ORIGINAL ARTICLE

Content Validity of the General Nutrition Knowledge Questionnaire for Malaysian Adult Population.

Maisarah Hazwani Mohd Rahimi[1*], **Muhammad Rashidi Mohd 'Asri**[1], **Rosman Kass Yusuf**[1], **Salma Faeza Ahmad Fuzi**[2], **Norhafizah Ab Manan**[1]

[1]*Faculty of Medicine, University of Cyberjaya, Selangor, Malaysia.*
[2]*Department of Nutrition, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Selangor, Malaysia.*

Corresponding Author
Maisarah Hazwani Mohd Rahimi
Student, Bachelor of Medicine and Bachelor of Surgery,
Faculty of Medicine,
University of Cyberjaya,
Selangor, Malaysia
Email: maisarahhazwani99@yahoo.com

Submitted: 13/02/2023. Revised edition:04/03/2023. Accepted: 11/04/2023. Published online: 01/06/2023

Abstract

Introduction: Adequate knowledge of nutrition showed a strong association with good dietary habits and a healthy lifestyle. Nevertheless, there has not yet been a validated questionnaire on this particular topic for application among the general Malaysian populace. As such, this study was aimed to construct a questionnaire that is content validated, suitable, and developed for the Malaysian population adapted from the latest revised version of the general nutrition knowledge questionnaire (GNKQ-R) **Methods**: We conducted this study through one-on-one online interviews with three expert panels, to review each item of the GNKQ-R, taking into account the Malaysian Dietary Guideline 2020, and the Malaysian Adult Nutrition Survey 2014. Further, five expert panels were asked to rate the revised items based on relevance on the four-point scale Content Validity Index (CVI) was calculated for each item with a value of more than 0.8 indicating that the item is relevant to include in the questionnaire. **Results**: Overall, out of 47 items, five items scored CVI less than 0.8 (range 0.6- 1.0). The item on waist circumference was suggested to add by the experts. **Conclusion**: Five items were suggested to review or revise and one item on waist circumference is suggested to add before the questionnaire is translated to Bahasa Malaysia and further evaluated for face validity and psychometric properties.

Keywords: *content validity; Malaysian population; nutrition knowledge questionnaire*

Introduction

According to the Oxford Learner's Dictionary, nutrition is the process whereby living things, such as humans and animals, receive the food necessary for them to grow and be healthy. Good nutrition lays the foundation for healthy, thriving, and productive communities and nations [1]. The benefits of good nutrition thus carry across generations and act as the "glue" binding and supporting various facets of a nation's development [2]. To have a powerful community, we need to have knowledge on nutrition, so it can affect society's awareness on the importance of good nutrition. In a study, adequate knowledge of nutrition showed a strong association with good dietary habits and a healthy lifestyle [3].

Deficiencies and excesses in the diet may cause nutritional diseases. A national survey carried out in 1996 showed that the prevalence of obesity in the adult population was 4.4%. Prevalence was doubled in the Malaysian Adults Nutrition Survey (MANS) survey and the latest National Health and Morbidity Survey, the prevalence of obesity among adults aged 18 years has reached above 19.7% [4]. Obesity is a known risk factor for noncommunicable diseases (NCDs) such as type 2 diabetes, cardiovascular disease, and cancers such as breast, large intestine, pancreatic, and kidney cancer. This rise in the prevalence of obesity in Malaysia is indeed distressing, and a standard tool for assessment of general knowledge of nutrition is necessary for use in the Malaysian population. Besides these increases in over-nutrition-related problems, NHMS 2019 also highlighted undernutrition problems such as stunting among children and anaemia among reproductive-age women.

In Malaysia, there have been studies to assess the nutritional knowledge among urban middle-aged women, antenatal mothers, elderly, overweight and obese children and university students in Selangor [5,6,7,8,9]. Nevertheless, there has not yet been a validated questionnaire on this topic for application among the general Malaysian populace. One of the important components of questionnaire validation is content validity, which indicates the extent that the instrument covers all the domains supposed to measure which are obtained from the literature, expert opinion, and representative of the relevant populations [10].

A content-validated, and suitable questionnaire that measures general nutrition knowledge should be available for the Malaysian population, which has unique norms when it comes to culture, societal constructs, and behaviours. The Parmenter and Wardle's questionnaire is the most recognised questionnaire on nutrition knowledge namely the general nutrition knowledge questionnaire [11]. It was developed in 1990 and validated in the United Kingdom (UK). Then, this questionnaire was revised and updated by Kliemann *et al.* (2016) as GNKQ-R, in which the questionnaire was oriented to the population in the UK in terms of food choices as well as local dietary guidelines and recommendations [12]. Therefore, the questionnaire should be endeavoured to reorient to suit the local Malaysian population, while also using the original questionnaire's sections and structures as the foundation of the modified questionnaire.

Many countries have translated this questionnaire into different languages and adapted it to their population, but not yet in Malaysia. Hence, this study aims to adopt and adapt the GNKQ-R questionnaire to establish content validity, filling the gap left by the lack of a content-validated questionnaire to assess the Malaysian population's knowledge of nutrition.

Materials and Methods

This study was conducted in two steps; qualitative and quantitative studies to establish the content validity of the latest revised version of GNKQ from Kliemann *et al.* (2016), GNKQ-R for the Malaysian population.

According to Putnoky *et al.* (2020), three experts are the minimum needed to evaluate the tool [13]. The experts were purposely selected based on their working experience in nutrition or public health setting for more than 10 years.

In the first step, three experts were involved. An online one-on-one interview session was conducted with each expert. Prior to the interview session, the experts were provided with the original version of GNKQ-R to critically review each item and provide opinions about the relevancy of each item. GNKQ-R by Kliemann *et al.* (2016) was the updated and revised version of the GNKQ by Parmenter & Wardle (1999), in which the questionnaire was oriented to the population in the UK in terms of food choices as well as local dietary guidelines and recommendations [11,12]. The questionnaire is divided into four sections; 1) dietary recommendations (nine questions), 2) sources of nutrients (10 questions), 3) choosing everyday foods (13 questions) and 4) diet-disease relationship (16 questions). The expert panels were also requested to suggest any additional new items or remove specific items to suit the context of the Malaysian population. The Malaysian Dietary Guideline 2020 and the Malaysian Adult Nutrition Survey 2014 were also used as guidance in selecting the foods used in the questionnaire [14,15]. Each interview session lasted between one to two hours. The final version was reviewed by a nutritionist before it was tested in the second step.

For the second step, a similar evaluation method by Trakman *et al.* (2013), which involved the utilisation of the Content Validity Index (CVI) was used [16]. Snowball sampling was used to disseminate the questionnaire via Google Forms to other experts with nutrition and dietetic backgrounds. Five experts in the field of nutrition and public health agreed to participate in this step, as previous research was done by Bukenya *et al.* (2017) and Olson (2010) [17,18]. The purpose of this study and the instruction on how to rate each question was clearly mentioned in the survey form. The experts reviewed the modified questionnaires and rated each item for relevance on a 4-point Likert scale; (1 = 'very irrelevant', 2= 'irrelevant', 3= 'relevant', 4 = 'very relevant'). To calculate the CVI of an item, the number of experts who scored a particular item 3 or 4 is divided by the total number of experts. If an item scored a CVI of 0.8 and above, it can be considered adequate and reliable. If it scored less than 0.8, items will either be edited based on recommendations made by the experts or removed from the list. The experts were also required to provide written feedback on each item. The flow of the study is described in Figure 1. In both steps, respondent information sheet has been disseminated to briefly explain about this study to participants. Further, consents have been obtained before the start of data collection. The data collected from participants only can be accessed by the researchers of this study and all personal information will be destroyed at the completion of the research. Ethical approval for this study was obtained from the appropriate ethics committee.

Results

Step 1 (Qualitative study)
Section 1: Dietary recommendation

Based on the expert panels' opinion, some modifications were made in accordance with the Malaysian Dietary Guidelines (MDG). For example, the answer of more, same, less, and not sure options was substituted with plenty, adequate, moderate, and limit. Several questions about the weekly food intake based on the recommended number of servings were changed to the daily food intake recommendations. Besides that, recommendation on the daily poultry/meat/egg intake was added, whereas the recommendation on the maximum alcoholic drink intake per day was removed.

Three questions remained unchanged, including the breakfast, and types of fats recommendations. One question was added which is regarding the plain water intake recommendation per day. Additionally, there were also new items added to the questionnaire to cover all the five food groups recommended by MDG. For example, four items were added in question 1 which include egg, fish, poultry, milk, and milk product. Added change in the questionnaire was the modification of certain items or phrases for consistency with the guidelines; process red meat was modified to processed food, reduced-fat milk was changed to low-fat milk and instead of fruits and vegetables, the phrase of vegetables and fruits was used. A common and familiar food in Malaysia was used, for instance, tilapia and kembong fish replacing Salmon and Mackerel. The question on the 'Eatwell plate' was substituted with 'quarter-quarter-half' for serving size recommendation.

Section 2: Sources of nutrients

In section 2, in the question of food with high or low in added sugar, diet cola drink, natural yogurt, tomato ketchup, and condensed milk have been replaced with the 3-in-1 premixed drink, unflavoured yogurt, canned fruit jam, and condensed milk. Other than that, food with high or low salts such as breakfast cereals, frozen vegetables, bread, baked beans, and canned soup was changed to nugget, prawn sauce (cencaluk), soy sauce, fried rice, and laksa. Potatoes with skin and pasta change to cabbage and french fries in question food with high or low in fibre.

Other foods that have been added to replace the food in the questionnaire in section 2 are legumes (e.g., dhal), cream crackers, margarine, mee hoon, and tapioca. Regarding the question of the main type of fat present in the foods, sunflower oil was replaced with palm oil and coconut oil was also added to the food options. Only two questions are needed to be modified such as whole milk and skimmed milk has been rephrased as full-cream milk and reduced/low-fat milk, respectively. Lastly, in the question about processed food, the phrase 'compared to minimally processed foods' was removed so that the questions are more direct.

Section 3: Choosing everyday foods

In general, major modifications were made to the questions and items of the questions in this section. For example, question 2, "If a person wanted soup in a restaurant or café, which would be the lowest fat option?" with options such as mushroom risotto and carrot butternut and spice soup was changed to "If a person wanted to eat nasi lemak, which would be the lowest fat option?" with the items being variations on how nasi lemak is served (e.g., with fried chicken, boiled or fried egg and prepared with pure coconut milk or low-fat coconut milk). Another example is question 4. The question was changed from "Which would be the healthiest and most balanced sandwich lunch" with options such as ham sandwich and tuna salad sandwich to "Which would be the healthiest and most balanced meal if someone does not want to eat rice", with options including crackers with milo and a whole grain chicken salad sandwich. One question pertaining to the traffic light food labelling utilised in the UK was deemed irrelevant to the Malaysian populace and removed. The two final questions of this section pertaining to the interpretation of food labels and comparison of two similar food products were also revamped by utilising the food labels of two similar local products; sugar crackers and plain crackers. However, the questions themselves remained unchanged.

Section 4: Diet-disease relationship

In the last section, changes were made based on the common health problem related to low fibre intake, high cholesterol, sugar, and salt intake, with the addition of food and activities that lead to increased weight in the Malaysian population. To give an example, some answers like tooth decay and hypothyroidism were replaced with more common health concerns such as high blood pressure, diabetes, and obesity. Answer option 'egg' was replaced with fish due to a high misconception about the effect of eggs on blood

cholesterol. Besides, the word 'grazing' was reworded to 'snacking' and added the physical activity answer option.

A total of eight items remained untouched which include questions like heart disease prevention, high Glycaemic Index food, healthy weight maintenance, and Body Mass Index classification. Some food such as bread and egg were replaced with rice and fish respectively. The phrase to reduce the risks of diabetes was used instead of to reduce diabetes. The image used to illustrate body shapes was replaced with a hand-drawn drawing to avoid copyrights issue.

Step 2 (Quantitative study)

As shown in Table 1, all items in Section 1 scored a CVI of 0.80 and above. However, in Section 2, two questions had a low CVI pertaining to the amount of calcium in different types of milk and the number of calories certain nutrients contain for the same weight of food. In Section 3, only one question scored a low CVI regarding the healthiest and most balanced food choices for the main meal. Lastly, in section 4, there were two out of 16 items which have low CVI, which were about cutting fat out completely to maintain weight and regarding body shapes that increase the risk of cardiovascular disease. There was also a suggestion to add waist circumference by one of the expert panels in the written feedback column**.** Overall, all items in Section 1 (dietary recommendation) were scored 0.8 and above. However, there were items from Sections 2 to 4 that scored less than 0.8 (Figure 2).

Discussion

This study was aimed to establish the content validity of the GNKQ-R which has been developed and modified in the UK for the Malaysian population. Modifying existing questionnaires may save time and efficient use of resources. The original questionnaire's sections and structures were used as the foundation of the modified questionnaire so that the property of this questionnaire is maintained thereby the data can be pooled and compared.

The CVI of items in this modified questionnaire ranged from 0.60 to 1.00 with five items scoring less than 0.8. In section 2 (sources of nutrients), the item comparing the amount of calcium in full-fat and low-fat milk scored a CVI of less than 0.8. According to MDG 2020, on the 8th key message, we are recommended to consume an adequate amount of milk and milk products without emphasising which type of milk should consume. Hence, this item may be unimportant and should be replaced or excluded.

Besides that, question 3, Section 3 (choosing everyday foods), "Which would be the healthiest and most balanced choice for the main meal in a restaurant?" scored a CVI of less than 0.8. Even though Ashari *et al.* (2022) reported that 84% of people preferred to eat out rather than taking their meals at home, however, there are many food outlets in Malaysia besides restaurants, such as *warung, Mamak,* hawker stalls, food courts, and food trucks [19]. Therefore, this question and items contained therein need to be re-evaluated to better encompass the types of food outlets found in Malaysia. Furthermore, in Section 4 (diet-disease relationship), the statement "to maintain a healthy weight people should cut fat out completely" scored a CVI of less than 0.8. Based on the MDG 2020, the amount of fat, carbohydrates, protein, and water in food determines its caloric content, also known as energy density (kcal/100g). Foods with a high-fat content have higher calories since fat has twice as many calories per gram as compared to carbohydrates and protein. Nonetheless, fat should not be cut out completely as 50% to 65% energy from carbohydrates, and 10% to 20% energy comes from proteins; and energy from fats should be limited between 25% to 30% to promote a healthy diet and meet nutrient needs as suggested by Recommend Nutrition Intake (RNI) for Malaysia (2017) [20].

Lastly, the item regarding certain body shapes; apple or pear body shapes increase the risk of cardiovascular diseases gained a CVI of less than 0.8. According to MDG 2020, greater health risks are linked to body fat in the abdominal area than in the periphery. The risk factors and morbidity of obesity-related disorders, such as cardiovascular diseases, are independently predicted by excess abdominal fat. The MDG did not specify the body shape, instead, the MDG specified the body area. In spite of that, since only 40% (2 out of 5) of the experts rated all the low CVI items as 'somewhat or not relevant to the measured domain', the items should be revised and re-evaluated rather than eliminated from the questionnaire.

One of the assessors recommended including the waist circumference measurement in Section 4 (diet-disease relationship), which was not written in the original questionnaire. According to the World Health Organization, there is a need for other indicators to complement the measurement of BMI which to identify people at increased risk of obesity-related morbidity due to accumulation of abdominal fat. Abdominal obesity can lead to cardiovascular disease which is the main cause of obesity-related death. The alternative measurement to measure abdominal adiposity like waist circumference has been suggested to being more superior to BMI in predicting cardiovascular disease risk [21]. Therefore, the suggestion to add waist circumference can be considered and implemented in the next future.
Other than that, one of the assessors was also concerned about the terms "zero diet/no cholesterol/diet/light" used in the questionnaire. To improve the clarity of the questionnaire, getting feedback from the target population is also important and should be done tremendously. According to Haynes *et al.* (1995), the end-user view is also important to assess the relevance of the items in evaluating face validity [22]. Testing of the psychometric property of this modified questionnaire should be further conducted to ensure the individual items are well correlated to the total score of each section and the score remain stable over a certain period.

One of the strengths of this study is a comprehensive technique consisting of qualitative and quantitative studies using adequate samples with a total of eight-panel experts. In previous GNKQ-R validation studies, only three to six-panel experts were involved to generate, modify or/and evaluate the content validity of the GNKQ questionnaire [13,17,23,24]. In addition, the latest Malaysian guidelines were used to reorient the questionnaire to suit the local Malaysian population.

Various limitations of the study are to be noted. As of the publication of this research, only an English version of the questionnaire exists and may be difficult to apply to certain subsets of Malaysia's population that have a stronger grasp of the Malay language than English. As such, the modified questionnaire should be translated into the Malay language, such that it can be professionally and universally applied to the Malaysian population that consists of multiple different races. Therefore, researchers who would like to use GNKQ-R may translate the modified questionnaire before it is tested psychometrically on the general population.

Conclusion

This study provides a questionnaire for researchers in Malaysia to measure the general nutrition knowledge of the adult Malaysian population, adapted from the GNKQ-R. However, five items are required to revise and re-evaluated and one item on waist circumference can be added before this questionnaire is further evaluated for face validity and psychometric properties.

Acknowledgments

The authors wish to thank the expert panels, reviewers, supervisor, and co-supervisor who provided valuable insight and expertise that greatly assisted in this research.

Conflict of Interest

The authors declare no conflict of interest in this study.

Table 1. Content validity index (CVI) of each item

No.	Item	CVI
Section 1		
1.	Do health experts recommend that people should be eating plenty, moderate, or less of the following foods? (Eg. fruits, processed food	0.80
2.	How many total servings of vegetables and fruits per day do experts advise people to eat as a minimum?	1.00
3.	Which of these types of fats do experts recommend that people should eat less of? (Eg. trans fats, saturated fats)	1.00
4.	Which type of milk or milk products do experts say is the best option? (e.g.: cheese, yogurt)	0.80
5.	How many servings per day do experts recommend that people eat fish? (e.g., 1 whole medium size of ikan tilapia/kembong)	0.80
6.	How many glasses of plain water is the minimum recommended per day?	1.00
7.	How many times per week do experts recommend that people eat breakfast (7.00 am – 10.30 am)	1.00
8.	How many servings per day do experts recommend that people eat poultry/meat/eggs?]	0.80
9.	According to the 'quarter-quarter-half', how much of a person's plate should be filled up with rice/other cereals/wholegrain cereal-based/tubers foods	1.00
Section 2		
1.	Do you think these foods and drinks are typically high or low in added sugar?	1.00
2.	Do you think these foods are typically high or low in salt?	1.00
3.	Do you think these foods are typically high or low in fibre?	1.00
4.	Do you think these foods are a good source of protein?	1.00
5.	Which of the following foods do experts count as starchy foods?	1.00
6.	Which is the main type of fat present in each of these foods?	1.00
7.	Which of these foods has the most trans-fat?	0.80
8.	The amount of calcium in a glass of full-cream milk compared to a glass of reduced/low-fat milk is...?	0.60
9.	Which one of the following nutrients has the most calories for the same weight of food?	0.60
10.	Processed foods are...?	0.80
Section 3		
1.	If a person wanted to buy yogurt at the supermarket, which would have the least sugar/sweetener?	0.80
2.	If a person wanted to have nasi lemak, which one would be the lowest fat option?	0.80

3.	Which would be the healthiest and most balanced choice for the main meal in a restaurant?	0.60
4.	Which would be the healthiest and most balanced meal if someone does not want to eat rice?	0.80
5.	Which of these foods would be the healthiest choice for a dessert?	0.80
6.	Which of these drinks would be the healthiest choice?	0.80
7.	If a person wanted to reduce the amount of fat in their diet but didn't want to give up French fries, which of the following foods would be the best choice?	1.00
8.	One healthy way to add flavour to food without adding extra fat or salt is to add:	1.00
9.	Which of the following cooking methods requires no fat to be added?	0.80
10.	"Zero diet"/ "No cholesterol"/ "Diet"/ "Light" foods are always good options because they are low in calories.	0.80
11.	Looking at products 1 and 2, which one has the most calories (kcal) per 100 grams	0.80
12.	Looking at product 1, what are the sources of sugar in the ingredient list?	0.80
Section 4		
1.	Which of these diseases is related to a low intake of fibre?	0.80
2.	Which of these diseases is related to how much sugar people eat?	0.80
3.	Which of these diseases is related to how much salt (or sodium) people eat?	0.80
4.	Which of these options do experts recommend to reduce the chances of getting cancer?	0.80
5.	Which of these options do experts recommend to lower the risk of getting heart disease?	0.80
6.	Which of these options do experts recommend to lower the risk of getting diabetes?	1.00
7.	Which one of these foods is more likely to increase people's blood cholesterol?	1.00
8.	Which one of these foods are classified as having a high Glycaemic Index (Glycaemic Index is a measure of the impact of a food on blood sugar levels, thus a high Glycaemic Index means a greater rise in blood sugar after eating)?	0.80
9.	To maintain a healthy weight people should cut fat out completely.	0.60
10.	To maintain a healthy weight people should eat a high protein diet.	0.80
11.	Eating rice/bread always causes weight gain.	0.80
12.	Fibre can decrease the chances of gaining weight.	1.00
13.	Which of these options can help people to maintain a healthy weight?	0.80
14.	If someone has a Body Mass Index (BMI) of 23kg/m2, what would their weight status be?	0.80
15.	If someone has a Body Mass Index (BMI) of 31kg/m2, what would their weight status be?	0.80
16.	Which of these body shapes increases the risk of cardiovascular disease (cardiovascular disease is a general term that describes a disease of the heart or blood vessels, for example, angina, heart attack, heart failure, and stroke)?	0.60

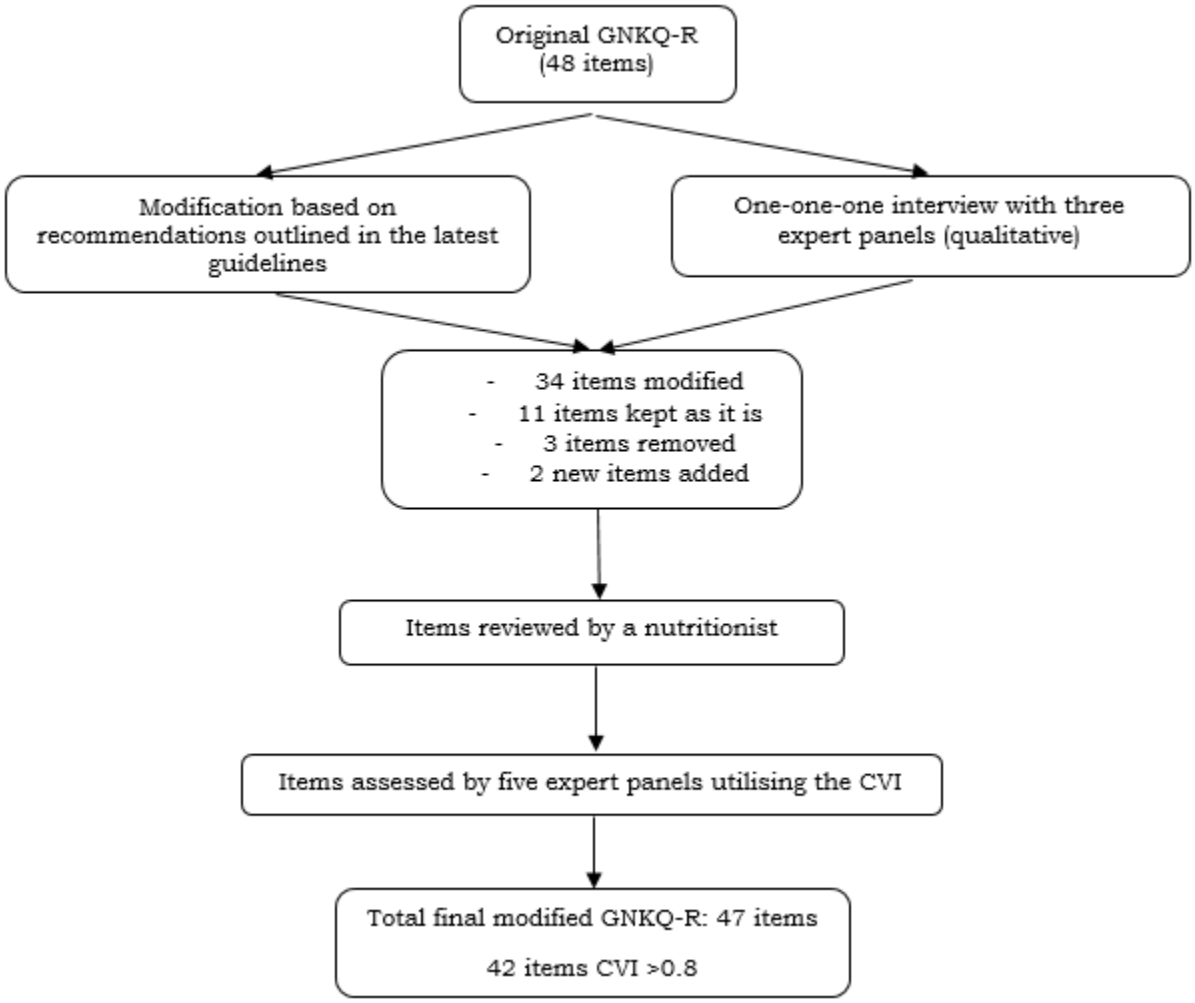

Figure 1. Study flowchart

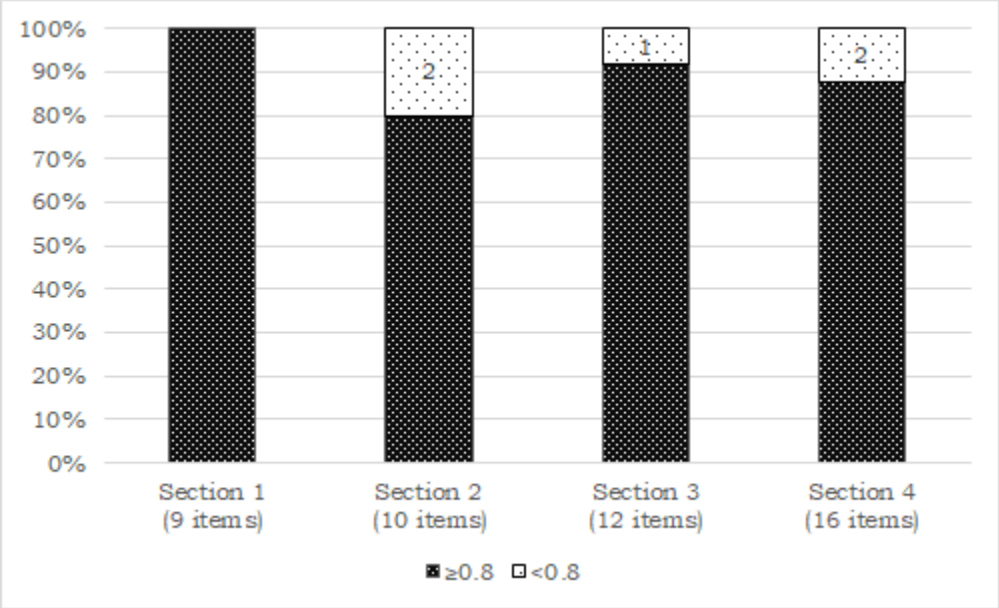

Figure 2. Overall result of CVI of each section

References

[1]. Oxford Learner's Dictionary. (online). From https://www.oxfordlearnersdictionaries.com/definition/english/nutritionFma?q=nutrition

[2]. UNICEF. In: The faces of malnutrition. 2016; https://www.unicef.org/nutrition/index_faces-of-malnutrition.html.

[3]. Spronk I, Kullen C, Burdon C, O'Connor H. Relationship Between Nutrition Knowledge and Dietary Intake. *British Journal of Nutrition* 2014 111(10): 1713-1726. doi:10.1017/s0007114514000087.

[4]. Institute for Public Health 2020. National Health and Morbidity Survey (NHMS) 2019: Non-communicable diseases, healthcare demand, and health literacy—Key Findings.

[5]. Pon LW, Noor-Aini MY, Ong FB, Adeeb N, Seri SS, Shamsuddin K. *et al*., Diet Nutritional knowledge and health status of urban middle-aged Malaysian women. *Asia Pacific Journal of Clinical Nutrition* 2006 15(3): 388-399. PMID: 16837432.

[6]. Lim ZX, Wong JL, Lim PY, Soon LK. Knowledge of nutrition during pregnancy and associated factors among antenatal mothers. *International Journal of Public Health and Clinical Sciences* 2018 5(1): 117-128. https://www.researchgate.net/publication/323941595_KNOWLEDGE_OF_NUTRITION_DURING_PREGNANCY_AND_ASSOCIATED_FACTORS_AMONG_ANTENATAL_MOTHERS.

[7]. Norimah AK, Nik Shanita S, Safiah MY, Norazliana MN, Zawiah A, Tee ES. Nutrition Knowledge among Malaysian elderly. *Jurnal Sains Kesihatan Malaysia* 2008 6(2): 43-54. http://www.fsk.ukm.my/jurnal/jilid%206%282%292008/Chap%205.pdf.

[8]. Wan Putri EWD, Hamid JJM & Hafzan Y. Nutrition Knowledge, Attitude and Practices (NKAP) and Health-Related Quality of Life (HRQOL) Status among Overweight and Obese Children: An Analysis of Baseline Data from the Interactive Multimedia-based Nutrition Education Package (IMNEP) Study. *Malaysian Journal of Nutrition* 2007 23(1): 17-29. https://www.researchgate.net/publication/316504371_Nutrition_Knowledge_Attitude_and_Practices_NKAP_and_Health-Related_Quality_of_Life_HRQOL_Status_among_Overweight_and_Obese_Children_An_Analysis_of_Baseline_Data_from_the_Interactive_Multimedia-based_N.

[9]. Mohd Rohaizat H, Hasanain FG, Nur Syazana U, Norzaleha M, Sameeha MJ, Zaleha MI. *et al*., Knowledge, Attitude and Practice of Healthy Eating and Associated Factors among University Students in Selangor, Malaysia. *Pakistan Journal of Nutrition* 2015 14(12): 892-897.https://www.researchgate.net/publication/286265001_Knowledge_Attitude_and_Practice_of_Healthy_Eating_and_Associated_Factors_among_University_Students_in_Selangor_Malaysia

[10]. Yaghmale F. Content validity and its estimation. *Journal of Medical Education* 2003 3(1): 25-27. https://www.researchgate.net/publication/277034169_Content_validity_and_its_estimation

[11]. Parmenter K, Wardle J. Development of a general nutrition knowledge questionnaire for adults. *European Journal of Clinical Nutrition* 1999 53: 298–308. doi: https://doi.org/10.1038/sj.ejcn.1600726.

[12]. Kliemann N, Wardle J, Johnson F, Croker H. Reliability and validity of a revised version of the General Nutrition Knowledge Questionnaire. *European Journal of Clinical Nutrition* 2016 70(10):1174-1180. doi: 10.1038/ejcn.2016.87.

[13]. Putnoky S, Banu AM, Moleriu LC, Putnoky S, Șerban DM, Niculescu MD. et al., Reliability and validity of a General Nutrition Knowledge Questionnaire for adults in a Romanian population. *European Journal of Clinical Nutrition* 2020 74(11): 1576-1584. doi:10.1038/s41430-020-0616-5.

[14]. NCCFN. 2021. Malaysian Dietary Guidelines 2020. National Coordinating Committee on Food and Nutrition. Ministry of Health Malaysia (MOH).

[15]. Institute for Public Health (IPH) 2014. National Health and Morbidity Survey 2014: Malaysian Adult Nutrition Survey. Vol. 1: Methodology and General Findings: 108 pages.

[16]. Trakman GL, Forsyth A, Hoye R, Belski R. Developing and validating a nutrition knowledge questionnaire: key methods and considerations. *Public health nutrition* 2013 20(15): 2670-2679. doi:10.1017/s1368980017001471

[17]. Bukenya R, Ahmed A, Andrade JM, Grigsby-Toussaint DS, Muyonga J & Andrade JE (2017). Validity and Reliability of General Nutrition Knowledge Questionnaire for Adults in Uganda. *Nutrients* 2017 *9*(2): 172. doi:10.3390/nu9020172.

[18]. Olson K. An examination of Questionnaire Evaluation by Expert Reviewers. *Fields Methods.* 2010 22(4): 295-318. doi:10.1177/1525822X10379795.
[19]. Ashari LS, Abd Rashid AA, Shahril MR, Lee YY., Kueh YC, Hakim BNA & Mohamed HJJ. Exploring the norms of eating-out practice among adults in Malaysia. *Malaysian Journal of Nutrition* 2022 28(1): 031-041. doi:10.31246/mjn-2021-0008.
[20]. Ministry of Health Malaysia (2017). *In: Recommended Nutrient Intakes (RNI) for Malaysia.* From https://nutrition.moh.gov.my/wp-content/uploads/2017/05/FA-Buku-RNI.pdf.
[21]. World Health Organization (2011). *In: Waist Circumference and Waist-Hip Ratio: Report of a WHO Expert Consultation, 2008*. From: http://apps.who.int/iris/bitstream/handle/10665/44583/9789241501491_eng.pdf;jsessionid=E5EF7EAEEB10F4F6D42A37533D25B614?sequence=1. [Retrieved July 15 2022].
[22]. Haynes SN, Richard DCS, Kubany ES. Content validity in psychological assessment: A functional approach to concepts and methods. *Psychological Assessment* 1995 *7*(3), 238–247. doi:10.1037/1040-3590.7.3.238.
[23]. Alsaffar AA. Validation of a general nutrition knowledge questionnaire in a Turkish student sample. Public Health Nutr. 2022 15(11):2074-85. doi:10.1017/s1368980011003594.
[24]. Bradette-Laplante M, Carbonneau É, Provencher V, Bégin C, Robitaille J, Desroches S. et, al., Development and validation of a nutrition knowledge questionnaire for a Canadian population. Public Health Nutr. 2017 20(7):1184-1192. doi: 10.1017/s1368980016003372