 30-40 minutes to complete one questionnaire, depend on the ability of the school children to comprehend the knowledge, attitude and practice

items.

Besides this, a sub-sample (n=151 school children) from the 207 school children were voluntarily participated in the test-retest reliability session. They were required to answer the questionnaire once again. Time interval between the first and second questionnaire completion was three weeks, which was considered as an appropriate time frame to prevent memory as a confounding factor (Siklosi *et al.*, 2010).

Statistical analysis

Statistical analysis was done using the SPSS version 22.0 (IBM SPSS Statistics, 2014). Data was entered, cleaned and checked before data analysis. Mean and standard deviations were calculated for continuous variables, frequencies and percentages for categorical variables. Item difficulty and item discrimination were measured for the knowledge items. Item difficulty refers to the proportion of school children that responded to the item correctly. The difficulty index was calculated using the following formula: difficulty index = (the number of correct responses to the knowledge items) / (the total number of responses comprises both correct and incorrect responses). Higher value of difficulty index indicated lower level of difficulty. The recommended criterion was to exclude knowledge items which were answered correctly by <20% or >80% of school children (Parmenter and Wardle, 2000). Item discrimination was defined as a measure used to discriminate between children in the top with that of the low group who obtained the correct responses (Boopathiraj and Chellamani, 2013). Knowledge items of each school children were scored and ranked, 27% of the students at the top and 27% at the bottom were separated for the analysis. Discrimination index was calculated by the following formula: discrimination index = [(the number of the children in the upper group 27% who responded correctly) – (the number of the children in the lower group 27% who responded correctly)] / (number of the children in the upper or lower groups). The higher the discrimination index, the better the item can determine the difference. Items were removed when discrimination index of <0.2 was obtained. Discrimination index of 0.20-0.29 were acceptable, 0.30-0.39 were good and 0.40 and above were excellent (Stubbings *et al.*, 2009).

To determine whether the questionnaire was presented in a multidimensional structure or simple structure for attitude and practice domains, an exploratory factor analysis with principle components method and varimax rotation were applied (Brown, 2009). Barlett’s test of sphericity ($p < 0.001$) and

the Kaiser-Meyer-Olkin (KMO) measurement of sampling adequacy (>0.6) were met for a satisfactory factor analysis to proceed (Cerny and Kaiser, 1977). The number of factors to remain were determined by considering the eigenvalues (>1), scree plot and interpretability of the factor (Pallant, 2011). Names were given for each identified factor. For the items that crossed loaded on more than 1 factor, these items were placed with the factor that was most closely related to conceptually (Pallant, 2011).

Reliability was expressed as the constancy of particular instrument in producing the same result in repeated measurements. To examine the reliability of the questionnaire, internal consistency of knowledge domain was assessed by Kuder-Richarson Formula 20 (KR20), whereas attitude and practice domains were assessed by Cronbach's alpha (CA). An acceptable KR20 or Cronbach's alpha coefficient was 0.7 or greater (Aron *et al.*, 2006). Corrected items-total score correlation was carried out to examine the correlation of the item with the overall domain. A correlation value less than 0.2 indicated that the corresponding item did not correlate with the overall scale and would be discarded (Huang *et al.*, 2006). Test-retest reliability was determined by intra-class correlation coefficient, whereby correlation coefficient with 0.70 was recommended as minimum standard for reliability and indicated good reproducibility of the questionnaire (Terwee *et al.*, 2007). Items were retained based on the internal consistency reliability analysis, content consideration and item analysis for knowledge domain or factor analysis for attitude and practice domains. P-values <0.05 were considered statistically significant.

Results

Demographic characteristics

The demographic and characteristics of the children are listed in Table 1. Mean (SD) age was 10.00(0.54) years. A majority of the school children were Malay (58.9%) and predominantly boys (54.6%).

Content and face validation

For the content validation, the expert panel commented the first and second versions of questionnaire's items needed some revision. Several suggestions and advices were given on the wordings and terminologies used. Third version of amended questionnaire was sent for content validation again, expert panel rated the overall amended questionnaire as adequately relevant, clear, simple and with no doubts. For face validation, eight school children

Table 1. Demographic and characteristics of the children (n=207)

Variables	n (%)
Age	10.00(0.54) ^a
Gender	
Boys	113 (54.6)
Girls	94 (45.4)
Ethnicity	
Malay	122 (58.9)
Chinese	41 (19.8)
Indian	40(19.3)
Others	4 (1.9)

^a mean(SD).

responded that most of the items were clear and easy to understand. Only two school children commented the word "frequent" was confusing. Based on the comments and suggestions from content and face validation, several changes were made including changed of multiple choice options in knowledge domain, rewording and items rearrangement for better readability and understandability.

Item difficulty and discrimination

Based on the item analysis conducted on knowledge domain, the difficulty indexes and discrimination indexes of knowledge items ranged from 0.44 to 0.80, and 0.29 to 0.75, respectively (Table 2). The knowledge domain was considered as the optimal level of difficulty and able to discriminate performance of good and poor school children.

Construct validation

Kaiser-Meyer-Olkin test (0.673) and the Bartlett's test of sphericity (chi-squared, $df= 586.16, 105$; p -value <0.001) showed that attitude items met the criteria required for factor analysis. A four-factor solution was obtained with a total of 15 items from attitude domain, and the total variance explained by the four factors was 52.2%. Whereas, Kaiser-Meyer-Olkin test (0.749) and the Bartlett's test of sphericity (chi-squared, $df= 312.75, 45$; p -value <0.001) showed that practice items met the criteria required for factor analysis too. A three-factor solution was obtained with a total of 10 items for practice domain, and the total variance explained by the three factors was 53.0%. Table 3 and Table 4 present the items along with their factor loading for attitude and practice domains. Only items with factor loading ≥ 0.40 are shown. All attitude and practice items were fairly good and retained in the questionnaire.

Reliability

Table 5 shows the internal consistency and test-retest reliability result of knowledge, attitude and practice domains. Internal consistency was examined for the overall domains. A KR20 of 0.70

Table 2. The difficulty and discrimination index of knowledge domain (n=207)

No.	Knowledge items	Dif-i	Dis-i
Food pyramid			
K1	What is the shape of food pyramid?	0.73	0.43
K2	Which level of the food pyramid consists of complex carbohydrate foods?	0.49	0.34
K3	Base on the food pyramid, which group should be consumed adequately?	0.76	0.29
Nutrient and function of complex carbohydrate			
K4	Complex carbohydrate is the main energy source required by our body?	0.74	0.54
K5	Among the following, which is the complex carbohydrate?	0.56	0.75
Nutrient and sources of whole grain			
K6	What is whole grain?	0.65	0.48
K7	Among the following, which belongs to wholegrain product?	0.48	0.55
K8	Corn is a wholegrain food.	0.61	0.41
K9	Wholegrain ready-to-eat cereals enrich with	0.67	0.46
K10	Wholegrain food enrich with	0.69	0.61
K11	Wholegrain food high in	0.75	0.48
Nutrient and function of whole grain			
K12	Wholegrain ready-to-eat cereals intake may increase the satiety	0.59	0.48
K13	What is the function of fiber from wholegrain ready-to-eat cereal?	0.44	0.55
K14	Wholegrain food may help in	0.53	0.64
K15	Taking wholegrain ready-to-eat cereal as breakfast may stronger the bone?	0.80	0.54

Dif-I: Difficulty index; Dis-i: Discrimination index.

was obtained for knowledge domain, whereas the overall Cronbach's alpha coefficients for attitude and practice domains were 0.72 and 0.73, respectively. The knowledge, attitude and practice items had fairly good correlation within the domains as their corrected item-total score correlation values ranged from 0.21 to 0.48, 0.20 to 0.44 and 0.33 to 0.43, respectively. For test-retest reliability, a total of 151 school children from the 207 respondents completed the questionnaire on a volunteer basis for the second time. The intra-class correlation coefficients for knowledge, attitude and practice domains were 0.80, 0.78 and 0.79, respectively ($p < 0.001$), indicating good-to-excellent test-retest reliability.

Discussion

A questionnaire on KAP towards whole grain was developed to be used for Malaysian school children aged 9 to 11 years. Item difficulty was used to distinguish difficult items from the easy ones. In general, knowledge items of this present study were at the optimal level of difficulty. To obtain the maximum distinction between the high and low-achieving school children, it was preferred that items to be of middle difficulty so that the score distribution could be spread out (Linn and Gronlund, 1995). In accordance with this, the recommended criterion to exclude knowledge items which were answered correctly by $< 20\%$ or $> 80\%$ of school children was applied.

Literature reviews disclosed several similar methods for evaluating the discriminator power of individual items to provide the index of the discriminatory effectiveness of the item, such as biserial correlation coefficient, point biserial

correlation coefficient, discrimination index and phi coefficient. This present study used the discrimination index with simplified technique of selecting the upper and lower 27% (Kelley, 1939). It is the most efficient fraction and suitable for the sample size of this present study ($n=207$). Twenty seven percent was used because a previous study had shown that this value would maximize differences in normal distributions while providing enough cases for analysis (Wierma and Jurs, 1990). A large group of school children were needed in each group to promote stability, at the same time it was desirable to have the two groups be as different as possible to make the discriminations clearer. The use of 27% would maximize these two characteristics (Kelley, 1939). In general, the entire knowledge items could be categorized as acceptable with discrimination index of over 0.20. This outcome showed that the entire knowledge items were good or satisfactory questions which did not need any modification or editing as these questions were able to differentiate good and poor school children. Whereby, 86.7% (13 items) of the total items regarded as excellent items, accomplished discrimination index of over 0.40, indicating that these knowledge items were excellent items for differentiating between good and poor performers.

The knowledge items were developed according to the area of interest that the research team wished to explore. The items were constructed in a consecutive manner from food pyramid, nutrient and function of complex carbohydrate, to more specific whole grains information. These items were known facts. Therefore, the knowledge items were not meant for factor analysis because they were not abstract ideas which required operationally defined and further

Table 3. Exploratory factor analysis of items in attitude domains using principle component extraction with varimax rotation (n=207)

No.	Attitude items	Loading on 4 Factors			
		F1	F2	F3	F4
Improving the whole grain intake					
A1	I don't like to consume wholegrain ready-to-eat cereal as my breakfast because it will increase my satiety and I have no appetite to enjoy fried chicken in the afternoon.	0.72			
A2	I seldom take the whole grain food because it is difficult to get in my neighborhood.	0.70			
A3	I will choose cream biscuit if there is a choice between wholegrain biscuit and cream biscuit.	0.46			
A4	I don't like to eat wholegrain ready-to-eat cereal with low fat milk because it is tasteless.	0.78			
Effort towards increasing whole grain intake					
A5	I study hard to determine the function of whole grain.	0.68			
A6	I try to spend more times on internet to search the advantages of eating wholegrain foods.	0.71			
A7	I try to spend more times on book reading to search the food which contain of whole grain.	0.75			
A8	I will buy wholegrain ready-to-eat cereal as breakfast if it is sold at school canteen.	0.50			
Action towards achieving whole grain recommendation					
A9	I will finish all the wholegrain foods despite I don't like it.			0.57	
A10	I will seek for the advice from teacher and parents if encounter any problem regarding whole grain.			0.59	
A11	I will choose wholegrain ready-to-eat cereals as my breakfast if there is a choice between wholegrain ready-to-eat cereal and coconut milk rice.			0.61	
A12	I am not worried about the wholegrain food choices because I am still healthy.			0.47	
Health and whole grain intake					
A13	I am interested to take wholegrain food if I am informed about the benefit of it.				0.66
A14	In my opinion, wholegrain foods such as ready-to-eat cereals have more nutrients and healthier compared to non-wholegrain food such as white				0.45

F: Factor; Items with factor loading ≥ 0.40 are shown. The 4 factors that are probably present among the items together explain 52.2% of the total variance in the results

grouped into general factors (Trochim, 2006).

For factor analysis, Barlett's test of sphericity and KMO indicated the suitability of the data for structure detection. A significant Barlett's test of sphericity and KMO measure more than 0.6 demonstrated that the factor analysis was useful with the data (Cerny and Kaiser, 1977). Factor loading played an important role in item deletion as it showed the correlation between item and its respective factor. The entire attitude and practice items were fairly good and retained in the questionnaire with the factor loading ≥ 0.40 .

In this present study, KR-20 was used to examine the internal consistency of the knowledge domain because it was scored dichotomously (Chen *et al.*, 2013). Cronbach's alpha reliability coefficient was used to assess the internal consistency of the attitude and practice domains because these two domains were scored by likert scale and rating (Tan, 2009). Intra-class correlation coefficient was conducted for test-retest reliability because Pearson correlation coefficient unable to show the systematic differences (Streiner and Norman, 1995). All the outcomes appeared to be satisfactory, indicating that this developed questionnaire is a reasonably reliable instrument to assess the level of KAP towards whole grains in school children. Despite there were only 151 children completed the test-retest session, this sample size was still adequate as the amount was exceed the estimated sample size after considering

a significant level of 0.05, 80% of study power and an expected intra-class correlation coefficient of 0.80 (Stata version 13).

To our knowledge, this is the first questionnaire developed to assess the level of KAP towards whole grain among Malaysian school children. The strength of this present study is that it involved children aged 9 to 11 years or studying in Years 4 and 5 school children who had already attended Healthcare Education Classes and been educated about the nutrition and whole grain. Nonetheless, several limitations exist. The population of this present study only recruited school children aged 9 to 11 years or studying in Years 4 and 5 from Kuala Lumpur, hence, the result could not be generalised. The whole grain KAP questionnaire was only suitable for Malaysian school children as it was constructed in Malay language and based on Malaysian dietary habits. It is recommended to translate the questionnaire into other languages or amend items to appropriate food habits so that it can be adopted in other countries.

Conclusion

This questionnaire appeared to be feasible, valid and reproducible for measuring the level of KAP towards whole grains among Malaysian school children. This measure can be used to provide a comprehensive evaluation of KAP towards whole

Table 4. Exploratory factor analysis of items in practice domains using principle component extraction with varimax rotation (n=207)

No.	Practice items	Loading on 3 Factors		
		F1	F2	F3
Wholegrain snack				
P1	I am taking wholegrain ready-to-eat cereal with low fat milk as my morning or afternoon tea.	0.40		
P2	I am taking wholegrain ready-to-eat cereal as my snack.	0.44		
P3	I am taking corn as my snack.	0.80		
P4	I am taking wholegrain biscuit as my snack.	0.71		
Wholegrain meal and drink				
P5	I am taking barley as my drink.		0.73	
P6	I am taking brown rice for my main meal		0.76	
P7	I am taking oat whenever I feel hungry.		0.64	
Wholegrain breakfast				
P8	I am taking wholegrain ready-to-eat cereal with low fat milk as my breakfast.			0.83
P9	I am taking wholegrain ready-to-eat cereal with chocolate drink as my breakfast.			0.71
P10	I am taking wholegrain bread as my breakfast.			0.47

F: Factor; Items with factor loading ≥ 0.40 are shown. The 3 factors that are probably present among the items together explain 53.0% of the total variance in the results.

Table 5. Internal consistency (n=207) and test-retest reliability (n=151) result of knowledge, attitude and practice domains

Domains and items	Corrected items -total score correlation	Kuder-Richarson Formula 20	Intraclass correlation coefficient
Knowledge			
K1	0.28	0.70	0.80
K2	0.21		
K3	0.21		
K4	0.42		
K5	0.44		
K6	0.26		
K7	0.31		
K8	0.22		
K9	0.28		
K10	0.41		
K11	0.33		
K12	0.23		
K13	0.27		
K14	0.34		
K15	0.48		
Attitude			
A1	0.30	0.72	0.78
A2	0.27		
A3	0.38		
A4	0.35		
A5	0.20		
A6	0.36		
A7	0.27		
A8	0.32		
A9	0.42		
A10	0.31		
A11	0.24		
A12	0.28		
A13	0.36		
A14	0.40		
A15	0.44		
Practice			
P1	0.41	0.73	0.79
P2	0.36		
P3	0.42		
P4	0.39		
P5	0.34		
P6	0.37		
P7	0.43		
P8	0.41		
P9	0.33		
P10	0.40		

grain among Malaysian school children in the near future, especially aged 9 to 11 years primary school children. Using data collected from this questionnaire, whole grain interventions can be developed, and the impact of the whole grain interventions can be evaluated too.

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