Validity and Reliability of Food Safety Knowledge and Practices Questionnaire among Food Handlers

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ABSTRACT: Majority of food borne disease outbreaks resulted from poor knowledge and malpractice during food preparation. Therefore, there is a need to develop a valid and reliable tool to measure the knowledge and practice towards safe food preparation that contribute to this outbreak. A cross-sectional study was conducted to determine the validity and reliability of the Food Safety Knowledge and Practice questionnaire among food handlers in the primary school canteen operated in Kelantan. Item analysis was conducted to determine the difficulty and discrimination indexes of 40 knowledge items. Construct validity and reliability assessment was done on 30 items that measure four types of food preparation practices; personal hygiene; food hygiene and safety; environmental sanitation; and food storage. Ninety-four food handlers completed the self-administered questionnaires. Item analysis revealed 6 items was answered correctly by more than 80%, and another 6 items correctly answered by less than 20% respondents. The discrimination index showed 9 items scored below 0.20. Considering the usefulness and practicality of the deleted items, 9 items were re-included resulted in 31 items retained under food safety knowledge section. Exploratory factor analysis of food safety practice section showed three factors with eigen values above 1 accounted for 48.6% of the variance. Nineteen problematic items were removed and remaining 11 items were loaded above 0.40. The internal consistency reliability was good with overall Cronbach's Alpha value was 0.724. This study proposes the Food Safety Knowledge and Practice questionnaire is

a valid and reliable measure of knowledge and practice among food handlers toward safe food preparation.

Keywords: Validity, reliability, item analysis, difficulty index, food safety and practice questionnaire

Introduction

The problems of food safety have increased in developed and developing countries. There is a range of reasons explaining why food poisoning has increased such as great eating out, lengthened the gap between production and consumption, failure to accept responsibility, government failures, food industry failures, and failures in management practices (Griffith, 2006; Motarjemi and Käferstein, 1999). Analysis of reported outbreaks throughout the world has shown that the great majority of these outbreaks resulted from malpractice during food preparation for public consumption in small food businesses, canteens, residential homes, and other places (Campos *et al*., 2009; Motarjemi and Käferstein, 1999). There is a direct correlation between poor personal hygiene and food borne illness. Thus, food handlers can be carriers of organisms such as *salmonella, staphylococci*, and other gastrointestinal microbes like *E. coli.* They also frequently serve as efficient vehicles for transmission of food poisoning organisms from raw food to cooked or processed foods (Oteri and Ekanem, 1989).

In Malaysia, insanitary food handling procedures accounted for more than 50% of poisoning episodes (Soon *et al*., 2010). Malaysian study among 430 food handlers in Kota Bharu, Kelantan in year 2001 shown there were poor knowledge levels among them in term of etiology (58.8%), symptoms (59.3%) and treatment (52.6%) of food borne disease, awareness of personal hygiene (55.8%). This study also reported that the practice among food handlers towards food borne disease and food safety was poor in view of hand washing (50.9%), personal hygiene (63.7%), treatment (50.2%) and safety food handling (54.7%) (Zain and Naing, 2002). Preparing meals too early and kept food under ambient temperature until served, utensils stored wet that favoring microbiological proliferation and dirty dishcloths used to dry utensils increasing the risk of cross contamination. These incorrect practices may lead to food

contamination, favor the growth and development of pathogens and cause food borne disease (Campos *et al*., 2009).

The most susceptible population group for food borne disease is children because they are more likely to become ill when exposed to food borne agents, and the main source of this problem arises from poor safety aspects by school canteens (Rodríguez-Caturla *et al*., 2011). Therefore, there is a need for a valid and reliable instrument that enable to assess food safety among food handlers in the school canteen in term of their knowledge and practice of personal hygiene, food hygiene, food storage and environmental sanitation. On top of that, the valid and reliable instrument is essential to assess the changes of their knowledge as well as a practice when intervention going to be carried out.

Ranges of questionnaires are available to investigate the knowledge and practice regarding food safety and health. These include Knowledge and Practice on Food Hygiene and Sanitation (Abdul-Mutalib *et al*., 2012), Food Hygiene Knowledge, Attitudes, and Practices (Bas *et al*., 2006), Food Sanitation Knowledge, Attitude, and Behavior (Ko, 2011), Hand Hygiene Knowledge, Attitudes and Practices Among Food Handlers at Primary Schools (Tan *et al.*, 2013)and Food Safety Knowledge and Attitudes (McIntyre *et al*., 2012). However, the instruments used by previous study did not focus on food handlers at the school canteen, the scoring method used based on 5-point Likert Scale and validation process for a knowledge score was done by using factor analysis.

More focused target group, broadened choices of answering practice section from 0 up to 10 scores as recommended by Awang (2012b) and more precise method of validating knowledge items are the main concern for this study. Previous studies validated the knowledge items by using Exploratory Factor Analysis. In fact, questionnaire for knowledge items generally asked respondents to respond "correct" or "wrong" answer, and then later scaled as "o" or "1". Awang (2012a) proposed that, the most suitable number of scales for good factor analysis would be 5 to 10. Therefore, item analysis is the best test to assess the quality of test items for knowledge section with a limited number of scales (Harun, 2013; Yusoff, 2013). The final aim

of this study is to produce a valid and reliable tool that able to assess Food Safety Knowledge and Practices among food handlers working at the primary school canteen.

Materials and Methods

Study design and sample

A cross sectional study was conducted among 98 food handlers worked in school canteens located in Kota Bharu, Kelantan, one of the north-eastern states in Malaysia between January 1, 2013 and September 31, 2013. The respondents were those from thirty-two primary schools randomly selected as a sampling frame out of 98 listed ordinary primary schools in Kota Bharu, Kelantan to represent primary schools within the district. Food handlers aged between 18 to 55, underwent a food handler training program approved by the Ministry of Health, Malaysia, and prepares or handle open high risk food were included. Meanwhile, those who were illiterate, had intention to change work within a year and had mental illness were excluded.

The instrument's construction

We used the newly developed questionnaire on knowledge and practice of safe food handling and preparation among food handlers. The items included based on literature review. The questionnaire consisted of four sections, namely: socio-demography (length of employment of food handlers, age, educational level, work experience, year of undertaking formal food hygiene training, mechanism for updating hygiene knowledge and monthly income); personal health information; knowledge towards safe food; and food safety practices.

Personal health information section includes the questions on any disease currently contracted with, history of typhoid vaccine injection and food borne disease that respondents might have within six months of the study period. The knowledge towards safe food section was separated under 4 sub-sections; food poisoning (14 items); high risk foods (13 items); temperature control (4 items); and food handlers' personal hygiene (9 items). All these knowledge

questions were developed based on past literatures (Walker *et al*., 2001). Respondents were asked to answer wrong, correct or do not know. The correct answer for each question was awarded one point, whereas wrong answers or "unsure" answers were given zero points.

In food safety practices section, it consisted of 4 sub-sections; personal hygiene (7 items); food hygiene and safety (12 items); environmental sanitation (7 items); and food storage (4 items). These practice items were constructed based on previous studies (Clayton *et al*., 2002; Fischer *at al*., 2006; Rodríguez-Caturla *et al*., 2011). Respondents were asked to scale the items on a 10-point Likert Scaleranged from zero for never to 10 for always as suggested by Awang (2012b). For the negative statements, the scale was recorded in reverse order.

Content validity was ascertained by an expert independent panel comprising professionals working in environmental health and expertise in theory of planned behavior from Universiti Sains Malaysia and Universiti Teknologi Malaysia. They provided comment on the clarity, difficulty, consistency and the content of the items. Few changes and modification were made such as rephrasing and moving items to a better domain.

The preliminary Food Safety Knowledge and Practices questionnaire was pre-tested for face validity on conveniently selected eight food handlers aged 23–30 years who worked at the university's cafeteria and primary school canteen. They provided few remarks on the clarity and difficulty of the items. Few sentences found to be unsuitable and removed from questionnaire due to not relatedness with the respondents. A discussion was done with respondents focusing on areas of confusion and poor comprehension. Appropriate changes were made accordingly to produce the final Food Safety Knowledge and Practices questionnaire. Due to time limitation, test-retest reliability was not performed.

Data collection

A total of 98 food handlers participated in this study. A guided self-administered questionnaire was used for data collection method. The respondents were informed that this questionnaire was not to assess their work performance, but for the sake of the current study and all the

information were confidential. They were reminded not to confer with each other. Oral instructions were given to respondents to fill in the socio-demographic and personal health information sections. Written informed consent was obtained from all respondents and the form was written in Malay language.

Data analysis

Data entries and analyses of results were done using the PASW version 19.0 software, a statistical software package. The data were first analyzed using descriptive statistic to describe socio-demographic characteristics and presented as mean and standard deviation (SD) for numerical and normally distributed data or presented as frequency and percentage (%) for categorical data.

Item analysis was used to determine the validity of knowledge sections by looking at two important parameters, namely the difficulty index and discrimination index. By doing this analysis, it can help to determine those items that are good and those that need deletion or improvement (Karelia, Pillai, & Vegada, 2013). The difficulty of a question is normally determined from the proportion of the total group selecting the correct answer to that question (Hotiu, 2006). Several values being reported as a target value for difficulty index. Based on (Karelia *et al*., 2013), a question was considered difficult when the difficulty index value was less than 30% and considered easy when the index was more than 70% and the value between 30-70% was acceptable (between 50-60% are ideal). However, current studies used a target range for too easy and too difficult items are between 20-80% of difficulty index (Fuad, 2010).

The Discrimination Index refers to how well an instrument differentiates between high and low scorers (Hotiu, 2006). In calculating the discrimination index, a correct response to an item was awarded 1 mark, while incorrect or unsure responses were given no marks. Later, the results of all respondent's responses were summative for total scores in order to calculate for discrimination index. Furthermore, the respondents were ranked based on these total scores from the highest to the lowest mark. Later, the top 27% was taken as the upper group (U) or high achievement and the bottom 27% regarded as the lower group (L) or low achiever. Each

item in a set of questionnaire needs to be calculated for its discrimination index value. The discrimination index for a particular question is defined by the proportion of the respondents in the *top group* who got it *correct* minus the proportion of respondents in the bottom group who got it correct, then divided by 27% of the total number of respondents who attempted the question (Fuad, 2010).

Again, the interpretation of this value varies. Karelia et al. (2013) reported that an item with a discrimination index between 0.25-0.35 was considered good, those with indices more than 0.35 were excellent, between 0.20-0.24 were accepted and below 0.20 were poor. Based on Fuad (2010), Discrimination index of negative up to 0.19 is regarded as poor and need to revise the question. In selecting an item, the questions need to rely on both discrimination and difficulty indexes. As suggested by Fuad (2010), those questions with a good discrimination index (>0.19) and moderate difficulty index (0.2 – 0.8) were acceptable to be retained in this study. However, deleted item can be re-included again, if the item was considered very important and related to current studies.

To test for construct validity of the scales and understand underlying factors related to food safety practices, the construct items scales were pooled and subjected to factor analysis. A principal component analysis was applied to extract the factors. The Kaiser–Meyer–Olkin (KMO) measure of sampling > 0.6 and the Bartlett's Test of Sphericity ($p < 0.05$) were used to determine the adequacy of data for factor analysis. The Eigen values and Scree Plot were used to determine the suggested number of factors for each domain. Any factor with an eigen value ≥ 1 was considered significant for factor extraction. The obtained factors were rotated by using Principal axis factoring extraction with the Promax rotation procedure. Variables with factor loadings of ≥ 0.40 were used as the cut point to be retained. The arbitrary criterion that item with factor correlation matrix >0.85 suggest the presence of multi Co linearity problems between factors was applied. The internal consistency reliability of the factors was evaluated using the Cronbach's α.

Ethical consideration

Ethical approval to conduct the study was obtained from the Human Research Ethics Committee, Universiti Sains Malaysia (Reference No: USMKK/PPP/JEPeM [259.3. (16)]). Ethical approval was also obtained from the Malaysian Education Ministry [Reference No: KP(BPPDP)603/5/JLD.02(43)] since the study was conducted in the government schools.

Results

Demographic profile

Ninety-four food handlers participated in this study. The majority of them was female (89.4%), Malay (97.2%) and in the age range of 18 to 54 (mean 37.95). More than half of the respondents (75.5%) were married and 92.6% completed at least secondary education as their highest level of education. The median duration of working experience as food handlers and working duration at current premise were 48.0 (IQR 68.0) and 36.0 (IQR 44.0) months respectively. Additionally, the median family income was RM 900.00 (IQR 1150.00).

All respondents admitted having at least one source of gathering information on food and personal hygiene. The most common source of information was from a discussion amongst friends (72.3%) followed by reading newspapers or magazines (50.3%). Most of food handlers (84.1%) indicated that they had received typhoid vaccination within 3 years. However, only 2.1% of them had food borne disease within the last six months and 8.5% had medical problems (Hypertension 3, gastritis 1, scalp problem 1, diabetes 3).

Food safety knowledge

The item difficulty index and discrimination index for each item in the knowledge of food safety section is presented in **Table 1**. Out of 40 items, 6 items were answered correctly by more than 80%, suggesting these questions were too easy. Less than 20% of respondents were able to correctly answer 6 items, indicating that these questions were too difficult. In

estimating discrimination index of the knowledge of food safety section, 9 items scored below 0.20 (cut off point). The total items that did not fit with either one or both of these indexes were 18 items.

However, 9 items were revised in viewed of their importance and relatedness to current study. Hence, the final items constructed the knowledge for food safety section were 31 items: 13 items for knowledge on food poisoning, 8 items for knowledge on high-risk foods, 4 items for knowledge on temperature control and 6 items for knowledge on personal hygiene.

Table 1: Item analysis of food safety knowledge among primary school canteen food handlers (n=94)

Item	Questions	Difficulty index (% answering correctly)	Discrimination index	Action
Knowledge on food poisoning				
A1a	Contaminated food can be detected by taste	0.21	0.32	Included
A1b	Contaminated food can be detected by naked eyes	0.04	0.04	Revised
A1c	Contaminated food can be detected by smell	0.04	0.04	Revised
A2a	Common symptom of food poisoning is headache	0.19	0.28	Deleted
A2b	Common symptom of food poisoning is diarrhea	0.88	0.28	Revised
A2c	Common symptom of food poisoning is skin rashes	0.32	0.36	Included
A2d	Common symptom of food poisoning is constipation	0.45	0.24	Included
A3a	Food borne disease is transmitted through food contamination	0.77	0.48	Included
A3b	Food borne disease is transmitted through water contamination	0.79	0.44	Included
A3c	Food borne disease is transmitted by flies	0.87	0.40	Revised

A3d	Food borne disease is transmitted by food handlers	0.60	0.52	Included
A3e	Food borne disease is transmitted through exposed food	0.42	0.32	Included
A3f	Food borne disease is transmitted through food contamination	0.85	0.28	Revised
A3g	Food borne disease is transmitted through improper solid waste disposal	0.78	0.36	Included
Knowledge on high risk foods				
B1a	Prawn crackers is a high risk food for food poisoning	0.22	0.40	Included
B1b	Rice is a high risk food for food poisoning	0.54	0.16	Revised
B1c	Pizza is a high risk food for food poisoning	0.10	0.08	Deleted
B1d	Bread is a high risk food for food poisoning	0.13	0.00	Deleted
B2a	UHT milk is sterile	0.53	0.64	Included
B2b	Yogurt is sterile	0.14	0.00	Deleted
B2c	Packed soya bean drink is sterile	0.07	0.12	Deleted
B3a	Raw and cooked foods should be kept separately to avoid cross contamination	0.13	0.24	Deleted
B3b	Raw and cooked foods should be kept separately to avoid changes of food taste	0.71	0.68	Included
B4a	Plain waterish good to kill bacteria	0.44	0.48	Included
B4b	Sanitizer is good to kill bacteria	0.32	0.44	Included
B4c	Detergents good to kill bacteria	0.12	0.12	Revised
B4d	Scrubbers good to kill bacteria	0.29	0.60	Included
Knowledge on temperature control				
C1	The temperature of the refrigerator should be $\leq 8^oC$	0.33	0.36	Included
C2	Bacteria causing food poisoning multiply rapidly at temperature 37^oC	0.26	0.60	Included
C3	Bacteria grows well at temperature 75^oC	0.21	0.24	Included
C4	Hot food should be kept at temperature $>65^oC$	0.29	0.40	Included

Knowledge on personal hygiene

D1a	Good personal hygiene is wearing jewelry	0.81	0.36	Deleted
D1b	Good personal hygiene is wearing protective clothes	0.67	0.36	Included
D1c	Good personal hygiene is cover cuts on fingers with plaster	0.48	0.40	Included
D2a	Hands should be washed when returning from the toilet	0.95	0.08	Revised
D2b	Hands should be washed after handling raw foods	0.88	0.24	Revised
D3a	Chicken is commonly related to salmonella contamination	0.38	0.64	Included
D3b	Fish is commonly related to salmonella contamination	0.32	0.48	Included
D3c	Bread is commonly related to salmonella contamination	0.18	0.24	Deleted
D3d	Fried rice is commonly related to salmonella contamination	0.18	0.28	Deleted

Construct validity for food safety practices

The preliminary number of items in practice section was 30, sub categorized under four subsections. Initial factor loading analysis by including all these items resulted with 19 problematic items. After removing these 19 problematic items, the factor loading for retained 11 items showed the Kaiser-Meyer-Olkin value was high at 0.768, and the Bartlett's Test of Sphericity was significant ($p < .001$), showed that the sample size was adequate and therefore satisfactory for factor analysis. Scree Plot (**Figure 1**) revealed 3 factors with eigen values above 1, accounted for 48.6% of the total variance with the first factor accounted for 30.93% of the variance, the second 11.51%, and the third 6.12%. Factor Correlation Matrix values (0.508, 0.263, and 0.037) were less than 0.85 indicating no multicollinearity problems between the factors.
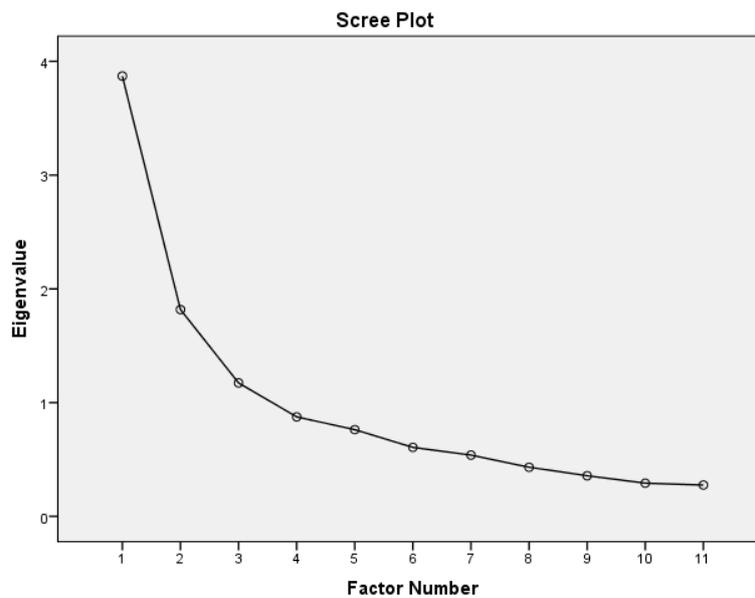
Figure 1: Scree plot for Food Safety Practices questionnaire (final analysis)

By using 0.40 as a cut-point for inclusion of an item in interpretation of factors, all 11 items loaded higher than the set threshold value. Of these items, Item A1, B8, B12 and C3 were loaded on 2 factors. However, these items were retained at the factor with factor loading more than 0.4. The other items were loaded appropriately in accordance with the proposed construct.

The final factor loadings of 11 items on factors are shown in **Table 2**. The loading values ranged from 0.435 to 0.825. The Factor 1 represents personal hygiene practice and comprised of 4 items. Their factor loading ranged from 0.455 to 0.825. Factor 2 related to food hygiene practice constructed from 4 items with factor loading ranged from 0.435 to 0.767. Finally, Factor 3 represents environmental hygiene   practices consisted of 3 items with faster loading ranged from 0.471 to 0.630.

Internal consistency reliability

All items selected from final factor loading in each factor were included in reliability analysis. Cronbach's alpha of factors 1, 2 and 3 were 0.798, 0.726 and 0.545, respectively. The low rate of Cronbach's alpha coefficient of factor 3 was due to the least number of items (only three

items) in this factor. The Overall Cronbach's α value of this questionnaire scale was 0.724 revealed good internal consistencies as presented in **Table 2**.

Table 2: Factor loadings and reliability analysis for Food Safety Practice questionnaire (final analysis) (n=94)

[¥]Factor	Item	Statement	[Ж]Domain	[¥]Factor loading	[φ]Corrected Item-Total Correlation	[φ]Cronbach's Alpha if Item Deleted	[φ]Cronbach's Alpha
1	A1	I wash hands with soap and water after touching my face (such as nose, ears and mouth)	Personal hygiene	0.455	0.584	0.793	0.798
1	A2	I wash hands when touching meat/raw chicken		0.675	0.645	0.731	
1	A3	I wash hands with soap and water after went to toilet		0.693	0.638	0.748	
1	A4	I cover my hair during food preparation		0.825	0.662	0.729	
2	B6	I clean raw meat first before cooking	Food hygiene	0.767	0.616	0.601	0.726
2	B7	I clean kitchen area soon after cleaning raw meat prior to cooking process		0.689	0.517	0.672	
2	B8	I wash hands before handling food		0.435	0.567	0.653	
2	B12	I always cover cooked foods		0.529	0.406	0.725	
3	C3	I wash food utensils using sanitizer	Environmental hygiene	0.567	0.297	0.535	0.545
3	C5	I clean refrigerator once every two weeks		0.471	0.340	0.484	
3	C6	I wash cooking area using sanitizer		0.630	0.453	0.315	

Kaiser-Meyer-Olkin was 0.768; Bartlett's test of sphericity was significant ($p < 0.001$)
[¥]Factor Analysis; Principal axis factoring extraction with promax rotation was applied
Total variance explains was 48.6%.
[Ж]Domain were framed based on Exploratory Factor Analysis
[φ]Reliability analysis; Overall Cronbach's Alpha value was 0.724

Discussion

The demographic profile of the respondents reflects Kelantan population in terms of gender and ethnic composition. The mean age was 38 years, reflecting younger age group dominated this job. The education level of respondents was good in relation to their job scope. The median duration of working experience and working duration at current place were not much different. This suggests the mobility of work is not a big concern. Furthermore, the source of gathering information on food and personal hygiene among respondents not varies where majority gain from the discussion amongst friends and reading newspapers or magazines. These may bind their knowledge on current and proper practice toward safe food preparation for school children.

The percentage of those received typhoid vaccination within 3 years were higher (84.1%). A study done in Selangor stated that, 83.5% of food handlers employed in public education indicated that they had received a typhoid vaccine (Tan *et al*., 2013). Nevertheless, their study did not specify the duration of last received this vaccine. A small proportion of respondents claimed to have food borne disease within the last six months and medical problems.

In this study, a new set of questionnaire was constructed based on current literature reviewed. The questionnaire was developed to measure food handlers' practice regarding food safety. Content validity measures the extent to which the items within a construct, represent the domain of the characteristics. The content validity of this instrument was reviewed and commented by a few expert professional panels, seems sufficiently high. Prior to validity and reliability analysis, the pilot test was done. As explained by Veiros, Proenca, Santos, Kent-Smith, and Rocha (2009), the main objective of the pilot test was to evaluate the research tools and verify the degree of ease in its application, the adequacy of the terms as well as to facilitate comprehension by the evaluator on the items and sub items. Pilot test also assisted to determine the time requirements and streamline the methodology, as it is important that the time required for collecting the samples was not perceived by the retail outlet managers to be disruptive to the normal work pattern (Walker *et al*., 2003).

The item difficulty index for each item in the knowledge of food safety section seemed to have good quality except 12 items where six items were too easy questions and another six items were too difficult questions. In estimating discrimination index in the knowledge of food safety section, 9 items failed to distinguish between subjects scoring highly on the test and those with low scores. Considering both discrimination (>0.19) and difficulty indexes (0.2 – 0.8), 22 items presented with good reliability and included in this questionnaire.

Based on discussion among researchers, we decided to revise back 9 of deleted items after considering their importance and relatedness to the current study. For example, item A1b "contaminated food can be detected by naked eyes" and item A1c "contaminated food can be detected by smell" are really important in preventing food borne disease. Food handlers need to depend on more basic process for food safety criteria such as cooking period, cooking temperature and food storage rather than based on their naked eyes and simply on their smell. Therefore, the final item in this knowledge section consisted of 31 items.

Validity refers to the appropriateness, meaningfulness and usefulness of the specific inferences made from test scores. As discussed in previous studies, the most common approach for assessing construct validity is factor analysis. It can measure the inter correlations of a set of items to each other, and factor scores are developed as a result of these correlation analyses (McDermont and Sarvela, 1999). Meanwhile, a valid study instrument should relatively free from measurement error. Meaning that, the instrument is consistent, dependable and stable in producing the results. All these refer to reliability analysis (McDermont and Sarvela, 1999). Internal consistency, reliability could examine the average correlation among the items in a test. It measures the degree to which the items hang together, that is, the degree to which items relate to each other (Nunnally, 1978).

Results from current study suggested that the Food Safety Practices questionnaire is a valid and reliable instrument to determine the practice level toward preparation of safe food among food handlers in the school canteen. The strength of the relationship between items was good and met the criteria for factor analysis as shown by high KMO (0.768). Bartlett's test measure the original correlation matrix is an identity matrix, which is the null hypothesis. A significant

Bartlett's Test indicates the *R*-matrix is not an identity matrix; therefore, there are some relationships between the variables. Again, it showed this data is appropriate for factor analysis. The total variance explained by the factors was 48.6%, indicating satisfactory content validity of the questionnaire. Results from Factor Correlation Matrix values revealed no problems of multichollinearity between the factors constructed.

The items of Food Safety Practices subscales were further examined for construct validity. Three factors were identified instead of 4 factors proposed, namely personal hygiene, food hygiene and environmental hygiene. All items loaded well after forced extraction. All items fit excellently according to the groups with factor loading more than 0.4 (Bautista *et al*., 2013; Ko, 2011; Saddki *et al*., 2013; Yusoff *et al*., 2011). Thus, this instrument measured what it supposed to measure. For future improvement, it is recommended that confirmatory factor analysis being conducted to determine the existence of the Food Safety Practice latent constructs.

The reliability analysis suggested that the 11 items of the Food Safety Practice questionnaire demonstrated high internal consistency as the overall Cronbach's alpha values was more than 0.7. The Cronbach's alpha coefficients for each factor ranged from 0.549 to 0.798 indicating satisfactory criteria for internal consistency. Based on Bautista *et al*. (2013), a Cronbach's alpha of 0.5 or higher is considered to be the acceptable criteria for internal consistency in reliability analysis. Moreover, each scale item showed acceptable corrected item correlations of > 0.30 (range 0.49–0.91) (Nunnally, 1978). These findings revealed that this questionnaire is a reliable instrument that can be used in the future to measure food safety practices among food handlers in the school canteen.

The limitation of this study was it is only confined to the food handlers working in the primary school canteen in Kelantan. Therefore, it is suggested that a multi-center validation study covering other states and secondary schools being conducted in the near future to further test the validity and reliability of this questionnaire. Furthermore, test-retest reliability should be done to determine the questionnaire stability over time.

Conclusion

In conclusion, the Food Safety Knowledge and Practice questionnaire met basic psychometric criteria for reliability and validity test. Therefore, this instrument is a good instrument for assessing knowledge and practice among food handlers toward safe food preparation. Moreover, this questionnaire covers important aspects needed to be emphasized in preparation of safe food served to school children and suitable for measuring the changes associated with intervention work aimed at improving the knowledge and practice level among food handlers.

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