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# Development and validation of a salt knowledge questionnaire

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## Abstract

Objective Initiatives promoting the reduction of high-salt food consumption by consumers need to be partly based on current levels of salt knowledge in the population. However, to date there is no validated salt knowledge questionnaire that could be used to assess population knowledge about dietary salt (i.e. salt knowledge). Therefore, the aim of the present study was to develop and validate a salt knowledge questionnaire.

Design A cross-sectional study was conducted on an online web survey platform using convenience, snowball sampling. The survey questionnaire was evaluated for content and face validity before being administered to the respondents.

Setting Online survey.

Subjects A total of forty-one nutrition experts, thirty-two nutrition students and thirty-six lay people participated in the study.

Results Item analyses were performed to evaluate the psychometric properties of the test items. Twenty-five items were retained to form the final set of questions. The total scores of the experts were higher than those of the students and lay people ($P < 0{\cdot}05$). The total salt knowledge score showed significant correlations with use of salt at the table ($\rho = -0{\cdot}197$, $P < 0{\cdot}05$) and inspection of the salt content in food products when shopping ($\rho = 0{\cdot}400$; $P < 0{\cdot}01$).

Conclusions The questionnaire demonstrated sufficient evidence of construct validity and internal consistencies between the items. It is likely to be a useful tool for the evaluation and measurement of levels of salt knowledge in the general population.



## Keywords

questionnaire, knowledge, salt, validation, development


## Disciplines

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# Development and validation of a salt knowledge questionnaire

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## Abstract

*Objective:* Initiatives promoting the reduction of high-salt food consumption by consumers need to be partly based on current levels of salt knowledge in the population. However, to date there is no validated salt knowledge questionnaire that could be used to assess population knowledge about dietary salt (i.e. salt knowledge). Therefore, the aim of the present study was to develop and validate a salt knowledge questionnaire.
*Design:* A cross-sectional study was conducted on an online web survey platform using convenience, snowball sampling. The survey questionnaire was evaluated for content and face validity before being administered to the respondents.
*Setting:* Online survey.
*Subjects:* A total of forty-one nutrition experts, thirty-two nutrition students and thirty-six lay people participated in the study.
*Results:* Item analyses were performed to evaluate the psychometric properties of the test items. Twenty-five items were retained to form the final set of questions. The total scores of the experts were higher than those of the students and lay people ($P < 0{\cdot}05$). The total salt knowledge score showed significant correlations with use of salt at the table ($\rho = -0{\cdot}197$, $P < 0{\cdot}05$) and inspection of the salt content in food products when shopping ($\rho = 0{\cdot}400$; $P < 0{\cdot}01$).
*Conclusions:* The questionnaire demonstrated sufficient evidence of construct validity and internal consistencies between the items. It is likely to be a useful tool for the evaluation and measurement of levels of salt knowledge in the general population.

**Keywords**
Salt
Validation
Knowledge
Questionnaire

Dietary sodium intake has been identified as one of the major risk factors for high blood pressure and CVD[1–3]. Cost–benefit analyses have demonstrated that reduction of dietary salt is a cost-effective measure to reduce the disease burden associated with CVD[4–6].

Although more than 75% of dietary salt comes from processed foods[7], consumer awareness and education is important to empower consumers to choose products with lower salt content and reduce the amount of discretionary salt intake. Consumer understanding and evaluation of salt knowledge, attitude and behaviours has been recommended as one of the key components of a successful salt reduction programme[8,9].

To date, several studies have been conducted to assess the levels of salt knowledge in the population[10–14]. While there were some common elements in the questions used across these studies, no attempt has been made to validate them, i.e. to establish whether, in fact, they assess consumers' knowledge. The use of unreliable, unvalidated questionnaires to measure nutrition knowledge has been suggested as being responsible for the inconsistencies observed in the relationships between knowledge and dietary behaviours[15,16].

Given the importance of consumer knowledge as a fundamental aspect of population monitoring and providing information to policy makers and stakeholders involved in salt reduction initiatives[8], we believe there is an urgent need for a validated questionnaire to assess consumer salt knowledge and enable comparisons between different salt reduction communication programmes. Therefore, the aim of the present study was to describe the development and validation of a salt knowledge questionnaire in an Australian adult population.

## Method

### *Study design*

A cross-sectional study was conducted on an online web survey platform using convenience, snowball sampling[17].

### *Participants*

The study population consisted of experts (dietitians/nutritionists), dietetics or nutrition students and lay people. Experts were recruited via an email which was sent to a list of dietitians and nutritionists in Australia. Students were

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recruited through lectures attended by Dietetics and Nutrition students in two universities. Lay people were recruited through the professional and informal social networks of the researchers. In addition, the study was advertised in website forums. The invitation email also requested the potential participants to forward the email to others who might be interested in taking part in the study.

### Procedure

The participants were invited to answer a self-administered online questionnaire[18], which could be completed at their convenience within 20 to 40 min. The survey was kept open for four months.

### The questionnaire

The first part of the questionnaire required participants to indicate which group they belonged to, i.e. nutritionist/dietitians, or nutrition/dietetics students, or lay people. Next, they were asked to rate their overall knowledge of dietary salt based on a four-point scale which ranged from 'very high' to 'low' before they proceeded to the main part of the questionnaire.

The questionnaire consisted of four parts: (i) salt knowledge; (ii) beliefs about salt; (iii) dietary behaviours related to salt intake; and (iv) demographic information.

#### *Salt knowledge*

*Questions.* The salt knowledge section assessed two main domains of knowledge: (i) declarative knowledge, i.e. awareness of things and processes (i.e. the properties of nutrients such as salt and foods); and (ii) procedural knowledge or 'know how knowledge'[16]. The declarative knowledge section included questions drawn from the literature relating to the identification of diet–disease associations, expert recommendations and sources of high-salt foods[15], as well as common misconceptions about salt and health (e.g. 'Cutting down salt may cause leg cramps', 'Drinking more water can neutralise salt in my diet'). Where possible, items were derived from previous studies on salt knowledge[10,12–14,19], to enable comparison of results with past studies[15].

The procedural knowledge section related to purchasing behaviours, eating at home and eating out. These items were based on health education messages targeted at healthy populations[20–22].

A total of seventy-three questions was developed and reviewed by a nutritionist (V.F.) and a behavioural scientist (A.W.). These experts reviewed all of the questions to ensure they clearly represented the knowledge domains intended to be measured (content validity). Their inputs were taken into consideration in the construction of the items and the response formats[23]. The questionnaire was also pre-tested among five lay individuals for comprehension and question format (face validity). After the evaluation, sixty-five items were retained to form the questionnaire. These items were evaluated for psychometric criteria (discrimination index, item difficulty index, item-to-total correlation; see Statistical analysis). This resulted in a final set of twenty-five questions (fifteen questions which met all of the psychometric criteria and ten questions which were included to maintain content validity[15]; Table 2).

*Scoring.* The questions were presented to the respondents in the form of multiple-choice and true or false response scales (Table 2). All correct responses for multiple-choice items were scored as 1, while incorrect responses which included 'don't know' or 'not sure' and non-responses were assigned a score of 0.

True or false questions were presented using five-point response scales: 'certainly true', 'probably true', 'not sure', 'probably wrong' and 'certainly wrong'. In order to differentiate between lack of knowledge and knowledge held with low levels of confidence[24], a score of 2 was assigned for 'certainly true', 1 for 'probably true' and 0 for incorrect answers which included 'not sure' and non-responses. Negative statements were reversed prior to scoring.

The salt knowledge items were summed to yield scores for each subset of questions corresponding to dietary recommendations, diet–disease relationships, perceived salt content of commonly eaten foods, common misconceptions and label reading habits.

In addition, a total salt knowledge score was derived by summing the twenty-five items that were included in the final version of the questionnaire (Table 2).

#### *Beliefs related to salt*

While there are distinct epistemological differences in the definitions of knowledge and beliefs[24,25], both affect behaviour in the same way. For example, the Theory of Planned Behaviour posits that beliefs held by a person influence his/her attitudes which in turn determine his/her behaviour[26]. This is because the thinking processes and motivational effects of an individual holding a belief (regardless of the truth) act in similar ways[24].

The belief items were based on items used in past studies[12] and themes derived from websites and web discussions about salt[20,27]. Beliefs related to salt were assessed using four items: (i) 'My health would improve if I lowered the amount of salt in my diet'; (ii) 'In general, salt-free food tastes bad'; (iii) 'Salt makes food tasty'; and (iv) 'Salt should be used in cooking to enhance the taste of the food'. These belief items were measured on five-point Likert scales ranging from 'certainly wrong' to 'certainly true'. Principal component analysis showed that the second, third and fourth items formed one factor (Cronbach's $\alpha = 0{\cdot}58$). These three items were retained and were summed to derive a total beliefs score about the importance of the taste of salt. Higher scores indicate stronger beliefs about the importance of the taste of salt.

*Behaviours associated with higher salt intake*

*Dietary behaviour*. Dietary behaviours associated with salt consumption were assessed using a list of items which included: (i) the use of discretionary salt, which contributes about 20 % of the salt in Australians' diets (aged 2 years and older)[28]; (ii) dietary practices relating to the use of salt during meal preparation, e.g. fresh ingredients and substitution of salt with herbs and spices as recommended in the Dietary Guidelines for Australia[22]; (iii) consumption of fast food and sauces[29,30]; and (iv) the consumption of salted snacks.

Participants were asked to indicate how frequently they engaged in the particular behaviours. Responses ranged from never or not applicable to 1–3 times/week, 4–6 times/week and 7 times/week.

*Food shopping behaviour*. Frequencies of food shopping behaviours (e.g. 'Looked for the salt content in food products when shopping', 'Purchased a product labelled "low salt" or "reduced salt"') were assessed using five-point scales. Response options ranged from never to 4 or more times/week.

Scores were assigned according to the frequencies (1 for never, 2 for 2–3 times/week, etc.). Higher scores indicated higher frequency in engaging in particular behaviours.

*Demographic information*

Demographic information including age, gender and highest level of education was elicited from the respondents.

### Statistical analysis

Data analysis was conducted using the statistical software package IBM SPSS Statistics for Windows version 20·0. Descriptive statistics were calculated to describe the study sample. Item analyses were conducted by calculating: (i) the item difficulty index (IDI), the proportion of individuals who answered an item correctly[31]; (ii) the discrimination index (DI), which was used to determine whether each item was capable of discriminating between the highest and lowest scorers[31]; and (iii) item-to-total correlations (ITC), which measure the extent each item shares the same domain or common core as the other items[32]. The acceptable range of IDI for the present study was set as 0·3 to 0·9, the minimal DI was set at 0·2[31] and ITC at 0·30[33].

The construct validity of the questionnaire was established by comparing the responses of the three groups of individuals who were expected to have different levels of nutrition knowledge based on the degree of their nutritional training[15], i.e. dietitians/nutritionists should have greater knowledge than nutrition/dietetics students who in turn should have greater knowledge than lay people. The construct validity of the questionnaire was evaluated using the Kruskal–Wallis $H$ test. If any significant differences were observed in the total salt knowledge scores and each subset of questions (dietary recommendations, diet–disease relationships, perceived salt content of commonly eaten foods, common misconceptions and label reading) between the three groups (i.e. experts, students and lay people), the Mann–Whitney $U$ test was used to evaluate pair-wise differences (i.e. experts *v.* students, experts *v.* lay people).

Spearman's rho correlation coefficient was used to examine the associations between the total salt knowledge and total beliefs scores and the set of dietary behaviours associated with high salt consumption.

## Results

### Description of sample

Table 1 shows the demographic characteristics of the study participants. A total of 133 individuals accessed the survey website. Of these, twenty-four provided incomplete responses and were excluded from the data analysis. The remaining 109 provided usable responses for the final analyses. Forty-one respondents (37·6 %) were experts (dietitians/nutritionists), thirty-two (29·4 %) were dietetics/nutrition students and thirty-six (33·0 %) were lay people. The overwhelming majority of the participants were female (93·1 %). More than 50 % of the respondents were the main food shopper or food preparer for the household. The majority (73·1 %) of the nutrition experts rated their overall salt knowledge as high or very high, while the majority of nutrition students (65·6 %) rated their knowledge as medium. A third of the lay people rated their knowledge on dietary salt as low and slightly more than 50 % rated their knowledge as medium.

### Psychometric properties of the salt knowledge items

Table 2 shows the items that were included in the final set of questions. Twenty-one out of the twenty-five items had an acceptable level of item difficulty (IDI = 0·3–0·9), sixteen of the items had DI values above 0·2 (which is generally considered sufficient to discriminate between good and poor performers) and sixteen met the criterion set for ITC (≥0·30).

### Construct validity

The group differences in sub-scores and total salt knowledge score are shown in Table 3. The total salt knowledge score for all participants ranged from 9 to 30 (maximum possible score was 31) with a mean of 20·39 (SD 5·08). The mean total salt knowledge score and sub-scores were significantly and consistently higher among the experts, followed by the students (all $P < 0·05$).

### Relationship between total salt knowledge and belief scores with dietary behaviours

There were significant inverse correlations between total salt knowledge score and frequent use of salt at the table

**Table 1** Demographic characteristics of the study sample: respondents to the online salt knowledge questionnaire, Australia

| | Dietitians/nutritionists (*n* 41)† | Dietetics/nutrition students (*n* 32)† | Lay people (*n* 36)† |
|---|---|---|---|
| | % | % | % |
| Gender | | | |
| Male | 5·1 | 3·2 | 12·9 |
| Female | 94·9 | 96·8 | 87·1 |
| Age (years) | | | |
| <20 | 0·0 | 33·3 | 3·2 |
| 20–30 | 41·0 | 63·3 | 19·4 |
| 31–40 | 25·6 | 3·3 | 22·6 |
| 41–50 | 12·8 | 0·0 | 22·6 |
| 51–60 | 12·8 | 0·0 | 19·4 |
| >60 | 7·7 | 0·0 | 12·9 |
| Country of birth | | | |
| Australian | 71·1 | 77·4 | 83·3 |
| Others | 28·9 | 22·6 | 16·7 |
| Highest level of education | | | |
| Left school at 18 or earlier | 0·0 | 45·2 | 19·4 |
| TAFE or college diploma, certificate or formal trade qualification | 0·0 | 16·1 | 16·1 |
| Bachelor degree/graduate diploma/graduate certificate | 43·2 | 35·5 | 38·7 |
| Postgraduate degree | 56·8 | 3·2 | 25·8 |
| Cooking for the household | | | |
| Main role | 71·8 | 41·9 | 67·7 |
| Share responsibility | 25·6 | 45·2 | 25·8 |
| Food shopping for the household | | | |
| Main role | 74·4 | 45·2 | 45·2 |
| Share responsibility | 23·1 | 35·5 | 45·2 |
| Self-rated knowledge of dietary salt | | | |
| Very high | 14·6 | 0·0 | 2·8 |
| High | 58·5 | 34·4 | 13·9 |
| Medium | 26·8 | 65·6 | 52·8 |
| Low | 0·0 | 0·0 | 30·6 |

TAFE, technical and further education.
†Total for each row may vary slightly due to missing data.

($\rho = -0{\cdot}197$, $P < 0{\cdot}05$) and consumption of fast food ($\rho = -0{\cdot}293$, $P < 0{\cdot}01$; Table 4). The total salt knowledge score was also correlated positively with healthier dietary behaviours associated with lower use of salt, such as using fresh ingredients and herbs and spices in cooking ($\rho = 0{\cdot}327$, $P < 0{\cdot}01$) and looking for salt content in food products when purchasing foods ($\rho = 0{\cdot}400$, $P < 0{\cdot}01$). However, there was no significant correlation between the use of salt in cooking and salt knowledge.

Significant correlations were also observed between beliefs about the importance of the taste of salt and the use of table salt ($\rho = 0{\cdot}401$, $P < 0{\cdot}01$), salt in cooking ($\rho = 0{\cdot}443$, $P < 0{\cdot}01$), table sauces ($\rho = 0{\cdot}207$, $P < 0{\cdot}05$) and frequent consumption of salted snacks ($\rho = 0{\cdot}391$, $P < 0{\cdot}01$).

## Discussion

The final twenty-five-item questionnaire demonstrated adequate construct validity and good internal reliability.

The psychometric analysis of the items showed that their discriminatory properties varied between sections. For example, items in the dietary recommendations section, which require 'technical knowledge', had higher discriminatory values; i.e. there were more distinct differences between the experts and the lay people. All four items relating to dietary recommendations demonstrated good item discrimination (DI > 0·2) and three of the four questions were answered correctly by less than half of the respondents. The lay persons' responses observed in this section are similar to those seen in other studies which used similar questions[11,12,14,34].

In contrast, three out of five questions about the health risks associated with higher salt intake were answered correctly by at least 90 % of the respondents (IDI ≥ 0·90), hence their lower discriminatory values (DI < 0·2). Past studies have also shown that over 80 % of consumers possessed greater levels of awareness of the health risks associated with salt intake[11–14].

As in other studies of nutrition knowledge and dietary behaviours[35,36], the correlations observed between total salt knowledge score and dietary behaviours associated with high-salt food consumption were low or moderate. This may be because knowledge often acts as an indirect predictor of behaviour through mediating variables such as attitudes and intention[35].

Slightly stronger correlations were observed between beliefs about the importance of the taste of salt and use of salt at the table and in cooking, suggesting that taste preference may also may play an important part in

**Table 2** Item analyses for each item in the online salt knowledge questionnaire

| Category | Section/question | DI | IDI | ITC |
|---|---|---|---|---|
| Declarative knowledge | Dietary recommendations | | | |
| | Which of the following statements best describes the relationship between salt and sodium? (salt contains sodium)† | 0·5 | 0·7 | 0·422 |
| | How many grams of salt is equivalent to one teaspoon of salt? (4 g) | 0·6 | 0·5 | 0·387 |
| | A product is considered as 'low in salt' when it contains… (120/100 mg) | 0·9 | 0·5 | 0·643 |
| | What is the maximum recommended daily amount of salt for an adult in Australia? (6 g)‡ | 0·3 | 0·2 | 0·269 |
| | Conditions which might be associated with high salt intakes | | | |
| | High blood pressure‡ | 0·0 | 1·0 | – |
| | High blood sugar | 0·4 | 0·7 | 0·320 |
| | Stroke‡ | 0·0 | 1·0 | 0·000 |
| | Kidney disease‡ | 0·1 | 0·9 | 0·095 |
| | Osteoporosis | 0·5 | 0·4 | 0·391 |
| | Salt content of commonly eaten foods | | | |
| | White bread (medium)‡ | −0·1 | 0·5 | −0·087 |
| | Bacon (high)‡ | 0·2 | 0·9 | 0·337 |
| | White rice (boiled) (low) | 0·6 | 0·8 | 0·425 |
| | Beef steak (uncooked) (low) | 0·5 | 0·7 | 0·357 |
| | Mix vegetables (frozen) (low) | 0·5 | 0·8 | 0·420 |
| | Corn flakes (medium)‡ | −0·1 | 0·4 | −0·075 |
| | Vegemite (high) | 0·3 | 0·8 | 0·325 |
| | Cheddar cheese (processed) (high) | 0·4 | 0·8 | 0·430 |
| | Salt is naturally present in fresh food‡,§ | 0·2 | 0·7 | 0·139 |
| | Fast foods are high in salt‡,§ | 0·0 | 1·0 | 0·150 |
| | Bread is one of the main sources of salt in Australians' diets§ | 0·5 | 0·6 | 0·435 |
| | Common misconceptions | | | |
| | Sea salt is better than table salt‖,§ | 0·7 | 0·6 | 0·554 |
| | Drinking more water can neutralise salt in my diet‖,§ | 0·4 | 0·8 | 0·434 |
| | Cutting down on salt causes leg cramps‖,§ | 0·5 | 0·8 | 0·388 |
| Procedural knowledge | Label reading | | | |
| | Which pasta sauce has the highest salt content‡ | 0·2 | 0·9 | 0·192 |
| | If you see a TICK logo on a packet of breakfast cereal, what do you think about the product? | 0·5 | 0·8 | 0·447 |

DI, discrimination index; IDI, item difficulty index; ITC, item-to-total correlation.
†Correct answers are in parentheses after each item.
‡Items which were retained for the purpose of content validity.
§Indicates items were scored as: 2 = 'certainly true', 1 = 'probably true', 0 = all others; otherwise items were scored as 1 = correct answer; 0 = all others. Negative statements were reversed prior to scoring.
‖Items were reversed coded prior to scoring.

**Table 3** Mean and range of scores for each group of respondents to the online salt knowledge questionnaire

| | Experts | | | | Students | | | | Lay people | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Section | Mean | SD | Range (min – max score) | | Mean | SD | Range (min – max score) | | Mean | SD | Range (min – max score) | |
| Dietary recommendations†,‡,§ | 2·93 | 0·88 | 1 | 4 | 1·94 | 1·11 | 0 | 4 | 0·97 | 0·88 | 0 | 3 |
| Diet–disease relationship†,‡,§ | 4·39 | 0·70 | 3 | 5 | 4·06 | 0·56 | 3 | 5 | 3·47 | 0·70 | 2 | 5 |
| Salt content of commonly eaten foods†,‡,§ | 11·00 | 1·36 | 8 | 13 | 8·88 | 1·86 | 5 | 12 | 8·03 | 2·32 | 2 | 12 |
| Common misconceptions†,‡,§ | 4·90 | 1·30 | 1 | 6 | 3·13 | 1·64 | 0 | 6 | 1·94 | 1·37 | 0 | 6 |
| Label reading†,§ | 1·78 | 0·47 | 0 | 2 | 1·59 | 0·50 | 1 | 2 | 1·44 | 0·65 | 0 | 2 |
| Total score†,‡,§ | 25·00 | 2·88 | 19 | 30 | 19·59 | 3·60 | 11 | 26 | 15·86 | 3·50 | 9 | 24 |

†Significantly different between the three groups (Kruskal–Wallis *H* test, $P < 0·05$).
‡Significantly different, experts *v.* students (Mann–Whitney *U* test, $P < 0·05$).
§Significantly different, experts *v.* lay people (Mann–Whitney *U* test, $P < 0·05$).

**Table 4** Correlations of total salt knowledge score and total beliefs related to taste of salt score with self-reported frequencies of dietary behaviours associated with higher salt intake

| | Total salt knowledge score ($\rho$) | Total beliefs score ($\rho$) |
|---|---|---|
| Use of table salt | −0·197* | 0·401** |
| Added salt during cooking | −0·051 | 0·443** |
| Cooked meals from scratch/fresh ingredients | 0·321** | −0·067 |
| Used herbs and spices as flavouring for cooking | 0·327** | −0·159 |
| Table sauces (e.g. tomato sauce, chilli sauce, barbeque sauce) | −0·171 | 0·207* |
| Ready-made sauces (e.g. pasta sauces, marinades) for cooking | −0·068 | 0·182 |
| Frequency of eating fast food | −0·293** | 0·166 |
| Frequency of eating salted snacks | −0·175 | 0·391** |
| Looked for the salt content in food products when shopping | 0·400** | −0·108 |

Significant correlation: *$P < 0·05$, **$P < 0·01$.

determining dietary behaviour[37]. The relationships observed between beliefs and behaviour, especially with the discretionary salt use, could also be due to the specific phrasing of the statements used in the study. For example, the specificity of the belief statement 'Salt should be used in cooking to enhance the taste of the food' is more likely to predict behaviour than a more general belief statement[24].

While we used item analyses to guide the evaluation of each item, we were aware that these analyses reflect only the internal consistency of the items and not the validity of the items[38]. As such, some items that had low discriminatory values but were considered essential to measure salt knowledge levels in the population (content validity) were retained[15]. The inclusion of these items did not reduce the discriminatory value of the questionnaire since significant differences were observed in the total and sectional salt knowledge scores between the groups (which supports their construct validity).

Several factors such as the sampling method (convenience sampling), lack of information about the characteristics of non-responders and presence of chronic diseases may limit the generalisability of the study findings. Also, as in previous studies[39–41], females were over-represented in our sample as were those with higher levels of education.

Some of the items used in the present study are applicable only for Western diets where the majority of salt in the diet comes from processed foods. In developing countries (e.g. China) where the majority of salt in the diet is added to food during food preparation[42], additional questions on food preparation should be considered. Similarly, the misconceptions and beliefs about salt may vary between cultures[43]. Therefore, reassessments of these items are required prior to using the questionnaire in cultures with different salt beliefs and behaviours.

A further limitation of the study concerns the use of self-reported frequencies of dietary behaviours associated with high salt consumption as a proxy of dietary sodium intake. Even though self-reported use of table salt has been found to be correlated with actual behaviour[44] and urinary sodium[45], discretionary salt intake only represents about 20 % of salt intake in the diet[28]. Therefore, future studies should extend the validation of this questionnaire against other established sodium intake measurements such as 24 h urinary sodium excretion or dietary recalls and test the questionnaire for its test–retest reliability.

## Conclusion

The current questionnaire is likely to be a useful tool for researchers and policy makers who wish to measure levels of salt knowledge in general populations or to

examine the effectiveness of public education programmes. Further investigation is needed to improve the assessment of procedural knowledge and to test the validity of the questionnaire in other populations.

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