

Development and validation of the Salt Intake-Related Knowledge, Attitude, and Practice Questionnaire for Malaysian adults

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ABSTRACT

Introduction: Malaysian adults consume excessive amounts of salt daily, which could lead to hypertension. Understanding knowledge, attitudes, and practices (KAP) surrounding salt intake is crucial for designing effective interventions to reduce excessive consumption and its associated health risks. Therefore, this study aimed to adapt an existing salt intake-related KAP questionnaire that was previously employed in a local population-based survey and to validate and test its reliability.

Methods: This cross-sectional study comprised two phases: (1) adaptation, content validation (CV), and face validation (FV); (2) pilot testing and reliability testing. CV and FV involved a total of seven experts and ten Malaysian adults from the Klang Valley, respectively. Pilot testing involved 139 Malaysian adults to determine the questionnaire's reliability. Content validity index (CVI) and Face validity index (FVI) values were calculated to analyse CV and FV. Reliability of each domain was analysed by obtaining Cronbach's alpha (α) values. **Results:** A self-administered questionnaire comprising six items each for knowledge, attitude, and practice was developed. The questionnaire demonstrated acceptable item-level CVI (I-CVI) and item-level FVI (I-FVI) values of at least 0.83, indicating that the items were relevant, clear, non-ambiguous, and simple. Reliability test showed acceptable α values of at least 0.70 for each domain, suggesting that the questionnaire was reliable.

Conclusion: This tool could be considered valid and reliable for assessing the level of KAP towards salt intake among adults in Malaysia.

Keywords: adults, awareness, questionnaire, salt intake, validation

INTRODUCTION

The Institute for Public Health (IPH, 2019a) previously reported in the local Population-Based Salt Intake Survey to Support the National Salt Reduction Programme for Malaysia, also known as the Malaysian Community Salt Survey (MyCoSS), that Malaysians consume around 7.9 g/day of salt. This amount exceeds the maximum recommended

intake by the World Health Organization (WHO, 2012) of 5g/day. Excessive salt intake has been linked to hypertension (Choe *et al.*, 2015), which is one of the strongest risk factors for various cardiovascular complications (Kjeldsen, 2018). Moreover, the prevalence of hypertension among adults in Malaysia in 2019 was 30% (IPH, 2019b), consistent with the previous prevalence

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of 30.3% reported in 2015 (Ministry of Health Malaysia, 2015). These statistics indicate that one in three Malaysians suffers from hypertension—a significant concern given that cardiovascular complications account for 34.8% of mortality (IPH, 2017). Therefore, reducing dietary salt intake is a cost-effective method to prevent and reduce non-communicable diseases, such as hypertension, and consequently, cardiovascular complications (Ministry of Health Malaysia, 2015).

An individual's salt intake is influenced by his/her knowledge, attitude, and practices regarding dietary habits (Mahat *et al.*, 2017). Hence, targeting personal attitude is an important component of behavioural change (Bettinghaus, 1986). Despite the reported high levels of salt intake and high prevalence of hypertension, most Malaysians are actually aware of their high dietary salt intake and its impact on health (IPH, 2019a). However, only a little more than half (55.4%) controlled their salt intake regularly through seven types of dietary practices, such as avoiding processed foods and reading food labels. A majority (72.9%) consistently added salt while cooking and nearly half (47.7%) added salt, sauces, and condiments to their food at the table. These statistics suggest a disconnect between awareness and actual dietary practices or behaviours.

In Malaysia, only a handful of knowledge, attitudes and practices (KAP) studies have focused on dietary salt intake. These comprised studies that either adopted (Ismail *et al.*, 2021; Ahmad, Taha & Harith, 2020; Tee, Singh & Cheng, 2020) or adapted (Haron, 2022; Haron *et al.*, 2021; Dahalim & Jusoh, 2020) a questionnaire that was validated by IPH and first used in the MySalt 2015 study (IPH, 2016). This study involved only staff from the Ministry of Health (MOH) Malaysia and the questionnaire was used again during the MyCoSS. Similar to MyCoSS (IPH, 2019a), a study

found that only 50.0% of the staffs in a local private university regularly engaged in practices to control their dietary salt intake, despite majority of them knowing the association between high salt intake and health problems, and that salt reduction is important (Tee, Singh & Cheng, 2020). In contrast, two other studies (Ahmad *et al.*, 2020; Ismail *et al.*, 2021) conducted among non-academic staffs and undergraduate students of two local universities, respectively, found that the awareness seemed to be reflected through the respondents' behaviours or practices. As for studies that adapted the MyCoSS questionnaire, two studies that incorporated a scoring classification reported that the practice of controlled dietary salt intake was inadequate, although the awareness was considered good (Haron, 2022; Haron *et al.*, 2021). In a study by Dahalim & Jusoh (2020) who added a knowledge-related question on recommended daily salt intake, reported that majority of the respondents, comprising of staffs from a local private university, did not have the knowledge. Furthermore, only half of the staffs controlled their salt intake despite being aware of the health effects of high salt intake.

While it is challenging to fully explain the discrepancy between awareness and actual dietary practices, the questionnaire used in the MyCoSS and the studies that adapted the questionnaire may have had some limitations that prevented a comprehensive assessment of the respondents' knowledge, attitudes, and practices. For instance, the questionnaire had an unequal number of items for each domain, in which only two items were for knowledge (K), two for attitude (A), and four for practice (P). Aside from that, there is concern that the questionnaire may not have captured comprehensive information on KAP among respondents due to its limited number of items. Furthermore, responses in the MyCoSS questionnaire were also only presented at a descriptive level, unlike studies that

reported their findings based on a scoring classification (Haron, 2022; Haron *et al.*, 2021). Although recent studies that have adapted the questionnaire have included new items that addressed other areas related to the KAP (Haron, 2022; Haron *et al.*, 2021; Dahalim & Jusoh, 2020), a detailed procedure on the validation and reliability testing of these adapted questionnaires was not described. Therefore, this study aimed to develop a Salt Intake-Related Knowledge, Attitude, and Practice Questionnaire (SI-KAP) by adapting an existing questionnaire used in the MyCoSS, validate it and test its reliability to assess the KAP level among Malaysian adults concerning salt intake.

MATERIALS AND METHODS

Study design

This cross-sectional study design was conducted in two phases among adults in Klang Valley, Malaysia (Figure 1): Phase I – adaptation, content validation, and face validation of the questionnaire, and Phase II – pilot testing and reliability testing of the questionnaire. The Research Ethics Committee of the Universiti Kebangsaan Malaysia approved this study, with the reference number UKM PPI/111/8/JEP-2020-433. This study was conducted in accordance with the Helsinki Declaration of 1975, as revised in 2008.

Study instrument

To suit the Malaysian context, IPH has adapted the questionnaire from the World Health Organization/Pan American Health Organization protocol for population-level sodium monitoring (WHO/PAHO, 2010), which was translated into the Malay language, validated through back-translation, and the final version established for content validity through expert panel consensus. It was pre-tested among the Malaysian adult population. The questionnaire was first utilised in the MySalt study (IPH, 2016) among staffs of MOH and

subsequently in MyCoSS (IPH, 2019a) with the broader Malaysian population.

The questionnaire consisted of eight items divided into three domains: knowledge, attitude, and practice. The knowledge domain included two items covering the area of health problems related to high salt intake. The attitude domain also comprised two items addressing the following: (i) the importance of reducing salt consumption and (ii) perceptions of the amount of salt consumed. Four items in the practice domain covered these aspects: (i) one item on methods of reducing salt intake during cooking; (ii) one item on methods of reducing salt intake at the table; and (iii) two items on methods of reducing salt intake regularly.

The responses in the questionnaire were close-ended. The knowledge and practice domains offered 'yes', 'no', 'don't know', and 'refuses to answer' as response options. Meanwhile, the attitude domain provided 'very important', 'somewhat important', 'not at all important', 'far too little', 'too little', 'just the right amount', 'too much', 'far too much', 'don't know', and 'refuses to answer' as response options.

Phase I

Items adaptation

Literature search using journal databases such as Science Direct, Scopus, PubMed, Cochrane Database, and Medline was conducted to identify local and international studies related to salt intake KAP. The keywords used included "salt intake", "salt intake awareness", "KAP towards salt intake", and "consumption of salt by Malaysians". The questionnaires from the identified studies were reviewed and compared with the MyCoSS questionnaire. The assessment, in collaboration with a group of experts in the salt reduction project, aimed to incorporate significant new information from existing questionnaires, identify

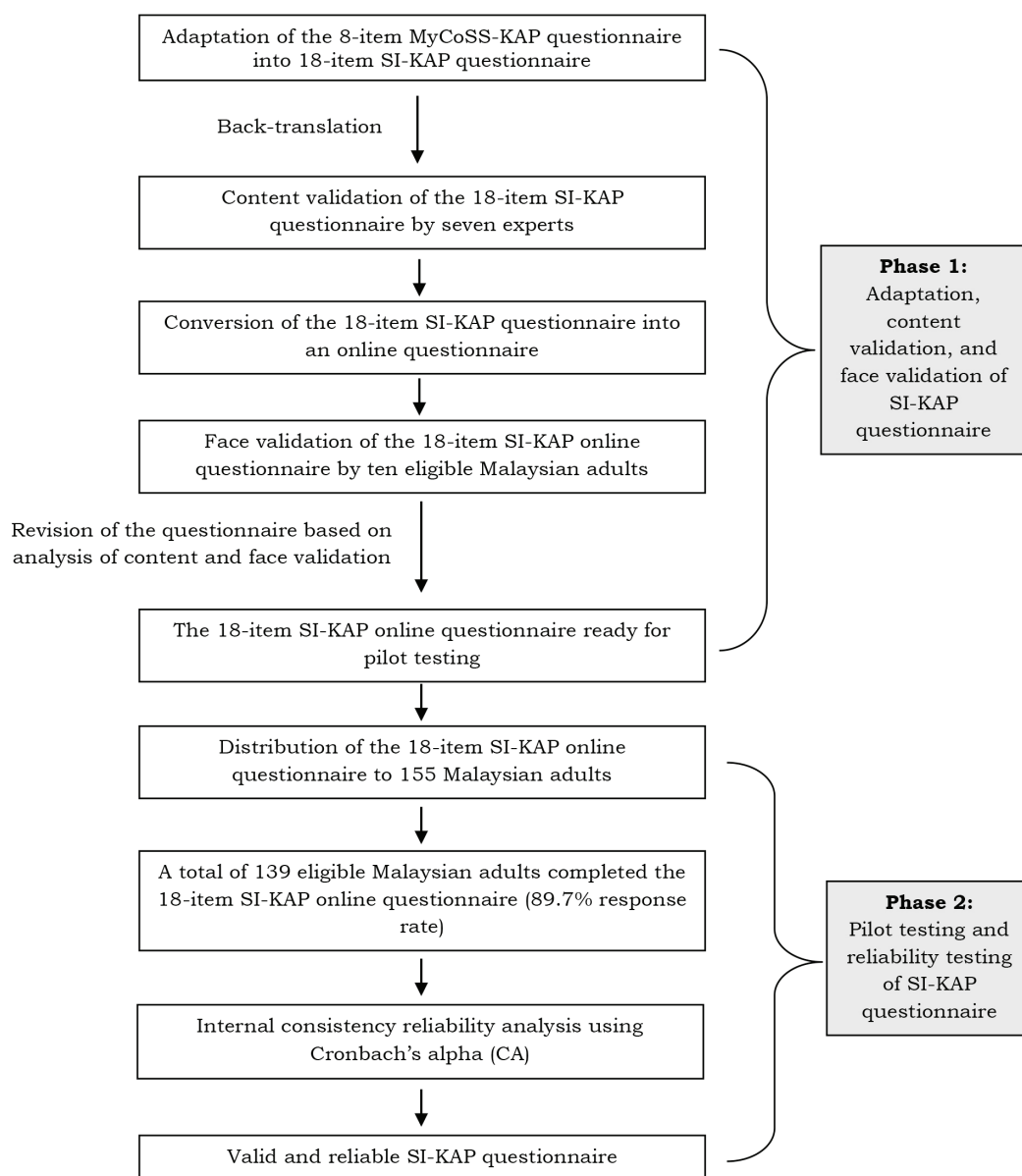


Figure 1. Phases of adaptation, validation, and reliability testing of Salt Intake-Related Knowledge, Attitude, and Practice (SI-KAP) Questionnaire

gaps in the gathered information, and eliminate redundant and irrelevant details based on the reviewers' extensive experience and expertise (Dyrbye *et al.*, 2010). It was also determined whether the number of items in the MyCoSS questionnaire sufficiently represented

the domains and if the content from non-local studies was relevant to the Malaysian context.

In the SI-KAP questionnaire, four items were added to the knowledge domain to cover the following new areas: (i) recommended daily salt intake; (ii) main

sources of salt in the Malaysian diet; (iii) permissible amount of salt consumption; and (iv) relationship between salt and sodium. Two items from the MyCoSS questionnaire that addressed health problems related to high salt intake were retained. In the attitude domain, five new items addressed: (i) the importance of identifying foods high in salt; (ii) beliefs about minimising salt consumption; (iii) beliefs about the impact of reduced salt intake on hypertension risk; (iv) beliefs regarding flavour enhancement of adding salt to food; and (v) the importance of checking food labels for salt content. One item from the original questionnaire addressing the importance of reducing salt consumption was retained, while another concerning the perceived amount of salt consumed was moved to the practice domain. In the practice domain, an item was added to discuss practices of reducing salt intake when eating out. Two items from the original questionnaire, pertaining to the practices of reducing salt intake during cooking and at the table, were modified in wording. Two items focusing on the regular practice of reducing salt intake were retained.

Responses adaptation

The responses in the SI-KAP questionnaire remained close-ended. Minor modifications were made to the response options. In the knowledge domain, the 'refused to answer' option was removed from one of the retained items. For another retained item, the options 'stroke', 'heart disease', 'all of the above', and 'refused to answer' were eliminated. In the attitude domain, 'important' and 'less important' options were introduced, complementing the existing 'very important' and 'not important' options. In the practice domain, 'limit the consumption of salty snacks' was included as one of the options for an item addressing the practices of reducing salt intake on a regular basis.

Scoring and classification

In contrast to the MyCoSS questionnaire, the SI-KAP questionnaire incorporated a scoring system to facilitate the interpretation of comparisons between domains. Every option for all items across the three domains was assigned a score, with the most appropriate response receiving the highest score. After summing the highest scores of all items within that domain, the maximum scores were 24 for knowledge, 24 for attitude, and 26 for practice. Participant's score for each domain was converted into a percentage to reflect their level of knowledge, attitude, and practice towards salt intake. Additionally, an overall awareness score was calculated by adding the scores from all three domains, with the maximum possible score being 74 (24+24+26=74). These percentage scores were then interpreted as follows (Bakarman, Kurashi & Hanif, 1996):

- (i) Knowledge: Unsatisfactory (< 60%), moderate (60%-70%), good (> 70%).
- (ii) Attitude: Negative (< 60%), neutral (60%-70%), positive (> 70%).
- (iii) Practice: Inadequate (< 60%), adequate (60%-70%), good (> 70%).
- (iv) Overall awareness: Unsatisfactory (< 60%), moderate (60%-70%), good (> 70%).

Language validation

The MyCoSS questionnaire is available in both English and the Malay language (IPH, 2019a). Since the experts involved in the adaptation process were native English speakers, the adaptation was first carried out using the English version of the questionnaire. Similarly, the SI-KAP questionnaire is available in both languages. To produce the Malay version, the English version was first translated by four independent translators proficient in both languages. This Malay version was then back-translated into English to resolve any discrepancies and inaccuracies. The translation and

back-translation processes were applied only to the new and modified items. For the retained items, their existing Malay version were used.

Content validation

Content validation of the SI-KAP questionnaire was conducted by seven experts, including five nutritionists and two dietitians. Each expert completed an informed consent form to confirm their understanding and agreement to participate in the task, as well as a content validation form to critically review the domains and items before scoring each item. They individually reviewed the questionnaire to rate the relevance of each item to the respective domains using a 4-point Likert scale ranging from 1 (not relevant) to 4 (highly relevant) (Lau *et al.*, 2017; Ozair, Baharuddin & Yusoff, 2017) and provided feedback to enhance the items' relevance to the targeted domains. The analysis for content validation was based on the content validation index (CVI) values.

Conversion into online survey instrument

The paper-based SI-KAP questionnaire was transformed into an online survey using Google Forms prior to face validation with the intended participants. The first page of the online survey provided essential information about the study, including the purpose of the questionnaire, contact details of the researchers, a statement of confidentiality, and a declaration that participation was voluntary, with the right to withdraw at any time. At the end of this page, participants needed to confirm their eligibility for the study, acknowledge that they had read and understood the provided information, and give their informed consent by selecting the appropriate button, which then allowed access to the subsequent pages of the questionnaire.

The questionnaire was organised into three sections. Section A comprised

seven items regarding socio-demographic characteristics. Section B included a single item about the participants' health history, allowing them to select multiple options if necessary. Finally, Section C presented the 18-item KAP domains. Participants needed to respond to all questions before proceeding to the conclusion of the questionnaire.

Face validation

For face validation, ten eligible Malaysian adults were involved. Using a non-face-to-face approach, they accessed the online version of the questionnaire to evaluate the clarity, ambiguity, and simplicity of the items, providing a score for each and were encouraged to submit written feedback. Following the methodology of content validation, each item was rated using a 4-point Likert scale. The analysis for face validation was based on the face validation index (FVI) values.

Analysis of content validation and face validation

Following a validation protocol for CVI guideline by The International Consultation on Incontinence Questionnaire (ICIQ, n.d.), scores rated from 1 to 4 during content and face validations were transformed into dichotomous values. Items rated 1 or 2 were coded as non-valid (represented as 0) and items rated 3 or 4 were coded as valid (represented as 1).

For content validity, the item-level-CVI (I-CVI) and scale-level-CVI (S-CVI) were calculated. The S-CVI was computed in two ways: S-CVI/UA (universal agreement method) and S-CVI/Ave (average calculation method). S-CVI/UA involved determining the number of items with 100% agreement by the experts and dividing this by the total number of items. S-CVI/Ave was calculated by summing the total I-CVI values and then dividing it by the number of items. For a panel of experts ranging from six to eight, a CVI value of 0.83 or

higher was considered acceptable for content validation (Lynn, 1986).

Similarly, for face validity, the item-level-FVI (I-FVI) and scale-level-FVI (S-FVI) were determined. S-FVI/UA and S-FVI/Ave were calculated using the same methods as I-CVI and S-CVI, respectively. For face validation with 10 raters, a FVI value of 0.83 or above was deemed acceptable (Marzuki, Yaacob & Yaacob, 2018).

All feedback were reviewed to refine the domains and items upon completion of the validation process. Decisions to edit, remove, or retain items were made after thorough discussion among the researchers, based on the CVI and FVI values, and comments received. The revised questionnaire was then moved to Phase II of the study.

Phase II

Pilot testing

The online SI-KAP questionnaire was pilot tested among 155 Malaysian adults who met the same eligibility criteria as those in Phase I. However, those who had participated in Phase I were excluded from participating in Phase II.

Reliability testing

To assess the internal consistency of the adapted questionnaire and its ability to produce consistent results across repeated measurements, the instrument was analysed for reliability using Cronbach's alpha (α). This coefficient α evaluates the degree to which different items measure the same attribute or domain. The reliability assessment was conducted following guidelines by Yusoff, Arifin & Hadie (2021). To calculate the α for each domain, responses for items based on multiple-choice options were converted dichotomously. For the knowledge, attitude, and practices domains, responses were coded as 0 (incorrect/disagree/never) or 1 (correct/agree/always).

Sample size and sampling method

Through established networks, convenience sampling was used to recruit seven experts, which is sufficient for conducting a content validity test (Lynn, 1986).

In contrast, face validation requires a minimum of ten raters who are typical users of the questionnaire rather than professionals or experts (Yusoff, 2019). To recruit potential subjects for this phase, convenience sampling was utilised by disseminating announcements via social networking sites (SNS) and through known networks. Interested respondents were screened against inclusion criteria: Malaysian nationals aged 18 years and above of any gender, and with the ability to read and understand English or Malay. Snowball sampling was subsequently employed to reach the target of ten eligible subjects.

The sample size for pilot testing was determined using a subject-to-item ratio of 5:1 (Tan, 2009). Therefore, a minimum of 90 participants was required (18 items \times 5 = 90) in the testing. Anticipating a response rate of 72.7% (IPH, 2019a), the questionnaire was distributed to at least 155 participants. Following the completion of content and face validations, subject recruitment was conducted using the same method until at least 155 suitable participants matching the inclusion criteria were achieved.

Statistical analysis

Data analyses were conducted using the IBM SPSS Statistics for Windows version 25.0 (IBM Corp., Armonk, New York, USA). Socio-demographic characteristics of participants from the pilot test were analysed using descriptive statistics and data were reported as percentage values. For reliability testing, the α for each KAP domain was calculated. An α of at least 0.70 was deemed acceptable for this study (Taber, 2018).

Table 1. Summary adaptation of the SI-KAP questionnaire

Item no.	Original 8-item MyCoSS questionnaire	Adapted 18-item SI-KAP questionnaire	Scoring responses in 18-item SI-KAP questionnaire
			Response (score)
Knowledge domain			
1	-	Added: Recommended amount of salt intake in a day	<ul style="list-style-type: none"> • 5 g (about 1 teaspoon) (2) • 8 g (about 1 ½ teaspoons) (1) • 10 g (about 2 teaspoons) (1) • Don't know (1)
2	-	Added: Main sources of salt in the Malaysian diet	<ul style="list-style-type: none"> • Salt added during cooking (4) • Salt from processed foods such as soy sauce, fast food and snacks (3) • Salt from natural food sources such as shellfish and milk (2) • Don't know (1)
3	-	Added: Amount of salt allowed to be consumed	<ul style="list-style-type: none"> • Very little (4) • Right amount (3) • Too much (2) • Don't know (1)
4	-	Added: Relationship between salt and sodium	<ul style="list-style-type: none"> • Salt contains sodium (3) • Salt and sodium are the same (2) • Sodium contains salt (2) • Don't know (1)
5	Health problems related to high salt intake	No change except for answer rephrased	<ul style="list-style-type: none"> • Yes (3) • No (2) • Don't know (1)
6	Health problems related to high salt intake	No change except for answer rephrased	<p>Can answer more than one:</p> <ul style="list-style-type: none"> • High blood pressure (2) • Osteoporosis (2) • Stomach cancer (2) • Kidney stones (2) • None of the above (1) • Don't know (1)
Practice domain			
7	Practices of reducing salt intake at the table	<ul style="list-style-type: none"> • Modified to reducing soy and soy sauce intake at the table • Answer rephrased 	<ul style="list-style-type: none"> • Never (4) • Sometimes (3) • Often (2) • Always (1)
8	Practices of reducing salt intake during cooking	<ul style="list-style-type: none"> • Modified to the amount of salt added during cooking • Answer rephrased 	<ul style="list-style-type: none"> • None (4) • Very little (3) • Right amount (2) • Too much (1)
9	-	Added: Practices of reducing salt intake when eating out	<ul style="list-style-type: none"> • Never (1) • Sometimes (2) • Often (3) • Always (4)

Table 1. Summary adaptation of the SI-KAP questionnaire (*cont.*)

Item no.	Original 8-item MyCoSS questionnaire	Adapted 18-item SI-KAP questionnaire	Scoring responses in 18-item SI-KAP questionnaire
			Response (score)
10	-	<ul style="list-style-type: none"> Moved from attitude domain: Amount of salt consumed Question and answer rephrased 	<ul style="list-style-type: none"> Very little (4) Right amount (3) Too much (2) Don't know (1)
11	Practices of reducing salt intake on a regular basis	No change except for answer rephrased	<ul style="list-style-type: none"> Yes (3) No (2) Don't know (1)
12	Practices of reducing salt intake on a regular basis	No change except for answer rephrased	<p>Can answer more than one:</p> <ul style="list-style-type: none"> Avoid eating foods prepared outside of home (1) Avoid/minimise the consumption of processed foods (1) Avoid adding salt shaker/soy sauce on the table as you eat it or right before you eat it (1) Read the salt content on the food labels (1) Buy alternative foods with low salt (1) Limit the consumption of salty snacks (1) Not adding of salt when cooking (1)
Attitude domain			
13	-	Added: Importance of identifying food that contains high amounts of salt	<ul style="list-style-type: none"> Very important (4) Important (3) Less important (2) Not important (1)
14	-	Added: They believe that they minimised their salt consumption	<ul style="list-style-type: none"> Strongly agree (4) Agree (3) Slightly agree (2) Disagree (1)
15	Importance of lowering of salt consumption	No change except for answer rephrased	<ul style="list-style-type: none"> Very important (4) Important (3) Less important (2) Not important (1)
16	-	Added: They believe that that lowering their salt intake will reduce their risk of getting hypertension	<ul style="list-style-type: none"> Strongly agree (4) Agree (3) Slightly agree (2) Disagree (1)

Table 1. Summary adaptation of the SI-KAP questionnaire (cont.)

Item no.	Original 8-item MyCoSS questionnaire	Adapted 18-item SI-KAP questionnaire	Scoring responses in 18-item SI-KAP questionnaire Response (score)
17	-	Added: They believe that adding salt to food will make it tastier	<ul style="list-style-type: none"> • Strongly agree (1) • Agree (2) • Slightly agree (3) • Disagree (4)
18	-	Added: Importance of checking the salt content on food labels	<ul style="list-style-type: none"> • Very important (4) • Important (3) • Less important (2) • Not important (1)
19	Amount of salt consumed	Moved to practice domain (item 10)	-

RESULTS

The adaptations and modifications to the MyCoSS questionnaire are summarised in Table 1, which also includes responses and scoring for the adapted version. The addition of new items was aimed to broaden the assessment of salt intake-related knowledge, attitudes, and practices (KAP), and to deepen the questionnaire’s scope. The revised SI-KAP questionnaire comprised 18 items, with an equal number of six items in each of the three domains. It was administered in both English and the Malay languages, similar to the MyCoSS questionnaire.

Table 2. Content validity of SI-KAP Questionnaire evaluated by experts (n=7)

Item	Domain		
	Knowledge	Attitude	Practice
S-CVI/Ave	1.00	0.98	1.00
S-CVI/UA	1.00	1.00	1.00
Average proportion of items	1.00	0.98	1.00

For content validity, both the knowledge and practice domains achieved a S-CVI/UA and S-CVI/Ave value of 1.00 (Table 2). For the attitude domain, the S-CVI/UA was 1.00 and

S-CVI/Ave was 0.98, deemed acceptable for the number of experts consulted (Lynn, 1986). No further modifications were made to the questionnaire as the experts provided no additional feedback.

Table 3. Face validity of SI-KAP Questionnaire evaluated by Malaysian adults (n=10)

Domain	Component	S-FVI/Ave	S-FVI/UA
Knowledge	Clarity	0.90	1.00
	Ambiguity	0.93	1.00
	Simplicity	0.93	1.00
Attitude	Clarity	0.90	0.83
	Ambiguity	0.90	0.83
	Simplicity	0.93	1.00
Practice	Clarity	0.90	0.67
	Ambiguity	0.88	0.67
	Simplicity	0.93	1.00

Face validity results (Table 3) indicated that the S-FVI/UA and S-FVI/Ave for clarity, ambiguity, and simplicity were above the acceptable threshold of 0.83 for all domains (Marzuki, Yaacob & Yaacob, 2018). This suggests that participants found the questionnaire’s items, language, wording, and layout to be clear, simple, and straightforward. The S-FVI/UA for the practice domain

regarding clarity and ambiguity fell below the threshold, with a value of 0.67. Some participants found certain terms too complex; thus, minor corrections were made, including word substitutions with simpler synonyms.

The pilot test yielded 139 complete responses (89.7% response rate). Most participants (79.9%) were aged 18-29 years, followed by 30-39 years (10.8%), 50-59 years (5.8%), and 40-49 years (3.6%). Females represented 78.4% of the sample, while males accounted for 21.6%. Participants were predominantly of Chinese ethnicity (46.8%), with Malays (36.7%), Indians (11.5%), and others (5.0%) comprising the remainder. A significant majority (84.9%) were single, with 15.1% married. The participants were mostly educated to tertiary level (87.1%), with secondary education at 12.9%. Over half (61.2%) were students, 13.7% were private sector employees, 10.8% were unemployed, 7.9% were self-employed, and 6.5% worked in the government sector. The majority (69.8%) had a monthly household income of RM 4,849 or below, 24.5% between RM 4,850 and RM 10,969, and 5.8% at least RM 10,970.

Table 4. Reliability of SI-KAP Questionnaire assessed among Malaysian adults ($n=139$)

Domain	Cronbach's alpha (α)
Knowledge	0.72
Attitude	0.79
Practice	0.70

Cronbach's alpha values for internal consistency (Table 4) were 0.72 for the knowledge domain, 0.79 for attitude, and 0.70 for practice, suggesting that the adapted questionnaire reliably produces consistent outcomes across repeated measures.

DISCUSSION

To the best of our knowledge, this was the first study that has adapted

the MyCoSS questionnaire and tested its validity and reliability. The questionnaire administered in past studies (IPH, 2019a; Haron *et al.*, 2021; Mansor *et al.*, 2021) showed that good knowledge and attitude towards dietary salt intake among Malaysians were not showcased through their practices. This discrepancy might arise from a lack of comprehensive knowledge and attitudes related to various aspects of dietary salt intake. Therefore, an adaptation through the SI-KAP questionnaire was necessary to capture the knowledge and attitude towards broader areas related to dietary salt intake. Furthermore, validation and reliability were tested to ensure that the adapted questionnaire accurately measures its intended constructs and produces consistent outcomes upon repetition.

Similar to local studies that adapted the MyCoSS questionnaire (Haron *et al.*, 2021; Ahmad *et al.*, 2020; Dahalim & Jusoh, 2020), we deemed it necessary to ask participants if they knew of the global recommended amount for daily salt intake (WHO, 2012). In the SI-KAP questionnaire, the item addressing this area was similar to previous studies (Ahmad *et al.*, 2020; Haron *et al.* 2021), since we assumed that participants who chose the correct answer knew of the national recommendation. Another new item that had not been addressed in any existing local studies was the focus on the main sources of salt in the Malaysian diet, where responses included salt added during cooking, salt from processed foods, fast foods, and snacks, as well as salt naturally present in raw food sources. This area is crucial as the common misconception is that salt primarily comes from only what is added during food preparation. Knowledge about the relationship between salt and sodium was also questioned since food products in the Malaysian markets are labelled with sodium content (Disease Control Division, 2021); thus, it is

necessary for Malaysians to distinguish between the two.

With regards to the attitude domain, the additional five items included opinions or beliefs about the importance of identifying foods containing a high amount of salt, beliefs about minimising salt consumption, whether lowering salt intake will reduce the risk of hypertension, whether adding salt to food enhances its taste, and the importance of checking salt content on food labels. The item assessing the participant's opinion regarding their salt consumption was moved to the practice domain, as it was perceived to fit better there. Similar to the study by Haron *et al.* (2021), this item was also moved to the practice domain.

With regards to practice, the two items that addressed the practices of reducing salt intake at the table and during cooking were modified in wording. For the first item, the MyCoSS questionnaire asked whether participants practised adding salt, sauce, soy sauce, or food enhancers to food at the table. This item was modified by excluding salt and food enhancers, as the practice of adding these substances to food upon eating is not common among the locals. Haron *et al.* (2021) included only soy sauce for this item in the practice domain, whereas Dahalim & Jusoh (2020) separated soy sauce and salt into two separate items. Similar to Haron *et al.* (2021), for the modification of the second item on practices of reducing salt during cooking, the question was changed from how often participants added salt during cooking to how much salt is usually added. Additionally, an item related to practices when eating out was added as eating out has become a common dining habit among Malaysians, with 70% of the population eating out regularly (IPH, 2014). The item from the attitude domain that addressed the amount of salt consumed was moved to this domain and modified to fit the context better.

In contrast to the MyCoSS questionnaire, the SI-KAP questionnaire enabled the findings to be presented not only in frequency and percentage, but also the classification levels of participants' knowledge, attitude, and practice. Compared to other local studies, only those by Mansor *et al.* (2021) and Haron *et al.* (2021) assigned scores to every item in order to classify the percentage score into different levels of each domain. Similar to Haron *et al.* (2021), the SI-KAP questionnaire used the classification by Bakarman *et al.* (1996) instead of the classification by Mansor *et al.* (2021) because the authors (Mansor *et al.*, 2021) did not justify the level of classification used.

Regarding content and face validity, the acceptable CVI values indicated that the items were relevant to their respective domains in the questionnaire. Also, the acceptable FVI values suggested that the items, language, wording, and layout of the questionnaire were clear, simple, and unambiguous. A direct comparison with other studies could not be made as no studies were found assessing the salt-related KAP questionnaire itself or addressing the validation process, even though adaptations of the MyCoSS questionnaire were made (Haron *et al.*, 2021; Ahmad *et al.*, 2020; Dahalim & Jusoh, 2020).

Regarding internal consistency, the α computed for each domain indicated that outcomes were consistent upon repeated measurements (Taber, 2018). In comparison to other studies, only Haron *et al.* (2021) reported the α of their questionnaire, which was at least 0.70, signifying that their adapted questionnaire was reliable.

This study was strengthened by the involvement of experts in salt reduction strategy to review the information gathered from the literature search. The SI-KAP questionnaire was ensured to be more comprehensive than the MyCoSS questionnaire as it covers a wider scope

related to dietary salt intake and is relevant to the local context. Similar to the MyCoSS questionnaire, the SI-KAP questionnaire was administered in the two languages commonly used in Malaysia, which may facilitate understanding among bilingual participants and those coming from various educational backgrounds. Nonetheless, limitations still exist. The present study only recruited Malaysian adults from Klang Valley, hence results cannot be generalised to the entire Malaysian adult population. Besides that, the use of an online questionnaire was vulnerable to response bias as participants could easily obtain information from the internet while answering the questionnaire.

This study has produced a valid and reliable questionnaire that can be used to evaluate dietary salt intake-related KAP in Malaysia. However, future researchers who adopt this questionnaire should at least perform an internal consistency analysis to ensure that the questionnaire is reliable for their targeted population. To ensure representative and unbiased sampling, future research should be conducted using a multi-stage random sampling method.

CONCLUSION

This study adapted the MyCoSS questionnaire that assessed the KAP of adults in Malaysia regarding salt intake. The SI-KAP questionnaire was proven to be valid and reliable for the intended purpose. With the inclusion of new salt-related topics, this questionnaire can provide a comprehensive evaluation of salt intake-KAP among Malaysian adults. Consequently, specific salt intake-related interventions could be developed and their impact evaluated to support the National Salt Reduction Programme in Malaysia.

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Authors' contributions

Zainorain Natasha ZA, Ngoh WH, Hng JW, Siti Aishah I and Maryam Hanis F, carried out the data collection and data analysis for content validity, face validity and reliability; Zainorain Natasha ZA, prepared the draft of the manuscript; Hasnah H, principal investigator, conceptualised and designed the study and reviewed the manuscript.

Conflict of interest

All authors declare no conflicts of interest.

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