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**Original Article**

# Salt intake-related knowledge, attitudes, and practices among Jordanian adults

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## Abstract

High salt consumption is a worldwide public health problem, and its magnitude varies considerably among different communities. This study aimed to assess Jordanian adults' knowledge, attitudes, and practices related to salt intake and to examine how these domains differed between genders. A quantitative cross-sectional survey was conducted using a multi-stage sampling technique to select a representative sample from the population of Amman, Jordan. Data were collected through a structured, validated questionnaire administered by trained interviewers between November and December 2021. The findings indicate that the majority of participants (70.8%) did not know the maximum recommended daily salt intake and reported not reading food labels when purchasing food. Almost half of the participants (48.2%) reported always adding salt while cooking, and 14.6% reported always adding table salt after cooking. The most commonly reported practices to reduce salt intake included using spices other than salt while cooking (67.2%) and avoiding or reducing the consumption of salt-rich foods. Significant gender differences were observed in knowledge, attitudes, and practices (KAP) toward salt intake. Females demonstrated greater awareness of recommended salt intake and associated health risks, and were more likely to engage in practices aimed at reducing salt consumption, such as avoiding high-salt foods and using alternatives in cooking. In contrast, males were more likely to report misconceptions, limited use of food labels, and higher engagement in unhealthy practices such as daily smoking and lower awareness of low-salt alternatives. In conclusion, this study showed that Jordanian adults have relatively limited knowledge about salt intake, and their practices regarding salt consumption are inappropriate. Therefore, there is a need to adopt long-term strategies to reduce salt intake among the Jordanian population and mitigate its negative impacts on community health.

**Keywords**: Knowledge, attitudes, practices, salt intake, Jordan

## Introduction

Non-communicable diseases (NCDs) are the leading global causes of mortality and the primary contributors to death in the World Health Organization (WHO) Eastern Mediterranean Region (EMR), including cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes [1]. Most of these deaths are preventable through lifestyle modifications and cost-effective interventions implemented by national governments [2]. Globally, NCDs account for 63% of all deaths, with low- and middle-income countries (LMICs) bearing 86% of premature mortality [3]. Raised blood pressure, a major global cause of premature death, is responsible for 9.4 million



Received: June 23, 2024 - Accepted: November 25, 2025 - Published online: December 2, 2025

deaths annually [4], with 45% attributed to heart disease and 51% to stroke. In Jordan, NCDs accounted for 78% of deaths in 2016, and the prevalence of hypertension and diabetes has risen substantially, with projections indicating a further increase by 2050 [5-7]. Studies in Arab countries reported a hypertension prevalence of 29.5%, strongly associated with high rates of obesity, physical inactivity, and unhealthy dietary habits [8-14].

Diet plays a crucial role in the prevention of NCDs. However, a cross-sectional study in Jordan revealed a concerning trend of sodium intake at nearly double the recommended daily level, consistent with global patterns [7]. Jordanians generally consume high amounts of sodium and low amounts of potassium, often without awareness of the associated health risks. The most recent STEPwise survey in Jordan highlighted low fruit and vegetable consumption, with 84% of the population consuming fewer than five portions daily, underscoring the need for dietary improvements [15,16]. Excessive sodium intake is associated with an increased risk of hypertension, cardiovascular disease, stroke, heart failure, osteoporosis, obesity, gastric cancer, and chronic kidney disease [17,18]. A meta-analysis of 31 trials demonstrated that reducing sodium intake by 75 mmol/day significantly lowered blood pressure [12]. In contrast, higher potassium intake has been linked to preventive benefits against hypertension and cardiovascular events [13]. Maintaining salt intake below 5 g/day can help prevent hypertension and reduce the risk of heart disease and stroke [9]. Implementing policies, strengthening surveillance systems, improving primary healthcare programs, and promoting healthy lifestyles through community awareness campaigns are essential to mitigate NCD morbidity and mortality, in line with the Sustainable Development Goals (SDGs) by 2030 [14].

Despite the global health concern of high salt consumption, its magnitude varies across communities. This study aimed to evaluate the knowledge, attitudes, and practices of Jordanians related to salt intake and to assess whether these domains differed between genders. The insights gained can guide targeted interventions, educational initiatives, and policy reforms to promote healthier salt consumption and reduce the burden of salt-related health problems. By addressing gaps in awareness and behavior, the findings will support the development of evidence-based strategies to encourage healthier dietary practices within the population.

# Methods

## Study design

A cross-sectional study was conducted among adults living in Amman, the capital of Jordan, to assess the knowledge, attitudes, and practices related to salt intake. The study population was Jordanian adults aged above 18 years residing in the Capital, Amman, with an estimated 2025 population of 2,2 million.

## Sampling

A multi-stage sampling technique was used to select representative samples from the population of Amman. In the first stage, well-defined areas were selected from each district of Amman governorate (21 districts). In the second stage, a stratified sampling approach was used to select districts, taking into consideration the varying sizes of each district. The districts were divided into strata based on their size, and then a proportionate number of districts were randomly selected from each stratum. This ensures that larger districts have a higher probability of being included in the sample, reflecting their significance in the overall population. Moreover, within each selected district, houses were selected using a systematic sampling method. The starting point for this systematic sampling was determined randomly to avoid bias. This approach enhances the representativeness of our sample, ensuring that both districts and individual houses are selected in a manner that aligns with the overall population distribution. At 95% confidence interval (CI), 5% precision, and 10% nonresponse rate and assuming that the expected proportion of the population with adequate knowledge is 50%, the sample size calculated was 856 persons.

## Questionnaire

A structured questionnaire, crafted in alignment with previous analogous surveys (14,32), was administered by trained interviewers to collect data systematically and reliably. The questionnaire included items on the socio-demographic characteristics and health characteristics

of participants, including previous diagnoses of diabetes, high cholesterol and triglyceride levels, and hypertension. The questionnaire was prepared in English (**Appendix 1**) and translated into Arabic using the backward-forward translation method by two bilingual Experts in epidemiology. The questionnaire was checked for clarity, consistency, and cultural acceptability. The questionnaire included sections covering sociodemographic characteristics, medical history, smoking habits, knowledge about salt intake, attitudes toward salt consumption, and salt intake practices. The sociodemographic section gathered data on age, educational qualifications, and marital status, while the medical history section included questions on hypertension, diabetes, hypercholesterolemia, and cardiovascular diseases.

Participants were asked about their smoking habits, specifically cigarette and waterpipe smoking, with frequencies and types of smoking recorded. Knowledge about salt intake was assessed through questions on the recommended maximum daily salt intake, awareness of the health risks associated with excessive salt consumption, and the importance of reducing salt intake. Attitudes towards salt consumption were evaluated by inquiring about beliefs regarding the harmlessness of certain types of salt, taste perceptions of food eaten outside the home, and perceived availability of salt alternatives.

The questionnaire also covered salt intake practices, such as the type of salt used at home, reading nutritional labels, purchasing decisions based on salt content, and habits related to adding salt and salty sauces during cooking and meals. Participants were asked about their practices to reduce salt intake, such as using spices instead of salt and avoiding high-salt foods. Additionally, sources of health information and reasons for high salt intake were explored, including preferences for information sources and perceived barriers to reducing salt consumption.

### Data collection

Research assistants (data collectors) were recruited and trained by research supervisors. Data were collected through face-to-face interviews with an automated household questionnaire. Ethical considerations were strictly followed, and informed consent was obtained from the respondents before each interview. The data collectors received training on the interpretation and use of the data collection tools to enable them to collect quality data. The data collectors worked under direct supervision to ensure that the team focused on the objectives of the study, and data was collected as planned through the household survey method, where a team of experienced researchers carried out this process. Data cleaning was carried out involving both field and office editing of the collected data. In the field, the supervisor sought to ensure that data was properly entered into the questionnaires. At the office level, data was further checked and screened for inconsistencies by the core team.

### Statistical analysis

Means, standard deviations, and percentages were used to describe the data. Gender-specific estimates were reported. Chi-square was used to compare percentages. A $p$-value of less than 0.05 was considered statistically significant. Data was entered and analyzed using the Statistical Package for Social Sciences software IBM SPSS (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp).

## Results

### Participants' characteristics

A total of 1,354 individuals participated in the study, comprising 1,042 females (77.0%) and 312 males (23.0%), with approximately half (52.0%) younger than 40 years. Overall, 22.4% reported hypertension, 13.7% reported diabetes, and 6.9% reported cardiovascular disease. Comparisons between sexes using the Chi-square test showed no significant differences in age distribution (<40 years: 51.6% of females vs. 53.2% of males, $p$=0.625), hypertension prevalence (21.9% vs 24.0%, $p$=0.422), diabetes prevalence (13.6% vs 13.8%, $p$=0.944), or cardiovascular disease prevalence (6.3% vs 8.7%, $p$=0.155). However, males were significantly more likely than females to report university-level education (51.9% vs 43.7%, $p$=0.010), being single (31.4% vs 18.5%, $p$<0.001), and daily cigarette smoking (59.6% vs 9.3%, $p$<0.001).

Table 1. Participants' sociodemographic and clinical characteristics (n=1354)

| Variable | Female | | Male | | Total | | *p*-value* |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| Age (year) | | | | | | | 0.625 |
| <40 | 538 | 51.6 | 166 | 53.2 | 704 | 52.0 | |
| ≥40 | 504 | 48.4 | 146 | 46.8 | 650 | 48.0 | |
| Qualifications | | | | | | | 0.010 |
| High school graduates or less | 587 | 56.3 | 150 | 48.1 | 737 | 54.4 | |
| University education | 455 | 43.7 | 162 | 51.9 | 617 | 45.6 | |
| Marital status | | | | | | | <0.001 |
| Single | 193 | 18.5 | 98 | 31.4 | 291 | 21.5 | |
| Married | 700 | 67.2 | 198 | 63.5 | 898 | 66.3 | |
| Divorced | 61 | 5.9 | 8 | 2.6 | 69 | 5.1 | |
| Widow | 88 | 8.4 | 8 | 2.6 | 96 | 7.1 | |
| Medical history | | | | | | | |
| Hypertension | 228 | 21.9 | 75 | 24.0 | 303 | 22.4 | 0.422 |
| Diabetes | 142 | 13.6 | 43 | 13.8 | 185 | 13.7 | 0.944 |
| Hypercholesterolemia | 165 | 15.8 | 50 | 16.0 | 215 | 15.9 | 0.936 |
| Cardiovascular diseases | 66 | 6.3 | 27 | 8.7 | 93 | 6.9 | 0.155 |
| Cigarettes smoking | | | | | | | <0.001 |
| Sometimes | 56 | 5.4 | 12 | 3.8 | 68 | 5.0 | |
| Every day | 97 | 9.3 | 186 | 59.6 | 283 | 20.9 | |
| Not at all | 889 | 85.3 | 114 | 36.5 | 1003 | 74.1 | |
| Waterpipe smoking | | | | | | | 0.029 |
| Sometimes | 253 | 24.3 | 67 | 21.5 | 320 | 23.6 | |
| Every day | 146 | 14.0 | 29 | 9.3 | 175 | 12.9 | |
| Not at all | 643 | 61.7 | 216 | 69.2 | 859 | 63.4 | |

*Analyzed using the Chi-square test

## Salt intake-related knowledge

Respondents' knowledge about salt intake by gender is presented in **Table 2**. Overall, 70.8% of participants did not know the recommended maximum daily salt intake for adults. However, most participants recognized the relationship between excessive salt intake and illnesses such as hypertension (96.1%) and kidney stones (86.2%). In addition, the majority (94.2%) reported that it is important to reduce salt intake. Females were more likely than males to be aware of the recommended maximum daily intake (31.5% vs 21.5%, $p<0.001$), to recognize the association between excess salt intake and osteoporosis (53.6% vs 43.6%, $p=0.002$) and stomach cancer (46.3% vs 38.5%, $p=0.015$), and to acknowledge the importance of lowering salt intake (95.4% vs 90.4%, $p=0.001$) (**Table 2**).

Table 2. Respondents' knowledge about salt intake according to gender (n=1354)

| Knowledge | Female | | Male | | Total | | *p*-value* |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| Know the maximum daily salt intake for an adult | | | | | | | <0.001 |
| Yes | 328 | 31.5 | 67 | 21.5 | 395 | 29.2 | |
| No | 630 | 68.5 | 245 | 78.5 | 959 | 70.8 | |
| Eating too much salt or salty sauces in the diet causes | | | | | | | |
| Hypertension | 1000 | 96.0 | 301 | 96.5 | 1301 | 96.1 | 0.687 |
| Osteoporosis | 558 | 53.6 | 136 | 43.6 | 694 | 51.3 | 0.002 |
| Stomach cancer | 482 | 46.3 | 120 | 38.5 | 602 | 44.5 | 0.015 |
| Kidney stones | 906 | 86.9 | 261 | 83.7 | 1167 | 86.2 | 0.139 |
| How important to you is lowering salt in your diet? | | | | | | | 0.001 |
| Not important | 48 | 4.6 | 30 | 9.6 | 78 | 5.8 | |
| Important | 994 | 95.4 | 282 | 90.4 | 1276 | 94.2 | |

*Analyzed using the Chi-square test

## Attitude toward salt intake

Respondents' attitudes toward salt intake by gender are presented in **Table 3**. Less than half of the participants (40.8%) reported that there is a type of salt used in food preparation that is harmless regardless of quantity. A higher percentage of males (68.9%) than females (56.2%) believed that no such harmless type of salt exists ($p$<0.001). Overall, 77.3% of respondents reported that the taste of food is normal when eating meals outside the home. In addition, a higher proportion of males (54.2%) than females (46.8%) stated that there are no alternatives to salt that can be added to food ($p$=0.023) (**Table 3**).

Table 3. Respondents' attitude towards salt intake according to gender (n=1354)

| Variable | Female | | Male | | Total | | $p$-value* |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| Do you think there is a type of salt that is used in food making that is harmless regardless of its quantity? | | | | | | | <0.001 |
| No | 586 | 56.2 | 215 | 68.9 | 801 | 59.2 | |
| Yes | 456 | 43.8 | 97 | 31.1 | 553 | 40.8 | |
| When eating meals outside the home, how do you feel the taste of food? | | | | | | | 0.833 |
| No taste | 75 | 7.2 | 23 | 7.4 | 98 | 7.2 | |
| Normal | 802 | 77.0 | 244 | 78.2 | 1046 | 77.3 | |
| Salty | 165 | 15.8 | 45 | 14.4 | 210 | 15.5 | |
| Are there any alternatives to salt that can be added to the food? | | | | | | | 0.023 |
| No | 488 | 46.8 | 169 | 54.2 | 657 | 48.5 | |
| Yes | 554 | 53.2 | 143 | 45.8 | 697 | 51.5 | |

*Analyzed using the Chi-square test

## Salt intake practices

Respondents' salt intake–related practices are presented in **Table 4**. Overall, 77.4% reported using iodized salt, with a higher proportion of females (79.5%) compared to males (70.5%) ($p$=0.003). Approximately 17.1% of respondents reported reading nutritional labels while grocery shopping, with no significant difference between females (17.7%) and males (15.1%) ($p$=0.285). Regarding the purchase of high-salt foods, 67.7% of participants reported avoiding such items, with females (69.2%) more likely than males (62.8%) to do so ($p$<0.001). About half of the respondents (48.2%) reported always adding table salt when cooking, with a significantly higher proportion of females (55.8%) compared to males (22.8%) ($p$<0.001). Furthermore, 14.6% reported always adding salt at the table during meals, with no significant difference between females (15.0%) and males (13.5%) ($p$=0.340). For adding salty sauces to every meal, 11.4% of respondents reported this practice, with no significant difference between females and males ($p$=0.049). Almost half (46.8%) reported always adding salty spices such as Maggi or chicken broth while cooking, with a significantly higher proportion of females (51.9%) compared to males (29.5%) ($p$<0.001) (**Table 4**).

The most commonly reported practices to reduce salt intake included using spices other than salt while cooking (67.2%) and avoiding or reducing the consumption of salt-rich foods (64.2%) (**Table 5**). A significantly higher percentage of females engaged in these salt-reduction practices compared with males.

Table 4. Respondents' salt intake related practice according to gender (n=1354)

| Variable | Female | | Male | | Total | | $p$-value* |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| What type of salt do you usually use when preparing your meals at home? | | | | | | | 0.003 |
| Non-iodized | 50 | 4.8 | 19 | 6.1 | 69 | 5.1 | |
| I don't know | 164 | 15.7 | 73 | 23.4 | 237 | 17.5 | |
| Iodized | 828 | 79.5 | 220 | 70.5 | 1048 | 77.4 | |

| Variable | Female | | Male | | Total | | *p*-value* |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| Do you read the nutritional labels on the food items when grocery shopping? | | | | | | | 0.285 |
| No | 858 | 82.3 | 265 | 84.9 | 1123 | 82.9 | |
| Yes | 184 | 17.7 | 47 | 15.1 | 231 | 17.1 | |
| In case the food item contains a higher amount of salt than the allowed one, do you still buy it? | | | | | | | <0.001 |
| No | 721 | 69.2 | 196 | 62.8 | 917 | 67.7 | |
| Don't care | 238 | 22.8 | 103 | 33 | 341 | 25.2 | |
| Yes | 83 | 8 | 13 | 4.2 | 96 | 7.1 | |
| Do you add table salt when cooking your daily meals? | | | | | | | <0.001 |
| Never | 186 | 17.9 | 50 | 16 | 236 | 17.4 | |
| Always | 581 | 55.8 | 71 | 22.8 | 652 | 48.2 | |
| Not responsible for cooking meals | 53 | 5.1 | 142 | 45.5 | 195 | 14.4 | |
| Sometimes | 222 | 21.3 | 49 | 15.7 | 271 | 20 | |
| Do you add salt to the table in your daily meals? | | | | | | | 0.34 |
| Never | 659 | 63.2 | 190 | 60.9 | 849 | 62.7 | |
| Always | 156 | 15 | 42 | 13.5 | 198 | 14.6 | |
| Sometimes | 227 | 21.8 | 80 | 25.6 | 307 | 22.7 | |
| Do you add salty sauces to every meal of your day? | | | | | | | 0.049 |
| Never | 556 | 53.4 | 191 | 61.2 | 747 | 55.2 | |
| Always | 125 | 12 | 30 | 9.6 | 155 | 11.4 | |
| Sometimes | 361 | 34.6 | 91 | 29.2 | 452 | 33.4 | |
| Do you add salty spices such as Maggi or chicken broth when cooking your daily meals? | | | | | | | <0.001 |
| Never | 216 | 20.7 | 122 | 39.1 | 338 | 25 | |
| Always | 541 | 51.9 | 92 | 29.5 | 633 | 46.8 | |
| Sometimes | 285 | 27.4 | 98 | 31.4 | 383 | 28.3 | |

*Analyzed using the Chi-square test

Table 5. Common practices for reducing salt intake

| Variable | Female | % | Male | % | Total | % | *p*-value* |
|---|---|---|---|---|---|---|---|
| To reduce salt intake: | | | | | | | |
| I avoid or decrease the amount of salt-rich food I eat | 689 | 66.1 | 180 | 57.7 | 869 | 64.2 | 0.006 |
| I buy alternative products with low salt content | 520 | 49.9 | 134 | 42.9 | 654 | 48.3 | 0.031 |
| I read the salt content on the food labels | 382 | 36.7 | 92 | 29.5 | 474 | 35.0 | 0.020 |
| I do not add salt when cooking, or i add a very small amount | 569 | 54.6 | 136 | 43.6 | 705 | 52.1 | 0.001 |
| I only use spices instead of salt when cooking | 483 | 46.4 | 108 | 34.6 | 591 | 43.6 | <0.001 |
| I avoid eating outside a lot | 539 | 51.7 | 137 | 43.9 | 676 | 49.9 | 0.015 |
| If i eat outside, i choose low-salt food options | 434 | 41.7 | 115 | 36.9 | 549 | 40.5 | 0.130 |
| I use spices other than salt while cooking | 726 | 69.7 | 184 | 59.0 | 910 | 67.2 | <0.001 |

*Analyzed using the Chi-square test

## Source of health information

Respondents' preferred sources of information on salt intake are presented in **Table 6**. The majority reported preferring health centers (82.8%) and social media (78.2%) as sources of information on salt intake and health. A higher proportion of females than males preferred television as an information source (65.0% vs 55.4%, $p$=0.002). Similarly, more females (54.2%) than males (47.8%) preferred obtaining information from friends ($p$=0.045).

Table 6. Respondent preferred source of information on salt intake

| Variable | Female | % | Male | % | Total | % | *p*-value* |
|---|---|---|---|---|---|---|---|
| | n | | n | | n | | |
| Flyers, brochures, and posters | 402 | 38.6 | 102 | 32.7 | 504 | 37.2 | 0.059 |
| Television | 677 | 65.0 | 173 | 55.4 | 850 | 62.8 | 0.002 |
| Radio | 226 | 21.7 | 83 | 26.6 | 309 | 22.8 | 0.070 |
| YouTube | 621 | 59.6 | 196 | 62.8 | 817 | 60.3 | 0.307 |
| Social media platforms | 812 | 77.9 | 247 | 79.2 | 1059 | 78.2 | 0.642 |
| Google | 717 | 68.8 | 232 | 74.4 | 949 | 70.1 | 0.060 |
| Friends | 565 | 54.2 | 149 | 47.8 | 714 | 52.7 | 0.045 |
| School or university | 312 | 29.9 | 95 | 30.4 | 407 | 30.1 | 0.864 |
| Health centers | 854 | 82.0 | 267 | 85.6 | 1121 | 82.8 | 0.137 |

*Analyzed using the Chi-square test

### Reasons for high salt intake

Participants' reported reasons for high salt intake are presented in **Table 7**. The main reasons included the high cost of low-salt foods (72.1%), not reading food labels (78.2%), and limited options available at restaurants (72.1%). Females were more likely than males to cite the complicated cooking process as a reason for high salt intake (46.0% vs 38.8%, $p$=0.025). Conversely, more males than females reported not reading food labels (82.7% vs 76.9%, $p$=0.029). In addition, males were more likely than females to be unaware of the availability of low-salt foods (74.4% vs 67.2%, $p$=0.016) and to report not knowing the risks associated with salt (62.2% vs 55.6%, $p$=0.038) (**Table 7**).

Table 7. Participants' reported reasons for high salt intake

| Variable | Female | % | Male | % | Total | % | *p*-value |
|---|---|---|---|---|---|---|---|
| | n | | n | | n | | |
| Limited options are available at restaurants | 758 | 72.7 | 218 | 69.9 | 976 | 72.1 | 0.321 |
| Complicated cooking process | 479 | 46.0 | 121 | 38.8 | 600 | 44.3 | 0.025 |
| Low amount of knowledge around methods of decreasing sodium | 686 | 65.8 | 215 | 68.9 | 901 | 66.5 | 0.313 |
| Not reading food labels | 801 | 76.9 | 258 | 82.7 | 1059 | 78.2 | 0.029 |
| Not knowing food labels | 744 | 71.4 | 240 | 76.9 | 984 | 72.7 | 0.055 |
| Not knowing the availability of low-salt food | 700 | 67.2 | 232 | 74.4 | 932 | 68.8 | 0.016 |
| The high cost of low-salt food | 773 | 74.2 | 242 | 77.6 | 1015 | 75.0 | 0.227 |
| Not knowing the risks of salt | 579 | 55.6 | 194 | 62.2 | 773 | 57.1 | 0.038 |

*Analyzed using the Chi-square test

## Discussion

Understanding the population's knowledge, attitudes, and practices regarding salt intake is critical for designing effective salt-reduction policies. While global data highlight wide variations in salt consumption across countries and populations, local evidence remains essential given the strong association between excessive salt intake and hypertension, cardiovascular disease, and kidney disease [19-26]. In Jordan, previous studies have reported both high salt consumption and increasing hypertension prevalence [10,15]. The findings of this study further underscore the urgency of addressing dietary salt intake as a national public health priority.

This study revealed limited knowledge of the recommended daily salt intake, with only 29.2% of participants correctly identifying the 5 g/day recommendation. Females demonstrated greater knowledge than males, particularly regarding the health risks of excess salt, consistent with earlier national surveys [15]. However, these findings differ from those in Tehran, where men exhibited greater awareness [27]. In contrast, nearly all participants recognized the link between salt and hypertension (96.1%) and kidney stones (86.2%), fewer associated excess salt with osteoporosis or stomach cancer. This knowledge gap highlights the need to strengthen awareness campaigns that emphasize the broader spectrum of health risks associated with excessive salt intake.

Attitudes toward salt intake were mixed. While two-thirds of participants (65.0%) considered it very important to reduce salt consumption, a substantial proportion believed that certain types of salt are harmless regardless of quantity. Only 17.1% reported reading food labels, despite evidence showing that label use is an effective strategy for monitoring sodium intake [39]. Compared with Lebanon, where nearly 40% of individuals regularly check labels [28], Jordanians demonstrated strikingly low engagement with nutritional information. This lack of attention to food labels represents a major barrier to informed dietary choices [29].

Reported practices further suggest widespread overuse of salt. Nearly half (48.2%) of respondents always added salt during cooking, and one in seven (14.6%) added salt at the table. Moreover, 46.8% reported regular use of salty seasonings such as Maggi. These practices are consistent with findings from national food composition studies that have documented high sodium levels in staple foods such as bread and traditional dishes [30-32]. Although most participants reported consuming fewer than three Arabic breads per day—keeping sodium intake from bread within acceptable limits—other sources, such as pickles, olives, sauces, snacks, and processed foods, substantially contribute to excessive sodium intake.

Dietary habits also revealed inadequate fruit and vegetable consumption, with nearly two-thirds of respondents reporting fewer than three daily servings. This dietary imbalance, combined with high salt use, increases the risk of NCDs. The prevalence of self-reported hypertension (22.4%) and diabetes (13.7%) was high, though likely underestimated given the significant proportion of undiagnosed cases in the country [15].

The study further highlighted key barriers to reducing salt intake, including the high cost of low-salt foods, limited availability of low-salt options in restaurants, and insufficient knowledge about alternatives. Males were more likely than females to report not reading food labels, lack of awareness about the availability of low-salt foods, and limited knowledge of salt-related health risks, indicating important gender-specific gaps.

Encouragingly, participants expressed strong support for strategies to reduce salt intake. Public education and community awareness campaigns were endorsed by over 96% of respondents, along with calls for food reformulation, clearer food labeling, and greater awareness among restaurant owners. Female respondents particularly supported individualized counseling services. These findings reinforce evidence from other countries, suggesting that successful salt reduction requires a multifaceted approach combining policy-level interventions, community engagement, and behavioral change strategies.

## Conclusion

This study demonstrated that Jordanian adults have limited knowledge of the recommended salt intake and frequently engage in unhealthy practices that contribute to excessive sodium consumption. Although awareness of the link between salt and hypertension was relatively high, important gaps remain regarding other health risks, common dietary sources of salt, and the use of nutrition labels. Misconceptions often shaped attitudes, and practices such as adding salt during cooking or relying on salty seasonings were prevalent.

To address these gaps, both immediate and long-term strategies are required to improve knowledge, attitudes, and practices related to salt intake, with the aim of mitigating its negative impact on community health. Priority interventions should include public education campaigns tailored to subgroups with lower awareness, such as males and younger populations; policy and regulatory measures, including clear mandatory nutrition labeling and food reformulation; and community-based initiatives delivered in schools, universities, malls, bakeries, and health centers. Strengthening the capacity of primary healthcare providers to deliver routine nutrition counseling and engaging the food industry to produce lower-salt alternatives will also be essential. Implementing multi-sectoral, gender-sensitive, and culturally appropriate strategies can help improve dietary behaviors and contribute to sustainable reductions in salt consumption across the Jordanian population.

### Ethics approval

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of Jordan University of Science and Technology, IRB #637/2021, (approval number: 53/637/2021).

### Acknowledgments

None to declare

### Competing interests

We declare that there are no financial or other relationships and activities that might lead to a conflict of interest regarding this research.

### Funding

This study received no external funding.

### Underlying data

The questionnaire used in this study is available in 10.6084/m9.figshare.26795734.

### Declaration of artificial intelligence use

We hereby confirm that no artificial intelligence (AI) tools or methodologies were utilized at any stage of this study, including during data collection, analysis, visualization, or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

## How to cite

Majeed ZA, Barham R, Al-Jawaldeh A, *et al*. Salt intake-related knowledge, attitudes, and practices among Jordanian adults. Narra J 2025; 5 (3): e1021 - http://doi.org/10.52225/narra.v5i3.1021.

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