# Knowledge, attitudes and behaviour of Greek adults towards salt consumption: a Hellenic Food Authority project

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## Abstract

*Objective:* To investigate the knowledge, attitudes and behaviour of Greek adults towards salt as well as their differences with respect to gender, age and level of education.
*Design:* Cross-sectional, observational survey.
*Setting:* Voluntary participation to a telephone interview, using a seventeen-item questionnaire.
*Subjects:* Greek adults aged over 25 years (*n* 3609), nationally representative according to age, gender and geographical distribution of the Greek population, were interviewed.
*Results:* More women of all age groups compared with men reported adding salt during cooking ($P < 0.001$), while less reported adding salt on the plate ($P < 0.001$). Also, more women believed that salt added during cooking was the main source of salt in the diet ($P < 0.001$). Participants aged 25–34, 35–44 and 45–54 years old had better knowledge of the harmful effects of salt on health compared with the 55+ years age group ($P = 0.002$, $P = 0.001$, $P < 0.001$, respectively); respondents in the aforementioned age groups also knew that children should consume less salt than adults compared with 55+ years age group ($P = 0.004$, $P < 0.001$, $P < 0.001$, respectively). Respondents with secondary and higher educational status were more likely to avoid consumption of processed foods ($P < 0.001$) and to check the nutrition information on food packaging as compared with respondents having basic education status ($P < 0.001$).
*Conclusions:* Awareness needs to be raised regarding salt recommendations for adults and children, sources of sodium in the diet and adding less salt during cooking, as well as reading food labels. Future campaigns for salt reduction should consider gender, age and level of education differences regarding knowledge, attitudes and behaviour towards salt.

Strong scientific evidence based on observational and experimental human and animal studies has established the adverse effect of excess salt intake on human health, especially on blood pressure levels[1–4]. Sodium restriction lowers blood pressure in both men and women, in all age groups, as well as resting blood pressure, and can avert serious vascular complications[5].

Reducing dietary sodium at the population level is one of the simplest and most cost-effective potential ways to reduce CVD risk and improve public health[6,7]. Unsurprisingly, on a global scale, its implementation has been indicated as the second of the five immediate priority actions for prevention of non-communicable diseases[5,8]. Reducing salt consumption has been estimated to save substantive health costs in developed countries,

mainly as a consequence of reduced cardiovascular morbidity and mortality[9,10]. According to a recent National Health Survey conducted by the Hellenic Statistical Authority[11], one in five Greek citizens reported suffering from hypertension (with the prevalence of hypertension in men and women being 17·7 % and 22·5 %, respectively). Therefore, any action that can potentially reduce the financial burden for health-care demands in Greece, especially during periods of economic crisis, becomes crucial.

However, consumers are not always aware of the foods or dietary behaviours that contribute the most to total sodium intake[12]. Even though the salt content of processed foods has been reduced through systematic measures in many European countries, processed foods

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are still considered to be the main contributors to dietary sodium intake[13]. Hence, national policies for dietary salt reduction usually focus both on raising awareness regarding salt in the general public as well as moving towards a progressive abatement of the salt content of the foods identified as the largest contributors to population salt intake, largely by engaging food business operators in this effort[14]. Even though a national dietary survey has not been completed in Greece, a recent study carried out in children[15] showed that processed foods such as pizza, cheese and bread are important contributors to total dietary intake.

In Greece, a national public health campaign can be successful if consumers' knowledge regarding salt as well as their related dietary habits are first taken into account, before developing and implementing targeted actions towards salt reduction. Since there is no published information about the beliefs related to salt consumption among Greek adults, the primary aim of the present study was to evaluate the knowledge, attitudes and behaviour towards salt intake in a nationally representative random sample of Greek adults, and second to examine potential differences with respect to age, gender and level of education. This could help in identifying key knowledge gaps regarding salt and attitudes towards high salt consumption, as well as in planning future interventions at changing consumer behaviour to reduce salt intake based on scientific data.

## Methods

### Study design and participants

The study was a cross-sectional, observational survey, carried out during January–February 2011 and September–October 2011, in all Greek areas. The sampling was random (i.e. random selection of telephone numbers through telephone catalogues, using a special algorithm) and nationally representative according to the age, gender and geographical distribution of the Greek population (provided by the Hellenic Statistical Authority). Only one person per household was interviewed, selected so as to achieve a representative age and sex distribution in the sample. In particular, of the 4505 initially approached individuals (excluding those who did not answer the telephone), 1727 men and 1882 women (aged 25–90 years) finally agreed to participate in the interview (80 % participation rate). Of them, 1255 were from Attica region (including Athens metropolitan area), 944 were from Macedonia and Thrace regions, 531 were from Thessaly, Sterea Ellada and Epirus, 481 were from Peloponnesus and Ionian islands, and 398 were from Crete and Aegean islands (Table 1).

All interviews were carried out by trained personnel (by a market analysis company). The study was conducted according to the guidelines laid down in the

**Table 1** Characteristics of the survey participants: nationally representative sample of Greek adults (*n* 3609), 2011

|  | *n* | % |
|---|---|---|
| Sex |  |  |
| Male | 1727 | 47·9 |
| Female | 1882 | 52·1 |
| Age group |  |  |
| 25–34 years | 667 | 18·5 |
| 35–44 years | 716 | 19·8 |
| 45–54 years | 657 | 18·2 |
| 55–64 years | 624 | 17·3 |
| 65–74 years | 502 | 13·9 |
| 75+ years | 443 | 12·3 |
| Educational status |  |  |
| Low school | 840 | 23·3 |
| Basic school | 365 | 10·1 |
| High school | 1167 | 32·3 |
| Higher education | 1224 | 33·9 |
| Region |  |  |
| Attica | 1255 | 34·8 |
| Macedonia and Thrace | 944 | 26·2 |
| Thessaly, Sterea Ellada and Epirus | 531 | 14·7 |
| West Sterea Ellada, Peloponnesus and Ionian islands | 481 | 13·3 |
| Crete and Aegean islands | 398 | 11·0 |

Declaration of Helsinki and all procedures involving human subjects were approved by the Management Board of the Hellenic Food Authority (Decision no. 6/14.03.2011). Prior to the commencement of the survey, the Hellenic Data Protection Authority was notified of the study. Participants were informed about the aims and procedures of the survey and consent was obtained from all of them. The participants responded to the questions anonymously.

### Measurements

Data were collected by a computer-assisted telephone interview. The questionnaire covered sociodemographic characteristics (gender, age, education level and place of residence) and included seventeen pre-coded questions related to knowledge, attitudes and behaviour of Greek adults towards salt consumption. Two of the questions each contained an additional open-ended question. One of them asked the participants to specify the maximum daily intake recommended by experts and the other one asked them to specify the relationship between salt and sodium. The rest of the questions had a number of pre-defined answers that the respondents could choose from.

The initial questionnaire was sent to experts in Greece (Hellenic Health Foundation), the UK (Salt Team, Department of Heath), the USA (Pan-American Health Organization) and Consumers International in Chile for initial comments. During the preliminary phase of the study, the questionnaire was completed by participants (*n* 100) attending a one-day conference on nutrition policy in Athens, Greece, organized by the Hellenic Food Authority (October 2010), in order to reassure that the questions were clear and understood by everyone.

### Statistical analysis

Categorical variables are presented as absolute and relative frequencies. Associations between categorical variables were tested by calculation of the $\chi^2$ test. The statistical software package IBM SPSS Statistics 18·0 was used for all statistical calculations. Comparisons between $C$-statistic values were performed using the $Z$-test. All reported $P$ values were based on two-sided hypotheses.

## Results

In general, most of the participants tended to add salt always during cooking (72·4 %) but rarely/never on their plate at the table (70·6 %). With regard to their knowledge towards salt, a small percentage of the participants knew that there is a recommended maximum daily intake of salt (33·3 %) but among them, even fewer knew correctly this recommendation (11·1 %). Moreover, most of the respondents knew that salt is associated with health problems (95·0 %). However, only half reported that salt reduction was very important in their diet (59·2 %). The responses on the attitudes and behaviour questions showed that a large percentage of the cohort had the habit of avoiding processed foods (77·6 %) but few reported always reading the nutritional information on food packages (24·7 %).

### Gender differences regarding knowledge, attitudes and behaviour towards salt

Compared with men, more women reported adding salt during cooking ($P < 0·001$), while less reported adding salt on the plate at the table ($P < 0·001$; Table 2). Also, more women compared with men believed that salt added during cooking was the main source of salt in the diet ($P < 0·001$). More than half of the respondents were not aware of the recommended maximum daily amount of salt for adults ($P < 0·001$). However, more women compared with men reported that there is a maximum daily amount of salt recommended for adults by experts ($P < 0·001$), although less than a fifth knew that the recommended daily amount is less than 5–6 g ($P = 0·032$). Also women were more likely to report that children should consume less salt than adults ($P < 0·001$). Women were less likely to know that there is a relationship between salt and sodium ($P = 0·044$) and understand the exact nature of this relationship ($P < 0·001$). Women had better knowledge of the harmful effects of salt on health ($P < 0·001$), as they knew that a diet high in salt correlates with high blood pressure ($P = 0·011$), obesity ($P < 0·001$), stomach cancer ($P < 0·001$) and kidney stones ($P < 0·001$). In addition, compared with men, more than half of the female respondents thought they were probably eating less or the right amount of salt as recommended ($P < 0·001$) and that a reduction of salt in the diet was very important ($P < 0·001$). Women were more likely to avoid consumption of processed foods ($P < 0·001$) and more likely to check the nutrition information on food packaging ($P < 0·001$) compared with men. When the participants were asked what they would prefer on food labels, more than half of the women appeared to prefer reading the amount of salt/sodium per serving ($P < 0·001$). Finally, more than half of the women would prefer a clear indication of foods high in salt to be mandatory on food labels ($P = 0·03$).

### Age differences regarding knowledge, attitudes and behaviour towards salt

When the analysis was stratified by age group (Table 3), it was observed that in all age groups participants tended to add salt more frequently during cooking, with women having higher percentages compared with men within each age group ($P < 0·001$). As far as the withholding of salt on the plate was concerned, independent of age group, more than half of the respondents and more women compared with men reported avoiding adding salt on the plate (25–35 years: $P = 0·007$, 36–45 years: $P < 0·001$, 46–55 years: $P = 0·0028$, 56–65 years: $P = 0·003$, 66–75 years: $P = 0·009$, 75+ years: $P = 0·045$). Furthermore, less than half of the participants aged 25–34 ($P = 0·024$), 35–44 ($P < 0·001$), 55–64 ($P = 0·003$) and 65–74 ($P = 0·010$) years old were informed about the maximum daily amount of salt recommended for adults, while women seemed to be better informed as compared with men. The participants in all age groups appeared to know that children should consume less salt than adults; however, these differences were statistically significant only in those aged 25–34 ($P = 0·004$), 35–44 ($P < 0·001$), 45–54 ($P < 0·001$) and 55–64 ($P < 0·001$) years old. More than half of the respondents of 56–65 ($P = 0·045$), 66–75 ($P = 0·014$) and 75+ ($P < 0·001$) years age groups were less likely to know that there is a relationship between salt and sodium, while females were found to be less informed compared with males. Finally, participants aged 25–34 ($P = 0·008$), 35–44 ($P = 0·012$), 45–54 ($P < 0·001$) and 55–64 ($P < 0·001$) years old were more likely to avoid processed foods in an effort to control their salt intake. In this survey, respondents (women more than men) of 25–34 ($P < 0·001$), 35–44 ($P = 0·031$), 45–54 ($P < 0·001$) and 55–64 ($P = 0·001$) years age groups checked food labels more frequently. Additionally, participants aged 25–34 ($P = 0·002$), 35–44 ($P = 0·001$) and 45–54 ($P < 0·001$) years old as well as women were more concerned about the harmful effects of salt on health, while those aged 25–34 ($P = 0·001$), 35–44 ($P < 0·001$) and 64–75 years ($P = 0·010$) preferred the indication of the amount of salt/sodium on the food label as per serving (females more than males).

### Education status differences regarding knowledge, attitudes and behaviour towards salt

The impact of education status was also investigated. All the aforementioned analyses were repeated to identify

**Table 2** Consumption, knowledge and beliefs on salt by gender among the survey participants: nationally representative sample of Greek adults (*n* 3609), 2011

| | Men (*n* 1727) | Women (*n* 1882) | |
| --- | --- | --- | --- |
| | % | % | *P* |
| 1. Do you put salt in food when you cook? | | | |
|     Always | 63·6 | 80·4 | |
|     Occasionally (less than half meals) | 10·2 | 8·3 | 0·0005 |
|     Never | 7·1 | 4·6 | |
| 2. Do you add salt to your plate when you sit at the table? | | | |
|     Always | 8·3 | 4·3 | |
|     Occasionally (less than half meals) | 17·3 | 13·2 | 0·0005 |
|     Never | 44·9 | 58·2 | |
| 3. Is there a maximum daily amount of salt recommended for adults by the experts? | | | |
|     Yes | 28·3 | 37·8 | |
|     No | 19·7 | 15·5 | 0·0005 |
|     I do not know | 51·9 | 46·7 | |
| 3a. If your answer is yes, which is the correct amount? | | | |
|     Yes (correct answer) | 8·8 | 12·8 | 0·032 |
|     No (wrong answer) | 91·2 | 87·2 | |
| 4. Compared with adults, do you believe that children should consume…? | | | |
|     More salt | 12·0 | 9·7 | |
|     The same quantity of salt | 14·1 | 17·1 | 0·0005 |
|     Less salt | 61·2 | 66·4 | |
| 5. Is there a relationship between salt and sodium? | | | |
|     Yes | 58·5 | 54·4 | |
|     No | 5·6 | 6·2 | 0·044 |
|     I do not know | 35·9 | 39·5 | |
| 5a. If yes, please specify: | | | |
|     Yes (correct answer) | 38·4 | 29·3 | 0·0005 |
|     No (wrong answer) | 61·6 | 70·7 | |
| 6. Do you believe that a diet high in salt could cause serious health problems? | | | |
|     Yes | 92·9 | 96·9 | |
|     No | 4·5 | 1·8 | 0·0005 |
|     I do not know | 2·6 | 1·3 | |
| 7. If yes, what kind of problems? | | | |
|     High blood pressure | | | |
|       High correlation | 88·2 | 90·8 | 0·011 |
|       No correlation | 0·9 | 0·4 | |
|     Obesity | | | |
|       High correlation | 47·6 | 62·6 | 0·0005 |
|       No correlation | 11·2 | 5·8 | |
|     Osteoporosis | | | |
|       High correlation | 29·8 | 31·2 | 0·669 |
|       No correlation | 9·2 | 8·2 | |
|     Stomach cancer | | | |
|       High correlation | 9·2 | 10·8 | 0·0005 |
|       No correlation | 13·7 | 9·3 | |
|     Kidney stones | | | |
|       High correlation | 53·9 | 62·8 | 0·0005 |
|       No correlation | 4·4 | 3·2 | |
|     High cholesterol | | | |
|       High correlation | 35·7 | 36·3 | 0·115 |
|       No correlation | 12·1 | 9·5 | |
| 8. How much salt do you think you eat? | | | |
|     More than the right amount | 15·6 | 10·8 | |
|     The right amount | 34·5 | 40·3 | 0·0005 |
|     Less than the right amount | 27·6 | 30·9 | |
| 9. What is the main source of salt in the diet of adults in Greece? | | | |
|     Salt in cooking | 37·4 | 38·8 | |
|     Bread | 3·6 | 3·3 | 0·0005 |
|     Meat & sausages | 18·9 | 21·8 | |
| 10. How important is the reduction of salt in the diet? | | | |
|     Not important | 13·5 | 10·4 | |
|     Less important | 31·6 | 25·6 | 0·0005 |
|     Very important | 54·5 | 63·5 | |
| 11. What do you do to control the intake of salt? | | | |
|     Avoid consumption of processed foods | 72·1 | 82·7 | 0·0005 |
|     Remove salt from foods in brine | 67·7 | 72·7 | 0·001 |
|     Avoid eating outside | 42·4 | 54·5 | 0·0005 |

**Table 2** Continued

| | Men (n 1727) | Women (n 1882) | |
|---|---|---|---|
| | % | % | P |
| 12. How do you assess the meals available in restaurants, taverns and canteens on the concentration of salt? | | | |
|     The right amount of salt | 27·9 | 27·0 | |
|     High in salt | 36·5 | 36·9 | 0·174 |
|     Too high in salt | 15·9 | 16·5 | |
| 13. Do you read the nutrition information on food packaging? | | | |
|     Always | 21·0 | 28·2 | |
|     Never | 33·1 | 24·0 | 0·0005 |
| 14. Which of the following would you prefer to appear on food labels? | | | |
|     Salt | 26·5 | 24·1 | |
|     Sodium | 2·1 | 2·9 | 0·210 |
|     Salt and sodium | 58·9 | 60·3 | |
| 15. Would you prefer the amount of salt/sodium on food labels to appear per…? | | | |
|     Serving | 49·5 | 56·4 | 0·0005 |
|     100 g/ml | 34·9 | 28·6 | |
| 16. Would you prefer the amount of salt/sodium on food labels to appear as a percentage of the recommended daily intake? | | | |
|     Yes | 81·4 | 82·5 | 0·071 |
|     No | 7·1 | 5·3 | |
|     I do not know | 11·5 | 12·2 | |
| 17. Which of the following would you prefer to be mandatory? | | | |
|     Indication of foods high in salt/sodium | 56·4 | 59·9 | 0·033 |
|     Clear indication of foods high in salt in catalogues/restaurant menus | 37·9 | 33·9 | 0·012 |

differences between participants with primary education (i.e. 6 years of schooling), gymnasium (i.e. 9 years of schooling), lyceum (i.e. 12 years of schooling) and higher education (i.e. academic; Table 4). It was observed that, independent of education level, participants were more likely to add salt to food during cooking ($P < 0·001$) with female participants of higher levels of education (academic graduates) adding less compared with the rest. Men and women with primary school ($P = 0·002$), lyceum ($P < 0·001$) and higher education ($P < 0·001$) seemed to avoid adding salt on the plate (women more than men). Less than half of the respondents, independently of education level, were more likely to report that there is a maximum daily amount of salt recommended for adults, with women being better informed than men (primary graduates: $P = 0·001$, gymnasium graduates: $P = 0·014$, lyceum graduates: $P = 0·004$, academic graduates: $P < 0·001$). Graduates of primary ($P = 0·021$), lyceum ($P < 0·001$) and higher education ($P < 0·001$) had better knowledge of the maximum daily amount of salt recommended for children, with female graduates being better informed than men graduates of the same educational status. As far as the knowledge of the relationship between salt and sodium was concerned, when educational status was taken into account, the effect was not statistically significant. Graduates of lyceum ($P < 0·001$) and higher educational status ($P < 0·001$) were also more concerned about the harmful effects of excessive salt intake on health (women more than men of similar education levels), reported a tendency of avoiding consumption of processed foods (lyceum: $P < 0·001$, higher educational status: $P < 0·001$), while at the same time they reported checking the nutrition information on food

packaging more frequently (lyceum: $P < 0·001$, higher educational status: $P < 0·001$).

## Discussion

Excessive dietary sodium consumption is an important public health issue both at national level and internationally[16,17]. The aim of the present study was to gain insight into what Greek adults know and do regarding salt consumption. The study was carried out by telephone interview using a structured questionnaire. This method was viewed as a quick and cost-effective method of data collection and at the same time it allowed access to respondents that the face-to-face style of interviewing would not, either because of distance (considering the geography of Greece) or time restraints. Telephone interviews have also been used for other nutrition-related surveys including monitoring of changes in dietary habits[18].

Among the factors that influence choice and food consumption is nutrition knowledge. In the present study, most respondents either were not aware of or had a false belief of the recommendations that experts give regarding salt consumption (i.e. 5–6 g/d)[5]. Even though more than half of the respondents knew that there is a relationship between salt and sodium, only few of them knew correctly the nature of this link. Our results are in line with recent studies[19,20]. Knowing the targets that experts set on salt intake can help consumers make better informed choices when purchasing processed foods and become more aware and sensitive when cooking or eating. Better knowledge of the relationship between salt

**Table 3** Consumption, knowledge and beliefs on salt by age group among the survey participants: nationally representative sample of Greek adults (n 3609), 2011

| | 25–34 years (n 667) | | | 35–44 years (n 716) | | | 45–54 years (n 624) | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Men | Women | | Men | Women | | Men | Women | |
| | % | % | P | % | % | P | % | % | P |
| 1. Do you put salt in food when you cook? | | | | | | | | | |
| Always | 69·6 | 82·7 | | 62·5 | 81·3 | | 65·4 | 82·1 | |
| Occasionally (less than half meals) | 6·6 | 6·6 | 0·0005 | 9·2 | 8·1 | 0·0005 | 11·1 | 8·7 | 0·0005 |
| Never | 5·1 | 4·8 | | 5·8 | 3·5 | | 5·9 | 3·0 | |
| 2. Do you add salt to your plate when you sit at the table? | | | | | | | | | |
| Always | 10·5 | 5·4 | | 9·5 | 3·8 | | 8·3 | 5·2 | |
| Occasionally (less than half meals) | 17·2 | 18·8 | 0·007 | 17·9 | 10·0 | 0·0005 | 19·4 | 13·0 | 0·0028 |
| Never | 38·3 | 49·6 | | 41·8 | 62·3 | | 41·9 | 53·0 | |
| 3. Is there a maximum daily amount of salt recommended for adults by the experts? | | | | | | | | | |
| Yes | 34·6 | 44·2 | | 31·1 | 45·8 | | 32·9 | 41·3 | |
| No | 16·9 | 11·9 | 0·024 | 17·9 | 15·7 | 0·0005 | 17·6 | 16·0 | 0·084 |
| I do not know | 48·5 | 43·9 | | 51·0 | 38·5 | | 49·5 | 42·7 | |
| 3a. If your answer is yes, which is the correct amount? | | | | | | | | | |
| Yes (correct answer) | 12·2 | 13·5 | 0·854 | 5·5 | 13·0 | 0·044 | 8·4 | 11·8 | 0·524 |
| No (wrong answer) | 87·8 | 86·5 | | 94·5 | 87·0 | | 91·6 | 88·2 | |
| 4. Compared with adults, do you believe that children should consume…? | | | | | | | | | |
| More salt | 11·7 | 5·4 | | 5·2 | 3·8 | | 13·1 | 10·3 | |
| The same quantity of salt | 16·6 | 13·1 | 0·004 | 11·2 | 16·0 | 0·0005 | 10·4 | 20·1 | 0·0005 |
| Less salt | 62·7 | 74·3 | | 72·6 | 79·1 | | 62·3 | 63·9 | |
| 5. Is there a relationship between salt and sodium? | | | | | | | | | |
| Yes | 68·1 | 67·2 | | 64·3 | 67·5 | | 65·1 | 67·4 | |
| No | 3·0 | 4·8 | 0·498 | 6·1 | 6·5 | 0·548 | 6·9 | 5·7 | 0·744 |
| I do not know | 28·9 | 28·1 | | 29·7 | 26·0 | | 28·0 | 26·9 | |
| 5a. If yes, please specify: | | | | | | | | | |
| Yes (correct answer) | 44·2 | 35·6 | 0·068 | 46·2 | 30·8 | 0·001 | 37·0 | 29·8 | 0·123 |
| No (wrong answer) | 55·8 | 64·4 | | 53·8 | 69·2 | | 63·0 | 70·2 | |
| 6. Do you believe that a diet high in salt could cause serious health problems? | | | | | | | | | |
| Yes | 91·9 | 97·6 | | 91·9 | 98·1 | | 92·7 | 98·6 | |
| No | 6·3 | 1·2 | 0·002 | 3·7 | 0·8 | 0·001 | 5·2 | 1·4 | 0·0005 |
| I do not know | 1·8 | 1·2 | | 4·3 | 1·1 | | 2·1 | 0·0 | |
| 7. If yes, what kind of problems? | | | | | | | | | |
| High blood pressure | | | | | | | | | |
| High correlation | 81·6 | 89·6 | 0·017 | 89·3 | 87·3 | 0·275 | 88·1 | 92·3 | 0·068 |
| No correlation | 0·7 | 0·0 | | 1·3 | 0·3 | | 1·5 | 0·0 | |
| Obesity | | | | | | | | | |
| High correlation | 42·6 | 62·4 | 0·0005 | 38·6 | 63·0 | 0·0005 | 50·7 | 63·4 | 0·001 |
| No correlation | 16·1 | 6·7 | | 11·6 | 5·5 | | 13·8 | 6·1 | |
| Osteoporosis | | | | | | | | | |
| High correlation | 21·6 | 24·5 | 0·269 | 24·8 | 25·1 | 0·657 | 30·2 | 30·0 | 0·505 |
| No correlation | 11·8 | 9·2 | | 7·8 | 9·7 | | 10·8 | 7·4 | |
| Stomach cancer | | | | | | | | | |
| High correlation | 7·2 | 11·0 | 0·254 | 6·3 | 6·6 | 0·028 | 7·1 | 11·3 | 0·086 |
| No correlation | 14·8 | 11·6 | | 15·7 | 8·8 | | 15·3 | 9·9 | |
| Kidney stones | | | | | | | | | |
| High correlation | 49·2 | 58·4 | 0·132 | 52·0 | 64·1 | 0·004 | 58·6 | 65·6 | 0·196 |
| No correlation | 4·6 | 4·3 | | 5·0 | 2·2 | | 4·9 | 2·5 | |

**Table 3** *Continued*

| | 25–34 years (n 667) | | | 35–44 years (n 716) | | | 45–54 years (n 624) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Men | Women | | Men | Women | | Men | Women | |
| | % | % | P | % | % | P | % | % | P |
| High cholesterol | | | | | | | | | |
|   High correlation | 33·8 | 41·6 | 0·156 | 33·2 | 30·9 | 0·438 | 37·7 | 31·1 | 0·054 |
|   No correlation | 10·8 | 11·3 | | 11·9 | 10·5 | | 15·7 | 11·8 | |
| 8. How much salt do you think you eat? | | | | | | | | | |
|   More than the right amount | 16·6 | 13·1 | | 20·2 | 12·7 | | 17·3 | 14·4 | |
|   The right amount | 45·8 | 45·7 | 0·137 | 36·3 | 41·5 | 0·007 | 35·6 | 44·0 | 0·007 |
|   Less than the right amount | 23·8 | 27·5 | | 24·8 | 30·9 | | 26·0 | 30·2 | |
| 9. What is the main source of salt in the diet of adults in Greece? | | | | | | | | | |
|   Salt in cooking | 38·3 | 36·7 | | 40·1 | 35·8 | | 34·3 | 43·8 | |
|   Bread | 5·7 | 2·4 | 0·001 | 4·6 | 3·5 | 0·011 | 3·1 | 2·4 | 0·0005 |
|   Meat & sausages | 23·5 | 24·5 | | 17·3 | 27·6 | | 18·0 | 21·7 | |
| 10. How important is the reduction of salt in the diet? | | | | | | | | | |
|   Not important | 16·3 | 16·7 | | 15·9 | 9·5 | | 11·4 | 8·7 | |
|   Less important | 40·4 | 34·9 | 0·340 | 39·2 | 27·4 | 0·0005 | 32·9 | 23·4 | 0·001 |
|   Very important | 43·1 | 48·4 | | 45·0 | 61·8 | | 54·3 | 67·9 | |
| 11. What do you do to control the intake of salt? | | | | | | | | | |
|   Avoid consumption of processed foods | 62·0 | 71·9 | 0·008 | 73·2 | 81·3 | 0·012 | 72·0 | 86·7 | 0·0005 |
|   Remove salt from foods in brine | 61·4 | 70·1 | 0·018 | 75·2 | 74·0 | 0·732 | 68·2 | 73·6 | 0·140 |
|   Avoid eating outside | 34·3 | 42·4 | 0·038 | 43·2 | 52·0 | 0·020 | 39·1 | 54·1 | 0·0005 |
| 12. How do you assess the meals available in restaurants, taverns and canteens on the concentration of salt? | | | | | | | | | |
|   The right amount of salt | 36·4 | 23·0 | | 28·5 | 32·8 | | 26·0 | 28·3 | |
|   High in salt | 37·0 | 42·4 | 0·008 | 37·8 | 38·2 | 0·475 | 37·0 | 39·1 | 0·695 |
|   Too high in salt | 15·4 | 19·1 | | 15·0 | 14·9 | | 20·1 | 18·2 | |
| 13. Do you read the nutrition information on food packaging? | | | | | | | | | |
|   Always | 19·0 | 22·1 | 0·0005 | 24·5 | 33·1 | 0·031 | 22·5 | 32·3 | 0·0005 |
|   Never | 30·1 | 16·7 | | 20·7 | 15·7 | | 30·8 | 17·4 | |
| 14. Which of the following would you prefer to appear on food labels? | | | | | | | | | |
|   Salt | 24·1 | 21·8 | | 20·5 | 19·2 | | 22·5 | 23·9 | |
|   Sodium | 2·4 | 5·4 | 0·005 | 3·5 | 3·5 | 0·070 | 2·1 | 3·0 | 0·852 |
|   Salt and sodium | 63·6 | 68·7 | | 66·3 | 72·4 | | 66·1 | 63·9 | |
| 15. Would you prefer the amount of salt/sodium on food labels to appear per…? | | | | | | | | | |
|   Serving | 51·8 | 63·6 | 0·001 | 55·3 | 69·9 | 0·0005 | 48·8 | 56·0 | 0·116 |
|   100 g/ml | 38·9 | 32·8 | | 37·8 | 27·1 | | 39·1 | 35·6 | |
| 16. Would you prefer the amount of salt/sodium on food labels to appear as a percentage of the recommended daily intake? | | | | | | | | | |
|   Yes | 89·5 | 91·6 | | 86·7 | 94·6 | | 88·2 | 86·4 | |
|   No | 4·2 | 6·6 | 0·006 | 7·8 | 3·5 | 0·001 | 4·5 | 6·3 | 0·616 |
|   I do not know | 6·3 | 1·8 | | 5·5 | 1·9 | | 7·3 | 7·3 | |
| 17. Which of the following would you prefer to be mandatory? | | | | | | | | | |
|   Clear indication of foods high in salt/sodium | 59·3 | 64·2 | 0·203 | 62·5 | 65·6 | 0·436 | 58·8 | 61·1 | 0·575 |
|   Clear indication of foods high in salt in catalogues/restaurant menus | 42·5 | 31·0 | 0·002 | 41·5 | 34·7 | 0·065 | 34·3 | 38·3 | 0·290 |

**Table 3** *Continued*

| | 55–64 years (*n* 624) | | | 65–74 years (*n* 502) | | | 75+ years (*n* 443) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Men | Women | | Men | Women | | Men | Women | |
| | % | % | *P* | % | % | *P* | % | % | *P* |
| **1. Do you put salt in food when you cook?** | | | | | | | | | |
| Always | 64·5 | 80·7 | | 60·6 | 78·2 | | 56·6 | 74·5 | |
| Occasionally (less than half meals) | 11·9 | 9·7 | 0·000 | 11·7 | 8·1 | 0·000 | 12·3 | 9·1 | 0·0005 |
| Never | 7·5 | 3·0 | | 8·7 | 7·7 | | 11·5 | 7·2 | |
| **2. Do you add salt to your plate when you sit at the table?** | | | | | | | | | |
| Always | 8·5 | 3·3 | | 6·1 | 4·1 | | 13·0 | 3·4 | |
| Occasionally (less than half meals) | 13·0 | 13·0 | 0·003 | 16·5 | 11·1 | 0·009 | 20·0 | 13·5 | 0·045 |
| Never | 50·2 | 61·3 | | 49·8 | 62·4 | | 51·1 | 63·5 | |
| **3. Is there a maximum daily amount of salt recommended for adults by the experts?** | | | | | | | | | |
| Yes | 24·9 | 37·5 | | 22·1 | 29·9 | | 20·0 | 18·3 | |
| No | 19·1 | 16·6 | 0·003 | 26·8 | 16·6 | 0·010 | 23·0 | 16·3 | 0·144 |
| I do not know | 56·0 | 45·9 | | 51·1 | 53·5 | | 57·0 | 65·4 | |
| **3a. If your answer is yes, which is the correct amount?** | | | | | | | | | |
| Yes (correct answer) | 8·2 | 10·5 | 0·803 | 5·9 | 11·1 | 0·368 | 12·8 | 23·7 | 0·255 |
| No (wrong answer) | 91·8 | 89·5 | | 94·1 | 88·9 | | 87·2 | 76·3 | |
| **4. Compared with adults, do you believe that children should consume…?** | | | | | | | | | |
| More salt | 13·0 | 13·3 | | 17·3 | 12·9 | | 14·5 | 16·3 | |
| The same quantity of salt | 14·3 | 17·2 | 0·000 | 19·5 | 19·2 | 0·501 | 14·0 | 16·8 | 0·641 |
| Less salt | 58·4 | 65·0 | | 53·7 | 56·1 | | 51·9 | 51·0 | |
| **5. Is there a relationship between salt and sodium?** | | | | | | | | | |
| Yes | 61·1 | 51·4 | | 45·9 | 33·9 | | 37·4 | 18·8 | |
| No | 4·8 | 6·9 | 0·045 | 6·5 | 5·5 | 0·014 | 7·2 | 8·2 | 0·0005 |
| I do not know | 34·1 | 41·7 | | 47·6 | 60·5 | | 55·3 | 73·1 | |
| **5a. If yes, please specify:** | | | | | | | | | |
| Yes (correct answer) | 34·8 | 26·2 | 0·102 | 23·4 | 20·0 | 0·607 | 31·8 | 15·0 | 0·053 |
| No (wrong answer) | 65·2 | 73·8 | | 76·6 | 80·0 | | 68·2 | 85·0 | |
| **6. Do you believe that a diet high in salt could cause serious health problems?** | | | | | | | | | |
| Yes | 95·2 | 97·0 | | 94·4 | 95·6 | | 91·5 | 92·3 | |
| No | 3·8 | 2·1 | 0·468 | 3·5 | 2·2 | 0·698 | 4·3 | 3·8 | 0·952 |
| I do not know | 1·0 | 0·9 | | 2·2 | 2·2 | | 4·3 | 3·8 | |
| **7. If yes, what kind of problems?** | | | | | | | | | |
| High blood pressure | | | | | | | | | |
| High correlation | 89·2 | 92·2 | 0·219 | 91·3 | 93·4 | 0·397 | 91·2 | 90·6 | 0·311 |
| No correlation | 0·4 | 0·0 | | 0·9 | 0·4 | | 0·5 | 2·6 | |
| Obesity | | | | | | | | | |
| High correlation | 53·4 | 65·7 | 0·007 | 52·8 | 60·6 | 0·180 | 51·2 | 57·8 | 0·141 |
| No correlation | 9·7 | 5·9 | | 8·7 | 4·6 | | 5·1 | 5·2 | |
| Osteoporosis | | | | | | | | | |
| High correlation | 37·3 | 35·2 | 0·885 | 32·6 | 37·1 | 0·481 | 35·8 | 41·7 | 0·420 |
| No correlation | 7·5 | 7·8 | | 11·0 | 7·3 | | 5·6 | 7·3 | |
| Stomach cancer | | | | | | | | | |
| High correlation | 11·8 | 12·8 | 0·573 | 11·9 | 11·6 | 0·061 | 12·6 | 13·0 | 0·528 |
| No correlation | 9·3 | 8·1 | | 13·3 | 6·2 | | 13·5 | 10·9 | |
| Kidney stones | | | | | | | | | |
| High correlation | 52·7 | 65·1 | 0·011 | 58·3 | 60·6 | 0·446 | 54·4 | 61·5 | 0·233 |
| No correlation | 2·5 | 2·2 | | 2·8 | 4·6 | | 6·5 | 4·2 | |

**Table 3** Continued

| | 55–64 years (n 624) | | | 65–74 years (n 502) | | | 75+ years (n 443) | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Men | Women | | Men | Women | | Men | Women | |
| | % | % | P | % | % | P | % | % | P |
| High cholesterol | | | | | | | | | |
| High correlation | 38·0 | 40·2 | 0·338 | 35·3 | 39·4 | 0·032 | 37·2 | 36·5 | 0·382 |
| No correlation | 12·5 | 8·1 | | 11·0 | 7·3 | | 10·2 | 5·7 | |
| 8. How much salt do you think you eat? | | | | | | | | | |
| More than the right amount | 15·0 | 8·2 | | 10·8 | 9·2 | | 0·6 | 3·4 | |
| The right amount | 33·4 | 37·8 | 0·009 | 29·0 | 33·2 | 0·212 | 21·3 | 36·1 | 0·002 |
| Less than the right amount | 27·6 | 34·7 | | 34·6 | 31·0 | | 32·3 | 31·7 | |
| 9. What is the main source of salt in the diet of adults in Greece? | | | | | | | | | |
| Salt in cooking | 32·8 | 33·8 | | 40·7 | 43·5 | | 38·7 | 40·9 | 0·064 |
| Bread | 3·1 | 4·5 | 0·157 | 2·6 | 3·0 | 0·007 | 1·7 | 4·8 | |
| Meat & sausages | 20·1 | 21·5 | | 16·5 | 16·2 | | 16·6 | 15·4 | |
| 10. How important is the reduction of salt in the diet? | | | | | | | | | |
| Not important | 12·3 | 11·5 | | 10·4 | 7·4 | | 13·6 | 6·7 | |
| Less important | 26·6 | 19·6 | 0·143 | 19·9 | 22·5 | 0·430 | 23·8 | 24·5 | 0·108 |
| Very important | 60·8 | 68·0 | | 69·7 | 70·1 | | 62·1 | 67·8 | |
| 11. What do you do to control the intake of salt? | | | | | | | | | |
| Avoid consumption of processed foods | 77·5 | 88·2 | 0·0005 | 81·4 | 87·5 | 0·063 | 68·9 | 80·8 | 0·0005 |
| Remove salt from foods in brine | 67·6 | 75·8 | 0·026 | 71·4 | 73·4 | 0·618 | 61·7 | 67·3 | 0·234 |
| Avoid eating outside | 40·6 | 58·3 | 0·0005 | 53·2 | 64·2 | 0·014 | 48·1 | 60·6 | 0·010 |
| 12. How do you assess the meals available in restaurants, taverns and canteens on the concentration of salt? | | | | | | | | | |
| The right amount of salt | 24·6 | 23·3 | | 25·5 | 23·2 | | 23·8 | 31·7 | |
| High in salt | 38·9 | 38·4 | 0·991 | 35·1 | 32·8 | 0·578 | 31·9 | 24·5 | 0·019 |
| Too high in salt | 14·3 | 15·1 | | 14·7 | 16·2 | | 16·2 | 14·4 | |
| 13. Do you read the nutrition information on food packaging? | | | | | | | | | |
| Always | 20·1 | 32·6 | 0·001 | 21·2 | 29·2 | 0·065 | 17·4 | 13·9 | 0·315 |
| Never | 28·7 | 24·2 | | 42·9 | 33·6 | | 54·0 | 49·5 | |
| 14. Which of the following would you prefer to appear on food labels? | | | | | | | | | |
| Salt | 32·1 | 23·3 | | 32·5 | 30·6 | | 31·1 | 29·8 | |
| Sodium | 0·7 | 2·1 | 0·016 | 1·7 | 1·5 | 0·779 | 2·1 | 1·0 | 0·131 |
| Salt and sodium | 57·0 | 58·9 | | 48·1 | 46·5 | | 46·0 | 39·4 | |
| 15. Would you prefer the amount of salt/sodium on food labels to appear per…? | | | | | | | | | |
| Serving | 50·5 | 55·6 | 0·359 | 47·6 | 50·2 | 0·010 | 39·1 | 31·3 | 0·09 |
| 100 g/ml | 33·8 | 28·7 | | 30·7 | 19·9 | | 25·1 | 23·1 | |
| 16. Would you prefer the amount of salt/sodium on food labels to appear as a percentage of the recommended daily intake? | | | | | | | | | |
| Yes | 81·2 | 81·9 | | 69·7 | 73·1 | | 65·5 | 52·9 | |
| No | 6·8 | 3·3 | 0·091 | 9·1 | 4·8 | 0·162 | 11·9 | 8·7 | 0·001 |
| I do not know | 11·9 | 14·8 | | 21·2 | 22·1 | | 22·6 | 38·5 | |
| 17. Which of the following would you prefer to be mandatory? | | | | | | | | | |
| Clear indication of foods high in salt/sodium | 53·2 | 58·3 | 0·226 | 49·4 | 55·7 | 0·178 | 51·1 | 49·0 | 0·704 |
| Clear indication of foods high in salt in catalogues/restaurant menus | 41·3 | 40·2 | 0·807 | 35·1 | 31·7 | 0·448 | 29·4 | 22·1 | 0·103 |

**Table 4** Consumption, knowledge and beliefs on salt by educational status among the survey participants: nationally representative sample of Greek adults (n 3609), 2011

| | Low school graduates (n 840) | | | Basic school (9 years, n 365) | | |
|---|---|---|---|---|---|---|
| | Men | Women | | Men | Women | |
| | % | % | P | % | % | P |
| 1. Do you put salt in food when you cook? | | | | | | |
| Always | 64·1 | 79·7 | | 63·8 | 84·0 | |
| Occasionally (less than half meals) | 8·7 | 9·9 | 0·0005 | 9·6 | 6·9 | 0·0005 |
| Never | 7·4 | 4·4 | | 9·0 | 3·2 | |
| 2. Do you add salt to your plate when you sit at the table? | | | | | | |
| Always | 8·4 | 4·6 | | 6·2 | 3·2 | |
| Occasionally (less than half meals) | 18·6 | 13·7 | 0·002 | 16·4 | 12·2 | 0·166 |
| Never | 48·0 | 58·2 | | 50·8 | 63·3 | |
| 3. Is there a maximum daily amount of salt recommended for adults by the experts? | | | | | | |
| Yes | 18·0 | 29·0 | | 15·8 | 28·2 | |
| No | 20·7 | 17·8 | 0·001 | 25·4 | 19·1 | 0·014 |
| I do not know | 61·3 | 53·2 | | 58·8 | 52·7 | |
| 3a. If your answer is yes, which is the correct amount? | | | | | | |
| Yes (correct answer) | 8·6 | 9·3 | 0·883 | 7·1 | 17·0 | 0·219 |
| No (wrong answer) | 91·4 | 90·7 | | 92·9 | 83·0 | |
| 4. Compared with adults, do you believe that children should consume…? | | | | | | |
| More salt | 10·5 | 11·0 | | 14·1 | 14·9 | |
| The same quantity of salt | 12·4 | 15·1 | 0·021 | 12·4 | 16·0 | 0·257 |
| Less salt | 58·8 | 63·1 | | 62·1 | 63·3 | |
| 5. Is there a relationship between salt and sodium? | | | | | | |
| Yes | 18·0 | 19·3 | | 38·4 | 38·8 | |
| No | 9·3 | 9·5 | 0·870 | 9·6 | 12·2 | 0·689 |
| I do not know | 72·8 | 71·2 | | 52·0 | 48·9 | |
| 5a. If yes, please specify: | | | | | | |
| Yes (correct answer) | 17·2 | 12·0 | 0·359 | 27·5 | 22·5 | 0·494 |
| No (wrong answer) | 82·8 | 88·0 | | 72·5 | 77·5 | |
| 6. Do you believe that a diet high in salt could cause serious health problems? | | | | | | |
| Yes | 92·9 | 94·8 | | 95·5 | 97·9 | |
| No | 3·1 | 2·7 | 0·439 | 2·8 | 1·1 | 0·408 |
| I do not know | 4·0 | 2·5 | | 1·7 | 1·1 | |
| 7. If yes, what kind of problems? | | | | | | |
| High blood pressure | | | | | | |
| High correlation | 87·0 | 91·6 | 0·011 | 90·5 | 90·8 | 0·936 |
| No correlation | 1·0 | 0·6 | | 1·2 | 1·6 | |
| Obesity | | | | | | |
| High correlation | 51·0 | 61·6 | 0·0005 | 48·5 | 64·1 | 0·007 |
| No correlation | 5·3 | 4·3 | | 10·7 | 3·8 | |
| Osteoporosis | | | | | | |
| High correlation | 38·0 | 38·8 | 0·328 | 27·2 | 35·9 | 0·270 |
| No correlation | 5·7 | 3·5 | | 7·7 | 9·2 | |
| Stomach cancer | | | | | | |
| High correlation | 12·0 | 13·1 | 0·153 | 10·1 | 8·7 | 0·144 |
| No correlation | 8·7 | 6·3 | | 14·2 | 8·2 | |
| Kidney stones | | | | | | |
| High correlation | 55·3 | 60·6 | 0·058 | 53·8 | 66·3 | 0·037 |
| No correlation | 5·0 | 2·0 | | 5·9 | 4·9 | |

**Table 4** *Continued*

| | Low school graduates (*n* 840) | | | Basic school (9 years, *n* 365) | | |
|---|---|---|---|---|---|---|
| | Men | Women | | Men | Women | |
| | % | % | *P* | % | % | *P* |
| High cholesterol | | | | | | |
| High correlation | 37·3 | 43·5 | 0·135 | 37·9 | 32·6 | 0·156 |
| No correlation | 7·7 | 5·1 | | 11·8 | 6·5 | |
| 8. How much salt do you think you eat? | | | | | | |
| More than the right amount | 14·6 | 6·8 | 0·0005 | 10·7 | 11·2 | 0·036 |
| The right amount | 27·6 | 37·9 | | 32·8 | 42·6 | |
| Less than the right amount | 29·1 | 32·3 | | 27·1 | 29·8 | |
| 9. What is the main source of salt in the diet of adults in Greece? | | | | | | |
| Salt in cooking | 40·9 | 42·2 | | 32·8 | 37·2 | |
| Bread | 1·9 | 4·1 | 0·024 | 2·8 | 2·7 | 0·046 |
| Meat & sausages | 13·6 | 14·7 | | 22·6 | 24·5 | |
| 10. How important is the reduction of salt in the diet? | | | | | | |
| Not important | 13·0 | 7·7 | | 9·6 | 9·6 | |
| Less important | 23·5 | 21·9 | 0·049 | 28·2 | 26·1 | 0·972 |
| Very important | 63·2 | 69·6 | | 61·6 | 63·8 | |
| 11. What do you do to control the intake of salt? | | | | | | |
| Avoid consumption of processed foods | 74·3 | 81·0 | 0·021 | 74·6 | 82·4 | 0·067 |
| Remove salt from foods in brine | 64·1 | 73·5 | 0·004 | 74·6 | 71·8 | 0·551 |
| Avoid eating outside | 52·3 | 65·8 | 0·0005 | 52·5 | 50·5 | 0·701 |
| 12. How do you assess the meals available in restaurants, taverns and canteens on the concentration of salt? | | | | | | |
| The right amount of salt | 32·2 | 29·6 | | 24·9 | 34·0 | |
| High in salt | 32·5 | 31·9 | 0·164 | 31·6 | 33·0 | 0·002 |
| Too high in salt | 12·4 | 13·0 | | 16·9 | 8·5 | |
| 13. Do you read the nutrition information on food packaging? | | | | | | |
| Always | 13·6 | 23·8 | 0·0005 | 22·0 | 27·1 | 0·130 |
| Never | 55·1 | 40·8 | | 37·3 | 27·1 | |
| 14. Which of the following would you prefer to appear on food labels? | | | | | | |
| Salt | 34·4 | 30·9 | | 26·6 | 21·3 | |
| Sodium | 2·5 | 0·8 | 0·028 | 2·3 | 3·2 | 0·397 |
| Salt and sodium | 38·1 | 46·6 | | 56·5 | 55·3 | |
| 15. Would you prefer the amount of salt/sodium on food labels to appear per…? | | | | | | |
| Serving | 41·5 | 46·6 | 0·346 | 52·5 | 57·4 | 0·369 |
| 100 g/ml | 24·1 | 21·9 | | 30·5 | 23·9 | |
| 16. Would you prefer the amount of salt/sodium on food labels to appear as a percentage of the recommended daily intake? | | | | | | |
| Yes | 64·7 | 66·5 | | 79·1 | 80·3 | |
| No | 8·7 | 5·4 | 0·182 | 8·5 | 1·6 | 0·005 |
| I do not know | 26·6 | 28·0 | | 12·4 | 18·1 | |
| 17. Which of the following would you prefer to be mandatory? | | | | | | |
| Clear indication of foods high in salt/sodium | 50·8 | 56·7 | 0·095 | 50·3 | 52·7 | 0·650 |
| Clear indication of foods high in salt in catalogues/restaurant menus | 27·2 | 29·6 | 0·464 | 40·1 | 31·4 | 0·082 |

**Table 4** *Continued*

| | High school (12 years, *n* 1167) | | | Higher education (academic, *n* 1224) | | |
|---|---|---|---|---|---|---|
| | Men | Women | | Men | Women | |
| | % | % | *P* | % | % | *P* |
| 1. Do you put salt in food when you cook? | | | | | | |
| Always | 68·2 | 80·7 | | 59·4 | 79·6 | |
| Occasionally (less than half meals) | 10·5 | 8·5 | 0·0005 | 10·8 | 7·4 | 0·0005 |
| Never | 4·1 | 4·5 | | 9·0 | 5·1 | |
| 2. Do you add salt to your plate when you sit at the table? | | | | | | |
| Always | 11·2 | 4·8 | | 6·3 | 3·7 | |
| Occasionally (less than half meals) | 16·5 | 11·4 | 0·0005 | 17·6 | 15·0 | 0·0005 |
| Never | 41·7 | 58·0 | | 44·5 | 56·5 | |
| 3. Is there a maximum daily amount of salt recommended for adults by the experts? | | | | | | |
| Yes | 28·4 | 37·3 | | 37·2 | 49·4 | |
| No | 18·0 | 14·3 | 0·004 | 18·5 | 13·0 | 0·0005 |
| I do not know | 53·6 | 48·4 | | 44·2 | 37·6 | |
| 3a. If your answer is yes, which is the correct amount? | | | | | | |
| Yes (correct answer) | 7·8 | 13·4 | 0·08 | 9·7 | 13·3 | 0·205 |
| No (wrong answer) | 92·2 | 86·6 | | 90·3 | 86·7 | |
| 4. Compared with adults, do you believe that children should consume…? | | | | | | |
| More salt | 10·4 | 9·2 | | 13·6 | 7·6 | |
| The same quantity of salt | 13·8 | 16·8 | 0·0005 | 15·7 | 19·6 | 0·0005 |
| Less salt | 64·3 | 69·3 | | 59·4 | 67·3 | |
| 5. Is there a relationship between salt and sodium? | | | | | | |
| Yes | 63·8 | 64·2 | | 80·0 | 80·4 | |
| No | 5·1 | 4·3 | 0·819 | 2·9 | 3·0 | 0·949 |
| I do not know | 31·1 | 31·4 | | 17·1 | 16·5 | |
| 5a. If yes, please specify: | | | | | | |
| Yes (correct answer) | 32·1 | 25·7 | 0·057 | 47·1 | 36·7 | 0·001 |
| No (wrong answer) | 67·9 | 74·3 | | 52·9 | 63·3 | |
| 6. Do you believe that a diet high in salt could cause serious health problems? | | | | | | |
| Yes | 91·2 | 96·7 | | 93·8 | 98·7 | |
| No | 6·0 | 2·1 | 0·0005 | 4·4 | 0·8 | 0·0005 |
| I do not know | 2·9 | 1·2 | | 1·7 | 0·5 | |
| 7. If yes, what kind of problems? | | | | | | |
| High blood pressure | | | | | | |
| High correlation | 83·8 | 89·1 | 0·028 | 92·1 | 91·6 | 0·219 |
| No correlation | 0·9 | 0·2 | | 0·7 | 0·0 | |
| Obesity | | | | | | |
| High correlation | 44·2 | 64·6 | 0·0005 | 48·6 | 60·7 | 0·0005 |
| No correlation | 13·4 | 5·4 | | 12·5 | 8·0 | |
| Osteoporosis | | | | | | |
| High correlation | 30·0 | 28·2 | 0·853 | 26·0 | 25·8 | 0·816 |
| No correlation | 8·6 | 9·1 | | 11·8 | 11·1 | |
| Stomach cancer | | | | | | |
| High correlation | 9·7 | 10·2 | 0·002 | 7·1 | 9·9 | 0·129 |
| No correlation | 13·4 | 8·6 | | 16·2 | 12·6 | |
| Kidney stones | | | | | | |
| High correlation | 52·6 | 63·8 | 0·0003 | 54·4 | 62·7 | 0·008 |
| No correlation | 3·9 | 2·5 | | 4·1 | 4·1 | |

**Table 4** *Continued*

| | High school (12 years, *n* 1167) | | | Higher education (academic, *n* 1224) | | |
|---|---|---|---|---|---|---|
| | Men | Women | | Men | Women | |
| | % | % | P | % | % | P |
| High cholesterol | | | | | | |
|   High correlation | 32·6 | 33·4 | 0·431 | 37·2 | 34·2 | 0·588 |
|   No correlation | 11·8 | 8·8 | | 14·5 | 15·0 | |
| 8. How much salt do you think you eat? | | | | | | |
|   More than the right amount | 18·4 | 12·1 | | 15·1 | 13·0 | |
|   The right amount | 36·9 | 41·5 | 0·061 | 36·5 | 40·3 | 0·043 |
|   Less than the right amount | 27·7 | 30·9 | | 26·6 | 30·4 | |
| 9. What is the main source of salt in the diet of adults in Greece? | | | | | | |
|   Salt in cooking | 36·4 | 37·1 | | 37·9 | 38·4 | |
|   Bread | 4·6 | 2·2 | 0·0005 | 4·0 | 4·0 | 0·091 |
|   Meat & sausages | 18·0 | 25·2 | | 21·4 | 23·9 | |
| 10. How important is the reduction of salt in the diet? | | | | | | |
|   Not important | 13·8 | 10·5 | | 14·6 | 12·5 | |
|   Less important | 32·8 | 23·7 | 0·0005 | 35·3 | 30·4 | 0·064 |
|   Very important | 52·9 | 65·8 | | 49·8 | 56·3 | |
| 11. What do you do to control the intake of salt? | | | | | | |
|   Avoid consumption of processed foods | 69·0 | 83·9 | 0·0005 | 73·2 | 83·0 | 0·0005 |
|   Remove salt from foods in brine | 66·0 | 72·9 | 0·011 | 69·4 | 72·3 | 0·260 |
|   Avoid eating outside | 37·8 | 52·8 | 0·0005 | 39·1 | 47·4 | 0·004 |
| 12. How do you assess the meals available in restaurants, taverns and canteens on the concentration of salt? | | | | | | |
|   The right amount of salt | 30·1 | 26·8 | | 24·6 | 22·9 | |
|   High in salt | 33·8 | 39·2 | 0·204 | 42·6 | 40·5 | 0·135 |
|   Too high in salt | 16·5 | 16·2 | | 16·8 | 21·9 | |
| 13. Do you read the nutrition information on food packaging? | | | | | | |
|   Always | 19·0 | 26·6 | 0·0005 | 26·0 | 34·1 | 0·0005 |
|   Never | 31·3 | 19·5 | | 22·3 | 12·5 | |
| 14. Which of the following would you prefer to appear on food labels? | | | | | | |
|   Salt | 23·6 | 21·9 | | 25·4 | 21·4 | |
|   Sodium | 0·5 | 2·4 | 0·041 | 3·5 | 5·2 | 0·111 |
|   Salt and sodium | 66·8 | 67·9 | | 62·9 | 66·8 | |
| 15. Would you prefer the amount of salt/sodium on food labels to appear per…? | | | | | | |
|   Serving | 56·6 | 62·9 | 0·072 | 46·3 | 58·7 | 0·0005 |
|   100 g/ml | 32·8 | 29·2 | | 43·7 | 35·4 | |
| 16. Would you prefer the amount of salt/sodium on food labels to appear as a percentage of the recommended daily intake? | | | | | | |
|   Yes | 85·0 | 89·8 | | 87·6 | 90·4 | |
|   No | 6·3 | 4·8 | 0·040 | 6·3 | 6·4 | 0·065 |
|   I do not know | 8·7 | 5·4 | | 6·0 | 3·2 | |
| 17. Which of the following would you prefer to be mandatory? | | | | | | |
|   Clear indication of foods high in salt/sodium | 56·3 | 62·7 | 0·026 | 61·0 | 62·4 | 0·620 |
|   Clear indication of foods high in salt in catalogues/restaurant menus | 40·3 | 38·2 | 0·455 | 40·4 | 34·4 | 0·030 |

and sodium can also facilitate the understanding of nutrition information on food labels.

It is encouraging that more than half of the sample surveyed knew that children should have lower salt intakes than adults, in light of the evidence that there has been an increase in the prevalence of high blood pressure among children[21,22]. In addition, childhood and adolescence are critical periods in the development of dietary habits that are likely to persist into adulthood[23]. In view of the fact that a recent large study[15] in Greece indicated that 23 % of Greek children had a daily dietary sodium intake above the current 2200 mg/d recommendation (without taking into consideration salt added at the table or during cooking), salt reduction initiatives targeting children and adolescents should be a priority for the national strategy on salt reduction.

The vast majority of respondents knew that there is a direct relationship between a diet high in salt and hypertension, in accordance with other studies[20]. Although there is no strong evidence, as there is with hypertension, a diet high in salt has been associated with other conditions such as gastric cancer[24]. In our study, the majority of respondents were not aware of a link between a diet high in salt and stomach cancer. Interestingly, more than half of the respondents reported that a diet high in salt is related to obesity. Even though sodium has no energy, it has been postulated that a high salt intake, through increased feeling of thirst, may lead to increased sugar-sweetened soft drink consumption, which in turn may increase the risk of obesity[25].

Most respondents, when asked to indicate the dietary source that contributes most to total salt intake, thought that it was the salt added during cooking, presumably because they are not fully aware of hidden sources of salt. A major dietary source of salt in many developed Western countries is bread. In the Greek arm of the European Prospective Investigation into Cancer and Nutrition, it was found that the consumption of cereals including bread was related to higher blood pressure[26]. However, only a small number of respondents indicated bread as the major source of salt in the diet, probably because most do not realize that sodium is present even in foods which do not taste salty and that the amount of a food consumed is also important for the total salt intake. The majority of participants in the present survey believed that their salt intake is either right or low. Therefore, while they consider that reducing salt in their diet is important, probably they feel that they do everything possible to control their salt consumption and hence efforts for salt reduction concern others and not themselves. Raising awareness that salt reduction concerns everyone is of utmost importance.

Regarding nutrition labelling, many respondents seemed to prefer values for both salt and sodium, as well as a clear indication 'high in salt' if a food is high in salt. Such an initiative has been implemented successfully in Finland[27]. Interestingly, while almost half of the respondents regarded the meals offered in restaurants and taverns as salty or too salty, few seemed to desire nutrition labelling on the menus. Regarding their behaviour towards salt, it is encouraging that most of the respondents did not seem to have the habit of adding salt to their food at the table. On the other hand, the majority of respondents reported adding salt when cooking. Therefore, efforts should be directed to cooking with no salt and finding 'smart' healthy ways to improve flavour and taste without adding salt. Only a quarter of the participants reported always checking the nutrition labelling before purchasing food. This was somewhat expected, since so far in Greece nutrition labelling has not been mandatory. In addition, some of those who reported always checking the nutrition labels before purchasing food might have found it difficult to fully comprehend them or understand the contribution of a particular food to their total salt intake. The new EU legislation regarding information provided to consumers (EU Regulation No 1169/2011), which renders nutrition labelling mandatory, might change favourably the attitudes and behaviour of Greeks towards reading food labels and making informed choices when purchasing food. Checking food content labels has been reported by less than half of respondents in other studies too[19].

Finally, regarding actions aiming at lowering salt in their diet, most reported that they avoid buying processed packaged foods. Possibly, messages from experts that most salt in the diet comes from processed foods have come across to a number of people. This can also serve as a motivation for the food industry to accelerate its actions towards lowering the sodium content of foods. Considering that most people add salt when cooking and that only about one in three would use seasonings to flavour food instead of salt, possibly because of ignorance of combining herbs or spices with specific foods, more efforts through campaigns to find alternative ways to make food tastier are imperative.

### Gender differences

Gender has been postulated to be an important factor of compliance with nutrition recommendations in adults[28,29]. Women tend to have greater nutrition knowledge[30–32], higher active interest in healthy eating and embrace dietary change to a greater extent than men[33,34]. In relation to salt in particular, in a recent Australian study women seemed to be more concerned about the salt they eat and more likely to buy low-salt foods compared with men[19]. In addition, there is evidence that salt intake in Europe (as assessed by 24 h urinary Na excretion) is generally higher in males than females[35,36]. In our study, females seemed to have better knowledge of salt recommendations and seemed to know better the health effects of excessive salt intake. Compared with men, fewer women tended to add salt at

the table, while more of them reported adding salt during cooking. This probably reflects the fact that more women than men may possibly be engaged in cooking and use salt following specific recipes.

Even though the frequency of eating meals prepared out of home was not included in the questionnaire, significantly more women reported avoiding eating out as a measure to control salt intake ($P < 0.001$) and significantly less preferred mandatory indication of foods high in salt in restaurant menus ($P = 0.012$) compared with men. Interestingly, there were no significant differences in the perception both genders have concerning the salt content of foods prepared and served out of home. This indicates that there may be no big differences in salt perception among genders. Therefore, campaigns to raise awareness especially among men are important, while 'cooking with less salt' campaigns should be encouraged especially among women. Engaging well-known chefs to cook on television shows with less or no salt, at a time when usually women watch, might raise awareness. Similarly, magazines which appeal mainly to women can have a column of 'cooking without salt'. The media and press are strongly encouraged to disseminate simple and coherent messages regarding salt.

### Age differences

The relatively few studies that have investigated age-related differences regarding attitudes and behaviour towards salt have produced controversial results. On one hand, in a recent Polish study[37], a significant increase in salt consumption was observed with age, possibly indicating that taste preferences vary depending on age. Animal[38] and human[39] studies have actually suggested age-related decreases in neural sensitivity to salt. Food can become unappetizing for the elderly as a result of declining taste and smell perception[39,40]. Therefore, the elderly may feel that they do not have a lot of salt, when indeed they have.

In contrast, interest in health and nutrition has been shown to increase with age[19]. A Canadian telephone survey suggested that reporting salt restriction was more common in adults over 55 years of age than in younger age groups[41]. A similar trend was also observed in our study, since less elderly tended to add salt either during cooking or at the table. However, since dietary salt intake was not estimated in the present study, it is difficult to differentiate the respondents' intention to lower salt intake from the actual lowering. In addition, less elderly tended to read nutrition labelling.

It is noteworthy that regarding knowledge, more of those in the older age groups held the wrong belief that children should consume more salt compared with adults. People of older age are many times responsible for the diet of young children. Raising awareness among older people of the fact that salt reduction is aimed not only for adults or for those suffering from hypertension but for everyone (unless there is a specific condition contra-indicated) is needed. Since dietary habits are formed early in life and are difficult to alter as we age, educating children to get used to less salt is very important.

### Education level differences

Education is another important factor contributing to healthy food habits[23,42,43]. More educated people are more likely to gain dietary-related information and implement this into their lifestyle[31]. In our study, those with higher education (university degree) were more likely to read nutrition labelling on food packages ($P < 0.001$). However, there was no significant difference in the knowledge regarding salt recommendations and health effects of excessive salt consumption of those with academic education compared with those with lower education. Despite this, fewer highly educated participants tended to add salt during cooking ($P < 0.001$). Our data highlight the need for future salt-related nutrition policies targeting the whole population and not only those with lower education.

### Limitations of the study

There are some limitations in the design of the present study that are worth mentioning. Participants were not asked whether they were suffering from hypertension. This is sensitive medical data, which could influence the response rate of the study. Similarly, the effects of income were not investigated, as it was thought that the question about income is sensitive and could make those approached reluctant to participate (as previously indicated[42]). The response rate to this survey was 80 %. Hence, it is possible that our results may show a more favourable picture than if all initially selected individuals were examined, since non-response is often associated with unhealthy behaviours. The study was conducted in Greek and therefore immigrants unable to speak the language were excluded. The survey was based on self-reported data, which may be different from actual behaviour.

### Conclusions

The findings of the present study suggest that in addition to actions designed to reduce the sodium content of foods, there is a need to address the low levels of knowledge regarding salt recommendations for adults and children, the sources of sodium in the diet, as well as the relationship between salt and sodium. In view of the lack of data related to habitual salt intake in Greece, our data on behaviour and attitudes of Greek adults towards salt become important for the design of successful campaigns on raising public awareness, parallel to the national efforts towards salt reduction in specific processed foods as well as in meals served out of home. Our study revealed

that several demographic factors (gender, age and level of education) contributed to the knowledge, attitudes and behaviour of Greeks towards salt. Future efforts on salt reduction awareness campaigns should consider these differences. This questionnaire could serve as a monitoring tool for the success of future national campaigns. The study needs to be repeated after the completion of campaigns raising awareness among the general public.

## Acknowledgements

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