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Development and Pilot Testing of Nutrition Knowledge, Attitude and Practice Questionnaire in Persons with Disabilities (KAP-nOKU) among Trainers in Rehabilitation Centres, Malaysia

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Abstract: Malnutrition and growth failure are prevalent among Persons with Disabilities (PWD) and most trainers or care givers in the Community-based Rehabilitation (CBR) centres had limited knowledge in nutrition management for this vulnerable population. The purpose of this study was to develop and examine the validity and reliability of an evaluation instrument, Nutrition Knowledge, Attitude and Practice Questionnaire in Persons with Disabilities (KAP-nOKU) among trainers in CBR centres, Malaysia. KAP-nOKU was a guided self-administered questionnaire and consisted of 30 knowledge, 15 attitude and 15 practice items. After items generation, it was assessed the content validity by an expert panel; and face validity by nine care givers for spastic children. The revised questionnaire was further pre-tested. This pilot study was a cross-sectional survey and recruited 165 trainers from CBR centres in Perlis, Pulau Pinang and Perak, Malaysia. Item analysis or construct validity, internal consistency and test-retest reliability of KAP-nOKU were examined. Five sub-domains were constructed for knowledge domain and three factor-solutions emerged for attitude and practice domains, respectively. Items with low factor loading and correlation were removed. Internal consistency was good-to-excellent for knowledge (KR20 = 0.63), attitude (CA = 0.67) and practice (CA = 0.82) domains. Test-retest reliability- the intraclass correlation coefficients for knowledge, attitude and practice domains were 0.59, 0.73 and 0.91 ($p < 0.05$). The finalized KAP-nOKU after analysis contained 57 items-29 knowledge, 13 attitude and 15 practice items. KAP-nOKU was an adequately valid and reliable questionnaire which can serve as an assessment tool to evaluate the effectiveness of nutrition education among trainers or care givers in rehabilitation centres, Malaysia.

Key words: Nutrition, knowledge, attitude, practice, disability

INTRODUCTION

“Disability” is defined as the interaction between persons with disabilities and the attitudinal and environmental barriers that prevents their effective participation in the society on an equal basis with the persons without disabilities (Laws of Malaysia, 2008). Persons with Disabilities (PWD) are more commonly known as *Orang Kurang Upaya* (OKU) in Malaysian context. An estimation of 1.3 million Malaysians live with various forms of disabilities in 2009 (Zulkiple, 2009); till 2010, there were only 280,000 of them who have registered with the social welfare department (Roslee, 2011).

Persons with Disabilities (PWD) are susceptible to nutritional impairment which eventually results in abnormal body composition and growth failure. The impact of malnutrition as the most frequent cause of growth impairment, particularly among the severely affected people, raised major public concerns.

International studies have been documented that under-nutrition was found in almost 50% of children with cerebral palsy (Sánchez-Lastres *et al.*, 2003; Marchand *et al.*, 2006). In spite of this, a remarkable prevalence of PWD whom are overweight and obese was also reported (Bertoli *et al.*, 2006; Melville *et al.*, 2007). Additionally, a local cross-sectional survey of nutritional assessment among 462 PWD in Community-Based Rehabilitation (CBR) centres in Kelantan, Malaysia reported almost 50% of the total PWD suffered from malnutrition; 20.3% of them were underweight while another 22.8% were overweight or obese (Chen, Unpublished data, 2010). Both of these nutritional concerns can further worsening their residual functional status and increasing the risk of co-morbidities. Community-based Rehabilitation (CBR) is a governmental public health notion that aims to empower the PWD to access and benefit from the health, education, social and employment services. It enables

them to gain access to rehabilitation in their own communities using predominantly local resources. This program is usually managed in rural areas in order to ensure the welfare of the unfortunate group in such areas was not neglected. Each CBR centre was operated by three to four trainers, or more commonly known as "teachers". Besides providing rehabilitation therapies and vocational training, these trainers also need to prepare meals for the PWD. Unfortunately, they have limited exposure to nutrition information and are not properly trained in nutrition management for the PWD.

Before initiating any nutrition education programme towards these trainers in CBR centres, a valid and reliable questionnaire is indeed essential to evaluate their level of knowledge, attitude and practice regarding nutrition management for PWD. To our best knowledge, no questionnaire that specifically targeting the nutrition in disability is available in Malaysia. Thus, this present study was conducted with the objective, to develop and examine the validity and reliability of the Nutrition Knowledge, Attitude and Practice Questionnaire in Persons with Disabilities (KAP-nOKU) among trainers in CBR centres.

MATERIALS AND METHODS

Questionnaire development: The KAP-nOKU was a guided self-administered questionnaire and answered by the trainers in CBR centres. It contained two sections, a) the respondent's socio-demographic characteristics and b) the nutrition knowledge, attitude and practice questionnaire. Development of KAP-nOKU was conducted by the following steps: determination on the constructs of interest for knowledge, attitude and practice domains; items generation; content validation by expert panel; face validation by potential examinees; and pilot testing among target group. The KAP-nOKU comprised of items reflecting general nutrition information and specific nutrition issues regarding PWD (knowledge domain); trainers' attitude and belief towards nutrition and health as well as nutrition teaching towards PWD (attitude domain); trainers' food and nutrition management for PWD in the centres (practice domain). Items formulation was done by review of published questionnaire, scientific literature and textbooks; and discussions within the research team. A pool of items was generated with emphasis on cultural-sensitivity.

This questionnaire was in Malay language and consisted of 60 items- 30 items for knowledge domain and 15 items for attitude and practice domains, respectively. The knowledge domain comprised of multiple choice items. Each item had four answer options and "Not Sure" option. Only one of the options was the correct answer. 1 score was given for a correct

answer and 0 score for an incorrect answer or "Not Sure". Possible scores ranged from 0 to 30. For attitude, the response options were 'strongly agree, agree, neutral, disagree, strongly disagree'; scored as 5, 4, 3, 2, 1. Respondents could indicate their degree of agreement towards the statement given. Similarly, the response options for practice were 'everyday, always (3-4 days in a week), sometimes (1-2 days in a week), seldom (1-2 days in a month) and never'; scored as 5, 4, 3, 2, 1. Respondents, on the other hand, indicated their frequency of action towards the practice items. Possible scores for both attitude and practice domains ranged from 15 to 75. Higher scores suggested good knowledge, positive attitude and good practice.

The content validation of KAP-nOKU was accomplished by an expert panel comprising seven experts in dietetics and nutrition, childhood psychology, paediatrics, community medicine and health promotion. These experts reviewed the questionnaire independently and rated it based on four criteria: content relevance, clarity, simplicity and ambiguity (Waltz and Bausell, 1983). Next, the face validation of the KAP-nOKU was completed by nine trainers from a rehabilitation training centre for spastic children to check on the feasibility, readability and the general formatting of the questionnaire. All feedbacks from content and face validation were reviewed by the research team. The items were either deleted, edited or remain unchanged after extensive discussion among the researchers. The revised KAP-nOKU would then proceed to the pilot study.

Pilot testing of KAP-nOKU: The pilot study was a cross-sectional survey and conducted from May to August 2011 at three states located at the northern region of Peninsular Malaysia: Perlis, Pulau Pinang and Perak. It aimed to examine the item analysis, construct validity and the reliability of the questionnaire. The sample size required for a validation study was based on the statistical analysis used. As factor analysis was conducted to analyze the construct validity of attitude and practice items (Total = 30 items), the sample size needed for this pilot study was 150 respondents (ratio of 5:1; $5 \times 30 = 150$).

One-stage cluster sampling method was adopted to select 43 CBR centres out of a total 61 centres at the three states. The inclusion criteria for the study respondents were trainers who worked more than six months in the respective CBR centre; aged between 18 to 60 years and directly involved in the services for PWD in the centres. All trainers of the selected centres who met the inclusion criteria were recruited.

Data collection was carried out by the researcher's visits to each CBR centre. The purpose and procedure of study were explained thoroughly before written informed consents were obtained from the trainers. KAP-nOKU

was a guided self-administered questionnaire. The trainers could clarify any doubts with the researcher during responding to the questionnaire. No time restriction implied but they had to complete and return the questionnaire on the same day.

Besides, the trainers were also requested to participate in the test-retest session of KAP-nOKU. They were informed that the same questionnaire would be mailed to them four weeks after the first data collection. A self-addressed stamped return envelope was also sent along with the questionnaire. The trainers were required to answer the questionnaire once again and return them to the researcher after completion.

This study was approved by the Malaysian Department of Social Welfare (Ref no. JKMM: 100/12/5/2 Jld 37[29]) and ethical approval was obtained from The Research Ethics Committee (Human), Universiti Sains Malaysia (Ref. no. USM/PPP/Ethics Com./2010[118]).

Statistical analysis: Statistical Package for the Social Sciences (SPSS) version 18.0 (SPSS, Inc., Chicago, IL, USA) was used to conduct the statistical analysis. Item analysis to investigate the difficulty and discrimination index was performed for the knowledge items. The difficulty index of an item refers to the percentage of respondents who answers the item correctly (Linn and Gronlund, 1995). A difficulty index of between 0.2 to 0.8 (20 to 80% of respondents can answer the question correctly) was considered acceptable (Dixon, 1994; Parmenter and Wardle, 2000). The discrimination index is the extent of the item discriminates between respondents who have high scores and low scores (Linn and Gronlund, 1995). Items with discrimination index 0.20-0.29 were acceptable; 0.30-0.39 were good and 0.40 and above were excellent. Construct validity of attitude and practice items were examined using exploratory factor analysis with varimax rotation using eigenvalue 1 and fixed numbers of factors. For reliability testing, internal consistency and test-retest reliability analysis was done for all domains. Internal consistency was assessed by KR20 for knowledge and Cronbach's alpha for attitude and practice. KR20 or Cronbach's alpha coefficient of 0.5 was acceptable (Portney and Watkins, 2009); while 0.7 and above shows good homogeneity among the items (DeVon *et al.*, 2007; Sushil and Verma, 2010). Items with factor loading and corrected item-to-total score correlation (CITC) of 0.2 were considered minimally acceptable and same or more than 0.4 were good to be factoring with its respective factor (Naing *et al.*, n.d.). Items were selected based on the item analysis (for knowledge items) or factor analysis (for attitude and practice items); internal consistency reliability analysis and content consideration. Test-retest reliability was determined by intraclass correlation coefficient. P-values <0.05 were considered statistically significant.

RESULTS

Content and face validity: For the content validity of KAP-nOKU, the experts rated the overall questionnaire as adequately relevant, clear, simple and with no doubts. Nevertheless, a few suggestions on the wordings or terminologies used were given. For face validity, all respondents agreed that most items were clear and easy to respond to with the exception of a few questions which were confusing. They commented that five knowledge items out of thirty were difficult. One respondent also suggested that the questionnaire was too lengthy and felt boring while answering it. Items duplication was not known. Based on their recommendations, several changes were made including rewording; changes of multiple choice options in knowledge domain; and items rearrangement for better understandability and readability.

Socio-demographic characteristics: A total of 165 trainers from 43 CBR centres were recruited in the pilot study, 96.4% were women (n = 159) and majority of them were Malays (97.6%). The age of the trainers ranged from 21 to 61 years, 70.9% of them aged within the range of 21 to 40 years. A number of 126 respondents were married and followed by 16.4% whom were single. Majority of them (86.7%) received their highest educational level until upper secondary school. There were 64.2% of the trainers who just worked as CBR trainers for less than five years; this shows that they were still quite new to the teaching and training of PWD. Almost 85% of them reported that they had not attended any nutrition courses before.

Item analysis, construct validity and reliability of KAP-nOKU: For the knowledge domain of KAP-nOKU, five sub-domains namely nutrient and sources; nutrient and functions; food pyramid; healthy eating and food preparation; and nutrition management for PWD, were developed. Based on the item analysis (Table 1), item K19 "In the list below which cooking method is the fattiest?" (Options were Grill; Roast; Steam; Cooked with coconut milk; Not sure) was removed as it was too easy (difficulty index = 0.99; discrimination index = 0.02) and almost all trainers could answer it correctly. Although items K27, K28 and K29 had difficulty and discrimination index below the acceptable range, they were still remained in the questionnaire after considering their content relevance and importance.

The exploratory factor analysis resulted in three factor solutions for both attitude and practice domains, respectively. Table 2 and 3 presents the factors (or sub-domains), the items along with their factor loading and CITC for attitude and practice domains. Two attitude items (A33 and A34) were removed from KAP-nOKU as

Table 1: The difficulty and discrimination index for knowledge items of KAP-nOKU (N = 165)

Item		Dif-I	Dis-I
Sub-domain			
Nutrient and sources			
K01	In the list below which is the group of nutrients?	0.23	0.22
K02	The followings are the foods rich in carbohydrate, EXCEPT	0.62	0.47
K03	The followings are the foods rich in protein, EXCEPT	0.62	0.67
K04	In the list below, the food with the highest fat content is	0.79	0.20
K05	What are the two MAIN nutrients contributed by fruits and vegetables?	0.70	0.36
K06	In the list below, the food with the highest calcium content is	0.69	0.33
K07	In the list below, the foods with the highest iron content are	0.35	0.29
K08	In the list below, the foods with the highest fibre content are	0.30	0.33
Nutrient and functions			
K09	What is the main function of carbohydrate?	0.80	0.36
K10	The following statements are the functions of protein, EXCEPT	0.46	0.33
K11	The following statements are the functions of vitamin C, EXCEPT	0.27	0.22
K12	In the list below which has the highest calorie (energy) content?	0.26	0.27
Food pyramid			
K13	What is well-balanced diet?	0.54	0.44
K14	You can get all the required nutrients by...	0.79	0.47
K15	Do you know about food pyramid?	0.80	0.38
K16	According to food pyramid, the foods you are advised to eat ADEQUATELY are...	0.27	0.31
K17	According to food pyramid, the foods you are advised to eat PLENTY are...	0.47	0.33
K18	According to food pyramid, the foods you are advised to eat in MODERATION are...	0.29	0.36
Healthy eating and food preparation			
K19	In the list below which cooking method is the fattiest?	0.99	0.02
K20	Recommended salt intake for an individual per day is...	0.29	0.22
K21	Fruit juice is better than whole fruit because fruit juice has higher vitamin content	0.50	0.47
K22	Exclusive breastfeeding should be given to baby until 6 month old	0.79	0.22
K23	The MOST SUITABLE food transition from liquid to solid for a child is...	0.30	0.40
K24	Choose the food combination that is MOST SUITABLE for a 6-year old child	0.76	0.42
Nutrition management for PWD			
K25	The following foods can easily cause choking among children with disabilities, EXCEPT	0.72	0.40
K26	The CORRECT method for eating management of a child with Down's syndrome is	0.58	0.36
K27	The following foods can easily cause food allergy among children with disabilities, EXCEPT	0.14	0.18
K28	Persons with cerebral palsy (CP) who has drooling problem should	0.18	0.24
K29	The following foods are suitable to be added into diet of an underweight person with disabilities (such as children with cerebral palsy CP), EXCEPT	0.12	0.18
K30	The effective method to lose weight among obese children with Down's syndrome is	0.24	0.20

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

they had low factor loading and correlation. All practice items were fairly good and retained in the questionnaire. The revised KAP-nOKU contained 57 items-29 items for knowledge, 13 items for attitude and 15 items for practice. For the reliability of the questionnaire, the internal consistency was examined for the overall domains and their sub-domains. The KR20 value for the knowledge domain was 0.63. The overall Cronbach's alpha coefficients for attitude and practice domains were 0.67 and 0.82. The attitude sub-domains had the Cronbach's alpha coefficients of 0.56; 0.81; 0.52 (Table 2); while the value for practice sub-domains were 0.85; 0.44; 0.52 (Table 3). In short, the attitude and practice items had fairly good correlation within the domains as their CITC value were greater than 0.2. For test-retest reliability, there were fifty-one trainers (31.0%) completed and returned the questionnaires after four weeks. The intraclass correlation coefficients for knowledge, attitude and practice domains were 0.59, 0.73 and 0.91, respectively (p<0.05).

DISCUSSION

The knowledge items of KAP-nOKU were developed based on the area of interest that the researcher wished to explore. The items were constructed in a consecutive manner from general nutrition knowledge to more specific nutrition management for the PWD (Table 1). All these nutrition information were known facts. Hence, the knowledge items were not meant for factor analysis as they were not abstract ideas that were required to be operationally defined (Trochim, 2006) and further grouped into general factors (Bryman, 2005). The quality of the knowledge items was evaluated using item analysis. Results show that all knowledge items had appropriate level of difficulty and discrimination index except items K19, K27, K28 and K29. Item K19 was removed as it was greatly deviated from the acceptable range. Items K27, K28 and K29 were still remained although there were less than 20% of the trainers who scored these items correctly. These items were relevant as these items were addressing the nutrition or food

Table 2: The factor loading, corrected items-to-total score correlation and internal consistency for attitude domain (N=165)

Domain		Factor loading				
Item	Sub-domain	F1	F2	F3	CITC	CA
	Attitude					0.67
	Nutrition and health					0.56
A31	Good eating habit is important for maintaining overall health	0.78			0.50	
A32	Improving nutrition knowledge is beneficial towards overall health	0.67			0.46	
A35	In my opinion, vitamin supplementation should be given to all PWD	0.23			0.27	
	Nutrition teaching towards PWD					0.81
A36	I am interested in teaching nutrition among PWD		0.61		0.47	
A37	I am responsible in teaching nutrition among PWD in CBR centre		0.73		0.61	
A38	I am confident that I manage to convey nutrition knowledge and information to PWD		0.75		0.60	
A39	My effort in nutrition teaching towards PWD will be more effective if there is cooperation from their parents or care givers		0.74		0.66	
A40	In my opinion, nutrition teaching among PWD will be more effective if reference sources such as teaching module are available		0.73		0.64	
A41	I would voice out my comment or advice if the food prepared for PWD is unhealthy		0.71		0.54	
	Improving the health of PWD					0.52
A42	I am not worried about the food choices for children because they are still young			0.56	0.29	
A43	I do not have nutrition knowledge to teach the PWD			0.50	0.23	
A44	Food behaviour among PWD could not be improved as they do not understand my advice			0.59	0.42	
A45	Physical activity should be limited in the daily lifestyle of PWD in order to reduce their burden			0.69	0.35	

F: Factor; CITC: Corrected items-to-total score correlation; CA: Cronbach's alpha

Table 3: The factor loading, corrected items-to-total score correlation and internal consistency for practice domain (N = 165)

Domain		Factor loading				
Item	Sub-domain	F1	F2	F3	CITC	CA
	Practice					0.82
	Food preparation and modification					0.85
P46	I prepare food like rice, meat, vegetables and fruits for PWD in CBR centre	0.76			0.65	
P47	I prepare vegetables in the menu of PWD in CBR centre	0.78			0.66	
P48	I prepare fruits in the menu of PWD in CBR centre	0.65			0.50	
P49	I try to modify hard-textured food to soft texture for the PWD	0.58			0.52	
P50	I add large amount of soup into the rice for PWD	0.62			0.56	
P51	I try to introduce new food to PWD	0.58			0.52	
P52	I insist on the PWD finishing the nutritious food even though they do not like it	0.51			0.46	
P53	I restrict the food quantity given to an overweight disabled child	0.75			0.63	
P54	I add more vegetables in the daily diet of underweight PWD	0.53			0.39	
P55	I inform the rules on good and bad eating behaviours to PWD who have behaviour problems during mealtimes	0.63			0.58	
	Response to aversive behaviour					0.44
P56	I only cook food that I know the PWD would like		0.67		0.25	
P57	I always prepare fried food to PWD because they like it most		0.60		0.28	
P58	I ignore the autistic child who is irritable and refuse to eat at CBR centre		0.69		0.26	
	Training the PWD					0.52
P59	I scold the PWD if they eat in a dirty and messy condition			0.68	0.35	
P60	I help the PWD to do physical activity in the CBR centre			0.77	0.35	

F: Factor; CITC: Corrected items-to-total score correlation; CA: Cronbach's alpha

intake problems that usually occurred among the children with disabilities. Low difficulty index, however, highlighted that the trainers in the CBR centres were lack of knowledge regarding this matter. Thus, these items were still retained in the questionnaire in order to identify the nutrition topic that warrants greater attention so that nutrition education programme on this specific topic could be targeted to the trainers or care givers.

In factor analysis, factor loading plays a crucial role in item deletion as it shows the correlation between item and its respective factor. Besides, CITC reflects the correlation among items within a factor. Two items (A33 and A34) having factor loading and CITC less than 0.2 were removed from attitude domain. Results demonstrated that there was one attitude item, "In my opinion, vitamin supplementation should be given to all the PWD", having low factor loading (0.23) and CITC (0.27) (Table 2). It was still kept in the questionnaire as it was important to evaluate the trainers' or care givers' nutrition attitude. This was because most care givers might think that vitamin supplementation was beneficial in intellectual functioning and should be given to all the PWD even though they had sufficient dietary intake. But, there is no consistent evidence to show that mega doses of vitamin supplementation have significant beneficial effects in health outcome (Weathers, 1983; Smith *et al.*, 1984); furthermore, it might pose a risk in drug-drug interaction. There were also two attitude and three practice items (Table 2 and 3) had relatively low CITC (<0.2) but their factor loadings were adequately high (>0.4). These items were still retained due to content wise based on experts' opinion as these items were important for evaluation purpose among the trainers regarding their nutrition management for PWD in the CBR centres. Similar opinion was adopted in the study of Naing *et al.* The criterion can be lowered if the item sounds theoretically and has practical reasoning for use (Lowenthal, 2001).

KR-20 and Cronbach's alpha coefficients, as the reliability index, are used to measure the internal consistency of a scale. KR-20 reliability index refers to the internal consistency of a knowledge test when it is scored dichotomously (for e.g., 1 score for correct answer and 0 score for incorrect answer). Cronbach's alpha reliability coefficient, on the other hand, is used to measure the internal consistency of an attitude questionnaire or when a test measures the score by ratings, for instance the Likert scale (Tan, 2009). Most categories in KAP-nOKU showed moderately good-to-excellent internal consistency (K = 0.63; A = 0.67; P = 0.82). However, the internal consistencies were just minimally acceptable for some sub-domains of attitude (Sub-domain III: 0.52) and practice (Sub-domain II: 0.44 and Sub-domain III: 0.52) (Table 2 and 3). These low internal consistencies might be due to the small number of items in the respective sub-domains. This is clearly shown in our measure that the factor "food preparation

and modification" (10 items) had a higher Cronbach's alpha coefficient as compared to factor "response to aversive behaviour" (3 items) (Table 3). A major way to make a test more reliable is to make them longer (Nunnally and Bernstein, 1994). This was not practical in our case because the respondents in current study (face validation and pilot study) reported the initial 60-item KAP-nOKU was too lengthy and they took more than thirty minutes to complete it. Hence, it was ideal for the questionnaire to be reduced to a 57-item instrument. Local and international validation and reliability studies on nutrition knowledge, attitude and practice questionnaire were compared. Siti Sabariah's *et al.* (2006) reliability and validity study of primary school children's nutrition knowledge, attitude and practice demonstrated good internal consistency for knowledge domain but poor for both attitude and practice domains (Cronbach's alpha: K = 0.68; A = 0.37; P = 0.36). Validation study on questionnaire regarding adolescent girls' knowledge and attitude towards calcium intake (Glanz and Steffen, 2008) had good reliability (Cronbach's alpha: K = 0.72; A = 0.80). Similarly, Obayashi *et al.* (2003) study on nutrition knowledge (2 sub-domains) and social-psychological attitude measure (4 sub-domains) among large sample size of adult population (n = 1196) also reported fairly acceptable internal consistencies (Cronbach's alpha: K = 0.46 and 0.65; A = 0.48; 0.82; 0.78; 0.82).

In addition, intraclass correlation coefficients for knowledge (0.59), attitude (0.73) and practice (0.91) domains also demonstrated good-to-excellent test-retest reliability. Although there were only 31% of trainers completed the test-retest of KAP-nOKU, this small sample size was still adequate as the estimated sample size for test-retest session was 46 respondents after considering a significant level of 0.05; 80% of study power; and an expected intraclass correlation coefficient of 0.80 (Stata version 11.1).

The strength of this study is it involved the community-based trainers who engaged into the rehabilitation effort for the population with disabilities. To our knowledge, the KAP-nOKU is the first instrument developed to assess the knowledge, attitude and practice of the trainers or care givers in nutrition management for PWD in CBR centres, Malaysia. Nonetheless, a few limitations exist. Though the sample size was adequate, the respondents were only selected from the CBR centres in the northern region of Peninsular Malaysia. Thus, the study result was not generalizable. Besides, we would like to suggest further validation such as criterion validity and testing on various groups (parents or teachers in special education) can be done to gain acceptance on this questionnaire. The KAP-nOKU was only suitable to be used in Malaysia as it was constructed in Malay language and based on Malay food culture and habits. It is recommended that the instrument to be translated into other languages; or amendment of items according

to appropriate food culture and habits so that it can be adopted in other countries.

Conclusion: The KAP-nOKU developed to assess the knowledge, attitude and practice of the trainers in their nutrition management for the PWD at CBR centres, Malaysia, was found to have satisfactory validity and reliability. The nutrition knowledge, attitude and practice scores may help in determining the level of knowledge and readiness to change among the care givers. Additionally, identification of the low- or high-scoring sub-domains can contribute to developing effective nutrition intervention for the target group. Furthermore, the KAP-nOKU can serve as an evaluation tool for descriptive (to provide baseline data), prospective and intervention research among trainers in CBR centres in Malaysia.

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