ORIGINAL ARTICLE

Knowledge, attitudes, and practices toward dietary salt intake among adults in Haiphong, Vietnam

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ABSTRACT

Excessive salt intake is a significant contributor to hypertension and cardiovascular diseases. Data on knowledge, attitudes, and practices relating to salt consumption in Vietnam are currently insufficient. This community-based cross-sectional study evaluated the knowledge, attitudes, and practices related to dietary salt intake among 400 Vietnamese adults. Data were collected through face-to-face interviews. Only 28.2% of participants demonstrated good knowledge, 40.5% had positive attitudes, and 42.5% exhibited good practices toward dietary salt intake. The percentage of participants who frequently checked information about the amount of salt in food and stated that it often influenced their purchasing decisions is around 40%. Additionally, 52% of participants often try to buy "low-salt" food. Most participants frequently add salt to their food when preparing and cooking (94.8%), add salt to food at the table (84%), and use spices for cooking (97%). Among the participants, 63.8% claimed to be attempting to reduce their salt intake in their daily diet. Multivariate logistic regression analysis showed that age, knowledge, and attitudes were associated with good salt-related practices. A communication program should be implemented to improve people's knowledge and attitudes to reduce salt intake in the community.

Key words:
knowledge; attitudes; practices; dietary salt; Vietnam

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INTRODUCTION

There is no denying the connection between excessive salt intake and hypertension, which is a significant risk factor for stroke and other cardiovascular diseases.[1] A higher risk of obesity, diabetes, and hypercholesterolemia has also been linked to it. Additionally, this practice may lead to severe consequences, such as osteoporosis, kidney diseases, and stomach cancer - a concern that should not be dismissed.[2–4]

The World Health Organization (WHO) reports that the majority of individuals consume too much salt, on average, 9-12 grams per day, which is roughly twice the maximum amount advised (< 5 grams per day).[5] According to research from Hungary, Lithuania, and Nepal, people consume 11.7 grams, 10 grams, and 9.1 grams of salt daily, respectively.[6–8] In Vietnam, the average daily intake is 12-15 grams, with nearly 60% of individuals consuming twice the amount recommended by the WHO.[9]

Salt in the diet can come from processed foods, often high in salt (such as prepared foods, processed meats, and instant noodles), or foods consumed frequently in large amounts (such as bread and processed cereal products). Additionally, salt is added to food at the table (e.g., soy sauce, fish sauce, and table salt) or during cooking (e.g., bouillon and stock cubes).[5] In Vietnam, most of the daily salt intake comes from salt and spices added during food processing and cooking and from dipping or mixing fish sauce and spices at the table.[10]

In 2013, the WHO established nine global goals for preventing and controlling non-communicable diseases. These goals include stopping the rise in diabetes and obesity rates and reducing salt consumption by 30% by 2025. It is projected that 2.5 million deaths may be avoided annually if salt intake is decreased to the recommended limits worldwide.[5] People's knowledge and attitudes are believed to influence salt intake and are considered modifiable mediating factors.[11] WHO recommends assessing consumers' knowledge, attitudes, and practices (KAP) toward dietary salt as a health risk.[12] However, existing evidence from many countries reveals significant gaps in people's KAP toward salt intake.[2, 13–19] A systematic review of 24 studies across 12 countries examined the KAP related to dietary salt intake among adults in high-income countries. The review showed that people generally have limited knowledge, unhealthy attitudes, and excessive salt intake. Although consumers are aware of the adverse effects of consuming too much salt on their health, they lack a basic understanding of the recommended dietary intake, the primary food sources that contain excessive salt, and the connection between salt and sodium.[20] Mushoriwa et al. researched two communities in Grahamstown, South Africa, and found that none of the participants were aware of the recommended daily salt intake or the relationship between salt and sodium.[21] The research results among Saudi adults indicated limited knowledge and adherence to salt-related practices.[22] Previous evidence on salt reduction strategies suggests that it is crucial to understand the impact of knowledge and attitudes on behavior, as this information can be used to develop effective strategies for reducing salt intake in the community.[23]

Assessing the KAP of a population provides valuable information that can be used to formulate more effective interventions.[24] However, to our knowledge, no previous study has documented the KAP regarding dietary salt among the Vietnamese population. Therefore, this study aims to assess KAP toward dietary salt intake. The results of this study will provide stakeholders

and decision-makers with crucial aspects that must be addressed to reduce salt intake effectively.

METHODS

Study participants

The study participants were adults aged 18 years or older living in Dong Khe ward, Ngo Quyen district, Haiphong City, Vietnam. Dong Khe ward is located in the North Coast region of Vietnam, approximately 120 km northeast of Hanoi (the capital of Vietnam). To participate in the study, participants had to meet the following criteria: be 18 years or older and agreeing to participate. Those individuals suffering from hypertension were excluded because they may have already received salt-related dietary counseling and medical recommendations, which could potentially skew the results.

Study design and sampling

The sample size was calculated based on the formula for estimating the sample size for a proportion: $N = Z^2_{(1-\alpha/2)} \times P(1 - P)/d^2$, in which Z = the level of confidence (for a level of confidence of 95%, Z = 1.96); P = the estimated proportion of the population having good salt-related KAP, P = 0.5 (because there is no similar study in the study area); d = the margin of error, d = 0.05; N (minimum sample size) = 384 participants. In reality, we interviewed a total of 400 participants. We selected the sample using simple random sampling. First, we compiled a list of all individuals in the Dong Khe ward who met our selection criteria. The list was extracted from the population management application of the Haiphong Population and Family Planning Sub-Department. Next, we used a random number table to select 400 people from the list randomly. We conducted face-to-face interviews at participants' homes.

Instrument

A self-administered questionnaire was developed based on the guidelines provided by the WHO and previous research studies.[2, 15, 19, 25–27] We translated the questionnaire into Vietnamese (the local language). To ensure its validity, the questionnaire was reviewed by a nutrition expert and an epidemiologist from the Faculty of Public Health at Haiphong University of Medicine and Pharmacy in Vietnam. The pre-designed questionnaire was tested on a random sample of people (n = 10) who did not participate in the study to assess the understandability and clarity of the questions before distribution. The questionnaire comprised 26 items on salt-related knowledge, five on salt-related attitude, and nine on salt-related practices (see Supplementary File S1).

Statistical analysis

EpiData software 3.1 (The EpiData Association, Odense, Denmark) was used for data entry, and SPSS 25.0 (IBM Corp., Armonk, NY, USA) was used for statistical analysis. While qualitative data were presented as frequencies and percentages, quantitative data were reported as means, standard deviations (SDs), and minimum and maximum values. The KAP scores were calculated and converted into percentages. Based on the WHO guidelines, we categorized KAP levels as good/positive when participants answered more than 70% of the questions correctly.[25] The Chi-square test was used to compare KAP related to salt and factors. Univariate and multivariate logistic regression analyses were performed to explore potential associations between KAP dimensions and potential determinants. The multivariate logistic regression model included factors that were found to be significant ($p < 0.25$) in the univariate analysis of the KAP variables. Statistical significance was considered at $p < 0.05$.

Ethical approval

The research protocol was approved by the Scientific Council of Hai Phong University of Medicine and Pharmacy, Vietnam, in Decision No. 2811/QD-YDHP, dated December 26, 2022. Before participating in the study, all participants received a consent form that explained the study's purpose and their role in it. All data collected were kept confidential to ensure privacy.

RESULTS

The demographic characteristics of the study participants are presented in Table 1. The most participants were aged 30-39 (26.8%). The average age of the participants was 45.3 ± 16.4 years. Females accounted for 58.2% of the study population. A total of 50% of participants had a college or university education. The study participants consisted of workers, who made up the highest percentage (31.5%), while students accounted for the lowest proportion (6.2%).

Table 1. Demographic characteristics of study participants (n = 400)

Variables	n	%
Age groups (years)		
< 30	68	17.0
30 - 39	107	26.8
40 - 49	71	17.8
50 - 59	61	15.2
≥ 60	93	23.2
Age (Mean ± SD)	45.3 ± 16.4	
Gender		
Male	167	41.8
Female	233	58.2
Education level		
Secondary school or less	29	7.2
High school	171	42.8
College/University	200	50.0
Occupation		
Student	25	6.2
Housewife	42	10.5
Worker	126	31.5
Business	73	18.3
Civil servants	58	14.5
Retirees	76	19.0

The participants' knowledge of dietary salt intake is presented in Table 2. Among the study participants, 62.5% had proper knowledge about the relationship between salt and sodium; 80.0% correctly knew about the recommended daily amount of salt; 91.2% correctly knew about the adverse effects of a high-salt diet on health. The participants' knowledge of the salt content of various items, such as fresh fruits, fresh vegetables, canned foods, prepared dishes, and spices, ranged from 80% to 90% accuracy.

Table 2. Knowledge related to dietary salt intake by gender (n = 400)

Variables	Total n (%)	Male n (%)	Female n (%)	*p*-value
Relationship between salt and sodium				
Salt contains sodium **(**correct answer**)**	250 **(**62**.**5**)**	101 **(**60**.**5**)**	149 **(**63**.**9**)**	0**.**480
The maximum daily amount of salt recommended for adults by the WHO				
< 5 grams/day **(**correct answer**)**	319 (79.8)	131 **(**78**.**4**)**	188 (80.7)	0.582
Effect of high salt diet on health				
Worsen health **(**correct answer**)**	365 (91.3)	154 **(**92**.**2**)**	211 (90.6)	0.563
Health problems caused or aggravated by salty foods				
Hypertension	275 (68.8)	115 **(**68**.**9**)**	160 (68.7)	0.967
Stroke	208 (52.0)	91 **(**54**.**5**)**	117 (50.2)	0.399
Kidney disease	342 (85.5)	145 **(**86**.**8**)**	197 (84.5)	0.524
Fluid retention	266 (66.5)	113 **(**67**.**7**)**	153 (65.7)	0.676
Stomach cancer	102 (25.5)	43 **(**25**.**7**)**	59 (25.3)	0.923
Osteoporosis	84 (21.0)	32 **(**19**.**2**)**	52 (22.3)	0.445
The salt content in food*				
Bread (medium)	216 (54.0)	95 (56.9)	121 (51.9)	0.327
Fresh fruit (low)	351 (87.8)	147 (88.0)	204 (87.6)	0.887
Fresh vegetables (low)	336 (84.0)	140 (83.8)	196 (84.1)	0.938
Pickled mustard greens (high)	303 (75.8)	127 (76.0)	176 (75.5)	0.906
Vegetable oil, lard (low)	242 (60.5)	101 (61.1)	140 (60.1)	0.841
Rice (low)	273 (68.3)	115 (68.9)	158 (67.8)	0.824
Milk, yogurt (low)	251 (62.7)	107 (64.1)	144 (61.8)	0.643
Meat (chicken, duck, red meat,...) (low)	138 (34.5)	65 (38.9)	73 (31.3)	0.115
Seafood (medium)	101 (25.3)	43 (25.7)	58 (24.9)	0.846
Egg (low)	211 (52.8)	94 (56.3)	117 (50.2)	0.230
Soybeans, tofu (low)	263 (65.8)	111 (66.5)	152 (65.2)	0.798
Processed food, canned food (high)	337 (84.3)	138 (82.6)	199 (85.4)	0.453
Spices (broth mix, glutamate...) (high)	366 (91.5)	154 (92.2)	212 (91.0)	0.664
Instant noodles (high)	289 (72.3)	120 (71.9)	169 (72.5)	0.882
Sauces (high)	210 (52.5)	83 (49.7)	127 (54.5)	0.343
Snacks (salted roasted peanuts, savory rice crackers…) (high)	221 (55.3)	89 (53.3)	132 (56.7)	0.505
Smoked meat (high)	221 (55.3)	88 (52.7)	133 (57.1)	0.384
Good knowledge	113 (28.2)	48 (28.7)	65 (27.9)	0.853

Note*: *Correct answers are provided in brackets next to each food item*

People's attitudes and practices regarding dietary salt intake are presented in Table 3. Regarding attitudes toward salt, approximately 50% of participants agreed that reducing salt in their daily diet and consuming fewer processed foods were highly important. However, only 18.5% expressed concern about their daily sodium intake. Concerning salt-related practices, 41.8% of participants reported checking the amount of salt in food when making a purchase, while 42.8% believed that

information about salt content on food labels affected their purchasing decisions. Notably, 94% of participants added salt to their food while cooking and used different types of seasoning. The percentage of participants who added salt to their food at the table was 84.0%, while 63.8% reported reducing their salt intake in their daily die.

Table 3. Attitudes and practices related to dietary salt intake by gender (n = 400)

Variables	Total n (%)	Male n (%)	Female n (%)	*p*-value
Attitudes related to dietary salt intake				
Concerned about the amount of salt in the diet (Often[a)]	74 (18.5)	34 (20.4)	40 (17.2)	0.418
Reducing the amount of salt in daily diet is definitely important (Agree[b])	210 (52.5)	84 (50.3)	126 (54.1)	0.456
Reducing the amount of processed foods is definitely important (Agree[b])	221 (55.3)	88 (52.7)	133 (57.1)	0.384
Adjustable high-salt diet (Agree[b])	313 (78.3)	129 (77.2)	184 (79.0)	0.680
Salt can be reduced by substituting other salty seasonings (Agree[b])	313 (78.3)	122 (73.1)	191 (82.0)	0.033
Positive attitudes	162 (40.5)	61 (36.5)	101 (43.3)	0.171
Practices related to dietary salt intake				
Check labels before purchasing (Often[c])	285 (71.3)	117 (70.1)	168 (72.1)	0.656
Information on food labels affects purchasing decisions (Often[c])	264 (66.0)	105 (62.9)	159 (68.2)	0.264
Check labels specifically for salt content (Often[c])	167 (41.8)	69 (41.3)	98 (42.1)	0.882
Salt content indicated on the label affects purchasing decisions (Often[c])	171 (42.8)	71 (42.5)	100 (42.9)	0.936
Try to buy "low-salt" foods (Often[c])	208 (52.0)	88 (52.7)	120 (51.5)	0.814
Add salt to food during preparation and cooking (Often[c])	379 (94.8)	157 (94.0)	222 (95.3)	0.575
Add salt to food at the table (Often[c])	336 (84.0)	148 (88.6)	188 (80.7)	0.033
Use spices while cooking (Often[c])	388 (97.0)	163 (97.6)	225 (96.6)	0.548
Cutting down on salt intake in the daily diet (Often[c])	255 (63.8)	105 (62.9)	150 (64.4)	0.758
Good practices	170 (42.5)	70 (41.9)	100 (42.9)	0.842

Notes: [a]Answers of "Always" and "Often" have been merged into "Often". [b]Answers of "Agree" and "Strongly agree" have been merged into "Agree". [c]Answers of "Often" and "Sometimes" have been merged into "Often".

Good KAP toward dietary salt intake is shown in Figure 1. The percentages of participants with good knowledge, attitudes, and practices toward dietary salt were 28.2%, 40.5%, and 42.5%, respectively.

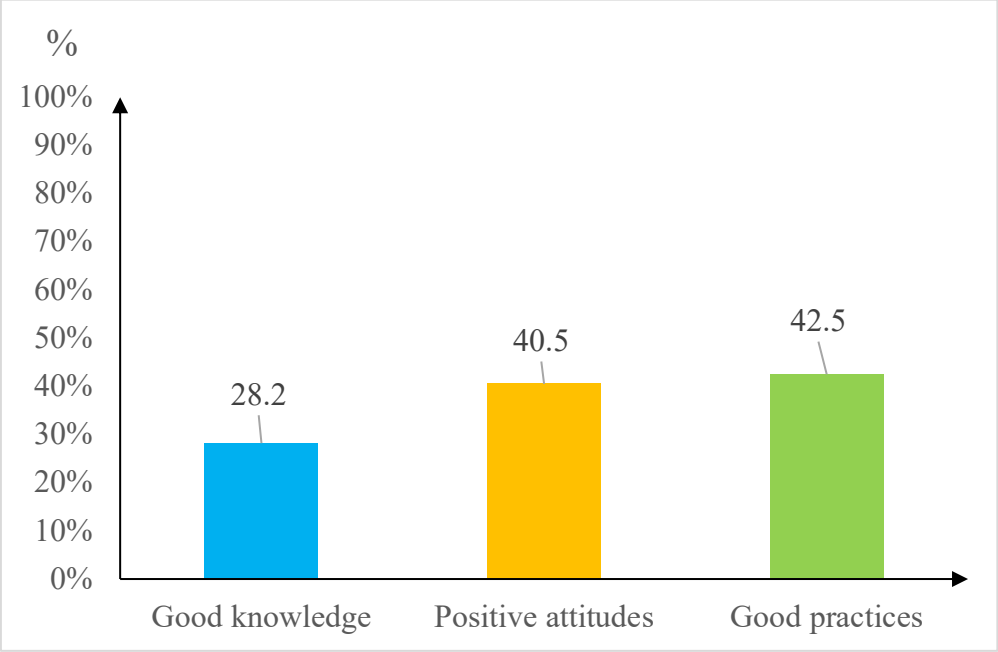


Figure 1. Good knowledge, attitudes, and practices toward dietary salt intake (n = 400)

The results of the multivariate logistic regression analysis of factors related to positive salt-related practices are presented in Table 4. The results showed that age, knowledge, and attitudes were significantly associated with good practices.

Table 4. Practices and Associated Factors: Univariate and Multivariate Logistic Regression Analysis (n,%)

Factors	Practices		Univariate OR (95%CI)	Multivariate AOR (95%CI)
	Poor N = 282	Good N = 118		
Age groups (years)				
< 30	22 (32.4)	46 (67.6)	1	1
30 - 39	54 (50.5)	53 (49.5)	**0.47* (0.25 - 0.89)**	0.66 (0.29 - 1.50)
40 - 49	41 (57.7)	30 (42.3)	**0.35** (0.18 - 0.70)**	0.56 (0.23 - 1.36)
50 - 59	38 (62.3)	23 (37.7)	**0.29** (0.14 - 0.60)**	0.42 (0.16 - 1.09)
≥ 60	75 (80.6)	18 (19.4)	**0.12*** (0.06 – 0.24)**	**0.23* (0.08 - 0.70)**
Education level				
Secondary school or less	21 (72.4)	8 (27.6)	1	1
High school	123 (71.9)	48 (28.1)	1.02 (0.43 - 2.47)	0.89 (0.32 - 2.53)
College/University	86 (43.0)	114 (57.0)	**3.48** (0.47 - 8.23)**	1.85 (0.65 - 5.25)
Occupation				
Student	6 (24.0)	19 (76.0)	**1**	1
Housewife	24 (57.1)	18 (42.9)	**0.24* (0.08 - 0.71)**	1.03 (0.24 - 4.33)
Worker	80 (63.5)	46 (36.5)	**0.18** (0.07 - 0.49)**	0.59 (0.17 - 1.99)
Business	37 (50.7)	36 (49.3)	**0.31* (0.11 - 0.86)**	0.83 (0.22 - 3.04)
Civil servants	23 (39.7)	35 (60.3)	0.48 (0.17 - 1.38)	0.78 (2.01 - 2.91)
Retirees	60 (78.9)	16 (21.1)	**0.08*** (0.03 - 0.25)**	0.47 (0.10 - 2.12)

Factors	Practices		Univariate OR (95%CI)	Multivariate AOR (95%CI)
	Poor N = 282	Good N = 118		
Knowledge				
Poor	190 (66.2)	97 (33.8)	1	1
Good	40 (35.4)	73 (64.6)	**3.58*** (2.26 - 5.64)**	**2.96*** (1.72 - 5.08)**
Attitude				
Nagative	174 (73.1)	64 (26.9)	1	1
Positive	56 (34.6)	106 (65.4)	**5.15*** (3.34 - 7.93)**	**4.43*** (2.74 - 7.16)**

Abbreviation: *OR: Odds Ratio, AOR: Adjusted Odds Ratio*, *CI: Confidence Interval*
Notes: *Bolded numbers are significant at p < 0.05 (*<0.05, **<0.01, ***<0.001)*

DISCUSSION

This cross-sectional study was conducted on adults in Haiphong City, Vietnam. Overall, the study participants had a very limited understanding of salt. This finding is consistent with the results of studies conducted in other countries.[2, 15, 19, 28] Our study also found that the younger population had a better general knowledge of salt, which aligns with the results of a study conducted in China.[29] This can be attributed to young people having better education and greater access to health information than older individuals.[30] In line with previous studies conducted in Lebanon, Australia, Greece, and Canada,[19, 31–33] most participants were aware that excessive salt intake could lead to serious health effects and is linked to specific conditions such as kidney disease and hypertension. However, few participants were aware of the link between excessive salt intake and other diseases, consistent with the results of studies conducted in Malaysia and China.[15, 34] Remarkably, our study revealed that half of the participants were unaware of the connection between excessive salt intake and stroke, and about four-fifths of them did not consider stomach cancer and osteoporosis as associated risks. Results from a study in Australia also showed that about one-third of the study participants did not identify stroke as a consequence of consuming too much salt, and only 29% believed that excessive salt intake could cause stomach cancer.[2] When we inquired about the salt content in 17 commonly consumed foods in their daily diets, the study participants, in general, had limited awareness, particularly when it came to foods with moderate to high salt content, such as bread, seafood, snacks (salted roasted peanuts, savory rice crackers…), and smoked meats. This finding was similar to the results of studies conducted in the United Arab Emirates and Lebanon.[19, 35] Educational measures should be taken to raise awareness about the salt content of commonly consumed foods. This will contribute to reducing the population's salt intake.

Regarding attitudes, most participants believed that a high-salt diet was adjustable. Still, only around half of the study participants believed that reducing salt in their daily diet and decreasing the consumption of processed foods was important. Previous studies have shown that adults who believed the importance of reducing salt or were concerned about the salt content in their diet were more inclined to take action to reduce their salt intake [36] or engage in salt-related behaviors, such as checking sodium information on food labels and purchasing low-salt foods.[19] Therefore, changing the population's attitudes toward the significance of salt reduction may be an essential premise for modifying salt-related behaviors.

We found that nearly three-quarters of the participants checked food labels

before purchasing. However, less than half of them examined the salt information on food labels, and more than half of the study participants believed it did not affect their purchasing decisions. This finding was similar to previous studies conducted in Lebanon and Australia.[19, 37] Therefore, we suggest that programs aimed at increasing awareness of the importance of reading nutrition and salt labels to guide purchasing decisions should be regularly implemented in the community. Additionally, the Vietnamese government needs to establish regulations for nutrition labeling on packaged foods. One suggestion is to implement labels similar to traffic lights, which would provide warnings for foods with high salt content.[38, 39] We found that most people used spices and added salt during preparation, cooking, and at the dining table. This was consistent with the Vietnam Preventive Medicine Department report in 2022 [10] and a study conducted in Lebanon.[19] Our study found a statistically significant correlation between participants' age, knowledge, attitude, and good salt-related practices. These findings were similar to those of previous studies.[2, 19, 40]

There were some limitations in our study. The study results were based on interview responses from the participants, and there may be differences between these results and their actual behaviors. Evaluating the actual behaviors of people requires direct observation and monitoring. Additionally, the study found that assessing 24-hour urine sodium excretion may serve as an indirect measure of salt-related behaviors.[41] Despite the study's limitations, the findings provide scientific evidence to support policymakers in developing effective salt reduction programs grounded in evidence. A comprehensive campaign aimed at increasing consumer awareness of salt intake also demonstrated the potential for community-based campaigns to change the habit of excessive salt intake in the community.[42]

CONCLUSION

The KAP of study participants regarding dietary salt was relatively low. The gaps in age, knowledge, and attitudes have been identified as significant predictors of salt-related practices in the study sample. These findings highlight the urgent need for education to improve knowledge and attitudes, which can help reduce salt intake in the community, especially among individuals aged 60 years and above. To address the limitations of this study, we recommend that future studies focus on monitoring the salt intake practices of each individual and evaluate urinary sodium excretion. This approach will provide more accurate results regarding people's salt intake.

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CONFLICTS OF INTERESTS

The authors declare no conflict of interest in this study.

AUTHORS' CONTRIBUTION

CMD designed the study; CMD, CKT, and LVNM conducted research; NTT and LVNM analyzed data; CMD and HVH wrote the manuscript. CMD had primary responsibility for the final content. All

authors read and approved the final manuscript.

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