Sultanate of Oman
Ministry of Health

al jisr
FOUNDATION

World Health
Organization
Sultanate of Oman

Nutrition - Related Knowledge, Attitudes & Practices Survey Among 14 - 60 year-old Omanis in the Sultanate of Oman (2023)

حضرة صاحب الجلالة

السلطان هيثم بن طارق المعظم

NUTRITION-RELATED KNOWLEDGE, ATTITUDES, AND PRACTICES AMONG 14-60 YEAR OLD OMANIS IN THE SULTANATE OF OMAN (2023)

Collaborators:

Implementing agencies

Nutrition Department of the Ministry of Health – Sultanate of Oman

Funding agencies:

Al Jisr Foundation

Ministry of Health – Sultanate of Oman

Technical partners

World Health Organization

GroundWork

Recommended Citation:

Nutrition Department of the Ministry of Health – Sultanate of Oman, Al Jisr Foundation and GroundWork. Nutrition-Related Knowledge, Attitudes and Practices among 14-60 year old Omanis in the Sultanate of Oman (2023). Muscat, Sultanate of Oman, 2024.

INVESTIGATORS AND INSTITUTIONAL AFFILIATIONS

Investigator	Organization
Dr. Salima Ali Almamary	Director of Nutrition Department, Ministry of Health
Dr. Halima Shtaiyat AL Ghannami	Nutrition Department, Ministry of Health
Mrs. Ibtesam Khalfan Al Ghammari	Nutrition Department, Ministry of Health
Mrs. Fatma Ali Al Mamari	Nutrition Department, Ministry of Health
Mr. Saleh Masoud Al Shammakhi	Nutrition Department, Ministry of Health
World Health Organization	
Prof. Lara Nasreddine	Consultant, WHO
Dr. Mohammed Al-Abri	Public Health Officer
GroundWork	
Bradley A Woodruff	GroundWork
James P Wirth	GroundWork
Nicolai Petry	GroundWork
Mohamed Turay	GroundWork
Partners	
Dr. Salah Al Awaidy	Health Affairs, Ministry of Health
Prof. Ronald Wesonga	Sultan Qaboos University
Al Jisr Foundation	
Mrs. Dina Al khalili	Al Jisr Foundation
Mrs. Asila Saud Saif Al Yarubi	Al Jisr Foundation
Mrs. Jamana Said Ali Al Zadjali	Al Jisr Foundation

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. Introduction

Like other countries of the Eastern Mediterranean Region, the prevalence of over nutrition and related morbidities is increasing in the Sultanate of Oman. The prevalence of overweight and obesity has steadily increased in the Sultanate of Oman over the past few decades, and the Sultanate of Oman has experienced one of the sharpest increases in obesity prevalence worldwide [1]. The Oman National Nutrition Survey (ONNS) from 2017 [2] and the Oman 2017 STEPS survey [3] both found high levels of overweight and obesity as measured using body mass index (BMI); the ONNS found that 59% of non-pregnant women 15-49 years of age were either overweight or obese, and the STEPs survey found 69% of women and 63% of men 18 years and older were overweight or obese. Additionally, the 2017 STEPS found that 63% of women and 66% of men had visceral obesity defined using waist-to-hip circumference ratio [3].

The increase in overweight and obesity prevalence has also been observed amongst adolescents. The 2017 ONNS found that 16% of adolescent girls 15-19 years of age were overweight and 9% were obese [2]. Among adolescents and young adults, the 2012 Oman World Heath Survey found that 18% of women and 12% of men 18-24 years of age were overweight or obese [4].

The increasing prevalence of overweight and obesity have likely contributed to the Sultanate of Oman's burden of non-communicable diseases (NCD). A Ministry of Health report from 2023 found that 36% of deaths in the Sultanate of Oman are caused by cardiovascular diseases and 8% are caused by diabetes [5]. In total, 72% of deaths in the Sultanate of Oman are caused by NCDs [6]. A high prevalence of risk factors for NCDs was also observed in the 2017 STEPS survey among individuals ≥18 years of age; hypertension was found in 39% of men and 27% of women, and high cholesterol was found in 32% of men and 40% of women [3].

The NCD epidemic in the Sultanate of Oman may also be linked to the nutrition transition that occurred in the country during the past few decades, with its characteristic shifts in diet, lifestyle, and body composition. Available data in the Sultanate of Oman highlight suboptimal dietary practices, characterized by high intakes of energy-dense and nutrient poor foods and low intakes of cardioprotective nutrient-rich foods, such as fruits and vegetables. For example, the STEPS survey 2017 showed that approximately 60% of adult men and women in the Sultanate of Oman consume less than 5 servings of fruit and vegetables per day [3]. Furthermore, a 2005 school-based survey of adolescents 13-17 years of age in the Sultanate of Oman found that only 29% had adequate intakes of fruits and vegetables [7]. A subsequent 2010 school-based survey in the Sultanate of Oman found that more than 50% of adolescents 15-18 years of age consumed fast food more than 4 times in the past week, and sweets and potato chips more than 3 times in the past week [8].

The estimated intake of sugar is also high. According to the Food and Agriculture Organization (FAO) of the United Nations, the per capita consumption of sugar in the Sultanate of Oman in 2021 was 62 grams [9], more than double the maximum sugar intake recommended by the United Kingdom [10].

The intake of atherogenic nutrients was also found to be high in the Sultanate of Oman. In 2010, sodium intake was estimated to be 3.8 g/day, which is equivalent to 9.5 g/day of table salt [11]; this is almost double the recommended maximum daily sodium intake set by the World Health Organization (WHO) (2 g/day) [12]. The 2017 STEPS survey confirmed a high intake of salt, estimating that Omani adults consumed an average of 8.4 grams per day of salt [3]. Similarly, the average intake of saturated fat was estimated at 10.3% of energy intake, which exceeds the global average of 9.4% [13]. Prior to their being banned from the Omani food market in 2022, the average trans fatty acids intake in the Sultanate of Oman was 1.8% of energy intake, which was higher than the global average value of 1.4% of energy intake [13] and the WHO-recommended upper limit of 1% [14].

There is limited recent research on general dietary patterns and the consumption of salt, sugar, and fat in the Sultanate of Oman. A 2019 study conducted among the general adult urban population in Muscat found that, although 91% of participants are aware of the dangers of high salt intake, only 42% of participants were actively trying to reduce salt intake [15].

This information on the current health status and dietary intake patterns of Omanis underlines the need for the development of culturally appropriate population-based interventions aimed to improve the quality of the diet, decrease the intake of atherogenic nutrients, and favor the consumption of cardioprotective foods in the Sultanate of Oman. In the planning for any intervention to alter the population's food consumption patterns, the first step is a thorough assessment of the knowledge and attitudes of the population as potential determinants of dietary practices [16].

In this context, three major stakeholders in the Sultanate of Oman, the Ministry of Health (MoH), Al-Jisr Foundation, and WHO, have collaborated on a joint project to assess knowledge, attitudes, and practices of Omani adults and adolescents pertaining to general dietary habits and specifically the consumption of salt, sugar and fat.

2. Methodology

2.1. Questionnaire development

For this project, four multicomponent questionnaires were developed to assess the population's KAP related to:

- General healthy eating (Questionnaire 1)
- Dietary salt (Questionnaire 2)
- Dietary sugar (Questionnaire 3)
- Dietary fat (Questionnaire 4)

The same questionnaires were used for adolescents and adults. The first part of each questionnaire inquires about basic sociodemographic information (age; gender; marital status; education level; training or experience in a health-related field). The development of the KAP assessment components was based on the general guidelines for assessing nutrition-related KAP published by FAO [17] and a thorough review of pertinent literature, as well as expert input from the MoH of the Sultanate of Oman. Below is a detailed description of the development process and content of each of the questionnaires.

2.1.1. General healthy eating questionnaire

A set of 27 questions assessing knowledge were based on the General Nutrition Knowledge Questionnaire [18]. Knowledge questions are categorized into three sections, each evaluating a distinct aspect of nutrition knowledge: 1) dietary recommendations from authoritative sources, including the World Health Organization and the MOH of the Sultanate of Oman, 2) food groups and the nutrients they contain, and 3) potential health problems or diseases related to diet. Some questions that were originally included in the General Nutrition Questionnaire were not retained because they were either not culture-specific (e.g. alcohol-related question or questions on the "eat well guide"), redundant with other questions in the overall KAP study (e.g. salt-specific questions), or not well understood during the pre-pilot testing (e.g. those using scientific terms such as glycemic index). In addition, one question about the bioavailability of iron from plant sources when compared to animal sources was added to the knowledge questionnaire, given that anemia is an important public health problem in the Sultanate of Oman [2].

The attitude and practice component of the general healthy eating questionnaire was developed based on published literature including the studies by Aung et al [19] and Saeidlou et al [20]. The assessment of practices is based on a set of 11 main questions inquiring about the frequency of eating away from home; breakfast consumption; practices adopted to stay in good health; practices adopted to prepare healthy meals (if applicable); reading food labels; consulting information on food caloric content; and frequency of consumption of specific food groups, items, and beverages. Attitude assessment inquires

about perceived health susceptibility and severity; attitudes towards specific nutrition practices; consumption of various types of media and news programming; the best source of nutrition education; and the perceived importance, benefits, and barriers to adopting a heathier diet. It is based on a set of four main questions, with the fourth question including 19 sub-items.

2.1.2. Dietary oil and fat questionnaire

The development of the dietary fat KAP questionnaire was based on a thorough review of the literature and those questions used in past surveys [21–27] Expert input from MoH was also provided. The questionnaire was developed to assess KAP pertinent to total fat as well as specific subtypes, including saturated fat and trans fats. When applicable, food lists were adapted to reflect locally available foods.

Practices are assessed based on a set of 11 main questions inquiring about the use of fat during food preparation and food consumption, the addition of various types of fats to foods, whether or not the respondent is decreasing fat consumption, whether or not he/she checks food labels for fat, identification of foods containing saturated fat and trans fats, and the frequency of consumption of specific food items.

Knowledge assessment is based on 14 questions that inquire about recommendations regarding consumption of oils and fats, cooking methods that may help in decreasing fat consumption, food choices to help decrease fat consumption, effects of fat consumption on health, and the fat content of various food items. Within these 14 questions, three specifically focus on saturated fat while three others target trans fat.

The attitude component is based on eight questions, the first of which contains six separate statements each of which is rated on a three-point Likert scale ranging from “disagree” to “agree”. These questions assess how important it is for the subject to reduce the amount of total fat and specific types of fat in the diet, how important it is to reduce the consumption of processed foods and evaluate the extent to which the subject agrees with specific statements about dietary fat.

2.1.3. Dietary salt questionnaire

The development of the salt KAP questionnaire was based on a thorough review of the literature, and the questions were modeled on those used in past surveys [28–32]. In particular, the available salt KAP instrument previously developed and used in Lebanon guided the development of the questionnaire [33]. When applicable, food lists were adapted to reflect locally available foods.

The practice component is based on a set of eight questions inquiring about whether or not the individual is attempting to cut salt intake, types of discretionary use of salt (adding salt while cooking, adding salt while eating, etc.), use of salt substitutes, reading food labels, and

tendency to buy "low-salt" or "no added salt" foods types. The frequency of consumption of specific food items was also assessed.

The knowledge component of the questionnaire consists of 12 main questions which inquire about the relationship between high salt and sodium diet and overall health status, whether or not salty foods have an effect on specific health conditions, the relationship between sodium and salt, the maximal limit for daily salt intake, and the main sources of salt in the Omani diet. In addition, these questions ask the respondent to classify specific foods as high, medium, or low in salt and/or sodium and to identify natural and artificial salt substitutes.

Attitude assessment is based on a set of six main questions. The first question contains six separate statements which are rated on a 3-point Likert scale ranging from "disagree" to "agree" to assess how important it is for the subject to reduce consumption of sodium and salt, reduce the amount of salt added to foods, and reduce the number of processed foods eaten. Other questions inquired whether the participant is concerned with the amount of salt and sodium in the diet, the subject's perceived susceptibility to hypertension, and perceived facilitators and barriers to reduction of dietary salt.

2.1.4. Dietary sugar questionnaire

The development of the dietary sugar KAP questionnaire was based on a review of pertinent literature [34–36] and on expert input from MoH personnel. When applicable, food lists were adapted to reflect locally available foods.

The practice component includes a set of 14 main questions inquiring about discretionary sugar use, reading food labels, attempting to decrease sugar intake and the frequency of consumption of specific food items. The knowledge component is based on a set of six main questions inquiring about the effects of sugar on health, sugar content of specific food items, and use of sugar substitutes. The attitude assessment is based on a set of seven questions, the first of which contains five separate statements which are rated on a three-point Likert scale ranging from "disagree" to "agree". These questions assess how important it is for the subject to reduce consumption of sugar and processed foods and to evaluate the extent to which the subject agrees with specific statements about dietary sugar.

2.2. Pre-testing of the Questionnaire

The questionnaires were reviewed for content validity by a nutritionist and were pre-tested in interviews with 80 individuals similar to those targeted by the KAP survey. Pretesting checked the clarity, feasibility, practicality, and cultural appropriateness of the questionnaires. Questions were modified as necessary based on these results.

2.3. Overall Study Design

The study was a cross-sectional survey of the Omani population. It was designed to derive prevalences of various indicators of knowledge, attitudes, and practices related to dietary salt, sugar, fat, and general healthy eating among the Omani population aged between 14 and 60 years, inclusive. Cluster sampling with stratification by governorate selected survey subjects from randomly selected health centres.

2.4. Study Population

The study sample was a representative sample of all Omani citizens aged 14-60 years old who currently reside in the Sultanate of Oman. The study subjects at each health center were recruited according to the following inclusion and exclusion criteria.

Inclusion Criteria:

- Age between 14 and 60 years, inclusive. The age was selected to include adolescents aged 14-18 years old.
- Omani nationality
- Current residence in the Sultanate of Oman

Exclusion Criteria:

- Non-Omani nationality
- Presence of mental disabilities: Substantial disorder of thought, mood, perception or cognitive ability that resulted in marked functional disability, significantly interfering with adaptive behavior and requires special services

2.5. Sampling Scheme

The first stage of sampling selected health centres as the primary sampling unit. Within each governorate, one-third of health centers were selected with equal probability. Separate samples were selected for each questionnaire; that is, each questionnaire was administered to a different survey subjects. As a result, variables from different questionnaires cannot be cross tabulated because the responses to questions in different questionnaires were derived from different individuals.

The number of survey subjects to be recruited at each selected health centre was proportional to the size of the health centre. For example, if a) in the prior year all health centres selected in the first stage of sampling in a governorate saw 100,000 outpatients in the prior year, b) the number of outpatients seen in the prior year in health centre X was 10,000, and c) the survey sample size for that governorate was 500, 10% of that governorate's sample size, or 50 survey subjects, would be recruited from health centre X. Eligible outpatients were consecutively recruited from persons attending the health centre until the target number for that health centre was reached.

Within each health center, the sample was selected to make 40% of the sample women 19-60 years of age, 40% men 19-60 years of age, and 20% adolescents 14-18 years of age. These proportions are based on the distribution of these demographic groups found in the Sultanate of Oman's Annual Health Report 2020 [37].

2.6. Sample size calculation

The standard sample size calculation formula was used to determine the minimum number of survey subjects to achieve a desired precision for a proportion is shown below:

$$n = Z_{\alpha}^{2} \frac{p \times (1 - p)}{d^{2}}$$

Where,

n= the minimum sample size
Z_{α}= the probability value associated with the confidence level
p= the prevalence of the indicator
d= the desired margin of error (precision or half confidence interval).

The minimum sample size within each governorate was calculated based on the following assumptions:

a) The governorate-specific proportion of the population advised to reduce salt intake in the Sultanate of Oman's 2017 NCD risk factor survey, adjusted assuming a 1 percentage point decline yearly since 2017
b) Compliance of 80%
c) A design effect of 1.2

The minimum total sample size for the KAP survey was 1406 survey subjects per questionnaire, or a total of 5623 survey subjects.

2.7. Training

Identified personnel were trained for 5 days on administration of the four questionnaires, on communication with participants, and on ethical issues related to the study, especially confidentiality of records and autonomy of participants. This training took place just before data collection. It involved going over the questionnaires question-by-question, discussion of possible answers, accounting for skip patterns, asking respondents for more clarification, and recording respondents' answers on paper data collection forms. It also involved role playing to show trainees how things will go in the field. Fieldworkers and team leaders were also trained on how to reduce judgmental verbal and nonverbal communication in order to minimize any social desirability bias. Two of the 5 days of training were conducted in health centers with respondents who were similar to the survey's target population.

2.8. Data Collection

The interviews took approximately 20-30 minutes for completion. Outpatients were approached in the health centre by a field worker who explained the study procedures and objectives, described the inclusion and exclusion criteria to participate in the study, and invited the person to participate in the survey. If interested, data collection occurred in a private room in the health centre.

2.9. Quality Control

Team leaders were responsible for the overall quality of activities and data collection teams' performance. Each questionnaire was checked by the team leader before leaving the health centre to ensure that there were no missing data. Data were checked on a daily basis by the Department of Nutrition at the MoH, and errors in data collection or missing data were identified and communicated back to the team leaders in each governorate. Based on this, team leaders gave feedback to field workers every day before departing to the next day's data collection.

2.10. Ethical Considerations

The study protocol was submitted for ethical approval to the Centre of Studies and Research, Ministry of Health, the Sultanate of Oman prior to the initiation of data collection. The surveyors ensured that the participants understood the objectives of the study and answered any questions prior to obtaining verbal consent for participation. In addition, surveyors emphasized to the respondent that participation in the study was entirely voluntary and that his/her identity and responses would remain confidential.

2.11. Data processing and analysis

All data were collected by interview questions. Survey subjects' responses were recorded on paper questionnaires. Subsequently, data were entered into the CSPro program (US Census Bureau, Washington DC) with appropriate ranges and legal values stipulated in the program. Outlying or illegal values were checked against the paper questionnaires, and corrections were made as necessary. Data were converted to SPSS format and were analysed using SPSS version 29 (IBM Corporation, Armonk, NY, USA).

Data were analysed separately for adolescents and adults. Most analyses consisted of generating frequency distributions. Many questions allowed more than one response. For each such question, responses were recorded in up to four variables in the dataset. The number of times a specific response was reported was calculated by summing the number of times that response was recorded in all corresponding variables. This sum was recorded in a separate variable. This process was used to calculate the number and proportion of respondents giving a specific response to a specific question. For those questions eliciting a

single response, simple frequency distributions are displayed a pie chart or a 100% bar chart.

All measures of precision, such as p values, chi-squares, and 95% confidence intervals, accounted for the cluster and stratified sampling. Because the sampling fraction in each governorate was different, a separate standardized sampling weight was calculated for each governorate and applied to every survey subject in that governorate's sample. This resulted in 11 different governorate-specific sampling weights which were applied whenever an analysis included data from two or more governorates.

An additional standardized sampling weight was calculated for each subgroup (adolescents 14-18 years of age, adult men 19-60 years of age, and adult women 19-60 years of age) to account for differences between the proportion of the survey sample represented by each subgroup and the proportion of the governorate population 14-60 years of age represented by each subgroup. These subgroup-specific sample weights were calculated separately for each governorate. As a result, each governorate-subgroup was assigned a different subgroup-specific sampling weight, resulting in 33 different subgroup-specific weights used in data analysis. This sampling weight was used whenever two or more subgroups were included in the analysis of data from a single governorate. For analyses which include two or more governorates and two or more subgroups, such as national estimates, the governorate-specific and subgroup-specific weights were multiplied together.

In each questionnaire, a group of questions indicating priority concerns were identified. These questions were combined into separate indices for knowledge, attitudes, and practices after assigning each question a numerical value depending on whether the response was correct or desirable versus incorrect or undesirable. These numeric values for each question were then summed to calculate a separate index for knowledge, attitudes, and practices in each of the four questionnaires. This process resulted in 12 indices, including three indices for each questionnaire. The continuous values for each index were then categorized using Bloom's criteria (<50% of the maximum possible score, 50-79% of the maximum possible score, and 80% or more of the maximum possible score). Questions not included in an index, as well as many of the questions included in an index, were analyzed separately.

Table 1 below shows the questions which were included in the formulation of each index. Because the questions included in the various indices were not equivalent between indices, each questionnaire's indices are based on different questions, and as a result, the indices between different questionnaires cannot be directly compared. For example, as shown in the table below, the index for oil and fat practices was based on seven questions, but the index for salt practices was only based on three questions, only one of which was comparable to a question used in the oil and fat practices index. Furthermore, the sugar practices index was based on six questions, none of which were comparable to the

questions used in the oil and fat or salt practices indices. This table excludes the general healthy eating practices index because that questionnaire had almost no questions comparable to the other questionnaires.

Table 1. Questions used to create the oil and fat, salt, and sugar indices for practices, knowledge, and attitudes

	Question included (range of points possible)			
Question number. Question asked	**General healthy eating**	**Oil and fat**	**Salt**	**Sugar**
PRACTICES				
1.1 How often do you eat out (a restaurant, fast food place, coffee shop, etc.) Or order food delivery from restaurants to your home?	✓ (0-1 point)			
3. How often do you eat breakfast per week?	✓ (0-1 point)			
6. Do you prepare food in a healthy way?	✓ (0-1 point)			
8.1 Do you read the nutritional information on food items when buying them?	✓ (0-1 point)			
8.2 Does your reading of the nutritional information affect your purchase of the food item?	✓ (0-1 point)			
8.3 Do you try to figure out the calories in the food you eat?	✓ (0-1 point)			
9. Do you eat the following foods? (followed by list of 18 healthy and unhealthy foods)	✓ (0-6 points)			
10. Do you drink the following? (followed by list of 16 health and unhealthy drinks)	✓ 0-5.3 points)			
11. How much water do you usually drink during the day?	✓ (0-1 point)			
1. When you prepare your meals do you add fat during cooking?		✓ (0-2 points)		
2. If the answer is rarely, sometimes, often or always, what kind of fat or oils are used?		✓ (0-1 point)		
4. When you eat your meals, do you add fats or oils when eating		✓ (0-2 points)		
5. If the answer is rarely, sometimes, often or always, what kind of fat or oils are used?		✓ (0-1 point)		
8 / 1 / 1. Please answer the following question regarding your practices (___ and food)		✓ (0-4 points)	✓ (0-12 points)	✓ (0-10 points)
9. Do you often check the following information on the nutrition label?		✓ (0-4 points)		
11. What kind of milk, buttermilk (laban) or yogurt do you always or most often have?		✓ (0-1 point)		
2. What are the natural salt substitutes-alternatives that you are currently using to compensate the taste of salt?			✓ (0-1 point)	
3. What artificial salt substitutes are you currently using?			✓ (0-1 point)	
4. What do you use sugar for, most often?				✓ (0-1 point)
5. How many spoons of sugar do you use to sweeten one cup of drinks?				✓ (0-2 points)
6. Are you trying to limit the amount of sugar you eat in your diet?				✓ (0-1 point)
9. Are you currently using artificial substitutes for sugar?				✓ (0-1 point)
11. Are you currently using natural alternatives to sugar?				✓ (0-1 point)
13. When imposing a tax on soft drinks and sweetened beverages, did you reduce your consumption?				✓ (0-1 point)

	Question included (range of points possible)			
Question number. Question asked	**General healthy eating**	**Oil and fat**	**Salt**	**Sugar**
KNOWLEDGE				
1. Do you think that health is related to age?	✓ (0-1 point)			
2. Do health experts recommend people eat more, the same amount, or less of the following foods & Drinks?	✓ (0-2 points)			
3. How many times per day do experts recommend to eat fruits and vegetables as a minimum?	✓ (0-1 point)			
4. Do experts encourage you to cut back on the fats listed below? Circle the number corresponding to each answer	✓ (0-3 point3)			
5. What kind of dairy products do experts encourage to have?	✓ (0-1 point)			
6. How many times a week do experts recommend that people eat fatty fish (such as salmon, sardines (auma, kingfish, shark, shari, kufr, safi)?	✓ (0-1 point)			
7. How many times a week do experts recommend eating breakfast?	✓ (0-1 point)			
14. The amount of calcium in a cup of whole milk compared to a cup of skimmed milk is: (mention the options for the respondents)	✓ (0-1 point)			
15. Which of the following nutrients contain more calories for the same weight of food? (Indicate options for the respondents)	✓ (0-1 point)			
16. Compared to unprocessed foods, processed foods are: (list the options for the respondents)	✓ (0-1 point)			
17. Does the iron in spinach have the same benefit as the iron in red meat?	✓ (0-1 point)			
18. Which of these diseases is associated with a low fiber intake?	✓ (0-1 point)			
19. Which of these diseases is related to the amount of sugar people eat?	✓ (0-1 point)			
20. Which of these diseases is related to how much salt (or sodium) people eat?	✓ (0-1 point)			
21. Which of these options do experts recommend to reduce your chances of developing cancer?	✓ (0-1 point)			
22. Which of these options do experts recommend to prevent heart disease?	✓ (0-1 point)			
23. Which of these options do experts recommend for diabetes prevention?	✓ (0-1 point)			
24. Which one of these foods is more likely to raise blood cholesterol?	✓ (0-1 point)			
25. To maintain a healthy weight, people should cut out fat completely	✓ (0-1 point)			
26. Eating fiber can reduce the chances of being overweight.	✓ (0-1 point)			
27. Which of these phrases can help people maintain a healthy weight?	✓ (0-2 points)			
2. Which type of the following fats should be reduced, according to the advice of experts?		✓ (0-2 point)		
3. Did you know that there are cooking methods to reduce the amount of fat in food?		✓ (0-1 point)		
4. If an individual want to reduce the amount of total fat in their diet, which of the following possibilities would be the best option?		✓ (0-1 point)		
5. Which of the following cheeses is the best low-fat choice?		✓ (0-1 point)		
6 / 1 / 1. What do you think the effect of too much ___ on your health?		✓ (0-1 point)	✓ (0-1 point)	✓ (0-1 point)
2 / 2. Do you think that the following health problems may be caused or worsened by eating foods?			✓ (0-2 points)	✓ (0-2 points)
9 & 10. Have you ever heard about saturated fats?		✓ (0-2 points)		
12 & 13. Have you ever heard of trans fats/ hydrogenated oils?		✓ (0-2 points)		

	Question included (range of points possible)			
Question number. Question asked	**General healthy eating**	**Oil and fat**	**Salt**	**Sugar**
3. How would you describe the relationship between salt and sodium?			✓ (0-1 point)	
4. How much salt is allowed for adults per day?			✓ (0-1 point)	
11 / 6. According to your information, what are the types of artificial alternatives that help reduce?			✓ (0-1 point)	✓ (0-1 point)
12. What is the information that tells you about salt content when you read it on food labels?			✓ (0-1 point)	
3. Determine whether the following sentences relating to sugar are true or false?				✓ (0-5 points)
ATTITUDES				
2. Are you currently worried about your health when you do not eat healthy food?	✓ (0-5 points)			
4. What is your attitude (your opinion) towards the following statements: (followed by 19 statements about various aspects of diet and nutrition)	✓ (0-19 points)			
1 / 1 / 1. What do you think of the following statements		✓ (0-6 points)	✓ (0-6 points)	✓ (0-5 points)

3. General Healthy Eating Results – Adolescents 14-18 years of age

3.1.1. Demographic characteristics

Table 2 below shows the characteristics of those adolescents responding to the general healthy eating questionnaire. Several of these characteristics were not included in further analysis of data from adolescents because the subgroups were of grossly unequal size; example, marital status, type of job, and whether or not the adolescent buys food for household had very few subjects in some subgroups. In addition, more than two thirds of adolescents did not know their household income.

Table 2. Distribution of various demographic characteristics among adolescents 14-18 years of age responding to the general healthy eating questionnaire

Characteristic	Unweighted number	Weighted percent
Sex		
Male	138	50.4%
Female	149	49.6%
Educational level		
Primary	10	4.6%
Elementary	125	42.7%
Secondary or more	151	52.7%
Marital status		
Single	284	98.5%
Married	3	1.5%
Governorate		
Muscat	24	8.4%
Dhofar	18	6.3%
Ad Dakhliyah	27	9.4%
Ash Sharqiyah North	23	8.0%
Ash Sharqiyah South	32	11.1%
Al Batinah North	27	9.4%
Al Batinah South	27	9.4%
Adh Dhahirah	27	9.4%
Al Buraymi	23	8.0%
Musandam	28	9.8%
Al Wusta	31	10.8%
Household income		
<200 OMR	16	4.9%
200-499 OMR	31	10.7%
500-999 OMR	22	8.2%
1000+ OMR	18	6.4%
Don't know	200	69.7%
Type of job		
Private	2	1.1%
Student	266	92.5%
Job seeker	9	2.2%
Not working	10	4.2%

Characteristic	Unweighted number	Weighted percent
Buys food for household		
Respondent	8	3.9%
Other household member	279	96.1%
Who buys food for household		
Housewife	135	46.8%
Head of house	125	46.6%
Servant	6	0.2%
Other person in house	21	6.4%
Talked to professional about diet		
Yes	45	18.0%
No	236	79.9%
Unknown	6	2.0%
Tried to lose weight		
Yes	100	37.4%
No	183	61.4%
Unknown	4	1.2%
Has disease		
Hypertension	1	<0.1%
Diabetes	1	<0.1%
Heart disease	0	0%
Overweight or obesity	23	11.8%

3.1.2. Knowledge

As can be seen in Table 3 below, the level of knowledge was quite low among adolescents in the Sultanate of Oman. In no subgroup was the knowledge index statistically significantly higher than in any other. In addition, about one-third of adolescents had moderate scores for general healthy eating knowledge, and in all educational levels and eight governorates, the majority of adolescents had a low level of knowledge.

Table 3. Composite index for general healthy eating knowledge of adolescents 14-18 years, by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	136	63.4%	(52.0, 73.5)	36.5%	(26.4, 47.9)	0.2%	(0.1, 0.2)	0.519
Female	147	59.4%	(49.6, 68.4)	40.5%	(31.4, 50.2)	0.2%	(0.1, 0.2)	
Educational level								
Primary	9	66.3%	(29.1, 90.4)	33.7%	(9.6, 70.9)	0%	-	
Elementary	124	61.5%	(49.6, 72.2)	38.4%	(27.7, 50.3)	0.1%	(0.1, 0.1)	
Secondary or more	149	60.9%	(49.3, 71.3)	38.9%	(28.5, 50.5)	0.2%	(0.2, 0.3)	
Governorate								
Muscat	24	70.8%	(48.0, 86.5)	29.2%	(13.5, 52.0)	0%	-	0.493
Dhofar	18	83.3%	(55.9, 95.2)	16.7%	(4.8, 44.1)	0%	-	
Ad Dakhliyah	27	63.0%	(50.4, 74.0)	37.0%	(26.0, 49.6)	0%	-	
Ash Sharqiyah North	27	52.2%	(22.4, 80.5)	47.8%	(19.5, 77.6)	0%	-	
Ash Sharqiyah South	31	61.3%	(40.2, 78.9)	38.7%	(21.1, 59.8)	0%	-	
Al Batinah North	27	48.1%	(25.8, 71.3)	51.9%	(28.7, 74.2)	0%	-	
Al Batinah South	26	57.7%	(40.4, 73.3)	42.3%	(26.7, 59.6)	0%	-	
Adh Dhahirah	25	44.0%	(28.3, 61.0)	56.0%	(39.0, 71.7)	0%	-	
Al Buraymi	23	60.9%	(34.4, 82.2)	39.1%	(17.8, 65.6)	0%	-	
Musandam	28	42.9%	NA*	42.9%	NA*	14.3%	NA*	
Al Wusta	31	90.3%	(83.4, 94.5)	9.7%	(5.5, 16.6)	0%	-	
Who buys food for household								
Housewife	133	60.1%	(48.7, 70.5)	39.7%	(29.3, 51.0)	0.2%	(0.0, 1.8)	0.705
Head of house	124	60.7%	(49.6, 70.8)	39.2%	(29.1, 50.4)	0.1%	(0.0, 0.6)	
Servant	6	83.3%	NA**	16.7%	NA**	0%	-	
Other person	20	75.7%	(43.2, 92.7)	24.3%	(7.3, 56.8)	0%	-	
Talked to professional about diet								
Yes	44	61.6%	(44.4, 76.2)	38.4%	(23.8, 55.6)	-	-	0.797
No	233	60.7%	(51.0, 51.0)	39.1%	(30.2, 48.8)	0.2%	(0.2, 0.2)	
Tried to lose weight								
Yes	98	60.4%	(47.3, 72.1)	39.6%	(27.9, 52.7)	-	-	0.713
No	181	61.3%	(49.6, 71.7)	38.5%	(28.0, 50.1)	0.2%	(0.2, 0.3)	
TOTAL	**283**	**61.4%**	**(53.0, 69.1)**	**38.5%**	**(30.7, 46.8)**	**0.2%**	**(0.1, 0.2)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

** Confidence intervals do not compute correctly.

Most adolescents correctly identified which foods health experts recommend increasing or decreasing consumption (Figure 1). However, for whole grains the opinions of respondents were more mixed.

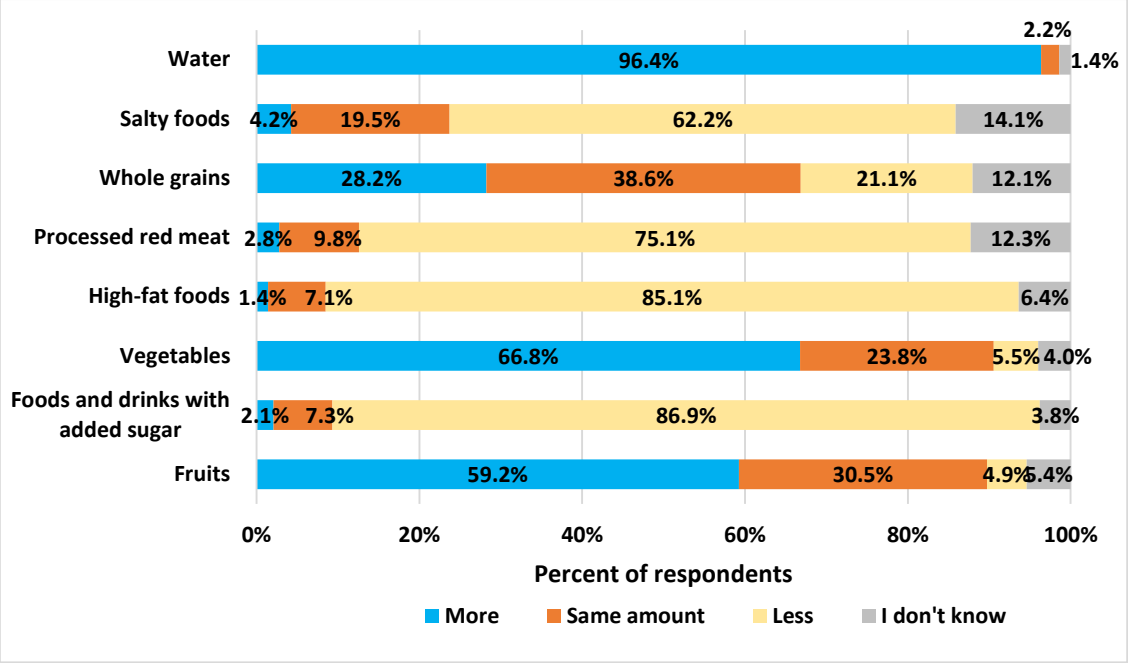

Figure 1 Health experts' recommendations regarding increasing or decreasing consumption of types of foods, adolescents 14-18 years of age

On the other hand, few adolescents correctly identified that international and Omani health experts recommend eating fruits and vegetables five or more times per day (Figure 2).

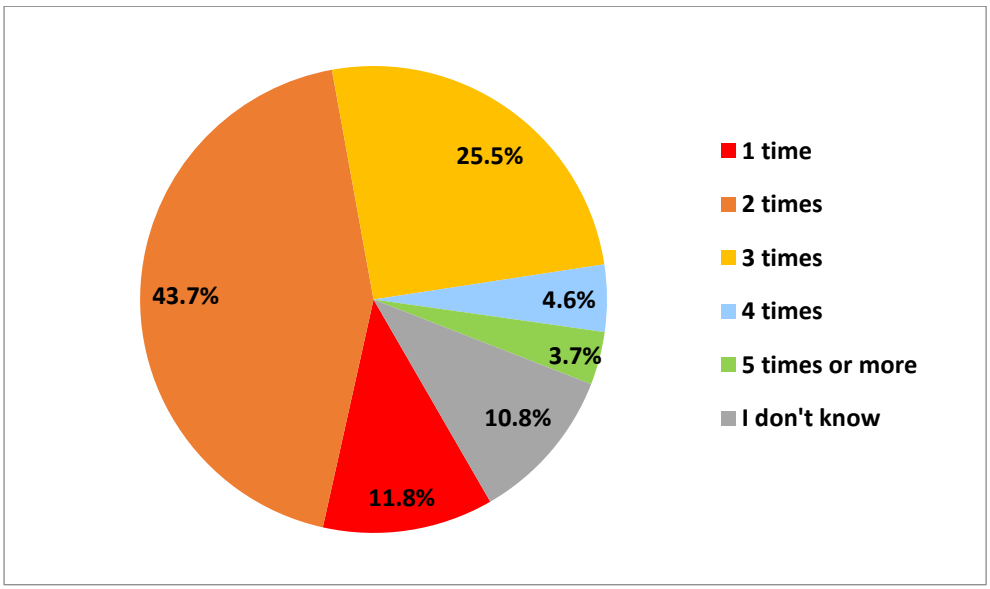

Figure 2 Health expert recommendations regarding number of times daily to eat fruits and vegetables, adolescents 14-18 years of age

Relatively few adolescents correctly identified recommendations regarding what type of dairy products should be consumed; that is, low-fat such as skimmed milk and low-fat cheese and other dairy products (Figure 3).

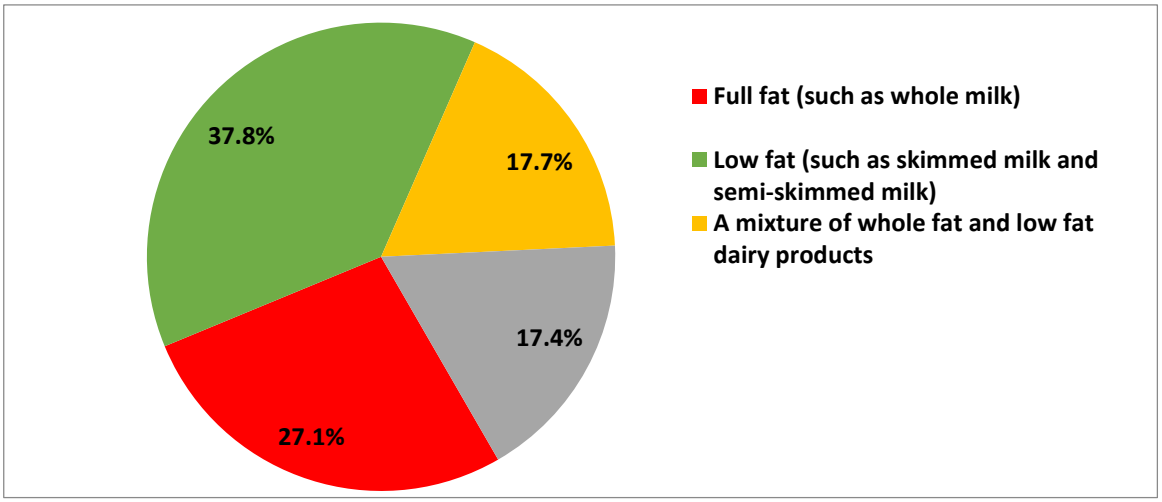

Figure 3 Health experts' recommendations regarding desirable dairy products, adolescents 14-18 years of age

In spite of the low level of knowledge, many adolescents correctly identified whether or not selected foods contained added sugar, as shown in Figure 4. The one exception to this is diet carbonated beverages, which about 40% of adolescents incorrectly identified as having substantial added sugar.

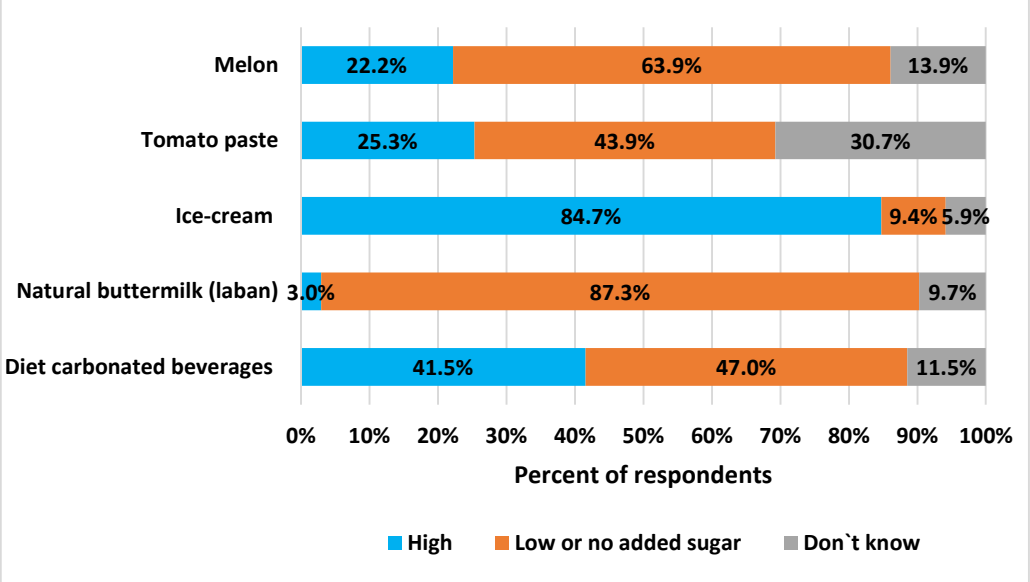

Figure 4 Perceived added sugar content of certain foods, adolescents 14-18 years of age

Adolescents' knowledge of the fiber content of selected foods was less complete (Figure 5). Between 24% and 30% incorrectly identified the relatively low-fiber foods pasta, egg, and white rice as high in the fiber.

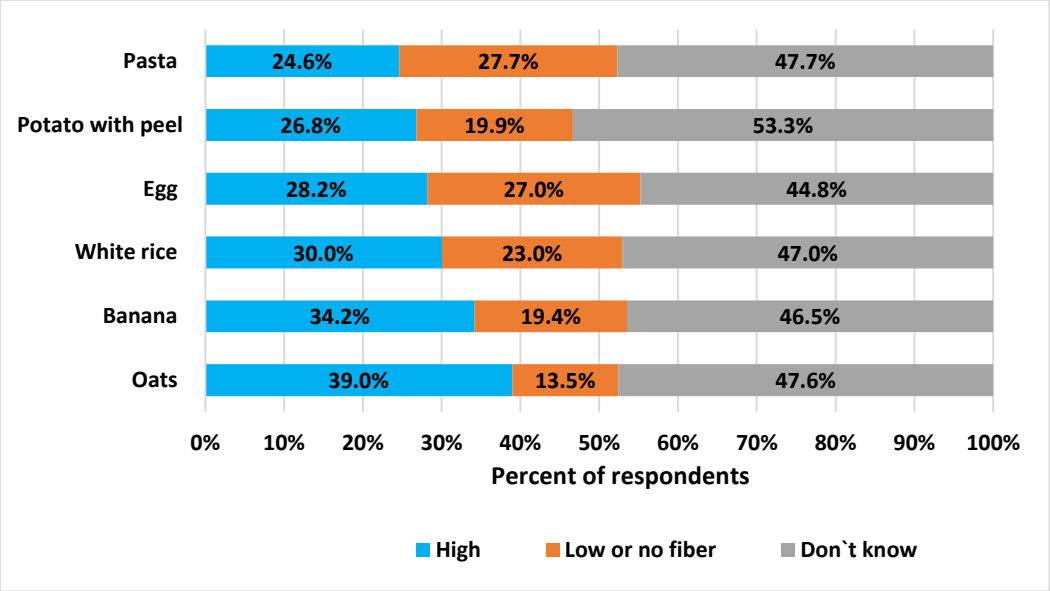

Figure 5 Perceived fiber content of certain foods, adolescents 14-18 years of age

Although many adolescents correctly identified nuts, cheese, and poultry as good sources of protein, almost two-thirds incorrectly identified fruit as a good source (Figure 6).

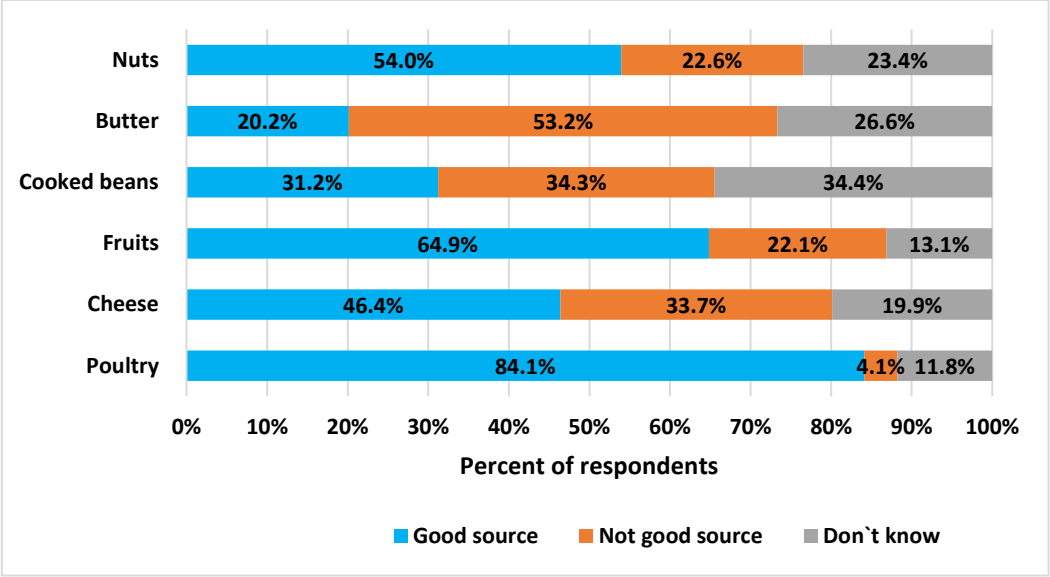

Figure 6 Perceived protein content of certain foods, adolescents 14-18 years of age

Although more than 70% of adolescents identified bread as high in starch, a much smaller proportion identified rice and potatoes as similarly high in starch (Figure 7). Moreover, a substantial minority of adolescents stated incorrectly that nuts, eggs, and cheese were a source of starch.

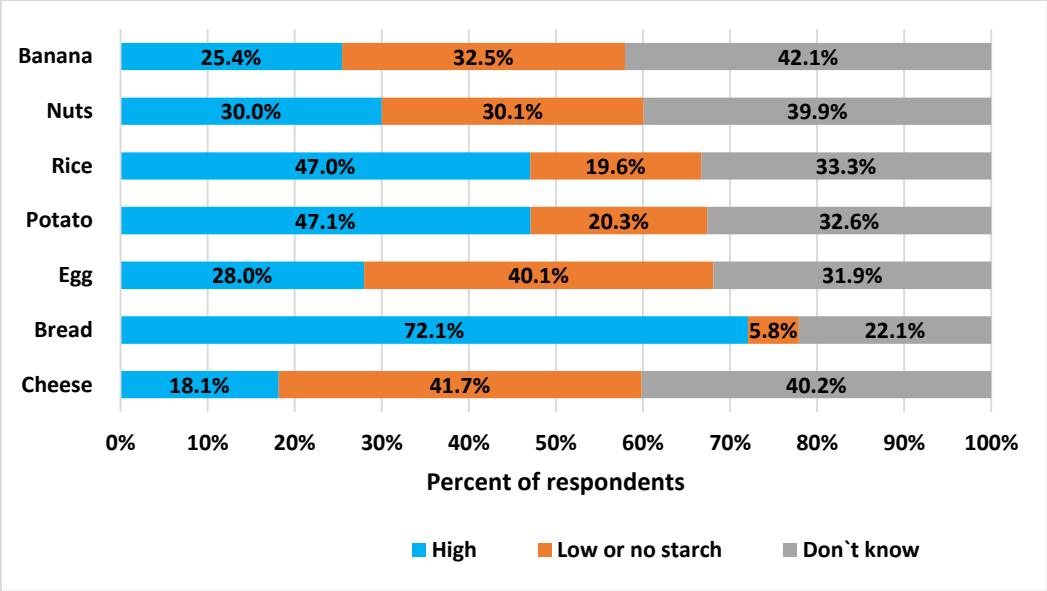

Figure 7 Perceived starch content of certain foods, adolescents 14-18 years of age

The majority of adolescents could not identify the main types of fat in the selected foods (Figure 8). Among adolescents offering a response, relatively few correctly identified unsaturated fat as the main fat in eggs and sunflower oil. A higher proportion reported correctly that unsaturated fat was the main fat in olive oil and that saturated fat was the main fat in butter.

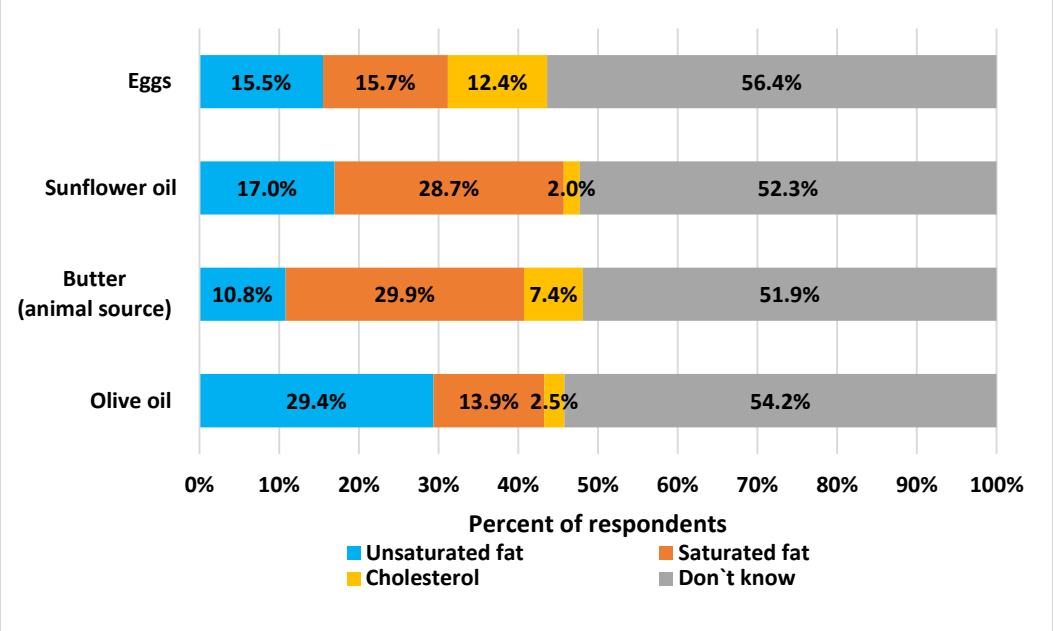

Figure 8 Main type of fat in certain foods, adolescents 14-18 years of age

As a with the question above regarding the main type of fat in selected foods, the majority of adolescents could not give an answer regarding whether selected foods contain trans fats (Figure 9). Nonetheless, more than one-third correctly identified baked goods as high in trans fats, and few incorrectly identified fish and canola oil as high in trans fats.

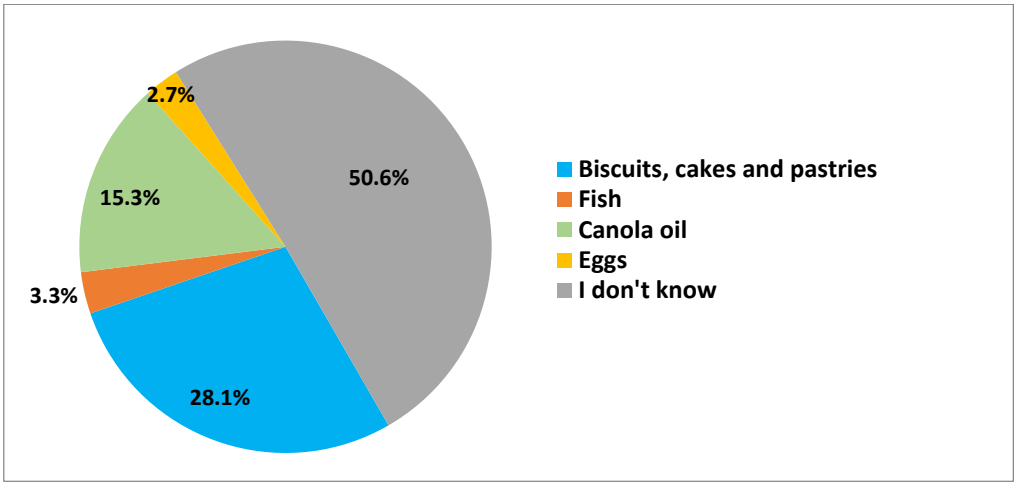

Figure 9 Food containing the greatest amount of trans fat, adolescents 14-18 years of age

3.1.3. Attitudes

Overall, a larger proportion of adolescents had positive attitudes than had correct knowledge (Table 4). Between one-third and one-half of adolescents in each demographic subgroup had moderate general healthy eating attitudes, and relatively few had negative attitudes.

Table 4. Composite index for general healthy eating attitudes of adolescents 14-18 years, by various demographic characteristics

		Negative		Moderate		Positive		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	135	18.0%	(10.2, 30.0)	42.2%	(32.1, 53.1)	39.7%	(28.7, 52.0)	0.527
Female	147	12.1%	(7.5, 18.8)	46.1%	(35.6, 57.1)	41.8%	(33.0, 51.2)	
Educational level								
Primary	9	19.7%	(2.6, 69.6)	52.3%	(17.6, 84.9)	28.0%	(7.0, 66.8)	0.967
Elementary	124	14.7%	(8.5, 24.1)	44.4%	(33.4, 56.0)	40.9%	(31.2, 51.4)	
Secondary or more	148	15.0%	(7.7, 27.2)	43.3%	(33.1, 54.1)	41.7%	(33.1, 50.8)	
Governorate								
Muscat	24	20.8%	(11.1, 35.7)	37.5%	(23.1, 54.5)	41.7%	(27.1, 57.8)	<0.01
Dhofar	18	33.3%	(14.1, 60.4)	44.4%	(25.5, 65.2)	22.2%	(9.2, 44.6)	
Ad Dakhliyah	27	11.1%	(4.8, 23.5)	51.9%	(30.9, 72.1)	37.0%	(22.9, 53.8)	
Ash Sharqiyah North	23	0%	-	26.1%	(10.0, 52.8)	73.9%	(47.2, 90.0)	
Ash Sharqiyah South	31	3.2%	(0.7, 13.8)	48.4%	(32.3, 64.8)	48.4%	(31.3, 65.8)	
Al Batinah North	26	7.7%	(2.0, 25.7)	42.3%	(29.8, 55.8)	50.0%	(31.8, 68.2)	
Al Batinah South	26	19.2%	(4.7, 53.6)	50.0%	(22.0, 78.0)	30.8%	(23.1, 39.6)	
Adh Dhahirah	25	12.0%	(5.8, 23.3)	52.0%	(36.8, 66.8)	36.0%	(20.5, 55.2)	
Al Buraymi	23	17.4%	(10.0, 28.5)	43.5%	(28.0, 60.3)	39.1%	(17.8, 65.6)	
Musandam	28	25.0%	NA*	42.9%	NA*	32.1%	NA*	
Al Wusta	31	38.7%	(30.5, 47.6)	54.8%	(44.8, 64.5)	6.5%	(2.0, 18.6)	
Who buys food for household								
Housewife	133	13.6%	(6.8, 25.2)	47.5%	(36.7, 58.5)	38.9%	(30.7, 47.8)	0.692
Head of house	123	16.8%	(10.1, 26.7)	42.6%	(31.7, 54.3)	40.6%	(30.3, 51.8)	
Servant	6	50.0%	NA**	50.0%	NA**	0%	-	
Other person	20	11.9%	(2.8, 38.9)	30.8%	(12.1, 59.0)	57.3%	(29.8,80.9)	
Talked to professional about diet								
Yes	44	8.1%	(2.8, 21.1)	58.9%	(41.1, 74.7)	32.9%	(17.9, 52.6)	0.179
No	232	16.3%	(10.1, 25.2)	41.4%	(33.4, 49.8)	42.3%	(34.0, 51.0)	
Tried to lose weight								
Yes	98	7.4%	(3.1, 16.7)	46.7%	(35.3, 58.4)	46.0%	(34.2, 58.2)	0.147
No	180	20.0%	(12.9, 29.7)	41.6%	(30.2, 54.0)	38.4%	(27.8, 50.1)	
TOTAL	**282**	**15.0%**	**(10.1, 21.8)**	**44.2%**	**(36.5, 52.2)**	**40.8%**	**(34.0, 48.0)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

** Confidence intervals do not compute correctly.

Most adolescents thought they were an excellent or good health (Figure 10).

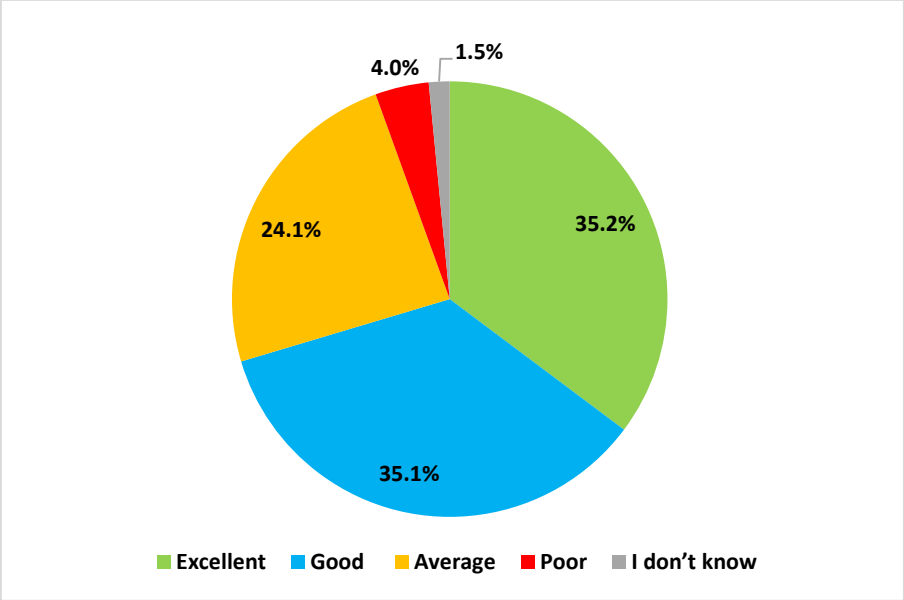

Figure 10 Respondents' rating of their own health in relation to age at the moment, adolescents 14-18 years of age

Most adolescent respondents rated their risk of developing chronic disease as zero or small (Figure 11).

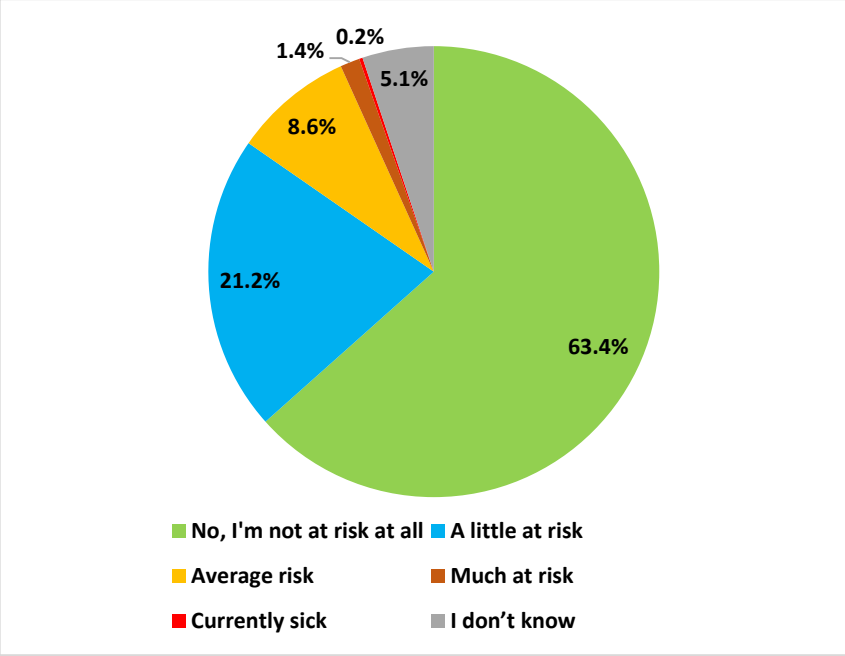

Figure 11 Respondents' rating of their risk of developing chronic diseases, adolescents 14-18 years of age

Among those adolescents who thought they were at risk for developing chronic diseases, the most common reason for this idea was eating an unhealthy diet. About one-quarter cited heredity as a reason (Figure 12).

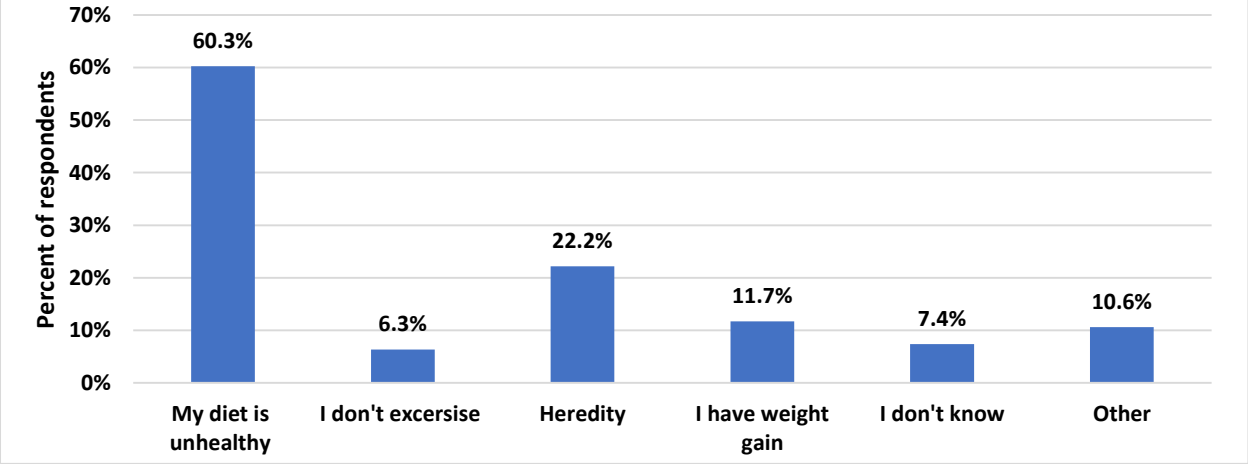

Figure 12 Respondents' reasons for their assessment that they were at risk, adolescents 14-18 years of age

Adolescents' responses to the questions listed below in Figure 13 and Figure 14 demonstrated substantial knowledge of the importance of eating a healthy diet while at the same time demonstrating their recognition of several obstacles to obtain this goal.

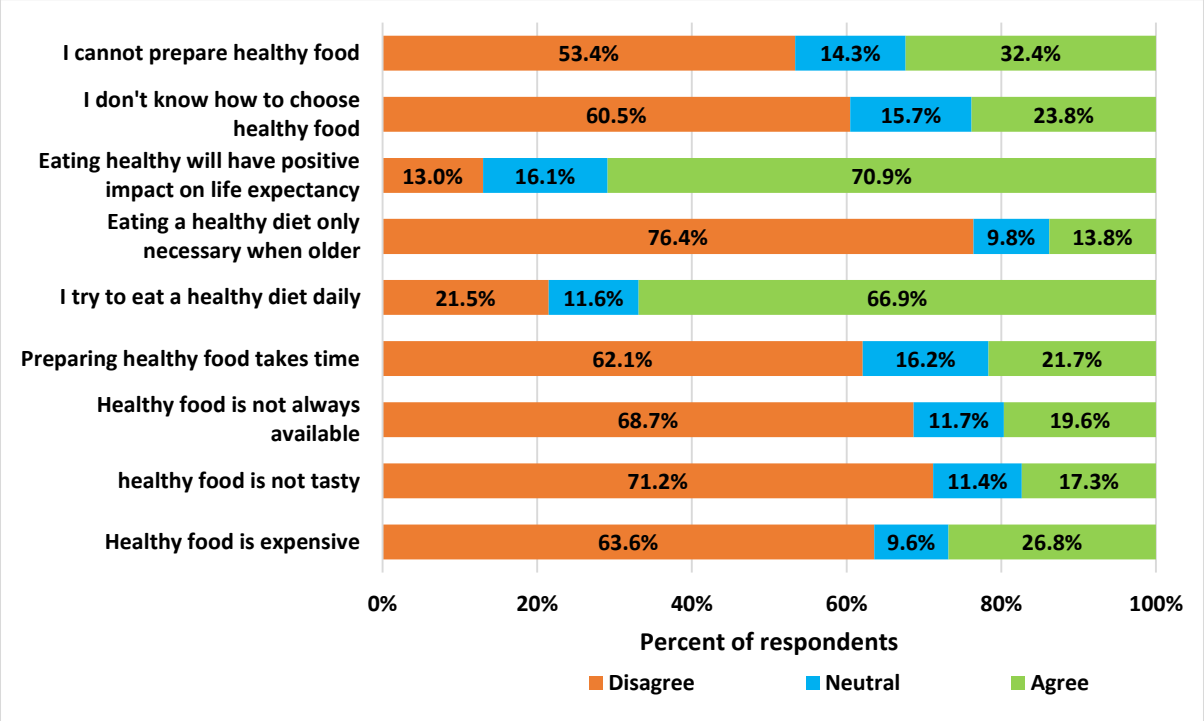

Figure 13 Respondents' agreement with various statements, adolescents 14-18 years of age

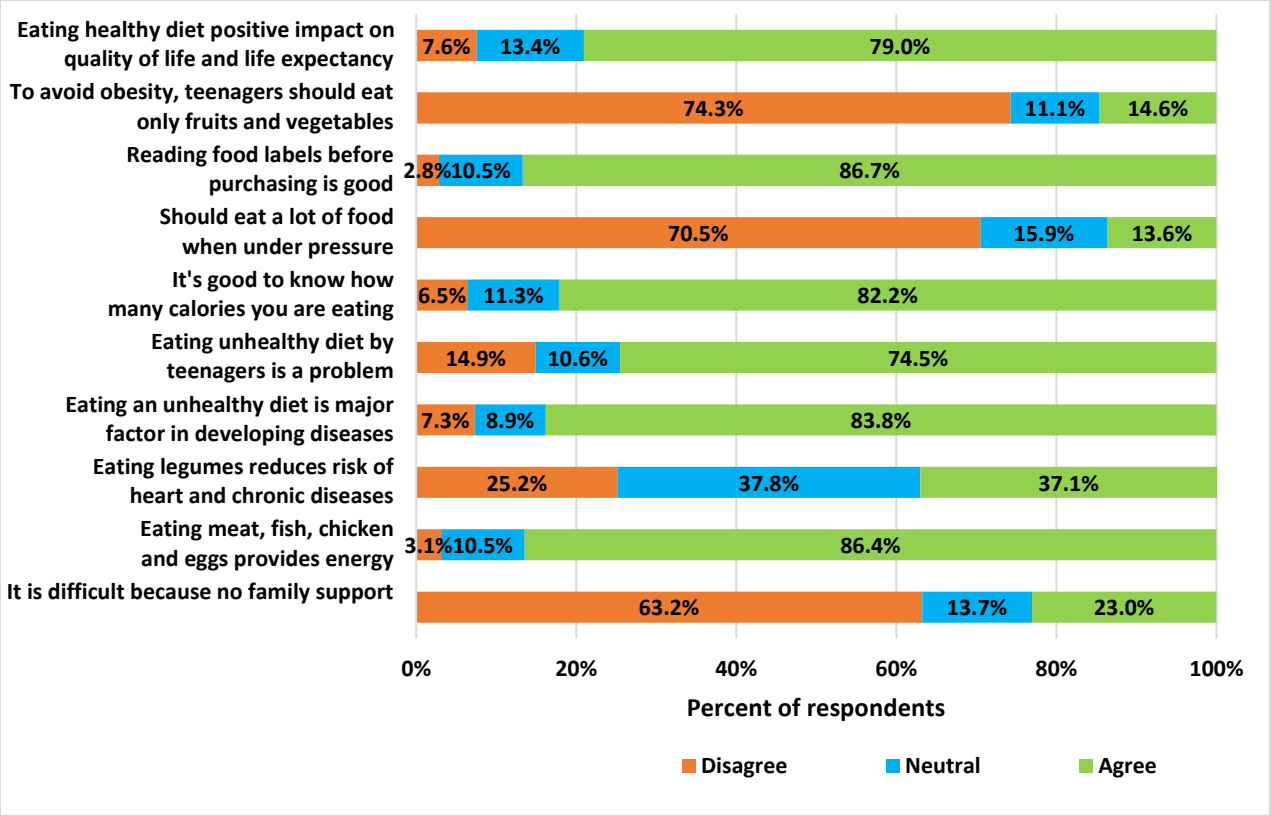

Figure 14 Respondents' agreement with various statements, adolescents 14-18 years of age

About one-third of adolescent respondents most recently obtained information about healthy foods from the internet, and a similar proportion reported obtaining information from school (Figure 15). About one in five reported relatives as a source of information.

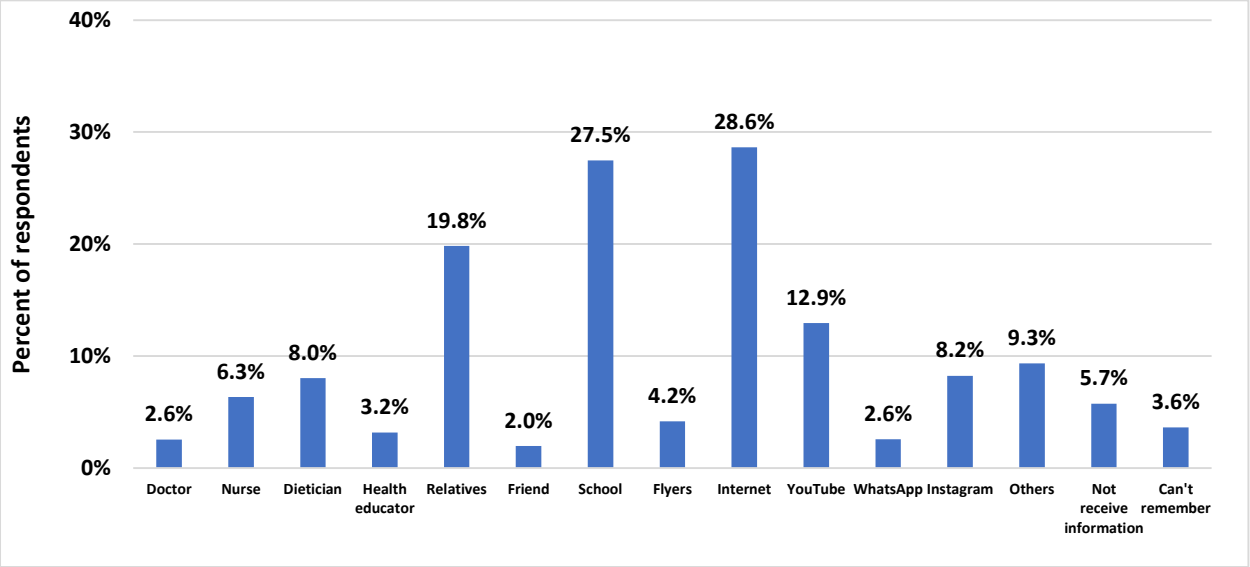

Figure 15 Where respondents reported getting information about healthy foods most recently, adolescents 14-18 years of age

About 60% of adolescent respondents reported usually getting information about healthy foods from the internet (Figure 16). Other usual sources were cited less commonly.

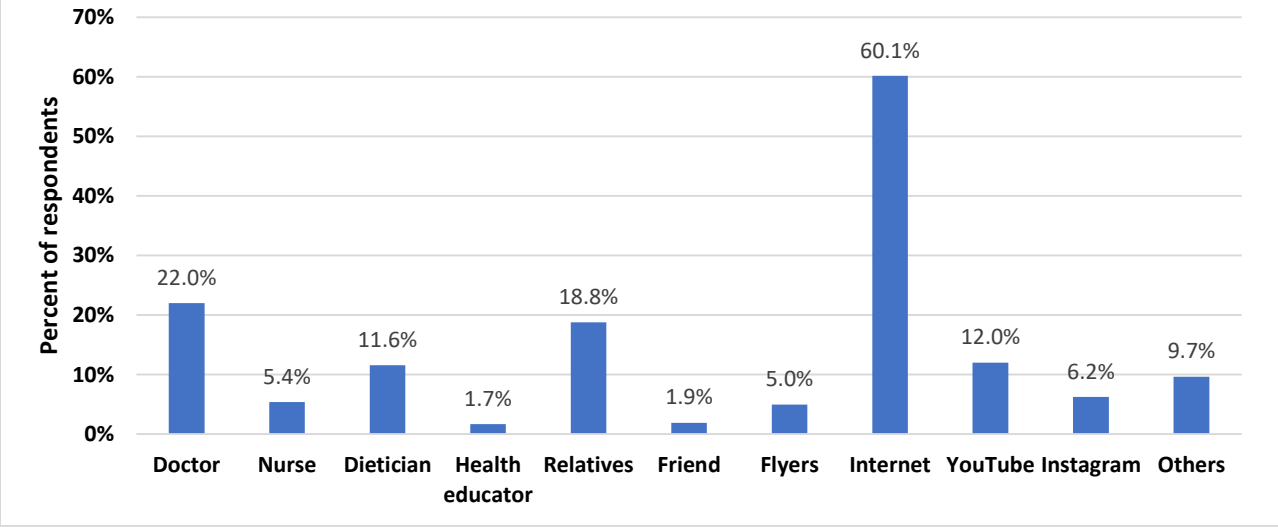

Figure 16 Where respondents reported usually getting information about healthy food, adolescents 14-18 years of age

Only 17 (3.9%) of 282 adolescent respondents reported reading newspapers or magazines. Of these 17, the most commonly reported newspapers or magazines were Al Watan and Shabiba (Figure 17).

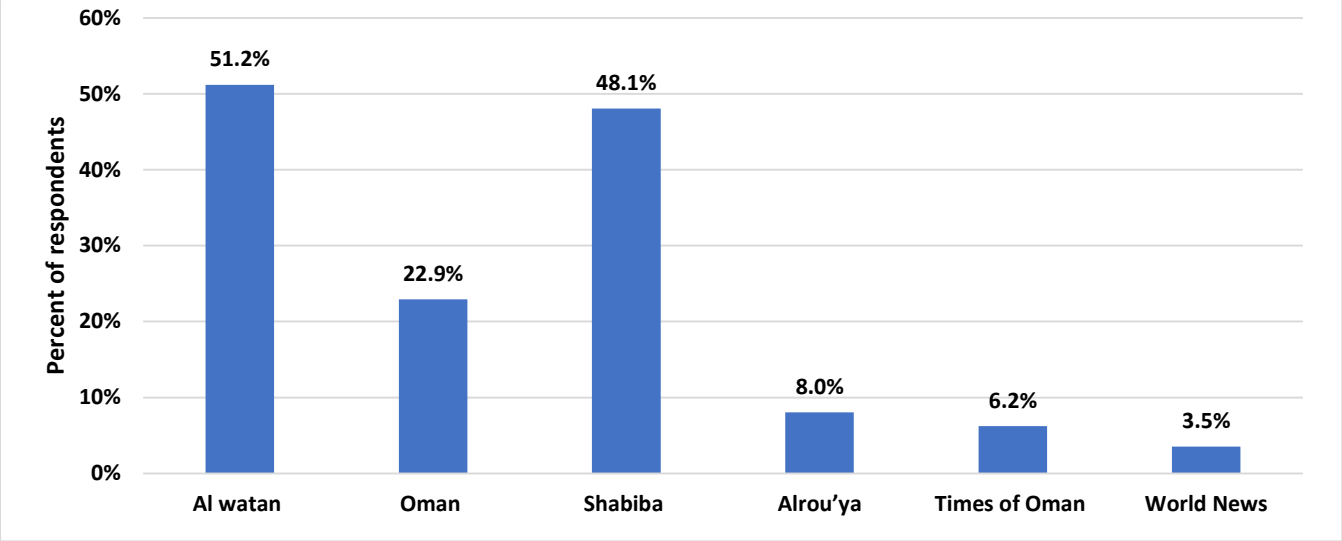

Figure 17 Newspapers and magazines reported by participants who reported reading them, adolescents 14-18 years of age

Many responses were mentioned as ways to educate people about healthy food, but none of these ways were reported by more than 22% of adolescent respondents (Figure 18).

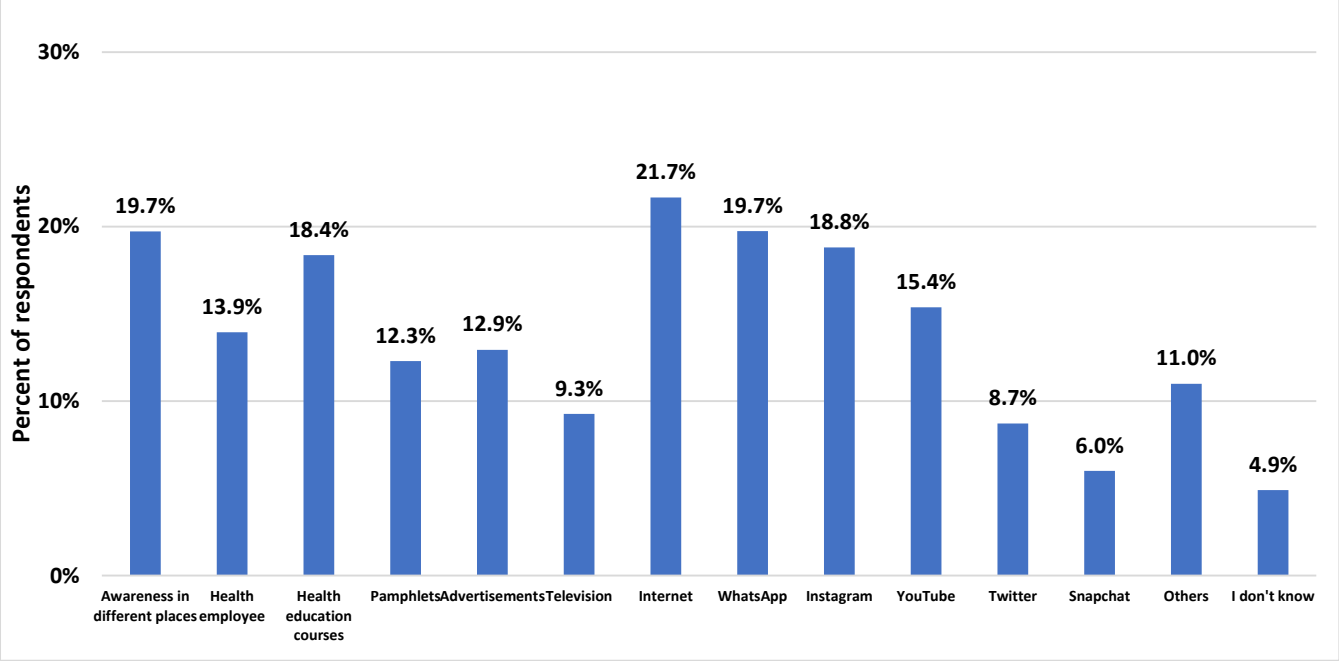

Figure 18 Best way to educate people about healthy food, adolescents 14-18 years of age

Clinicians, such as a doctor, nurse, or dietician, were overwhelmingly reported as the best people to provide education to the general population regarding healthy food (Figure 19).

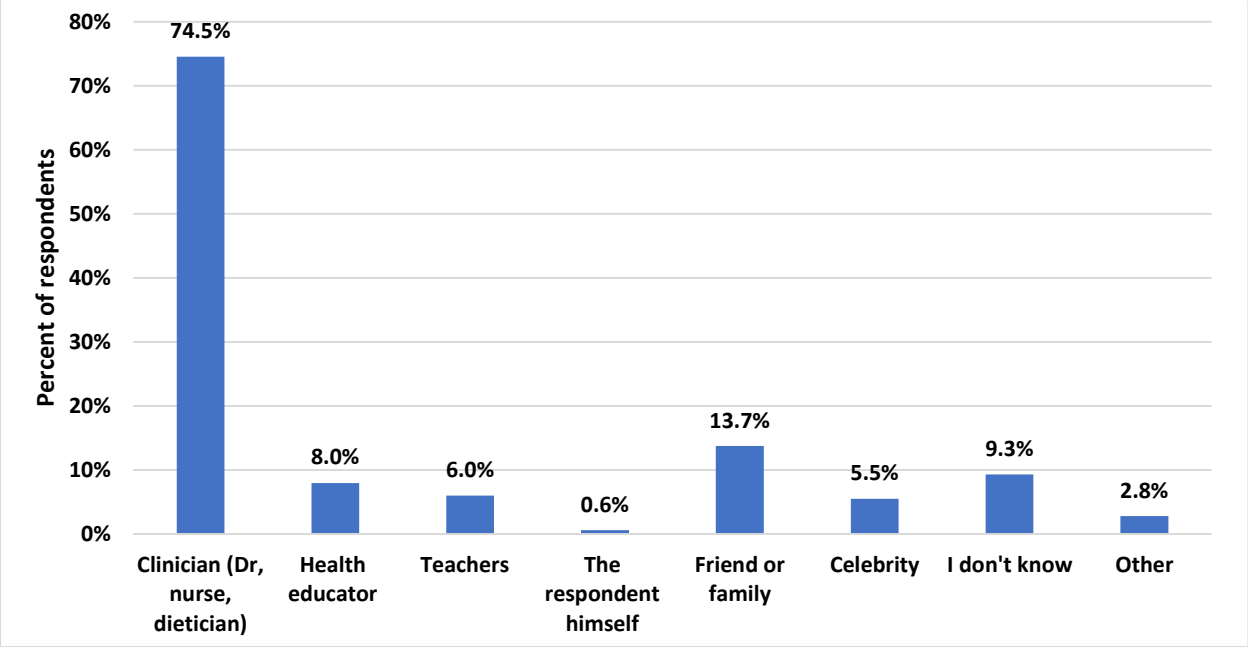

Figure 19 Best person to provide awareness in order to educate people about healthy food, adolescents 14-18 years of age

In contrast to educating people in general, the most commonly cited method of educating children about healthy food was using cartoon characters. However, about one fifth of respondents reported that they did not know any methods (Figure 20).

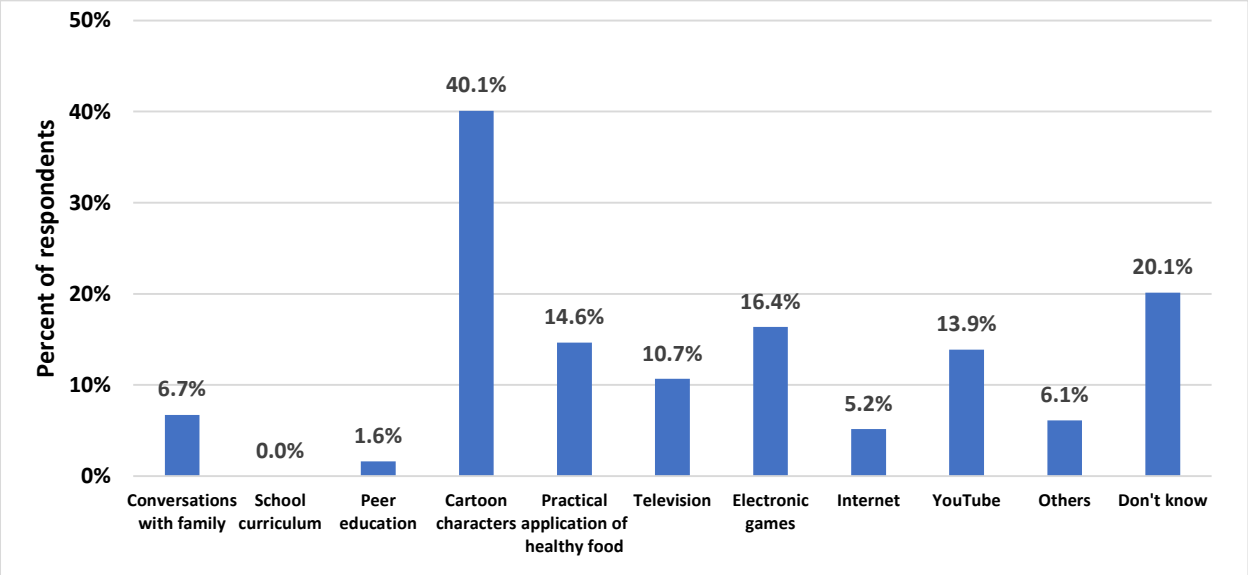

Figure 20 Best way to educate children about healthy food, adolescents 14-18 years of age

In contrast to the responses to provide education to people in general, clinicians were not the most commonly cited group when asked who could best educate children about healthy food (Figure 21). Friends or family were mentioned by two-thirds of adolescent respondents.

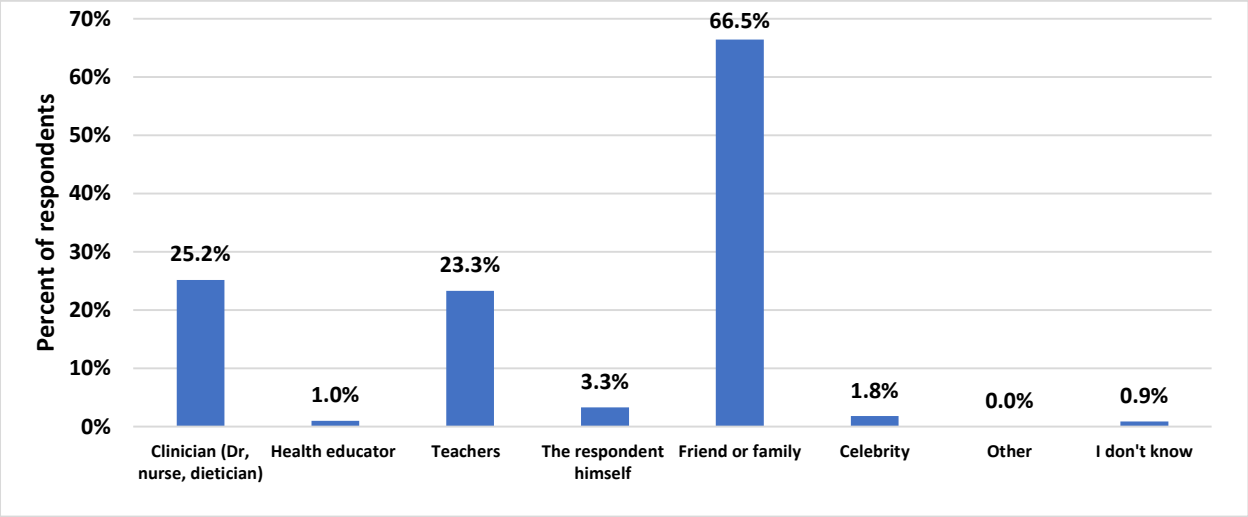

Figure 21 Best person to provide awareness with the aim of educating children about healthy food, adolescents 14-18 years of age

Only 59 (26.5%) of adolescents reported watching local Omani television. Among these, almost one-half reported watching the Sultanate of Oman's public television station, whose program "The News" was the most popular program reported (Table 5). The television stations *Oman Cultural* and *Oman Sport* were each watched by about one-third of respondents.

Table 5. Unweighted number (weighted %) of those adolescents 14-18 years of age who reported watching television, the percent watching Omani television channels, specific programs reported, and when

		Of those watching the channel		Of those watching the show	
Omani television channel	**Number (%) watching channel**	**Program**	**Number (%) watching program**	**% watching in morning**	**% watching in evening**
Oman Public	25 (45%)	The News	11 (39%)	16%	84%
		Series	3 (14%)	100%	100%
		Kayan	0%	-	-
		Cooking shows	1 (5%)	0%	100%
		From Oman	0%	-	-
		Morning Coffee	0%	-	-
		Soael Aheil Aziker	0%	-	-
		Heritage	0%	-	-
Oman Cultural	21 (36%)	Cooking Shows	0%	-	-
		Cultural Heritage	2 (5%)	7%	93%
		The world of animal and wildlife	1 (2%)	10%	0%
		Evening Shows	0%	-	-
Oman Sport	22 (37%)	News	2 (13%)	-	-
		Matches	8 (35%)	0%	100%
		Sport News	0%	-	-
		Camel Competitions	1 (3%)	100%	0%
		Basketball	1 (<1%)	0%	100%
		Al Majlis Show	0%	-	-
Majan	0 (0%)	No specific programs	-	-	-
Al estiqamah	2 (3%)	Governor Papers	0%	-	-
		Lectures	0%	-	-
		Prayers	1 (4%)	0%	100%
Oman Live	9 (16%)	News	2 (12%)	0%	100%
		Here Oman	0%	-	-
		Matches	1 (1%)	-	-
		Oman in a week	1 (6%)	-	-

Only 27 (12.6%) of adolescents reported listening to local Omani radio stations. Among these respondents, Youth Radio was the most popular radio station reported. Nonetheless, no particular radio shows were identified by more than one respondent (Table 6).

Table 6. Unweighted number (weighted %) of adolescents 14-18 years of age who reported listening to the radio, the percent listening to various Omani radio stations, specific programs reported, and when

		Of those listening to station		Of those listening to program	
Omani radio station	**Number (%) listening**	**Program**	**Number (%) listening to program**	**% listening in morning**	**% listening in evening**
Oman Public	0	News	-	-	-
		Morning coffee	-	-	-
		Soael Aheil Aziker	-	-	-
		Here Oman	-	-	-
		Nutrition/cooking	-	-	-
Holy Quran	5 (11%)	Holy Quran	0	-	-
		Soael Aheil Aziker	0	-	-
		Morning Talk	0	-	-
		Business transactions in Islam	0	-	-
		Drose Al Shukies	0	-	-
		Sazrate Eimaniah	0	-	-
		Religious Dialogue	0	-	-
Youth radio	13 (55%)	Youth Morning	1 (8%)		
		School Morning	1 (10%)	100%	0%
		Morning Assembly	0	-	-
		Children Show	1 (3%)	100%	0%
		Quran	0	-	
		News	1 (4%)	-	
Oman FM	2 (12%)	Morning	0	-	-
		Morning Coffee	0	-	-
		Youth Show	0	-	-
Oman voice radio	0	No specific shows	-	-	-
Hala FM	2 (9%)	Noon Show	1 (24%)	0%	100%
		Undefined	0	-	-
		Youth Show	0	-	-
Al Wisal	7 (25%)	Al Wisal Morning	0	-	-
		Al Wisal Forum	0	-	-
		Songs	0	-	-
		Undefined	0	-	-
Muscat radio	1 (7%)	Evening Shows	0	-	-
HI FM	0	No specific shows	-	-	-
Al Sumood FM	0	No specific shows	-	-	-
T FM	0	No specific shows	-	-	-
Merge FM	0	No specific shows	-	-	-
Shabiba FM	0	No specific shows	-	-	-

3.1.4. Practices

Very few adolescent respondents scored high on the general healthy eating practices index (Table 7). The majority of respondents in all demographic subgroups scored in the medium range.

Table 7. Composite index for general healthy eating practices of adolescents 14-18 years of age, by various demographic characteristics

		Low		Medium		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	138	16.3%	(11.0, 23.7)	83.7%	(76.3, 89.0)	-	-	0.331
Female	149	22.1%	(14.7, 32.0)	76.5%	(65.1, 85.0)	1.4%	(0.2, 9.9)	
Educational level								
Primary	10	-	-	100%	-	-	-	0.507
Elementary	125	20.7%	(13.4, 30.5)	79.3%	(69.5, 86.6)	-	-	
Secondary or more	151	19.7%	(13.5, 27.9)	79.0%	(69.8, 85.9)	1.3%	(0.2, 9.4)	
Governorate								
Muscat	24	12.5%	(4.9, 28.2)	87.5%	(71.8, 95.1)	-	-	0.930
Dhofar	18	44.4%	(22.3, 69.0)	55.6%	(31.0, 77.7)	-	-	
Ad Dakhliyah	27	11.1%	(4.3, 26.0)	88.9%	(74.0, 95.7)	-	-	
Ash Sharqiyah North	23	4.3%	(0.9, 17.9)	95.7%	(82.1, 99.1)	-	-	
Ash Sharqiyah South	32	34.4%	(23.3, 47.5)	65.6%	(52.5, 76.7)	-	-	
Al Batinah North	27	18.5%	(12.1, 27.3)	77.8%	(64.2, 87.2)	3.7%	(0.5, 21.1)	
Al Batinah South	27	18.5%	(9.9, 32.1)	81.5%	(67.9, 90.1)	-	-	
Adh Dhahirah	27	11.1%	(5.4, 21.6)	88.9%	(78.4, 94.6)	-	-	
Al Buraymi	23	21.7%	(5.4, 57.6)	78.3%	(42.4, 94.6)	-	-	
Musandam	28	28.6%	NA*	71.4%	NA*	-	NA*	
Al Wusta	31	25.8%	(14.5, 41.6)	74.2%	(58.4, 85.5)	-	-	
Who buys food for household								
Housewife	135	21.5%	(13.9, 31.7)	78.5%	(68.3, 86.1)	0%	-	0.665
Head of house	125	16.9%	(10.0, 27.0)	81.6%	(71.5, 88.7)	1.5%	(0.2, 10.3)	
Servant	6	66.7%	NA**	33.3%	NA*	0%	-	
Other person	21	18.1%	(6.2, 42.7)	81.9%	(57.3, 93.8)	0%	-	
Talked to professional about diet								
Yes	45	19.3%	(8.2, 39.3)	80.7%	(60.7, 91.8)	-	-	0.887
No	236	18.3%	(13.4, 24.4)	80.8%	(74.3, 86.0)	0.9%	(0.1, 6.3)	
Tried to lose weight								
Yes	100	15.6%	(9.4, 24.8)	82.5%	(73.3, 89.0)	1.9%	(0.3, 12.5)	0.258
No	183	20.7%	(14.6, 28.3)	79.3%	(71.7, 85.4)	-	-	
TOTAL	**287**	**19.2%**	**(14.6, 24.9)**	**80.1%**	**(74.1, 85.0)**	**0.7%**	**(0.1, 5.1)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

** Confidence intervals do not compute correctly.

About one-half of adolescent respondents reported daily or weekly eating meals in restaurants (Figure 22).

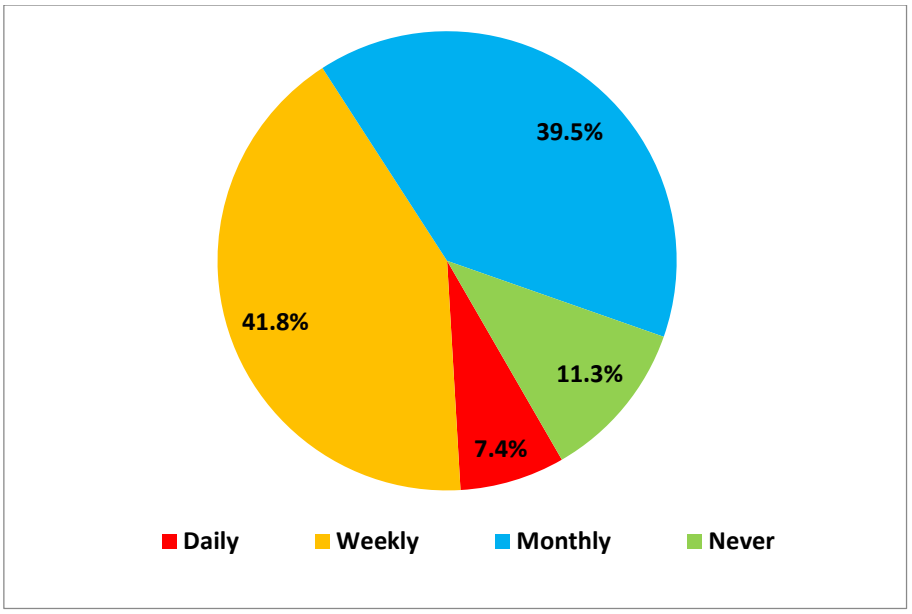

Figure 22 Frequency of eating in restaurants, adolescents 14-18 years of age

Of these adolescents reporting eating in restaurants daily, weekly, or monthly, by far the most common type of restaurant were those serving fast food (Figure 23).

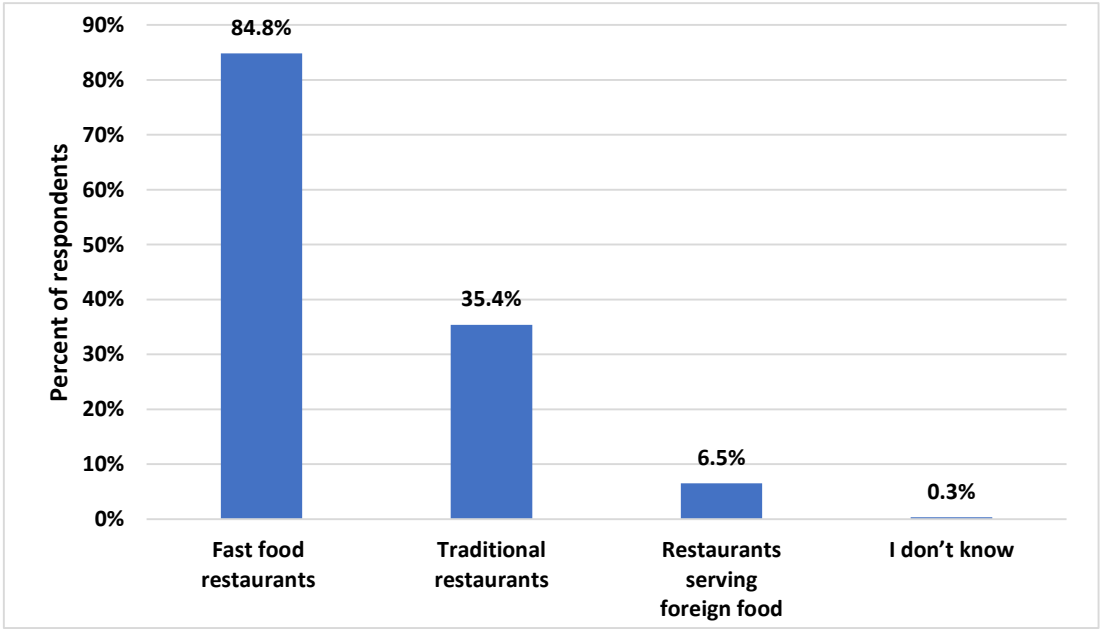

Figure 23 Respondents' choice of restaurants, adolescents 14-18 years of age

About one-half of adolescent respondents reported eating breakfast every day; however, almost one in five reported never eating breakfast (Figure 24).

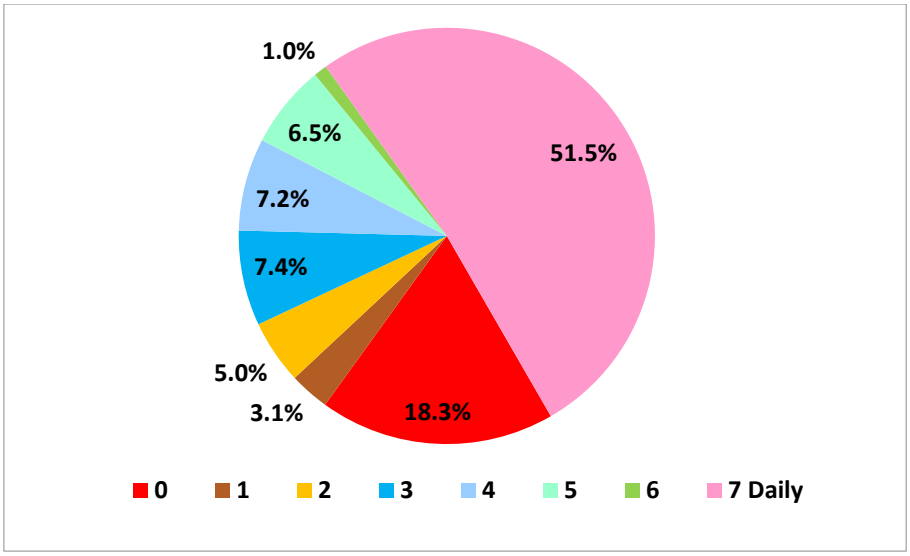

Figure 24 Number of days in a week respondent ate breakfast, adolescents 14-18 years of age

In contrast, when asked to list the methods they used to stay healthy, two-thirds of adolescent respondents mentioned exercising (Figure 25). Relatively few respondents reported eating healthy food, drinking a lot of water, or eating more fruits and vegetables as methods to stay healthy, and even fewer listed other practices.

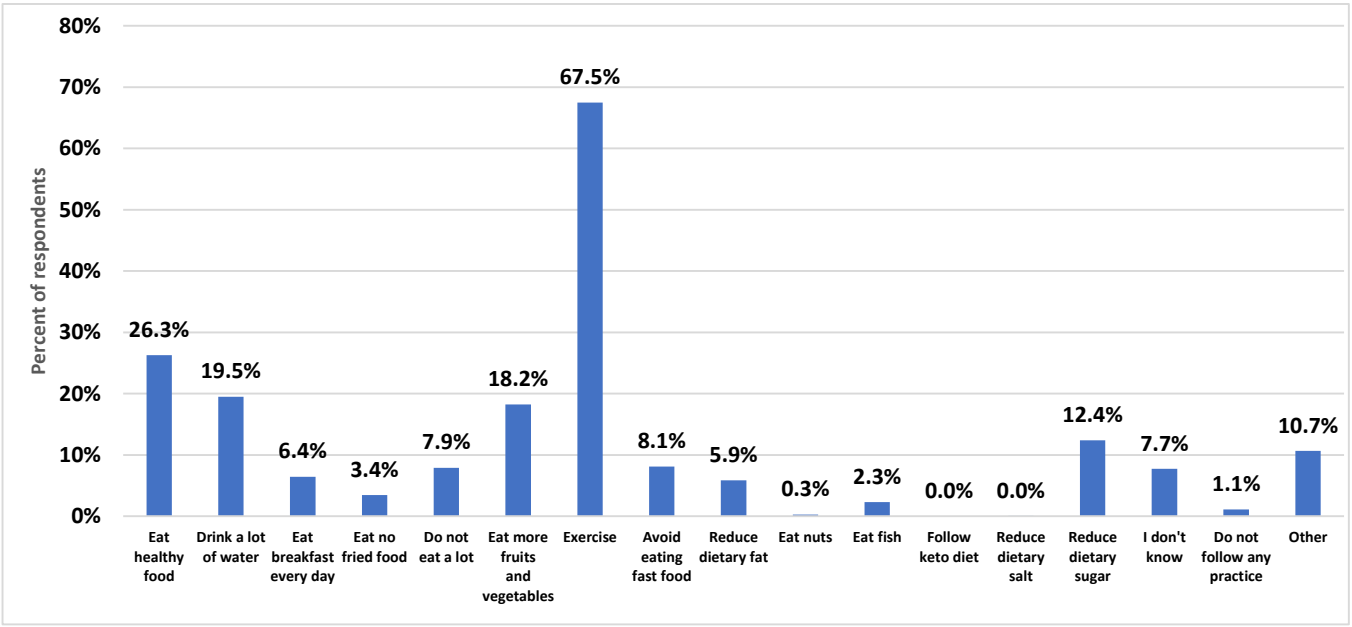

Figure 25 Practices followed by the respondent to stay healthy, adolescents 14-18 years of age

About one-half of adolescent respondents (46.8% of 287) reported that a housewife was primarily responsible for purchasing household food, and one-half (46.6% of 287) reported that this was the head of the household's responsibility. The distribution of this variable by sex and governorate is shown in Table S1 in the supplementary tables below.

A large majority of adolescent respondents reported that a housewife was mainly responsible for food preparation in the household (Figure 26). The distribution of this variable by sex and governorate is shown in Table S2.

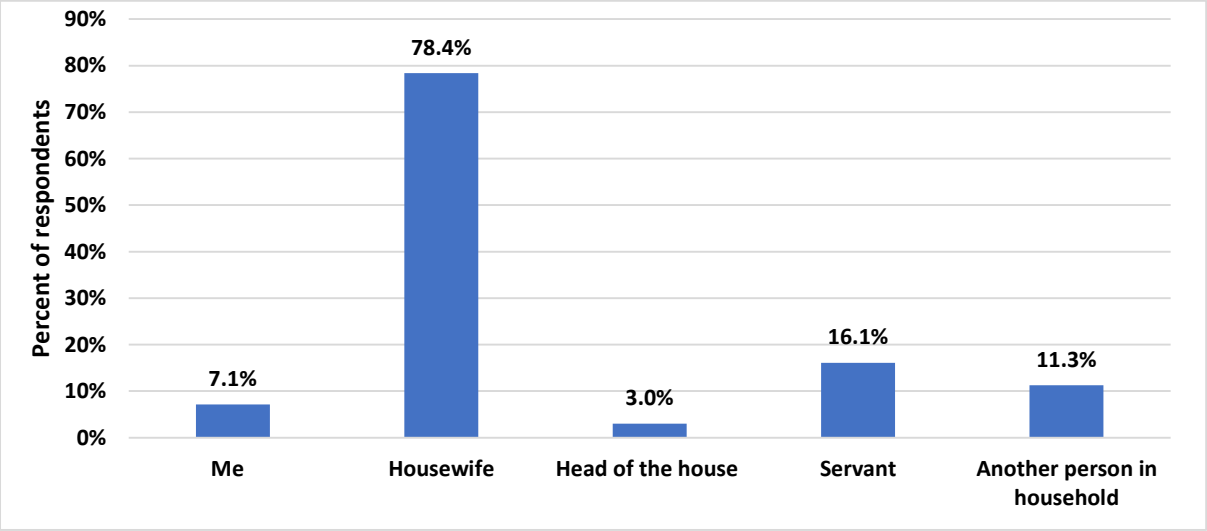

Figure 26 Main family member responsible for cooking, adolescents 14-18 years of age

Of the 16 adolescent respondents who reported being the principal household member responsible for preparing food, less than one-half reported that they prepared food in a healthy way often or always (Figure 27).

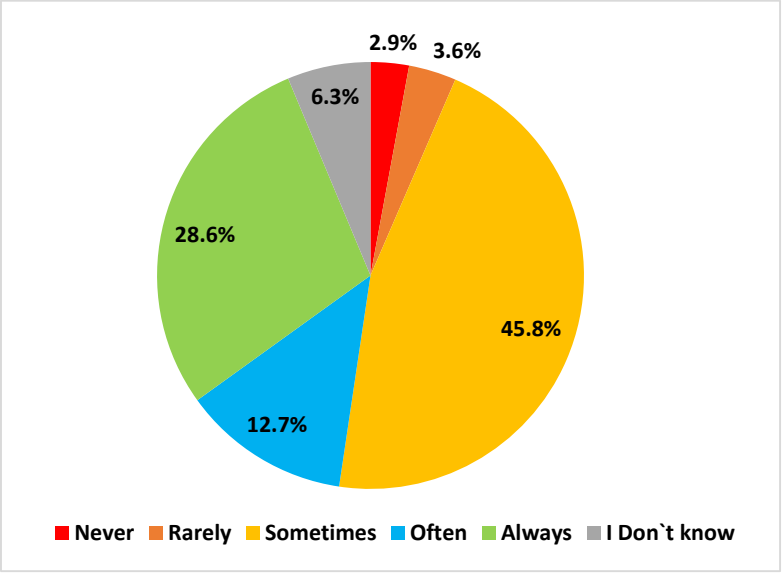

Figure 27 Participant reports preparing food in healthy way, adolescents 14-18 years of age

Of these 16 respondents who prepared food in the household, several methods of healthy food preparation were mentioned, and using less fat was by far the most common (Figure 28). No respondent mentioned preparing a diversity of foods.

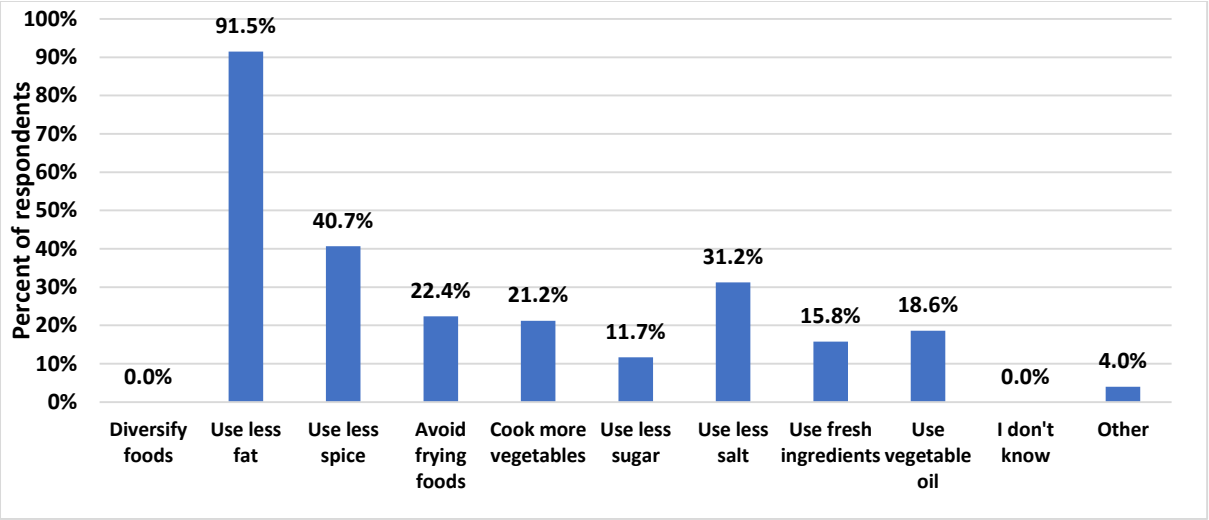

Figure 28 Of those reporting preparing food in a healthy way, frequency of various healthy ways reported, adolescents 14-18 years of age

The majority of adolescent respondents never or rarely read nutritional information on food packages before purchase (Figure 29). Among those that did, this reading did not affect food purchases in more than one-half. Less than 10% of adolescents reported counting calories in their food often or always. The variables are presented by sex and governorate of residence in **Table S3**, **Table S4**, and **Table S5**.

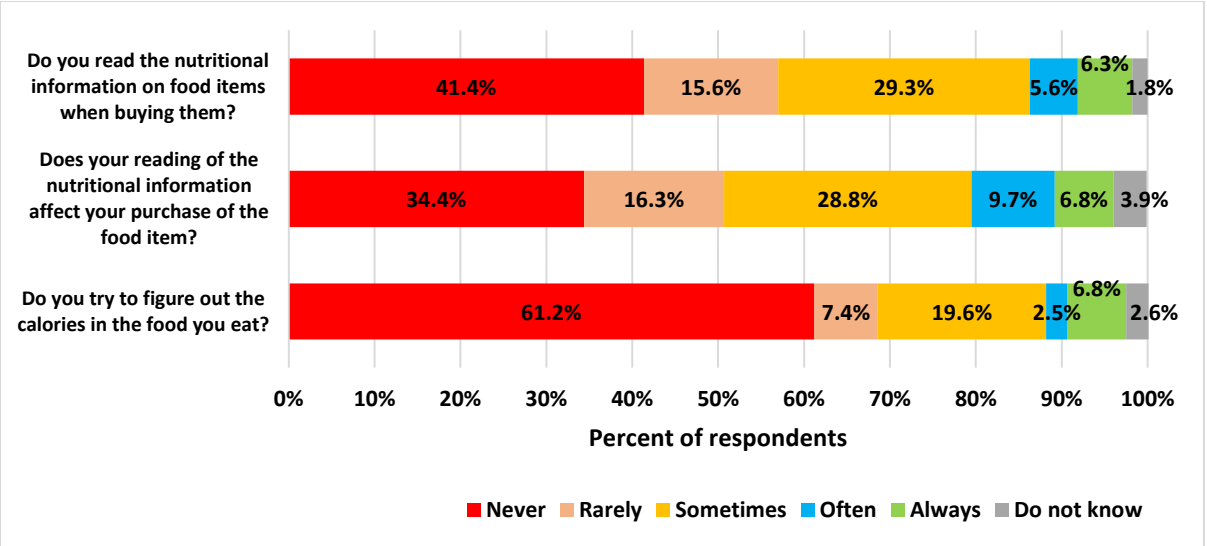

Figure 29 Frequency of various behaviors regarding nutrition information on food packaging, adolescents 14-18 years of age

Among adolescent respondents who read nutrition information on food packaging, the proportion in whom this reading affected food purchases increased with increasing educational level (**Table 8**).

Table 8. Among adolescents 14-18 years of age who read nutrition information, reported frequency of reading food package nutrition information having an effect on food purchases, by educational level

		Frequency that reading nutrition information on food packaging affected food purchases				
Educational level	**N**	**Never or rarely**	**Sometimes**	**Often or always**	**Do not know**	**P value**
Primary	7	73.4%	0%	0%	26.6%	<0.01
Elementary	74	52.9%	24.0%	19.4%	2.8%	
Secondary or more	90	46.5%	35.7%	16.3%	3.9%	

The most commonly consumed food groups reported by adolescent respondents were bread, fruit, vegetables, and dairy products (Table 9). Salty snacks and sweets, such as crisps, chocolate, and biscuits, were also commonly consumed.

Table 9. Reported frequency* of consumption of selected foods among adolescents 14-18 years of age

Food	Daily	Weekly	Monthly	Rarely
Bread	80.6%	18.1%	0.1%	1.3%
Breakfast cereal	6.0%	18.4%	13.4%	62.2%
Pastries	6.0%	42.4%	27.3%	24.4%
Legumes	15.0%	44.3%	10.5%	30.2%
Fruit	75.4%	18.1%	2.5%	3.9%
Vegetables	72.6%	15.1%	3.7%	8.6%
Dairy products	72.4%	17.8%	1.9%	7.9%
Eggs	24.2%	52.9%	5.6%	17.3%
Fish	18.1%	59.1%	5.2%	17.6%
Poultry	30.1%	64.8%	0.8%	4.3%
Red meat	7.2%	71.0%	10.8%	11.0%
Processed meat	7.8%	36.1%	20.1%	36.1%
Fast food	6.8%	33.5%	35.2%	24.5%
Crisps or chips	49.9%	35.4%	4.0%	10.6%
Chocolate or sugar biscuits	42.1%	34.7%	9.1%	14.2%
Sweets	7.1%	24.0%	22.9%	45.9%
Manufactured sweets, jam, or ice cream	11.5%	40.8%	9.9%	37.7%
Butter, cream, or mayonnaise	13.7%	30.6%	13.7%	41.9%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

Adolescents also reported commonly consuming carbonated drinks and sweetened drinks; however, the most frequently consumed beverage was Karak tea with sugar (Table 10).

Table 10. Reported frequency* of consumption of selected drinks among adolescents 14-18 years of age

Food	Daily	Weekly	Monthly	Rarely
Carbonated drinks	20.8%	36.3%	13.3%	20.8%
Energy drinks	3.7%	1.7%	4.9%	89.7%
Sweet drinks	30.7%	32.6%	11.5%	25.2%
Canned juice with added sugar	17.5%	30.0%	7.3%	45.2%
Fresh juice	7.6%	22.0%	8.2%	62.3%
Middle eastern coffee	28.8%	14.9%	4.3%	52.0%
Plain coffee with no sugar	4.1%	4.8%	4.8%	86.3%
Turkish coffee with no sugar	1.6%	2.6%	2.3%	93.5%
Coffee with milk and sugar	3.6%	16.8%	9.7%	69.9%
Coffee with milk and no sugar	1.6%	2.5%	1.1%	94.8%
Karak tea with sugar	56.9%	13.5%	5.9%	23.7%
Karak tea with no sugar	1.2%	0.8%	0.5%	97.5%
Red or green tea with sugar	15.3%	24.9%	8.0%	51.8%
Red or green tea with no sugar	2.7%	7.1%	1.7%	88.5%
Herbal tea with sugar	1.4%	5.0%	1.0%	92.6%
Herbal tea with no sugar	0.4%	1.4%	2.7%	95.4%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

Only 52 (21.8%) of adolescent respondents reported drinking 8 cups of water or more per day, while 122 (37.5%) reported drinking 5-7 cups, and 113 (40.7%) reported drinking fewer than 5 cups.

3.2. Results – Adults 19-60 years of age

3.2.1. Demographic characteristics

Table 11 below shows the characteristics of adults responding to the general healthy eating questionnaire.

Table 11. Distribution of various demographic characteristics among adults 19-60 years of age responding to the general healthy eating questionnaire

Characteristic	Unweighted number	Weighted percent
Sex		
Male	544	51.0%
Female	540	49.0%
Age (in years)		
19-29	372	35.8%
30-39	397	36.6%
40-49	232	19.6%
50-60	83	8.1%
Educational level		
Primary	51	3.7%
Elementary	112	10.8%
Secondary	517	49.2%
Diploma	159	15.6%
Bachelors or more	203	20.7%
Marital status		
Single	297	28.3%
Married	787	71.7%
Governorate		
Muscat	102	9.8%
Dhofar	58	5.8%
Ad Dakhliyah	88	8.6%
Ash Sharqiyah North	100	9.0%
Ash Sharqiyah South	108	10.4%
Al Batinah North	109	10.0%
Al Batinah South	99	9.2%
Adh Dhahirah	112	10.5%
Al Buraymi	91	8.9%
Musandam	116	8.6%
Al Wusta	101	9.4%
Household income		
<200 OMR	195	18.4%
200-499 OMR	350	32.5%
500-999 OMR	204	19.3%
1000+ OMR	109	11.2%
Don't know	226	18.5%

Characteristic	Unweighted number	Weighted percent
Type of job		
Government	267	20.3%
Private	182	20.5%
Military	82	6.7%
Retired	39	4.7%
Student	76	8.5%
Job seeker	155	15.1%
Not working	283	24.2%
Works in health field		
Yes	59	4.8%
No	781	95.2%
Buys food for household		
Respondent	441	40.8%
Other household member	643	59.2%
Who buys food for household		
Housewife	441	41.6%
Head of house	523	48.7%
Servant	12	0.2%
Other person	107	9.5%
Talked to professional about diet		
Yes	342	34.3%
No	722	64.3%
Unknown	20	1.4%
Tried to lose weight		
Yes	522	49.9%
No	545	49.6%
Unknown	17	0.5%
Has disease		
Hypertension	84	7.9%
Diabetes	79	7.2%
Heart disease	15	1.2%
Overweight or obesity	140	15.3%

3.2.2. Knowledge

As can be seen in **Table 12** below, the level of knowledge was quite low among adults in the Sultanate of Oman. This was especially true of males. The composite knowledge score increased with increasing educational level and was higher in married than in unmarried adults. There was no statistically significant differences in score by age, household income, type of work, or governorate. On the other hand, adults who had consulted a professional about nutrition and those who had attempted to lose weight in the past had higher scores.

Table 12. Composite index for general healthy eating knowledge of adults 19-60 years of age, by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	538	52.3%	(46.7, 57.8)	46.4%	(40.8, 52.0)	1.4%	(0.5, 3.7)	<0.001
Female	532	36.0%	(29.8, 42.8)	60.9%	(54.7, 66.7)	3.1%	(1.7, 5.5)	
Age								
19-29	370	48.6%	(43.3, 53.9)	50.2%	(44.8, 55.6)	1.2%	(0.4, 3.1)	0.085
30-39	391	39.1%	(32.5, 46.0)	58.3%	(51.7, 64.7)	2.6%	(1.3, 5.2)	
40-49	227	42.5%	(32.9, 52.7)	53.1%	(42.7, 63.2)	4.4%	(1.9, 10.1)	
50-60	82	55.0%	(38.5, 70.5)	45.0%	(29.5, 61.5)	0%	-	
Educational level								
Primary	49	54.9%	(37.0, 71.6)	45.1%	(28.4, 63.0)	0%	-	<0.001
Elementary	110	54.8%	(41.3, 67.6)	43.1%	(30.1, 57.2)	2.1%	(0.5, 8.9)	
Secondary	511	54.9%	(48.7, 61.0)	44.1%	(37.8, 50.5)	1.0%	(0.4, 2.3)	
Diploma	158	31.5%	(22.9, 41.5)	62.2%	(51.0, 72.3)	6.3%	(2.8, 13.6)	
Bachelors or more	200	17.6%	(11.9, 25.3)	79.7%	(72.3, 85.5)	2.7%	(1.1, 6.6)	
Marital status								
Not married	293	55.2%	(47.1, 62.9)	43.8%	(35.7, 52.3)	1.0%	(0.3, 3.7)	<0.01
Married	777	40.3%	(35.4, 45.4)	57.0%	(51.8, 62.1)	2.7%	(1.6, 4.6)	
Governorate								
Muscat	102	53.9%	(45.5, 62.2)	45.1%	(36.5, 53.9)	1.0%	(0.1, 7.2)	0.166
Dhofar	54	71.9%	(55.4, 84.0)	28.1%	(16.0, 44.6)	0%	-	
Ad Dakhliyah	88	32.0%	(22.6, 43.2)	65.7%	(54.5, 75.4)	2.2%	(0.4, 11.2)	
Ash Sharqiyah North	100	44.2%	(31.8, 57.3)	55.8%	(42.7, 68.2)	0%	-	
Ash Sharqiyah South	104	29.9%	(22.7, 38.1)	62.5%	(51.6, 72.2)	7.7%	(3.9,14.6)	
Al Batinah North	108	36.6%	(27.5, 46.8)	59.6%	(49.3, 69.2)	3.8%	(1.7, 8.2)	
Al Batinah South	97	40.7%	(34.3, 47.4)	58.2%	(51.1, 65.0)	1.1%	(0.2, 6.4)	
Adh Dhahirah	110	48.3%	(30.9, 66.1)	50.8%	(33.6, 67.8)	0.9%	(0.1, 6.4)	
Al Buraymi	90	40.2%	(34.1, 46.7)	55.3%	(47.4, 63.0)	4.4%	(3.2, 6.2)	
Musandam	116	45.1%	NA*	46.6%	NA*	8.3%	NA*	
Al Wusta	101	70.2%	(67.2, 73.0)	29.8%	(27.0, 32.8)	0%	-	
Household income								
<200 OMR	193	48.3%	(39.1, 57.5)	49.8%	(40.9, 58.8)	1.9%	(0.8, 4.4)	0.242
200-499 OMR	348	43.8%	(37.7, 50.2)	53.5%	(47.3, 59.6)	2.6%	(1.2, 5.7)	
500-999 OMR	201	40.1%	(32.1, 48.6)	59.3%	(50.7, 67.3)	0.6%	(0.2, 2.6)	
1000+ OMR	108	42.7%	(30.9, 55.4)	51.9%	(39.5, 64.2)	5.4%	(2.1, 12.7)	
Do not know	220	47.6%	(39.4, 55.8)	50.9%	(42.8, 59.0)	1.5%	(0.5, 5.2)	
Type of job								
Government	265	38.4%	(30.9, 46.6)	57.1%	(49.7, 64.1)	4.5%	(2.1, 9.3)	0.184
Private	179	49.7%	(41.9, 57.4)	49.7%	(42.0, 57.4)	0.6%	(0.2, 2.4)	
Military	81	45.1%	(31.6, 59.3)	53.8%	(39.3, 67.6)	1.2%	(0.2, 7.0)	
Retired	39	51.1%	(33.7, 68.2)	42.2%	(25.0, 61.6)	6.7%	(1.6, 24.1)	
Student	76	51.0%	(37.2, 64.8)	47.1%	(33.9, 60.7)	1.9%	(0.3, 11.2)	
Looking for work	151	43.5%	(34.8, 52.5)	55.3%	(46.3, 63.9)	1.3%	(0.2, 8.2)	
Not working	279	41.9%	(35.7, 48.4)	56.2%	(49.7, 62.5)	1.8%	(0.7, 4.5)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Works in health field								
Yes	57	15.3%	(6.0, 33.9)	74.5%	(55.1, 87.5)	10.2%	(3.5, 26.5)	<0.01
No	773	41.5%	(37.0, 46.1)	56.4%	(51.9, 60.8)	2.1%	(1.1, 4.1)	
Buys food for household								
Yes	434	40.5%	(33.8, 47.6)	56.1%	(49.0, 62.9)	3.4%	(1.9, 6.0)	<0.05
No	636	47.2%	(43.1, 51.3)	51.4%	(47.4, 55.4)	1.4%	(0.7, 2.8)	
Who buys food for household								
Housewife	437	42.0%	(35.1, 49.2)	54.4%	(47.3, 61.3)	3.6%	(2.2, 5.9)	0.219
Head of house	514	46.5%	(41.3, 51.8)	52.3%	(46.9, 57.6)	1.2%	(0.4, 3.3)	
Servant	12	93.0%	(67.3, 98.9)	7.0%	(1.1, 32.7)	0%	-	
Other person	106	43.3%	(32.2, 55.1)	55.1%	(43.9, 65.8)	1.6%	(0.2, 10.6)	
Talked to professional about diet								
Yes	333	37.5%	(30.3, 45.2)	58.8%	(51.7, 65.6)	3.7%	(1.9, 7.1)	<0.01
No	717	47.7%	(43.2, 52.2)	50.8%	(46.0, 55.6)	1.5%	(0.8, 2.8)	
Tried to lose weight								
Yes	512	34.7%	(28.9, 41.1)	61.6%	(55.5, 67.2)	3.7%	(2.0, 6.9)	<0.001
No	541	54.2%	(49.1, 59.3)	45.0%	(40.0, 50.1)	0.8%	(0.3, 2.0)	
Has hypertension								
Yes	81	32.1%	(21.3, 45.1)	61.6%	(48.6, 73.2)	6.3%	(2.2, 16.6)	<0.05
No	989	45.5%	(41.2, 49.9)	52.6%	(48.1, 57.0)	1.9%	(1.1, 3.3)	
Has diabetes								
Yes	78	44.1%	(29.6, 59.8)	54.9%	(39.4, 69.5)	1.0%	(0.1, 7.0)	0.741
No	992	44.5%	(40.3, 48.8)	53.2%	(48.8, 57.5)	2.3%	(1.4, 3.9)	
Has heart disease								
Yes	15	17.1%	(3.7, 52.9)	56.2%	(22.9, 84.7)	26.7%	(6.0, 67.6)	<0.001
No	1055	44.8%	(40.6, 49.2)	53.3%	(48.9, 57.6)	1.9%	(1.1, 3.4)	
Is overweight or obese								
Yes	136	40.4%	(32.3, 49.2)	58.9%	(50.1, 67.1)	0.7%	(0.2, 2.9)	0.081
No	934	45.2%	(41.1, 49.3)	52.3%	(48.1, 56.5)	2.5%	(1.4, 4.3)	
TOTAL	**1070**	**44.5%**	**(40.3, 48.8)**	**53.3%**	**(49.1, 57.5)**	**2.2%**	**(1.3, 3.8)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

Most adults correctly identified which foods health experts recommend increasing or decreasing consumption (Figure 30). For whole grains were the opinions of respondents more mixed.

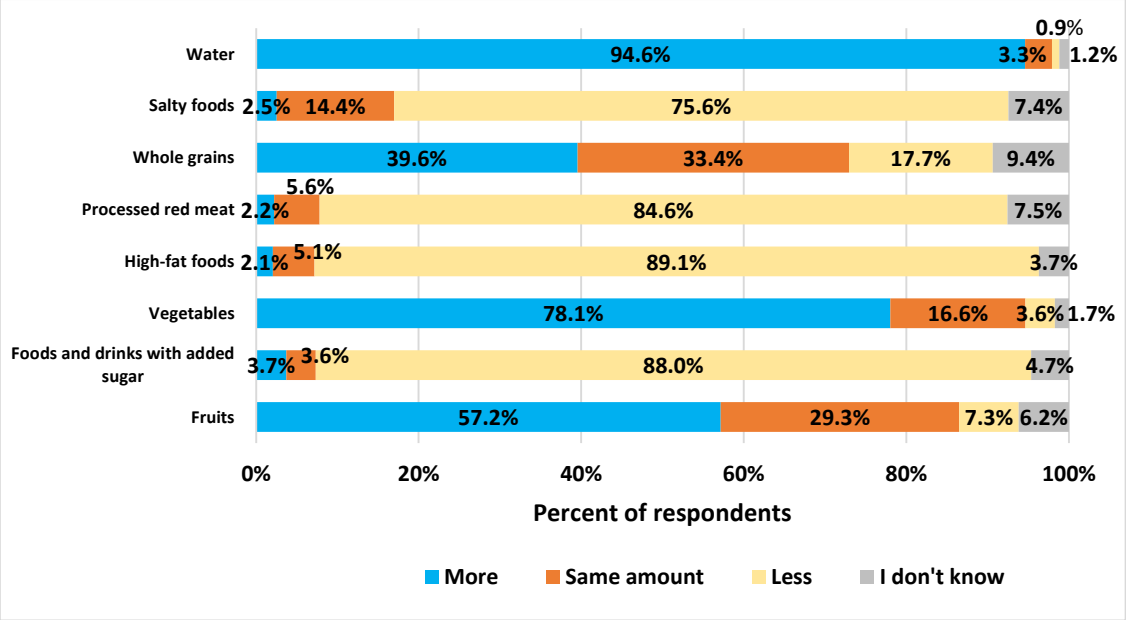

Figure 30 Health expert recommendations regarding increasing or decreasing consumption of types of foods, adults 19-60 years of age

On the other hand, few adults correctly identified that health experts recommend eating fruits and vegetables five or more times per day (Figure 31).

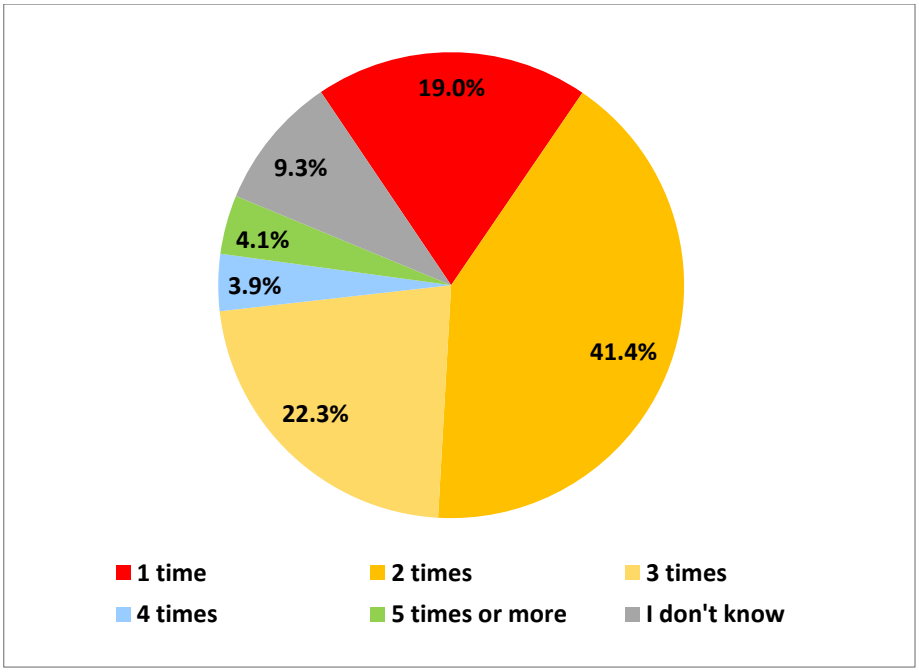

Figure 31 Health expert recommendations regarding number of times daily to eat fruits and vegetables, adults 19-60 years of age

More than one-half of adults correctly identified recommendations regarding what type of dairy products should be consumed; that is, low-fat such as skimmed milk and low-fat cheese and other dairy products (Figure 32).

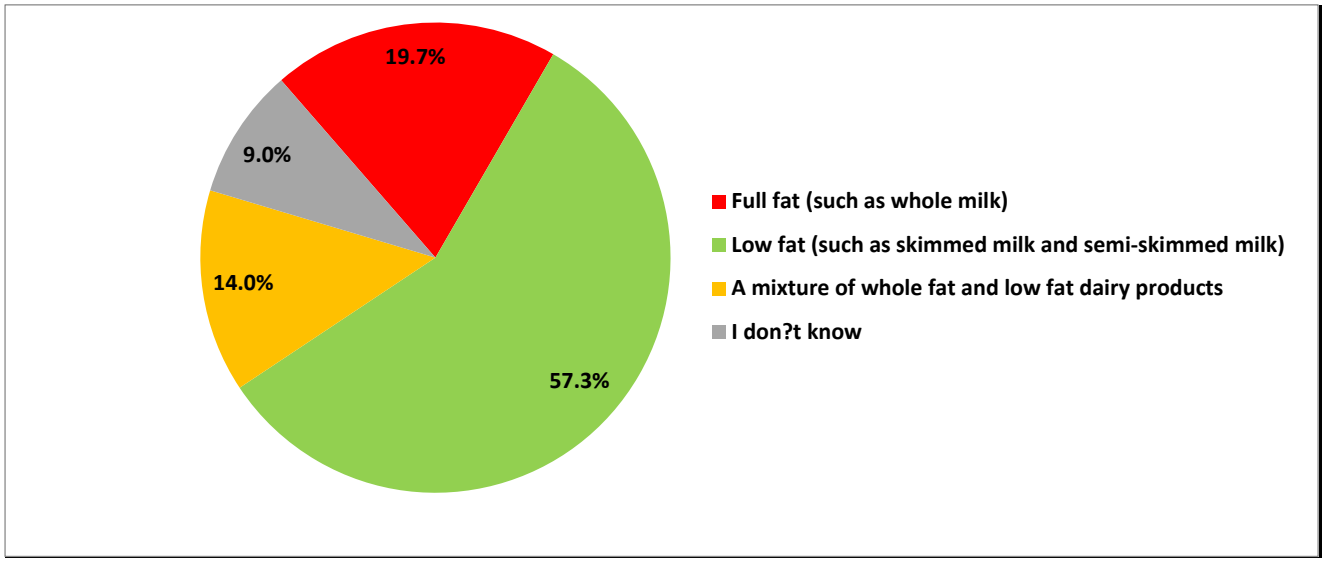

Figure 32 Health experts recommendations regarding desirable dairy products, adults 19-60 years of age

Many adults correctly identified whether or not selected foods contained added sugar, as shown in Figure 33. The one exception to this is diet carbonated beverages, which about one-half of adults incorrectly identified as having substantial added sugar.

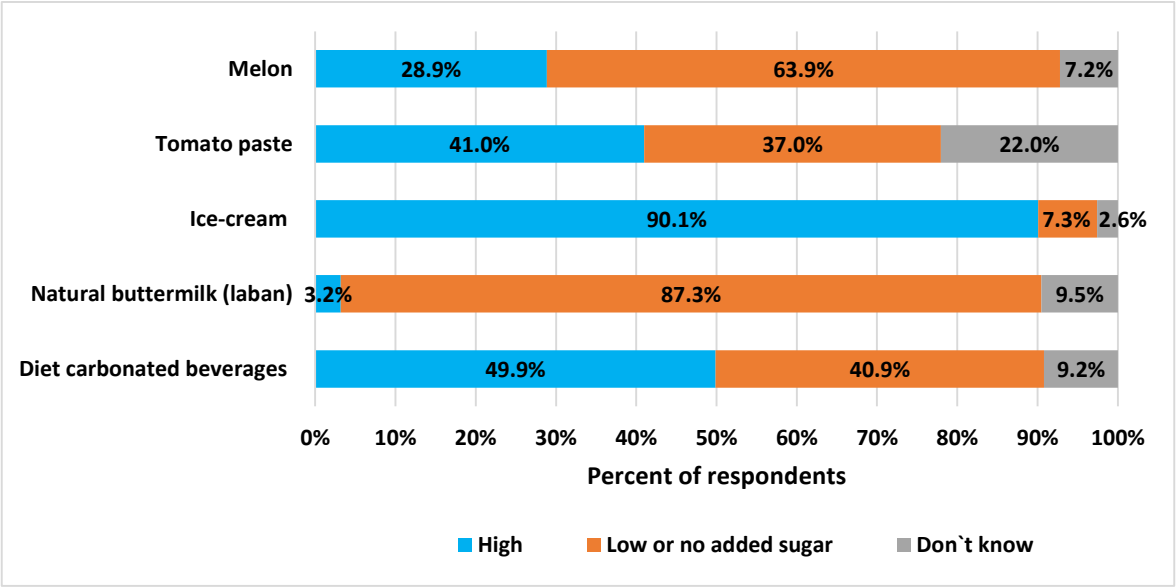

Figure 33 Perceived added sugar content of certain foods, adults 19-60 years of age

Adults' knowledge of the fiber content of selected foods was less complete (Figure 34). Between 24% and 31% incorrectly identified the relatively low-fiber foods pasta, egg, and white rice as high in the fiber.

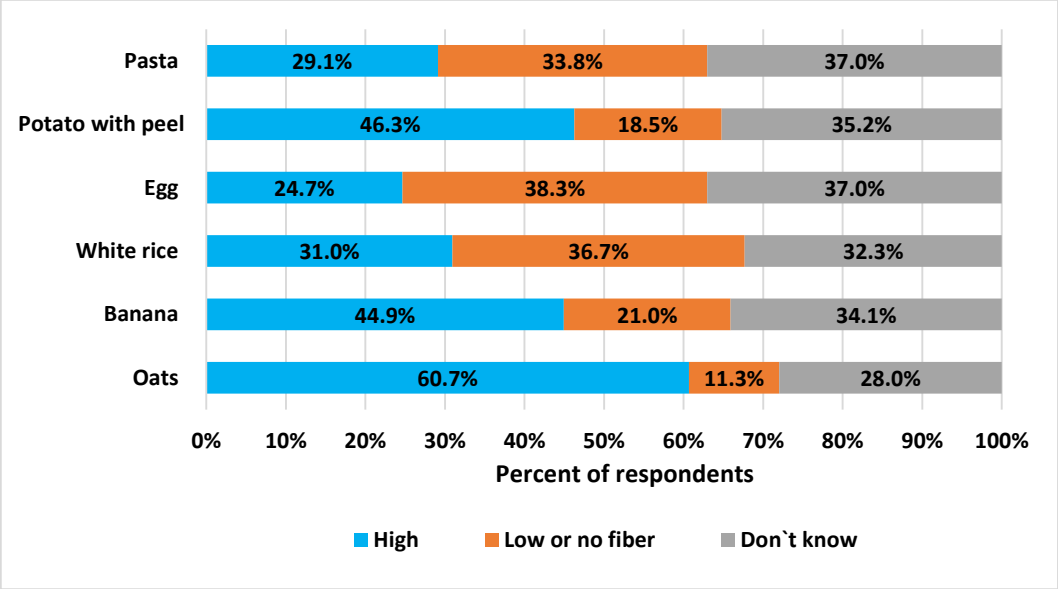

Figure 34 Perceived fiber content of certain foods, adults 19-60 years of age

Although many adults correctly identified nuts, cheese, and poultry as good sources of protein, almost one-half incorrectly identified fruit as a good source (Figure 35).

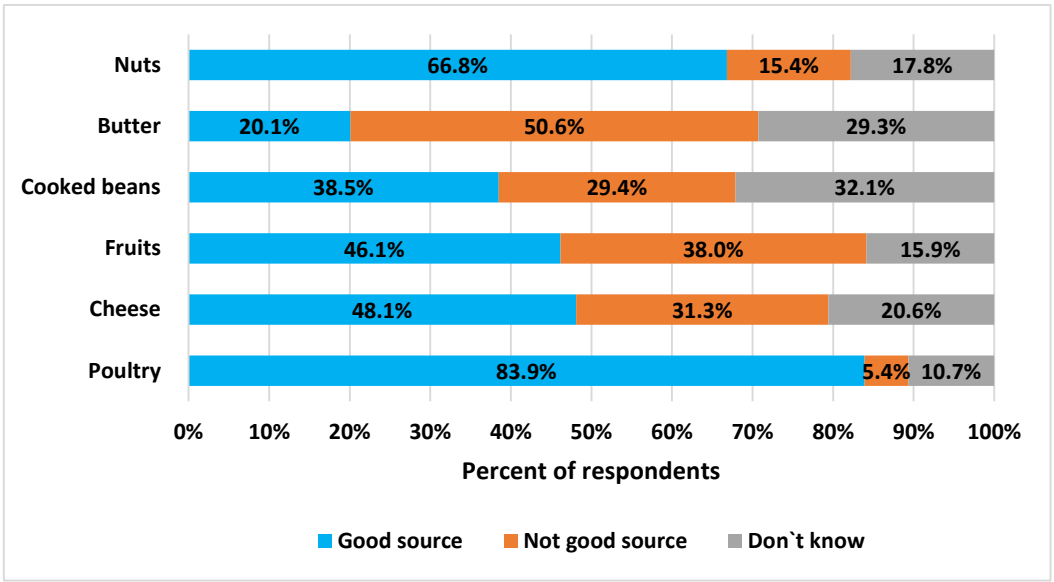

Figure 35 Perceived protein content of certain foods, adults 19-60 years of age

Although more than three-quarters of adults identified bread as high in starch, a smaller proportion identified rice and potatoes as similarly high in starch (Figure 36). Moreover, a substantial minority of adults stated incorrectly that nuts, eggs, and cheese were a source of starch.

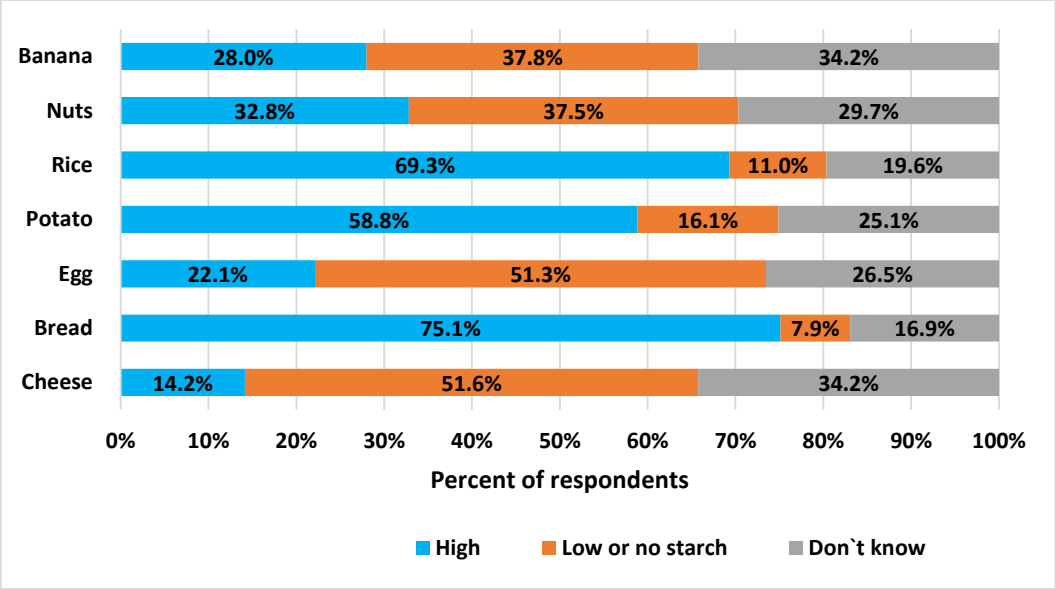

Figure 36 Perceived starch content of certain foods, adults 19-60 years of age

Almost one-half of adults could not identify the main types of fat in the selected foods shown in Figure 37. Among adults offering a response, relatively few correctly identified unsaturated fat as the main fat in eggs and sunflower oil. A higher proportion reported correctly that unsaturated fat was the main fat in olive oil and that saturated fat was the main fat in butter.

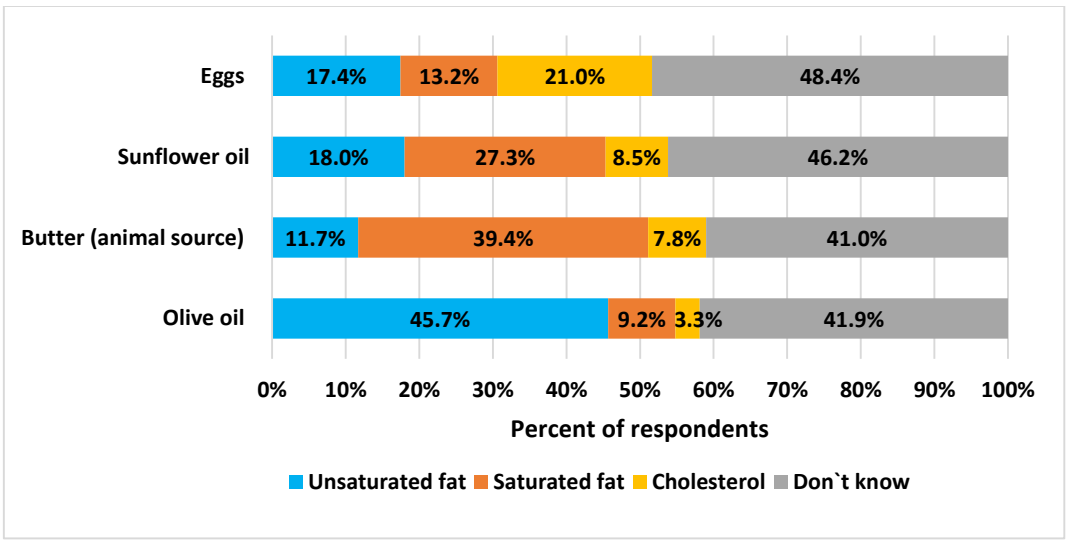

Figure 37 Main type of fat in certain foods, adults 19-60 years of age

As a with the question above regarding the main type of fat in selected foods, the substantial proportion of adults could not give an answer regarding which selected foods contain trans fats (Figure 38). Nonetheless, almost one-half correctly identified baked goods as high in trans fats, and few incorrectly identified fish and canola oil as high in trans fats.

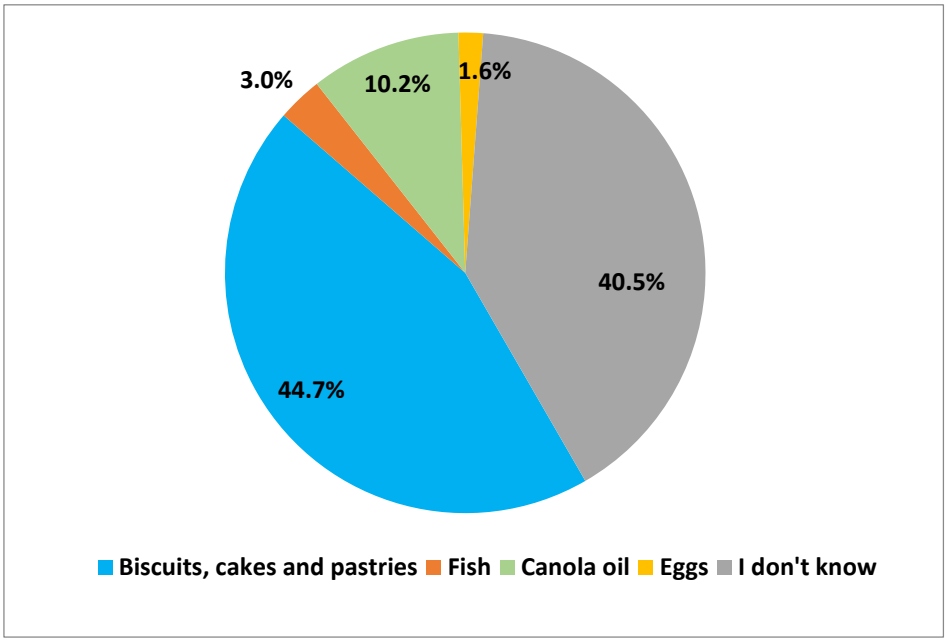

Figure 38 Food containing the greatest amount of trans fat, adults 19-60 years of age

3.2.3. Attitudes

Overall, a larger proportion of adults had positive attitudes than had correct knowledge (**Table 13**). Between one-third and one-half of adults in each demographic subgroups had moderate general healthy eating attitudes, and relatively few had negative attitudes. There were statistically significant differences among governorates, and adults who had tried to lose weight had significantly better attitudes than those who had not.

Table 13. Composite index for general healthy eating attitude of adults 19-60 years of age, by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	537	10.2%	(6.4, 15.9)	40.3%	(34.6, 46.3)	49.5%	(43.6, 55.3)	0.108
Female	531	7.9%	(5.1, 12.0)	34.2%	(28.5, 40.4)	57.9%	(51.9, 63.7)	
Age								
19-29	370	11.2%	(6.9, 17.7)	34.8%	(28.1, 42.2)	54.0%	(47.3, 60.5)	0.662
30-39	389	8.7%	(4.8, 15.2)	40.1%	(33.2, 47.4)	51.2%	(44.5, 57.9)	
40-49	227	6.9%	(3.0, 14.8)	39.4%	(31.2, 48.3)	53.7%	(44.2, 62.9)	
50-60	82	6.3%	(2.5, 15.3)	31.7%	(19.2, 47.6)	61.9%	(47.5, 74.5)	
Educational level								
Primary	49	11.2%	(4.0, 27.7)	38.9%	(25.1, 54.8)	49.9%	(33.3, 66.5)	0.557
Elementary	110	9.7%	(4.6, 19.4)	39.9%	(30.4, 50.2)	50.4%	(38.7, 62.0)	
Secondary	511	8.7%	(5.5, 13.6)	40.0%	(35.4, 44.8)	51.2%	(46.7, 55.7)	
Diploma	158	7.5%	(4.1, 13.3)	35.3%	(27.5, 43.9)	57.3%	(48.0, 66.1)	
Bachelors or more	198	5.5%	(2.5, 11.7)	33.0%	(25.1, 42.0)	61.4%	(51.8, 70.3)	
Marital status								
Not married	293	12.3%	(8.1, 18.2)	38.1%	(31.6, 45.0)	49.6%	(43.2, 56.1)	0.081
Married	775	7.8%	(5.0, 11.8)	37.1%	(32.7, 41.7)	55.1%	(50.9, 59.4)	
Governorate								
Muscat	102	11.8%	(6.0, 21.9)	38.2%	(30.3, 46.8)	50.0%	(42.7, 57.3)	<0.001
Dhofar	54	30.3%	(12.2, 57.7)	50.0%	(31.4, 68.6)	19.7%	(12.1, 30.4)	
Ad Dakhliyah	88	3.4%	(1.5, 7.7)	34.1%	(27.3, 41.7)	62.5%	(55.4, 69.1)	
Ash Sharqiyah North	100	3.1%	(1.1, 8.5)	21.0%	(16.0, 27.0)	75.9%	(66.4, 83.4)	
Ash Sharqiyah South	104	2.9%	(1.6, 5.1)	35.7%	(27.1, 45.2)	61.4%	(52.5, 69.7)	
Al Batinah North	107	6.6%	(2.4, 16.6)	32.5%	(22.8, 43.9)	60.9%	(48.6, 72.0)	
Al Batinah South	97	4.1%	(2.4, 7.0)	47.1%	(40.6, 53.7)	48.8%	(43.9, 53.7)	
Adh Dhahirah	109	7.3%	(4.7, 11.4)	40.4%	(27.9, 54.3)	52.2%	(37.9, 66.2)	
Al Buraymi	90	9.6%	(5.1, 17.2)	34.8%	(32.5, 37.3)	55.6%	(52.1,58.9)	
Musandam	116	18.9%	NA*	33.1%	NA*	48.0%	NA*	
Al Wusta	101	33.7%	(24.0, 44.9)	48.6%	(44.8, 52.5)	17.7%	(11.5, 26.2)	
Household income								
<200 OMR	193	6.2%	(2.8, 12.9)	41.0%	(32.0, 50.5)	52.9%	(43.6, 61.9)	0.457
200-499 OMR	348	10.0%	(6.5, 15.1)	36.4%	(30.4, 42.9)	53.6%	(47.0, 60.1)	
500-999 OMR	200	5.9%	(2.8, 11.8)	39.7%	(31.5, 48.5)	54.5%	(45.6, 63.1)	
1000+ OMR	107	8.9%	(4.3, 17.4)	38.3%	(27.4, 50.4)	52.9%	(38.6, 66.6)	
Do not know	220	13.7%	(8.0, 22.4)	32.5%	(25.9, 39.9)	53.8%	(44.8, 62.5)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Type of job								
Government	263	7.9%	(4.8, 12.8)	41.6%	(34.3, 49.3)	50.4%	(42.4, 58.5)	0.116
Private	179	9.7%	(5.8, 15.8)	44.3%	(35.1, 53.9)	46.0%	(37.4, 54.9)	
Military	81	5.2%	(1.7, 14.8)	40.1%	(27.3, 54.5)	54.7%	(40.3, 68.3)	
Retired	39	0.1%	(0.1, 0.2)	31.2%	(17.3, 49.5)	68.7%	(50.4, 82.6)	
Student	76	7.6%	(3.1, 17.6)	38.8%	(28.1,50.7)	53.5%	(42.6,64.1)	
Looking for work	151	13.8%	(7.1, 25.0)	29.5%	(19.8, 41.6)	56.7%	(44.7, 67.9)	
Not working	279	9.8%	(5.9, 15.8)	32.7%	(26.6, 39.3)	57.5%	(50.5, 64.2)	
Works in health field								
Yes	57	4.7%	(0.9, 20.9)	29.2%	(17.4, 44.8)	66.1%	(47.6, 80.6)	0.410
No	771	7.8%	(5.5, 11.0)	37.8%	(33.2, 42.5)	54.4%	(49.5, 59.3)	
Buys food for household								
Yes	433	6.2%	(3.6, 10.5)	38.4%	(32.5, 44.6)	55.4%	(49.5, 61.2)	0.122
No	635	11.0%	(7.7, 15.4)	36.7%	(31.1, 42.6)	52.3%	(46.4, 58.2)	
Who buys food for household								
Housewife	436	6.4%	(3.6, 11.0)	38.1%	(33.2, 43.3)	55.5%	(51.3, 59.7)	<0.05
Head of house	513	10.3%	(7.1, 14.7)	37.3%	(31.9, 43.0)	52.4%	(46.2, 58.5)	
Servant	12	68.6%	(14.7, 96.5)	24.4%	(3.1, 76.4)	7.0%	(1.1, 32.7)	
Other person	106	12.9%	(5.3, 28.1)	34.5%	(24.4, 46.3)	52.6%	(40.2, 64.8)	
Talked to professional about diet								
Yes	333	7.0%	(4.1, 11.6)	35.3%	(29.7, 41.4)	57.7%	(51.7, 63.4)	0.281
No	715	10.3%	(6.6, 15.7)	38.1%	(32.8, 43.6)	51.6%	(46.0, 57.2)	
Tried to lose weight								
Yes	510	6.0%	(4.2, 8.7)	33.3%	(28.1, 38.8)	60.7%	(54.8, 66.3)	<0.001
No	541	12.1%	(7.8, 18.1)	40.9%	(35.6, 46.5)	47.0%	(41.5, 52.6)	
Has hypertension								
Yes	81	6.6%	(2.2, 17.9)	32.0%	(22.2, 43.8)	61.4%	(48.1, 73.1)	0.455
No	987	9.3%	(6.4, 13.2)	37.8%	(33.6, 42.2)	52.9%	(48.7, 57.2)	
Has diabetes								
Yes	77	11.2%	(4.1, 27.1)	43.4%	(30.1, 57.8)	45.3%	(32.0, 59.4)	0.565
No	991	8.9%	(6.0, 12.9)	36.9%	(32.7, 41.3)	54.2%	(49.7, 58.6)	
Has heart disease								
Yes	15	1.2%	(0.3, 4.6)	28.3%	(7.2, 66.7)	70.5%	(32.9, 92.1)	.0327
No	1053	9.1%	(6.4, 12.9)	37.5%	(33.4, 41.8)	53.4%	(49.3, 57.4)	
Is overweight or obese								
Yes	136	5.6%	(2.2, 13.2)	40.4%	(31.1, 50.4)	54.1%	(44.9, 63.0)	0.394
No	932	9.7%	(6.6, 13.9)	36.8%	(32.8, 41.0)	53.5%	(49.2, 57.7)	
TOTAL	**1068**	**9.0%**	**(6.3,12.8)**	**37.4%**	**(33.4,41.5)**	**53.6%**	**(49.6,57.5)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

Most adults thought they were an excellent or good health (Figure 39).

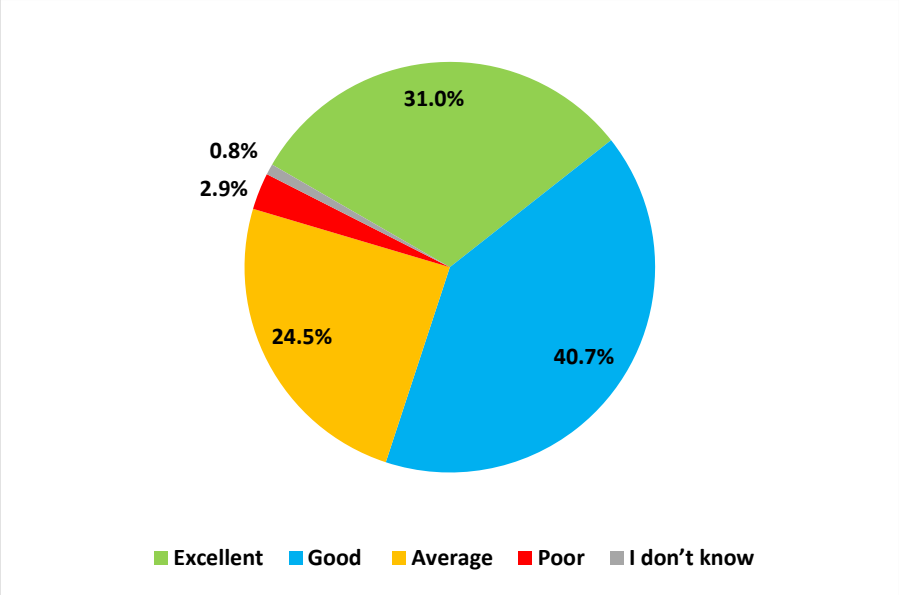

Figure 39 Respondents' rating of their own health in relation to age at the moment, adults 19-60 years of age

Most adult respondents rated their risk of developing chronic disease as zero or small (Figure 40).

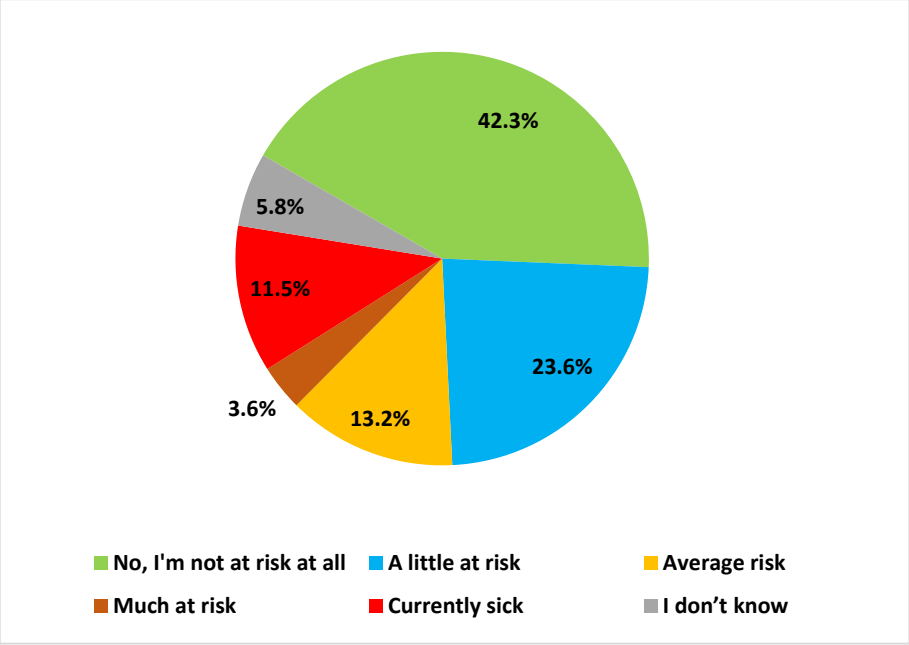

Figure 40 Respondents' rating of their risk of developing chronic diseases, adults 19-60 years of age

Among those adults who thought they were at risk for developing chronic diseases, the most common reason for this idea was eating an unhealthy diet. An almost equal proportion thought heredity was the cause. A smaller proportion thought they were at risk because of lack of exercise or because they were currently overweight (Figure 41).

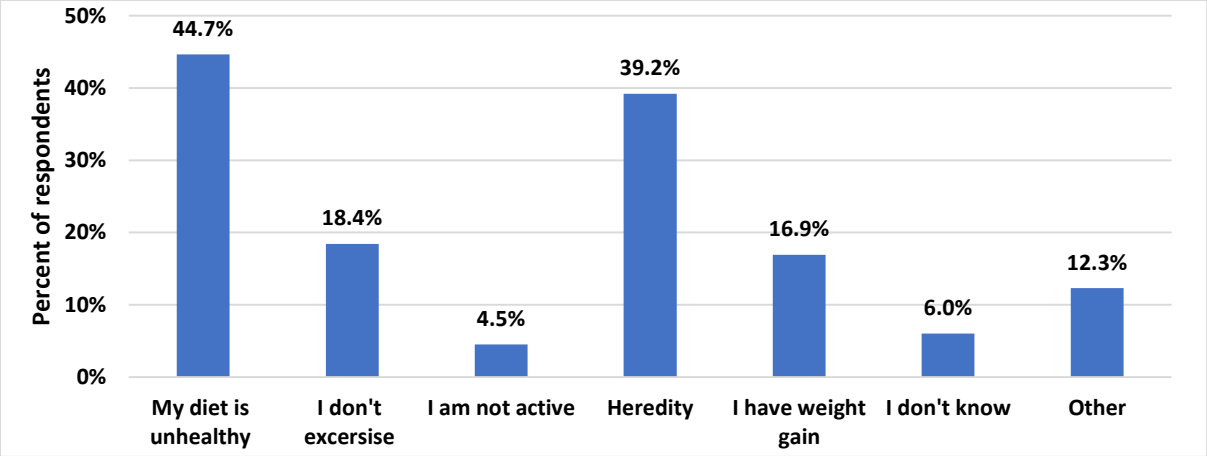

Figure 41 Respondents' reasons for their risk assessment, adults 19-60 years of age

Adults' responses to the questions listed below in Figure 42 and Figure 43 demonstrated substantial knowledge of the importance of eating a healthy diet while at the same time demonstrating their recognition of several obstacles to obtain this goal.

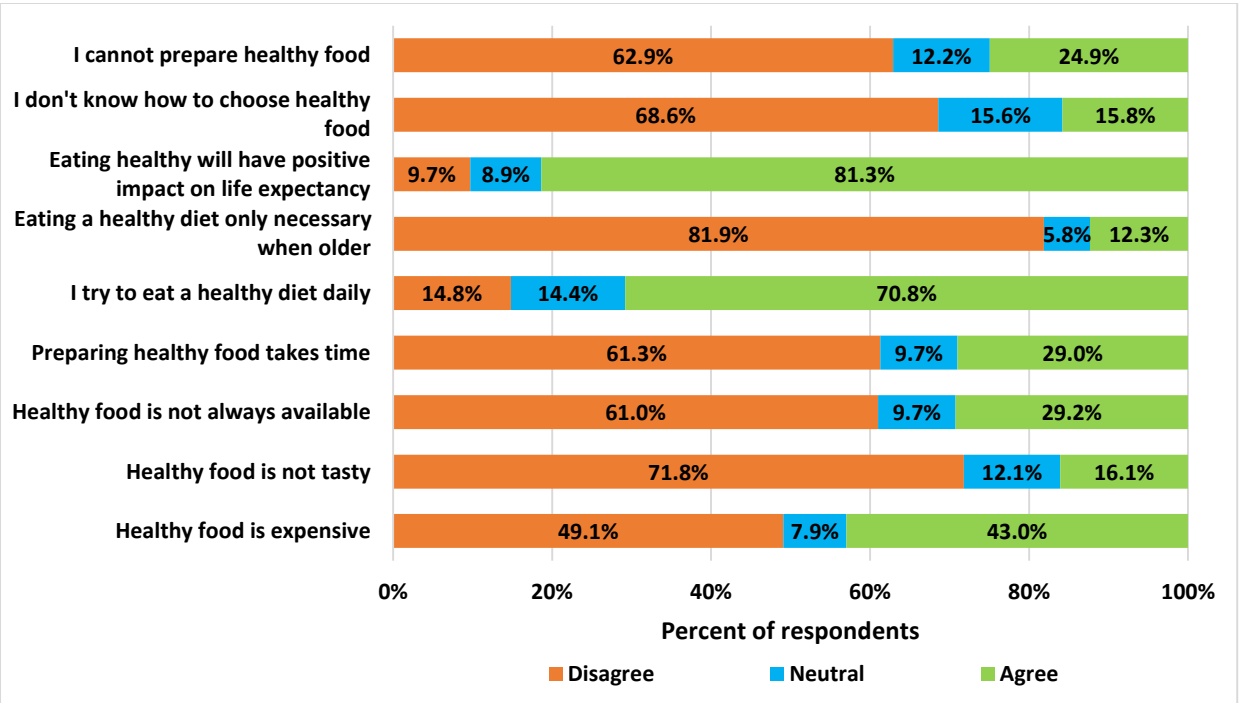

Figure 42 Respondents' agreement with various statements, adults 19-60 years of age

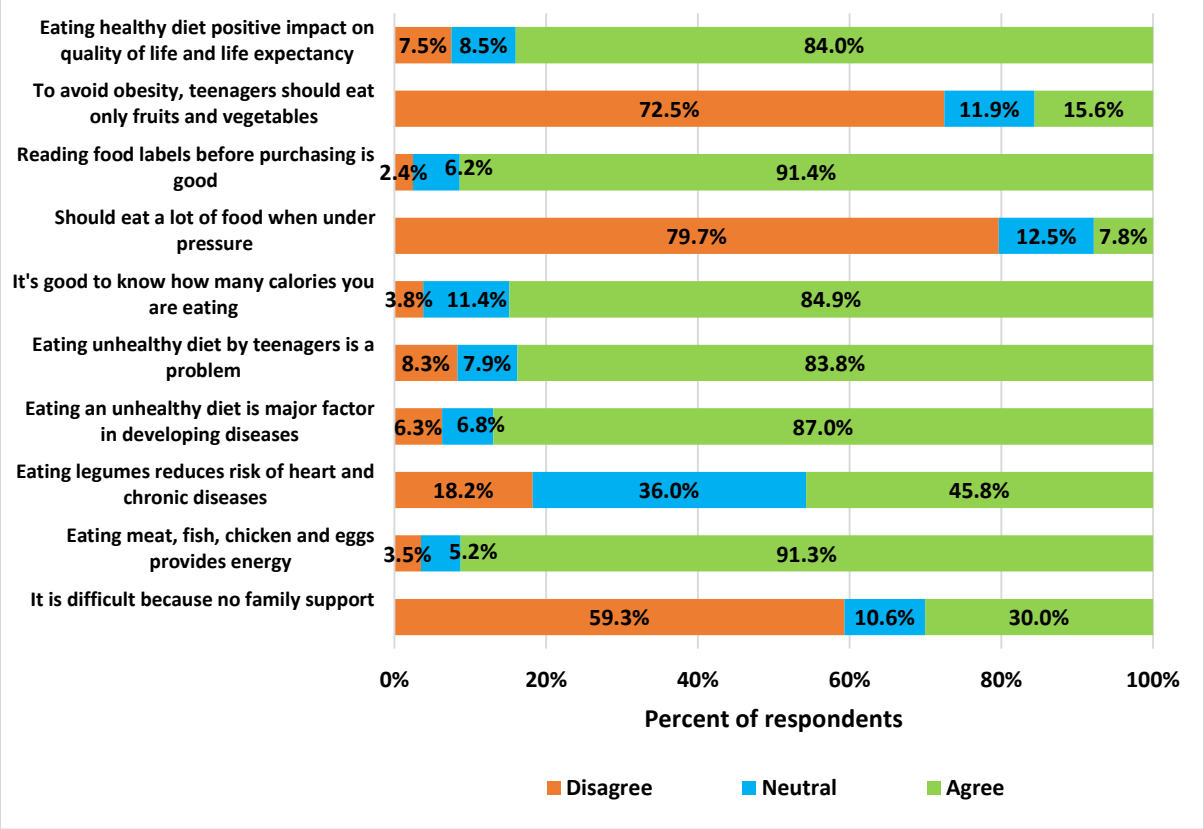

Figure 43 Respondents' agreement with various statements, adults 19-60 years of age

Almost one-third of adult respondents most recently obtained information about healthy foods from the internet (Figure 44). Other commonly cited sources include a doctor, a dietician, and various social media outlets.

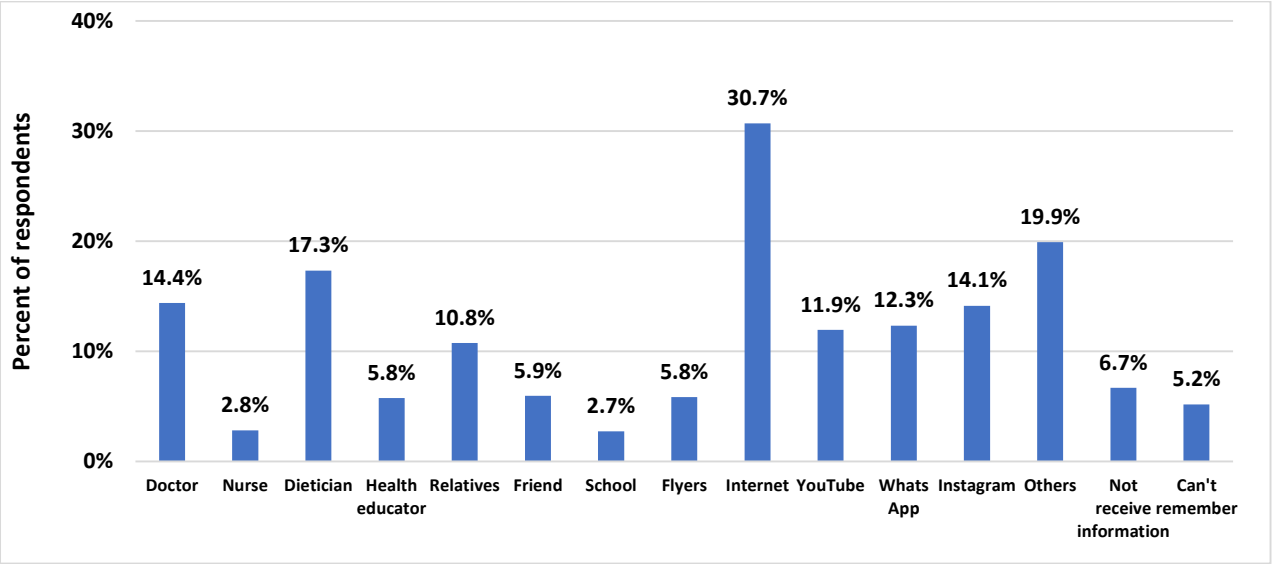

Figure 44 Where respondents reported getting information about healthy foods most recently, adults 19-60 years of age

Almost two-thirds of adult respondents reported usually getting information about healthy foods from the internet (Figure 45). Other sources were cited less commonly.

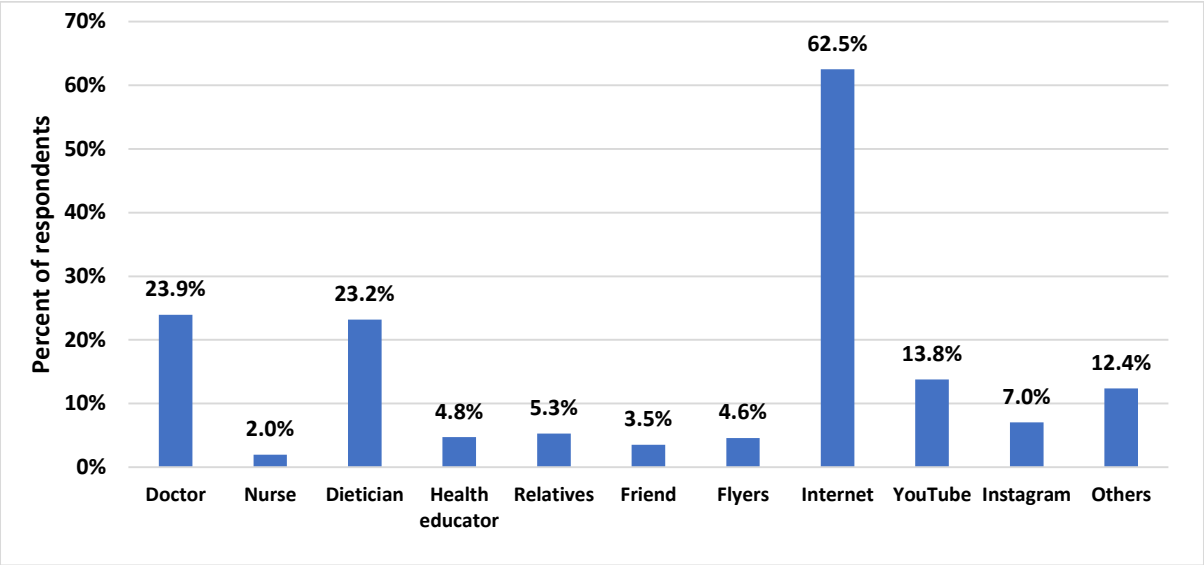

Figure 45 Where respondents reported usually getting information about healthy food, adults 19-60 years of age

Only 148 (16.7%) of adults reported reading newspapers or magazines. Of these 148 adults, the most commonly reported newspaper or magazine was Al Watan and Oman (Figure 46).

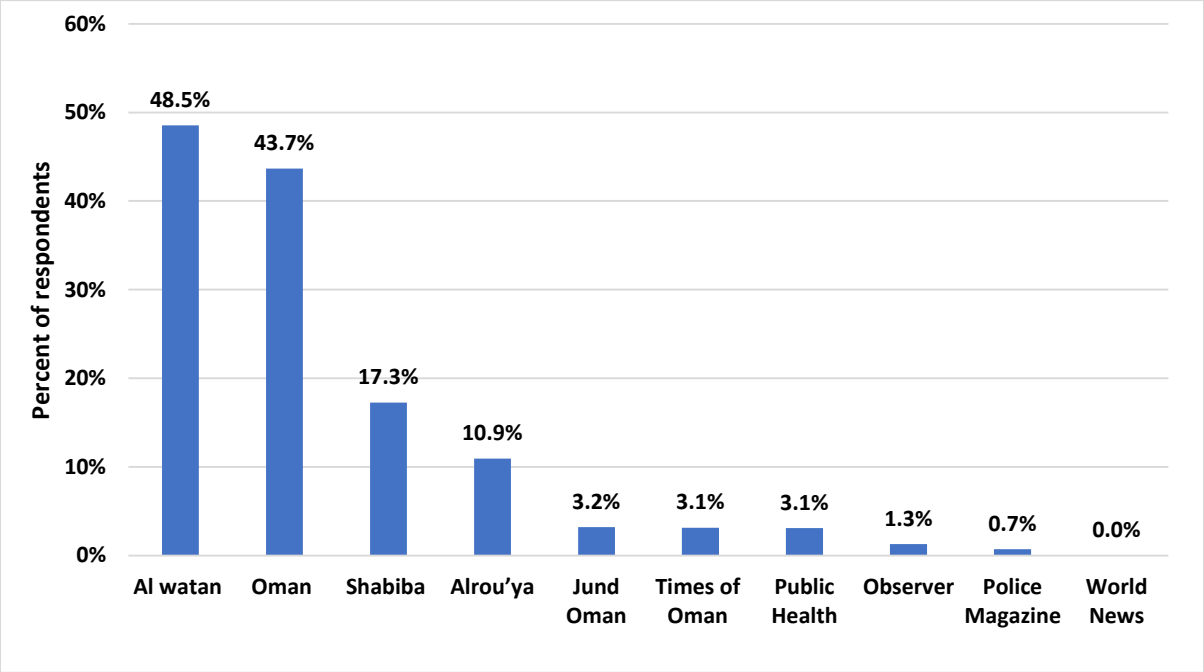

Figure 46 Newspapers and/or magazines reported by participants who reported reading them, adults 19-60 years of age

Many responses were mentioned as ways to educate people about healthy food, but none of these ways were reported by more than 29% of adult respondents (Figure 47).

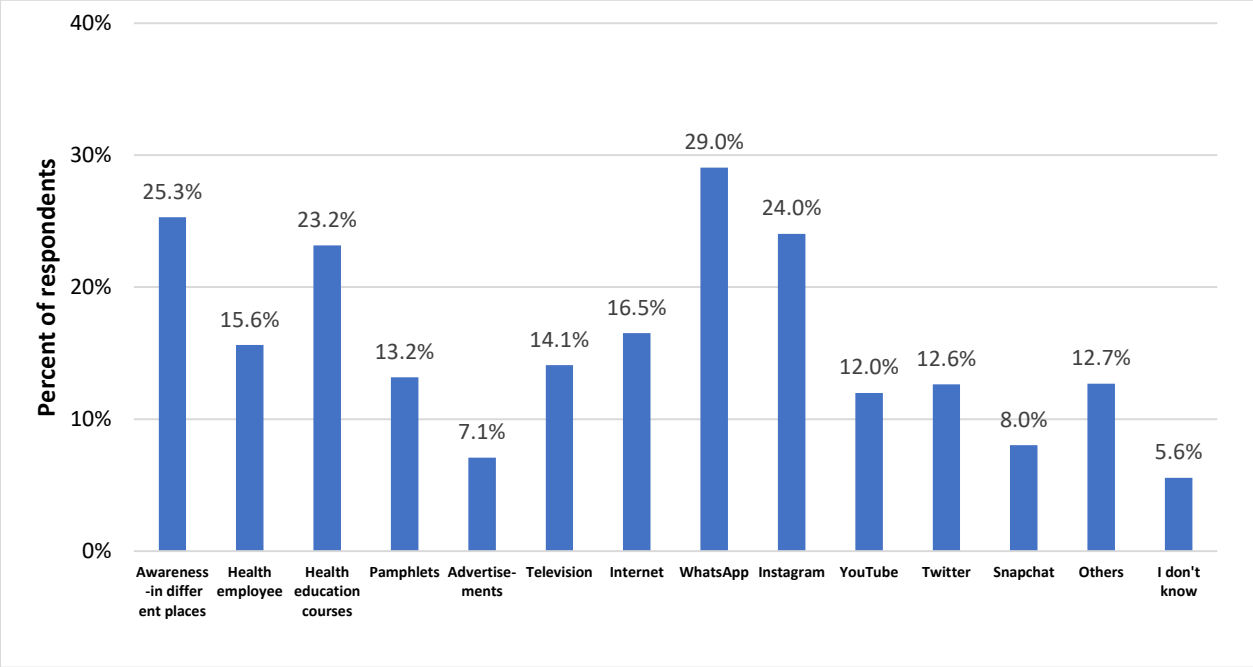

Figure 47 Best way to educate people about healthy food, adults 19-60 years of age

Clinicians, such as a doctor, nurse, or dietician, were overwhelmingly reported as the best people to provide education to the general population regarding healthy food (Figure 48).

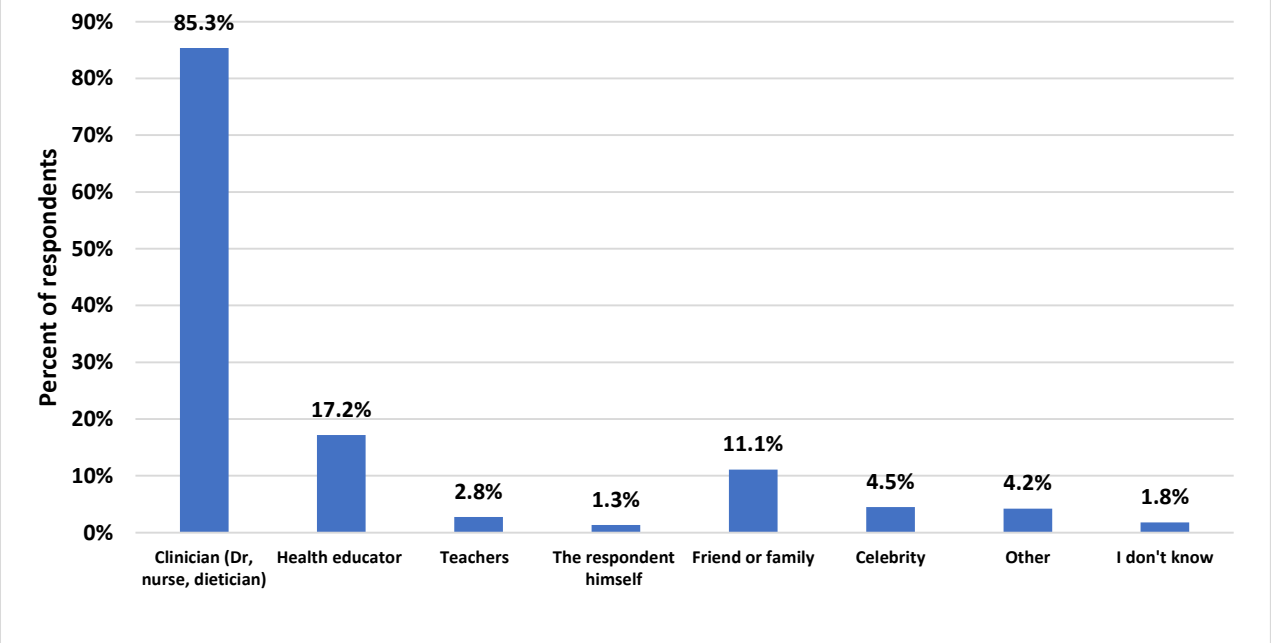

Figure 48 Best person to provide awareness in order to educate people about healthy food, adults 19-60 years of age

In contrast to educating people in general, the most commonly cited method of educating children about healthy food was using cartoon characters. (Figure 49).

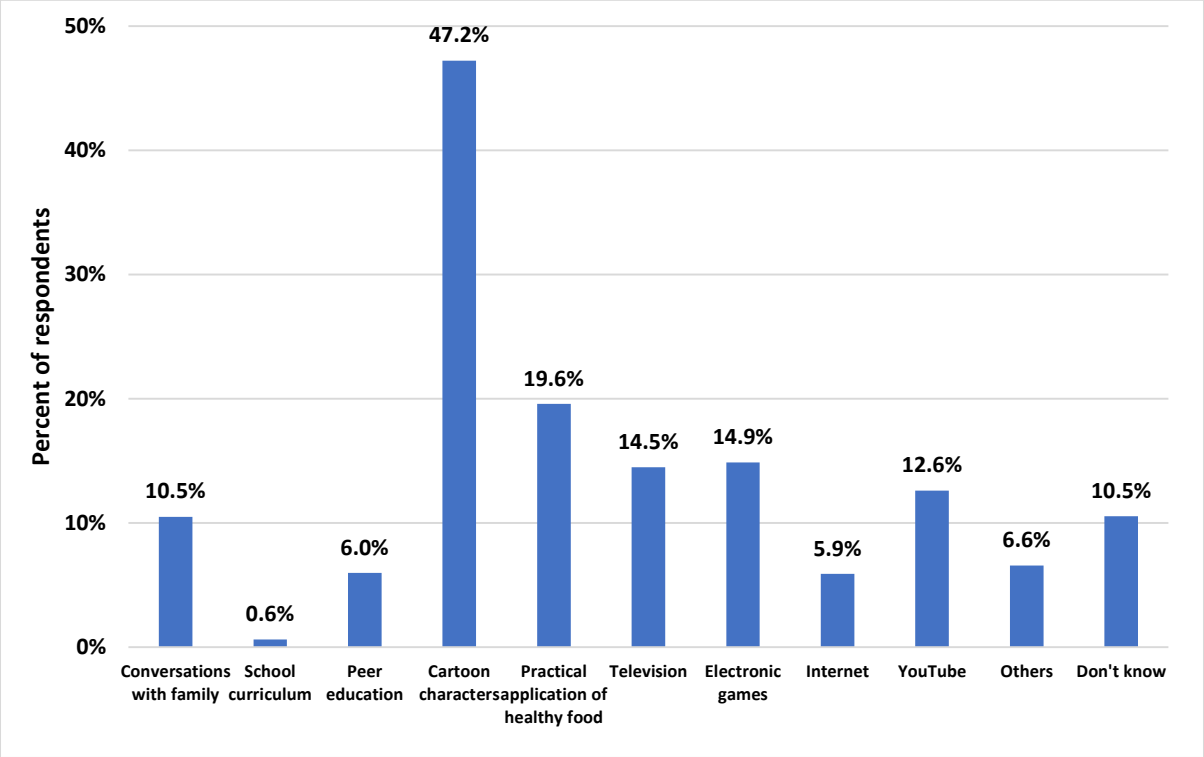

Figure 49 Best way to educate children about healthy food, adults 19-60 years of age

In contrast to the responses to provide education to people in general, clinicians were not the most commonly cited group when asked who could best educate children about healthy food (Figure 50). Friends or family were mentioned by almost three-quarters of adult respondents.

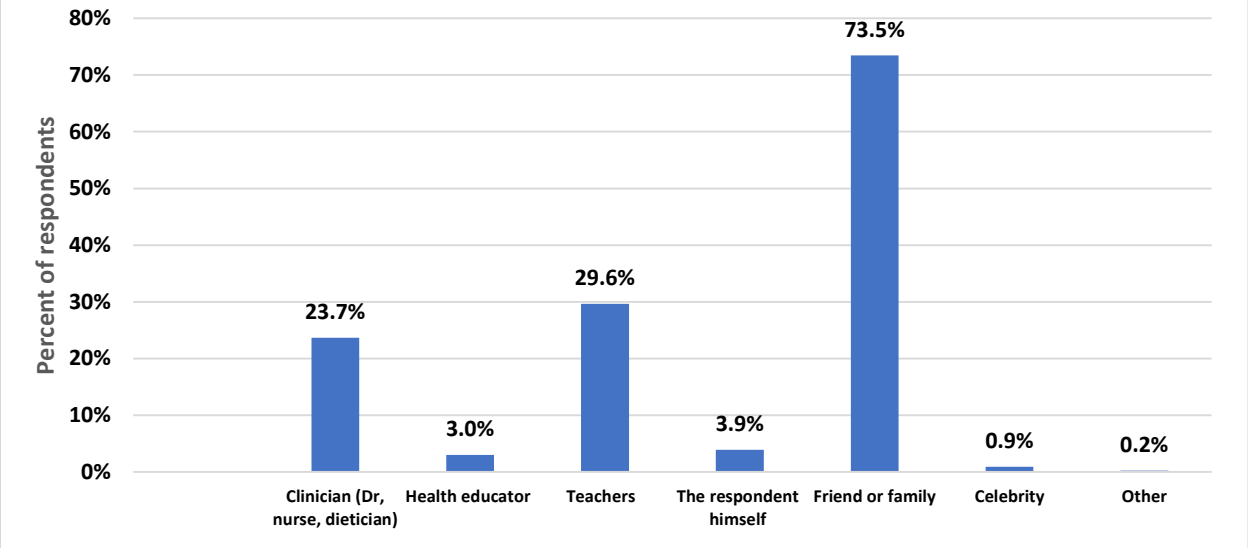

Figure 50 Best person to provide awareness with the aim of educating children about healthy food, adults 19-60 years of age

Overall, 31.7% of adults reported watching local Omani television. The channels and specific television shows reported to be watched are shown below in **Table 14**.

Table 14. Unweighted number (weighted %) of adults 19-60 years of age who reported watching television, the percent watching Omani television channels, specific programs reported, and when

		Of those watching the channel		Of those watching the show	
Omani television channel	**Number (%) watching channel**	**Program**	**Number (%) watching program**	**% watching in morning**	**% watching in evening**
Oman Public	199 (71.7%)	The News	83 (38.2%)	15%	85%
		Series	9 (4.3%)	14%	86%
		Kayan	2 (0.3%)	31%	69%
		Cooking shows	2 (0.2%)	50%	50%
		From Oman	6 (4.1%)	0%	100%
		Morning Coffee	39 (20.3%)	100%	0%
		Soael Aheil Aziker	4 (1.5%)	0%	100%
		Heritage	3 (2.1%)	0%	100%
Oman Cultural	48 (18.6%)	Cooking Shows	1 (2.6%)	100%	0%
		Cultural Heritage	4 (10.3%)	13%	87%
		The world of animal and wildlife	1 (3.0%)	0%	100%
		Evening Shows	0%	-	-

		Of those watching the channel		Of those watching the show	
Omani television channel	**Number (%) watching channel**	**Program**	**Number (%) watching program**	**% watching in morning**	**% watching in evening**
Oman Sport	88 (29.5%)	News	1 (0.6%)	100%	0%
		Matches	35 (46.6%)	0%	100%
		Sport News	7 (5.6%)	0%	100%
		Camel Competitions	2 (1.3%)	100%	0%
		Basketball	0%	-	-
		Al Majlis Show	3 (3.2%)	0%	100%
Majan	2 (1.4%)	No specific programs	-	-	-
Al estiqam ah	12 (6.1%)	Governor Papers	1 (11.5%)	100%	0%
		Lectures	2 (11.4%)	0%	100%
		Prayers	0%	-	-
Oman Live	37 (13.3%)	News	10 (25.7%	52%	48%
		Here Oman	2 (2.7%)	45%	56%
		Matches	0%	-	-
		Oman in a week	5 (9.6%)	0%	100%

Overall, 253 (30.6%) of adult respondents reported listening to local radio stations. The stations and radio shows reported to be watched are shown below in **Table 15**.

Table 15. Unweighted number (weighted %) of adults 19-60 years of age who reported listening to the radio, the percent listening to various Omani radio stations, specific programs reported, and when

		Of those listening to station		Of those listening to program	
Omani radio station	**Number (%) listening**	**Program**	**Number (%) listening to program**	**% listening in morning***	**% listening in evening***
Oman Public	56 (23.7%)	News	17 (28.2%)	58%	36%
		Morning coffee	4 (5.1%)	100%	0%
		Soael Aheil Aziker	0%	-	-
		Here Oman	1 (1.7%)	100%	0%
		Nutrition/cooking	1 (2.4%)	100%	0%
Holy Quran	69 (25.3%)	Holy Quran	30 (38.2%)	92%	6%
		Soael Aheil Aziker	4 (4.3%)	0%	64%
		Morning Talk	1 (0.8%)	-	-
		Business transactions in Islam	1 (2.0%)	0%	100%
		Drose Al Shukies	1 (0.8%)	0%	100%
		Sazrate Eimaniah	3 (4.3%)	34%	47%
		Religious Dialogue	3 (3.2%)	0%	45%
Youth radio	99 (36.1%)	Youth Morning	19 (16.6%)	90%	10%
		School Morning	10 (7.0%)	100%	0%
		Morning Assembly	2 (1.1%)	100%	0%
		Children Show	1 (0.5%)	100%	0%
		Quran	1 (0.5%)	-	
		News	1 (0.5%)	-	
Oman FM	24 (10.7%)	Morning	2 (10.2%)	100%	0%
		Morning Coffee	1 (6.8%)	100%	0%
		Youth Show	1 (2.2%)	-	-
Oman voice radio	2 (1.0%)	No specific shows	-	-	-
Hala FM	33 (15.2%)	Noon Show	2 (9.6%)	0%	100%
		Undefined	0	-	-
		Youth Show	4 (8.8%)	45%	-
Al Wisal	89 (37.2%)	Al Wisal Morning	15 (17.0%)	100%	0%
		Al Wisal Forum	1 (1.0%)	0%	100%
		Songs	1 (0.6%)	100%	0%
		Undefined	1 (0.4%)	0%	100%
Muscat radio	6 (2.5%)	Evening Shows	1 (13.5%)	-	-
HI FM	3 (1.1%)	No specific shows	-	-	-
Al Sumood FM	1 (0.5%)	No specific shows	-	-	-
T FM	0	No specific shows	-	-	-
Merge FM	1 (0.9%)	No specific shows	-	-	-
Shabiba FM	4 (1.9%)	No specific shows	-	-	-

* If total of morning and evening does not equal 100%, it is because some respondents are marked “N/A”.

3.2.4. Practices

Very few adult respondents scored high on the general healthy eating practices index (**Table 16**). The majority of respondents in all demographic subgroups scored in the medium range. The score for this index increased with increasing age, and was higher among married adults than among unmarried adults. There were also statistically significant differences among governorates and adults with different job types. In addition, adults who had consulted a professional about nutrition or who had tried to lose weight in the past scored better than adults who had not.

Table 16. Composite index for general healthy eating practice of adults 19-60 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	542	6.0%	(4.1, 8.7)	83.6%	(79.4, 87.1)	10.3%	(7.5, 14.0)	0.096
Female	539	7.9%	(5.1, 11.9)	76.8%	(72.1, 80.8)	15.4%	(12.3, 19.0)	
Age								
19-29	372	12.2%	(8.5, 17.3)	79.7%	(74.2, 84.2)	8.1%	(5.5, 11.9)	<0.001
30-39	397	5.5%	(3.3, 9.1)	81.5%	(77.1, 85.3)	12.9%	(9.7, 17.0)	
40-49	229	3.5%	(1.3, 9.0)	80.0%	(72.2, 86.0)	16.5%	(11.3, 23.5)	
50-60	83	0%	-	76.3%	(63.3,85.8)	23.7%	(14.2,36.7)	
Educational level								
Primary	51	4.9%	(0.8, 24.6)	81.8%	(63.3, 92.1)	13.3%	(4.6, 32.7)	0.072
Elementary	112	4.3%	(1.4, 13.0)	73.6%	(61.8, 82.7)	22.1%	(13.1, 34.9)	
Secondary	516	9.9%	(7.3, 13.4)	80.6%	(75.3, 84.9)	9.5%	(6.6, 13.6)	
Diploma	159	4.9%	(1.9, 12.1)	82.3%	(75.2, 87.7)	12.8%	(8.3, 19.3)	
Bachelors or more	201	3.7%	(1.2, 10.7)	79.7%	(72.6, 85.3)	16.6%	(11.5, 23.4)	
Marital status								
Not married	297	11.7%	(7.4, 17.9)	77.4%	(69.8, 83.4)	11.0%	(7.2, 16.4)	<0.05
Married	784	5.3%	(3.6, 7.6)	81.3%	(77.9, 84.2)	13.5%	(11.0, 16.5)	
Governorate								
Muscat	102	7.8%	(4.9, 12.4)	74.5%	(70.5, 78.2)	17.6%	(13.9, 22.1)	<0.001
Dhofar	57	14.6%	(9.1, 22.5)	83.4%	(74.8, 89.5)	2.0%	(0.3, 11.6)	
Ad Dakhliyah	88	5.7%	(3.6, 9.0)	80.7%	(74.4, 85.7)	13.6%	(8.4, 21.4)	
Ash Sharqiyah North	100	4.0%	(2.0, 7.9)	85.9%	(76.9, 91.8)	10.1%	(5.9, 16.7)	
Ash Sharqiyah South	107	2.8%	(0.9, 8.5)	83.2%	(74.0, 89.6)	14.0%	(7.0, 26.2)	
Al Batinah North	109	9.3%	(4.7, 17.5)	78.7%	(69.6, 85.6)	12.0%	(7.3, 19.1)	
Al Batinah South	99	3.1%	(1.5, 6.1)	80.5%	(75.2, 85.0)	16.4%	(12.6, 21.0)	
Adh Dhahirah	112	3.6%	(1.9, 6.8)	87.5%	(79.7, 92.5)	8.9%	(4.5, 16.8)	
Al Buraymi	91	9.5%	(5.2, 16.8)	84.7%	(82.0, 87.1)	5.8%	(3.3, 9.8)	
Musandam	115	5.2%	NA*	71.8%	NA*	23.0%	NA*	
Al Wusta	101	8.9%	(5.7, 13.5)	86.2%	(80.8, 90.2)	4.9%	(1.8, 12.7)	
Household income								
<200 OMR	193	9.3%	(5.0, 16.5)	78.6%	(70.4, 85.0)	12.2%	(7.4, 19.3)	0.546
200-499 OMR	349	5.2%	(2.7, 9.5)	81.0%	(75.9, 85.2)	13.8%	(9.6, 19.6)	
500-999 OMR	204	7.2%	(3.7, 13.4)	80.5%	(74.2, 85.6)	12.3%	(6.8, 21.1)	
1000+ OMR	109	2.7%	(0.8, 8.4)	84.2%	(74.0, 90.9)	13.1%	(7.1, 22.9)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Do not know	226	10.8%	(6.6, 17.1)	77.4%	(68.9, 84.1)	11.8%	(7.3, 18.5)	
Type of work								
Government	265	3.4%	(1.4, 8.3)	85.2%	(79.2, 89.6)	11.4%	(7.6, 16.8)	<0.01
Private	181	5.9%	(2.7, 12.4)	83.2%	(75.0, 89.1)	10.9%	(6.2, 18.6)	
Military	82	7.0%	(2.4, 18.6)	83.4%	(68.8, 92.0)	9.5%	(3.7, 22.5)	
Retired	39	0%	-	74.8%	(51.4,89.2)	25.2%	(10.8,48.6)	
Student	76	21.5%	(11.5, 36.7)	74.5%	(61.3, 84.4)	4.0%	(1.0, 14.1)	
Looking for work	155	6.2%	(3.1, 12.1)	81.4%	(72.6, 87.9)	12.4%	(7.5, 19.8)	
Not working	283	8.0%	(4.2, 14.6)	74.7%	(67.5, 80.8)	17.3%	(12.9, 22.9)	
Works in health field								
Yes	59	0%	-	84.8%	(66.8,93.9)	12.0%	(9.9, 14.5)	0.344
No	778	7.9%	(5.9, 10.5)	80.1%	(77.0, 82.8)	12.0%	(9.9, 14.5)	
Buys food for household								
Yes	438	2.7%	(1.3, 5.3)	84.3%	(80.0, 87.9)	13.0%	(9.6, 17.4)	<0.01
No	643	10.1%	(7.5, 13.5)	77.3%	(74.0, 80.3)	12.6%	(10.0, 15.8)	
Who buys food for household								
Housewife	439	4.9%	(2.7, 8.8)	81.7%	(76.2, 86.2)	13.4%	(9.8, 18.0)	0.257
Head of house	522	8.0%	(5.5, 11.6)	78.8%	(74.9, 82.3)	13.1%	(10.5, 16.4)	
Servant	12	3.5%	(0.6, 18.0)	93.0%	(67.3, 98.9)	3.5%	(0.6, 18.0)	
Other person	107	11.8%	(6.1, 21.5)	79.8%	(70.1, 86.9)	8.4%	(3.6, 18.3)	
Talked to professional about diet								
Yes	340	4.1%	(2.3, 7.4)	76.7%	(72.0, 80.8)	19.2%	(15.6, 23.4)	<0.001
No	721	8.8%	(6.9, 11.2)	81.6%	(78.1, 84.6)	9.6%	(7.3, 12.6)	
Tried to lose weight								
Yes	521	3.0%	(1.4, 6.3)	79.2%	(75.4, 82.5)	17.8%	(14.2, 22.0)	<0.001
No	543	11.2%	(8.3, 15.0)	81.5%	(77.2, 85.1)	7.3%	(4.6, 11.5)	
Has hypertension								
Yes	84	1.9%	(0.2, 13.6)	69.9%	(56.4, 80.7)	28.1%	(18.0, 41.1)	<0.01
No	997	7.5%	(5.8, 9.7)	81.0%	(78.2, 83.6)	11.4%	(9.3, 14.1)	
Has diabetes								
Yes	79	2.1%	(0.3, 13.4)	76.0%	(61.5, 86.3)	21.8%	(11.8, 36.8)	0.096
No	1002	7.5%	(5.7, 9.7)	80.5%	(77.7, 83.0)	12.1%	(9.9, 14.6)	
Has heart disease								
Yes	15	0.5%	(0.3, 1.0)	70.3%	(31.4, 92.4)	29.2%	(7.3, 68.4)	0.167
No	1066	7.2%	(5.5, 9.2)	80.3%	(77.7, 82.6)	12.6%	(10.5, 15.0)	
Is overweight or obese								
Yes	139	5.6%	(2.5, 12.0)	77.6%	(69.2, 84.2)	16.8%	(10.5, 25.8)	0.392
No	942	7.3%	(5.5, 9.7)	80.6%	(77.5, 83.4)	12.1%	(9.9, 14.7)	
TOTAL	**1081**	**7.1%**	**(5.5,9.1)**	**80.2%**	**(77.6,82.5)**	**12.8%**	**(10.8,15.1)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

The majority of adult respondents reported at least weekly eating meals in restaurants (Figure 51).

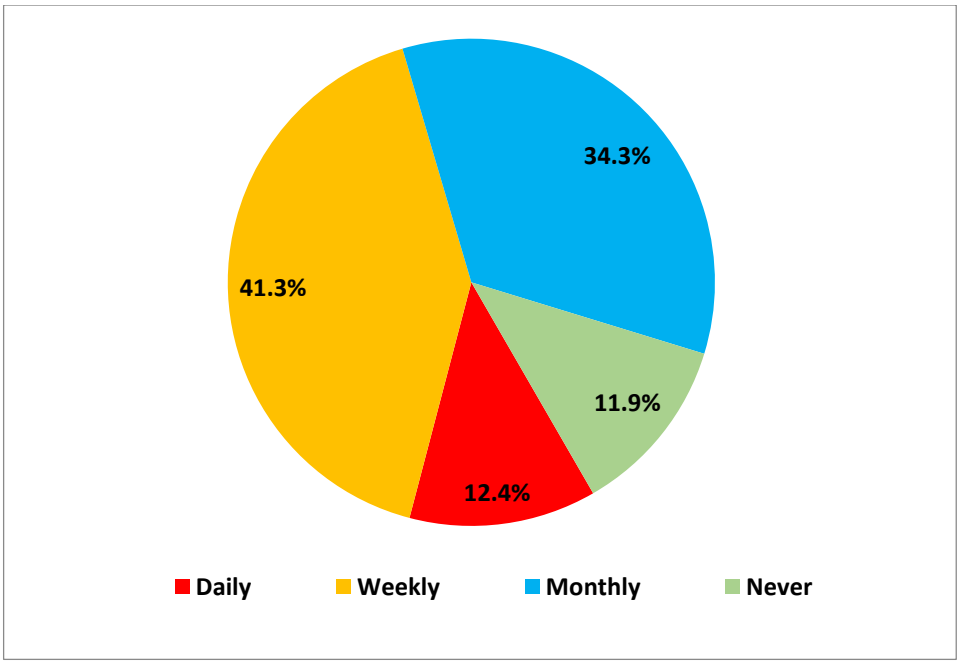

Figure 51 Frequency of eating in restaurants, adults 19-60 years of age

Of these adults reporting eating in restaurants at least sometimes, by far the most common type of restaurant were those serving fast food (Figure 52). Fewer adults, but still about one-half, reported eating in restaurants serving traditional Omani foods.

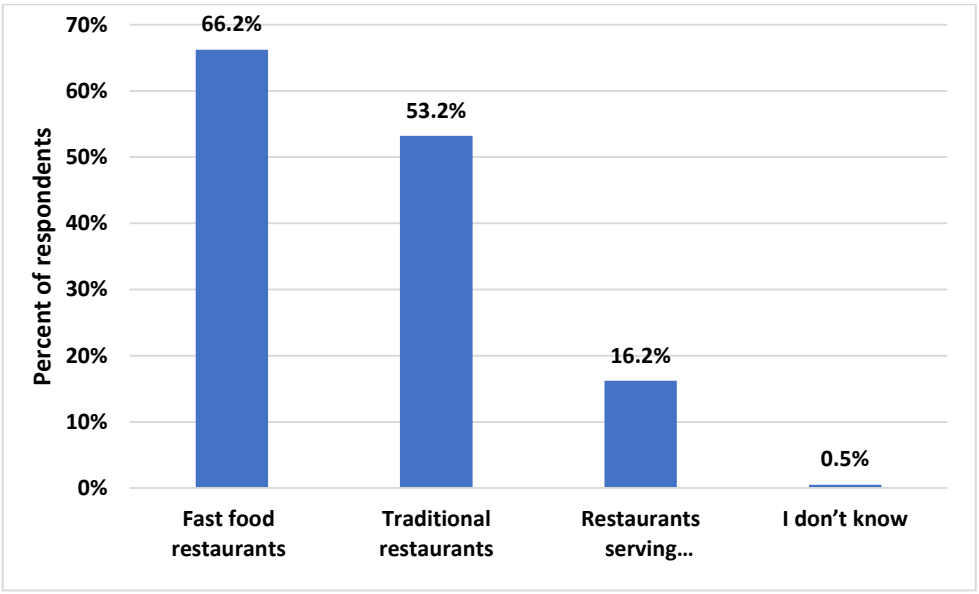

Figure 52 Respondents' choice of restaurants, adults 19-60 years of age

Almost two-thirds of adult respondents reported eating breakfast every day; however, almost one in ten reported never eating breakfast (Figure 53).

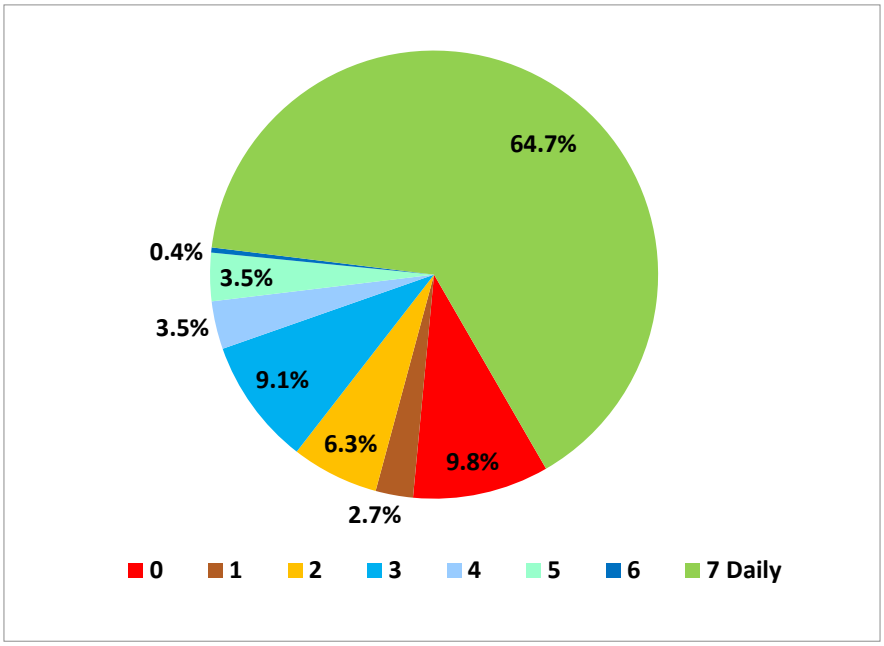

Figure 53 Number of days in a week respondent ate breakfast, adults 19-60 years of age

In contrast, when asked to list the methods they used to stay healthy, two thirds of adult respondents mentioned exercising (Figure 54). Relatively few respondents reported eating healthy food or avoiding fast foods as methods to stay healthy.

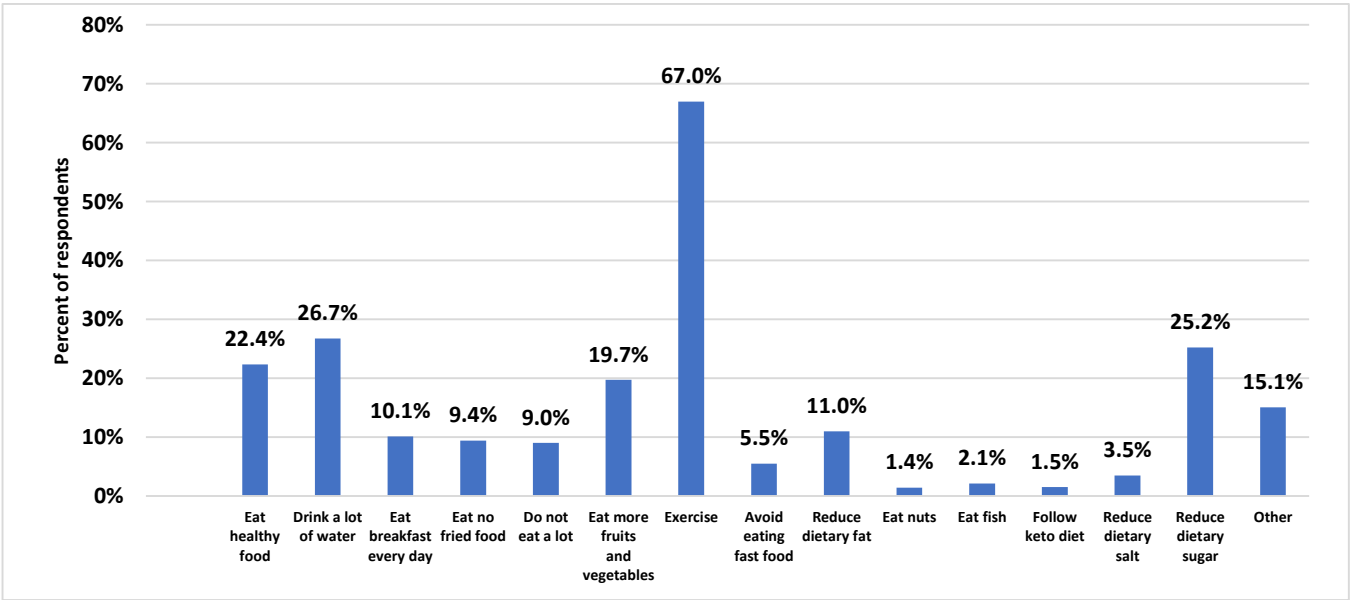

Figure 54 Practices followed by the respondent to stay healthy, adults 19-60 years of age

Less than one-half of adult respondents (41.6% of 1083) reported that a housewife was primarily responsible for purchasing household food, and one-half (48.7% of 1083) reported that this was the head of the household's responsibility. The distribution of this variable by respondent's sex, respondent's job, and governorate is shown in **Table S6** in the supplementary tables below.

About one-half of adult respondents reported that a housewife was mainly responsible for food preparation in the household, and more than one-third reported that they were mainly responsible for food preparation (Figure 55). The distribution of this variable by respondent's sex, respondent's job, and governorate is shown in **Table S7**.

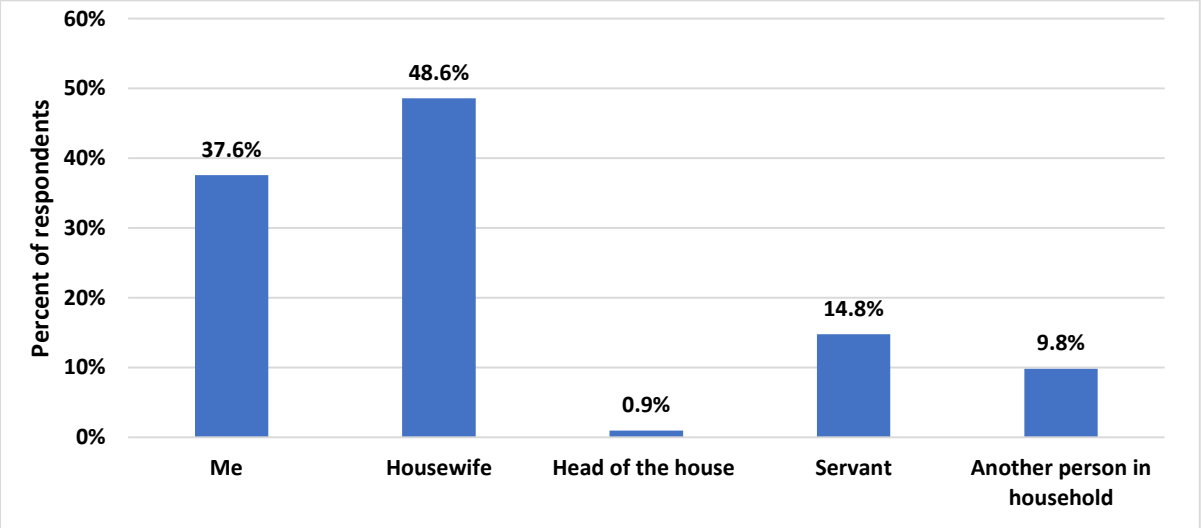

Figure 55 Main family member responsible for cooking, adults 19-60 years of age

Of the 385 adult respondents who reported being the principal household member responsible for preparing food, almost two-thirds reported that they prepared food in a healthy way often or always (Figure 56).

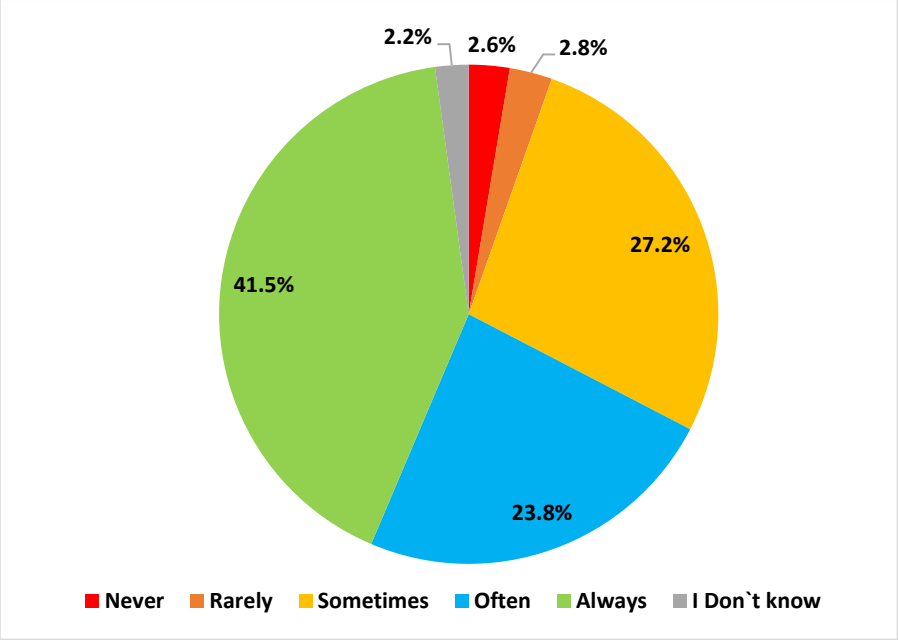

Figure 56 Participant reports preparing food in healthy way, adults 19-60 years of age

Of these 377 respondents who prepared food in the household, several methods of healthy food preparation were mentioned, and using less fat was by far the most common (Figure 57). Many respondents also mentioned using less fat and cooking more vegetables. Few respondents mentioned preparing a diversity of foods.

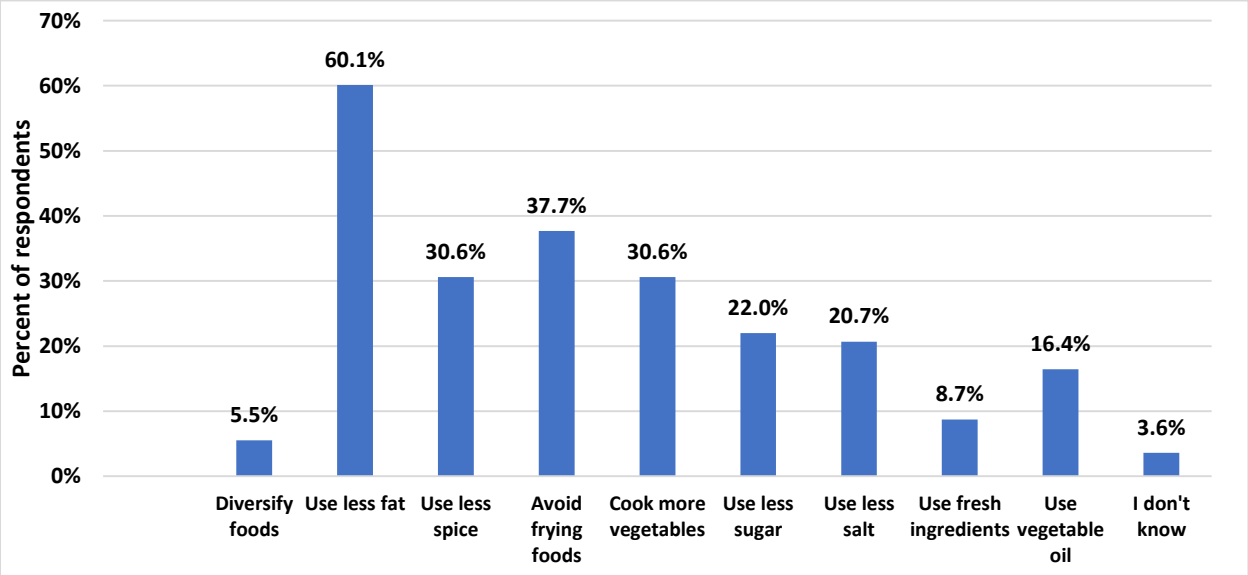

Figure 57 Of those reporting preparing food in a healthy way, frequency of various healthy ways reported, adults 19-60 years of age

A minority of adult respondents never or rarely read nutritional information on food packages before purchase (Figure 58). Among those that did, this reading had an affect on food purchases sometimes, often, or always in more than three-quarters. More than one-fifth of adults reported never counting calories in their food. The variables are presented by sex and governorate of residence in Table S8, Table S9, and Table S10.

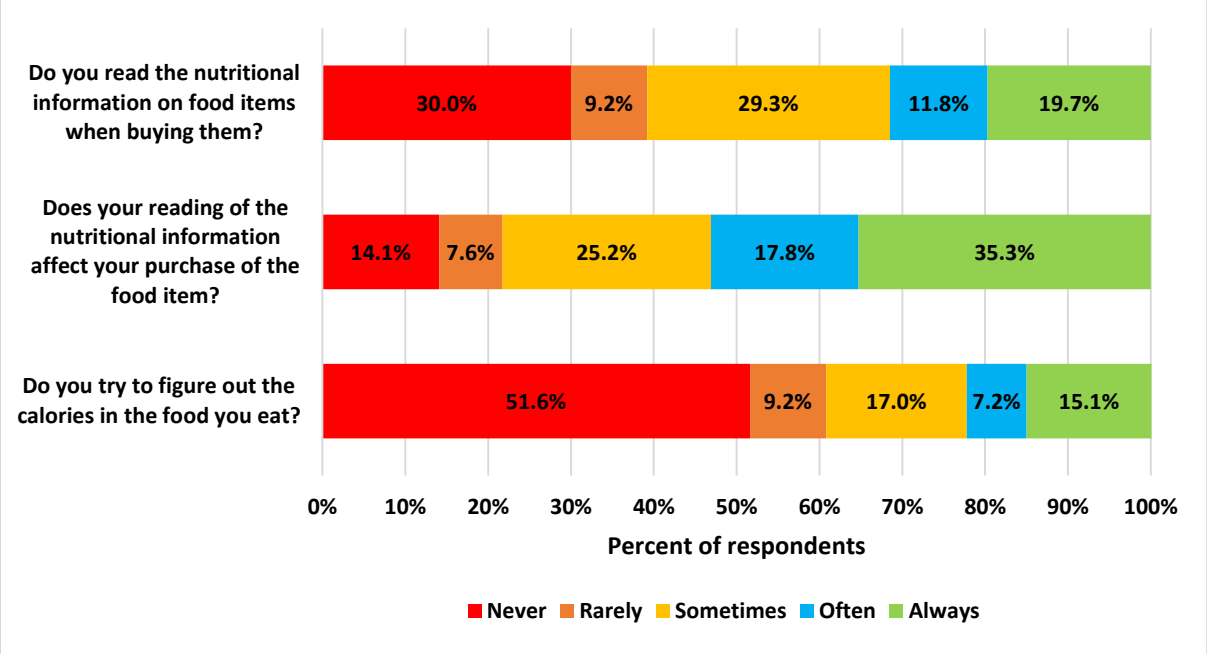

Figure 58 Frequency of various behaviors regarding nutrition information on food packaging, adults 19-60 years of age

Among adult respondents who read nutrition information on food packaging, the frequency with which this reading affected food purchases differed with statistical significance by educational level but without a clear dose-response relationship; that is, there was no clear and progressive change in the frequency of reading nutrition labels affecting food purchases with increasing educational level (**Table 17**).

Table 17. Among adults 19-60 years of age who read nutrition information, reported frequency of reading food package nutrition information having an effect on food purchases, by educational level

		Frequency that reading nutrition information on food packaging affected food purchases			
Educational level	**N**	**Never or rarely**	**Sometimes**	**Often or always**	**P-value**
Primary	25	20.1%	13.9%	65.9%	< 0.001
Elementary	73	34.0%	21.7%	44.4%	
Secondary	345	25.9%	27.2%	47.0%	
Diploma	124	20.7%	29.6%	49.8%	
Bachelors or more	161	8.9%	19.8%	71.2%	

The most commonly consumed food groups reported by adult respondents were bread, fruit, vegetables, and dairy products (**Table 18**). Salty snacks and sweets, such as crisps and chocolate, were also commonly consumed.

Table 18. Reported frequency* of consumption of selected foods by adults 19-60 years of age

Food	Daily	Weekly	Monthly	Rarely
Bread	79.8%	16.6%	0.1%	3.4%
Breakfast cereal	4.6%	10.2%	6.8%	78.4%
Pastries	4.1%	35.9%	23.0%	37.1%
Legumes	11.7%	52.3%	11.4%	24.7%
Fruit	71.1%	23.4%	2.3%	3.2%
Vegetables	83.2%	11.8%	1.0%	4.0%
Dairy products	67.4%	26.4%	1.4%	4.8%
Eggs	32.4%	53.8%	2.4%	11.3%
Fish	21.9%	68.4%	3.6%	6.1%
Poultry	25.2%	71.1%	0.9%	2.8%
Red meat	5.5%	68.3%	14.8%	11.4%
Processed meat	3.8%	23.4%	17.3%	55.5%
Fast food	4.3%	28.5%	28.2%	39.0%
Crisps or chips	27.6%	34.6%	9.8%	28.0%
Chocolate or sugar biscuits	17.2%	30.3%	10.9%	41.7%
Sweets	1.1%	17.6%	22.1%	59.1%
Manufactured sweets, jam, or ice cream	3.9%	19.4%	14.7%	62.0%
Butter, cream, or mayonnaise	7.2%	30.6%	14.7%	47.5%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

Adults also reported commonly consuming carbonated drinks and sweetened drinks; however, the most frequently consumed beverage was Karak tea with sugar (**Table 19**).

Table 19. Reported frequency* of consumption of selected drinks by adults 19-60 years of age

Food	Daily	Weekly	Monthly	Rarely
Carbonated drinks	14.6%	22.4%	11.4%	51.5%
Energy drinks	0.7%	3.1%	3.5%	92.8%
Sweet drinks	12.7%	25.0%	10.2%	52.0%
Canned juice with added sugar	10.2%	23.4%	14.4%	52.1%
Fresh juice	8.4%	27.7%	13.0%	51.0%
Middle eastern coffee	52.0%	15.8%	2.4%	29.9%
Plain coffee with no sugar	5.4%	8.3%	5.5%	80.9%
Turkish coffee with no sugar	0.6%	3.4%	4.0%	92.0%
Coffee with milk and sugar	4.0%	9.6%	8.7%	77.7%
Coffee with milk and no sugar	2.7%	3.6%	2.5%	91.3%
Karak tea with sugar	53.4%	13.5%	3.7%	29.4%
Karak tea with no sugar	5.6%	3.9%	0.9%	89.6%
Red or green tea with sugar	19.4%	23.2%	5.8%	51.5%
Red or green tea with no sugar	7.7%	8.9%	2.2%	81.2%
Herbal tea with sugar	2.8%	4.6%	2.3%	90.3%
Herbal tea with no sugar	4.1%	5.3%	3.1%	87.5%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

Only 412 (40%) of adult respondents reported drinking 8 cups of water or more per day, while 399 (34%) reported drinking 5-7 cups, and 271 (26%) reported drinking fewer than 5 cups.

3.3. Discussion

Few adolescents and adults had a high composite index score for general healthy eating knowledge. This index was created from the responses to many questionnaire questions, including several questions asking about the respondent's knowledge of specific expert recommendations. Although such recommendations have been widely publicized, these messages may not have maximally reached individual members of the Omani population. Relatively few respondents, especially adolescents, could identify the Omani government recommended number of daily servings of fruits and vegetables or the recommended type of dairy products. An additional category of questions incorporated into the composite index asked about various dietary and nutritional characteristics of specific foods or types of foods. Again, this is not the type of information to normally receive a high level of attention by either individuals or the news media. And finally, the third category of questions included in the index related to health problems resulting from poor diet and overweight. Adolescents need more attractive ways of health education and using technology other than the usual classic health education at schools and health centres. In adolescents, the composite knowledge index score did not differ by various demographic variables, indicating equal distribution of relative lack of awareness in the adolescent population. In contrast, in adults the composite index score was higher in women, those with higher education, married persons, those who had talked to a professional about nutrition, and those who have tried to lose weight in the past. This data may provide some guidance for targeting informational messages to specific groups of adults.

Even if individuals lacked specific or detailed knowledge, their more general attitudes towards diet and nutrition were correct. Nonetheless, the scores were substantially lower in some governorates than in others, indicating a need for geographic targeting of future dietary messages. In addition, adults who had attempted to lose weight in the past had substantially more positive attitudes, indicating an association between motivation, prior behaviour, and attitudes.

Although respondents' rating of their current health status was similar in adolescents and adults, adults rated their risk of developing chronic disease substantially higher than did adolescents. In addition, a much higher proportion of adults reported not exercising and having weight gain as reasons for their increased risk assessment.

Both adolescents and adults had an intermediate composite index score for general healthy eating practices. A substantially higher proportion of adults than adolescents had a high score for this index, indicating generally better practices among adults. The composite scores in adolescents did not differ substantially by various demographic factors. In contrast, adults' scores increased with age, were higher in married persons, differed by type of work, differed by governorate of residence, were higher in those who had talked to a professional about nutrition, and higher in those who had tried to lose weight in the past. As a result, specific

targeting by demographic or other factors of health messages regarding healthy eating practices may not be necessary in adolescence but may produce more efficient programming in adults.

Most adolescents and adults reported eating in restaurants weekly or monthly. The vast majority of adolescents identified fast food restaurants as the most common type of restaurant frequented. Multiplying the proportion of adolescents who report eating in restaurants daily or weekly (49.2%) by the proportion of these adolescents who reported eating in fast food restaurants most often (80.6%), we get an estimate that about 39.7% of adolescents eat fast food daily or weekly. This agrees with the responses to a later question in the general healthy eating questionnaire which directly asked respondents how often they ate fast food; for that question, 40.3% reported eating fast food daily or weekly. This calculation for adults, 53.8% eating in restaurants daily or weekly multiplied by 68.3% identifying fast food restaurants, results in an estimate of 36.7% of adults eating fast food daily or weekly. The direct question produces an estimate of 32.8% of adults eating fast food daily or weekly. As a result, we see substantial agreement in the frequency of eating fast foods produced by two independently asked questions. Although a somewhat lower proportion of adults identified fast food restaurants and a higher proportion identified restaurants serving traditional Omani food, both adolescents and adults too frequently eat in fast food restaurants.

About half of adolescents reported eating breakfast every day, while two-thirds of adults reported this behaviour. It appears that eating in restaurants and eating breakfast are better among adults than among adolescents.

Few adolescents reported that they were primarily responsible for food preparation in the household. Among these few adolescents and among responding adults who reported being responsible for food preparation, the large majority reported preparing food in a healthy way sometimes, often, or always. In addition, adolescents and adults mentioned similar healthy food preparation methods.

Relatively few adolescents and adults frequently read food labelling or make decisions based upon the nutrition information provided on such labels. Nonetheless, a substantially larger proportion of adults report that, if they read nutritional information, it affects their purchase of food items. Moreover, in adults this proportion increases with increasing level of education, but this is not true in adolescents. Similarly, a larger proportion of adults than adolescents tend to count calories in the food they eat. Therefore, providing important information on food labels may not be the most effective and efficient way of transferring important dietary information to the general Omani public unless heath education can substantially increase the proportion of the population who consistently read and act on this information.

Finally, the consumption frequency of fruits and vegetables was inadequate, and the consumption of carbonated drinks and sweet beverages was excessive in both adolescents and adults. In fact, the frequency of consumption of selected foods was largely similar between adolescents and adults with the possible exception of adolescents more frequently consuming potato chips, chocolate, sugar biscuits, or other sweet snacks. There seems to be much work yet to do in educating the Omani public about the negative health effects of consuming both various types of foods as well as specific foods.

4. Oil and fat Results – Adolescents 14-18 years of age

4.1.1. Demographic characteristics

The characteristics of adolescents completing the oil and fat questionnaire are shown in **Table 20** below. As with the general healthy eating questionnaire sample, several of these characteristics were not included in further analysis of data from adolescents because the subgroups were of grossly unequal size; for example, marital status, type of job, and whether or not the survey subject buys food for household had very few adolescents in some subgroups. In addition, more than two thirds of adolescents did not know their household income.

Table 20. Distribution of various demographic characteristics among adolescents 14-18 years of age responding to the oil and fat questionnaire

Characteristic	Unweighted number	Weighted percent
Sex		
Male	161	55.4%
Female	127	44.6%
Educational level		
Primary	19	8.6%
Elementary	119	47.6%
Secondary or more	150	43.8%
Marital status		
Single	288	100%
Married	0	0%
Governorate		
Muscat	27	9.4%
Dhofar	16	5.6%
Ad Dakhliyah	25	8.7%
Ash Sharqiyah North	26	9.0%
Ash Sharqiyah South	29	10.1%
Al Batinah North	30	10.4%
Al Batinah South	26	9.0%
Adh Dhahirah	24	8.3%
Al Buraymi	24	8.3%
Musandam	32	11.1%
Al Wusta	29	10.1%
Household income		
<200 OMR	26	10.6%
200-499 OMR	38	14.1%
500-999 OMR	23	5.4%
1000+ OMR	10	2.2%
Don't know	191	67.7%
Type of job		
Private	0	0%

Characteristic	Unweighted number	Weighted percent
Student	282	99.0%
Job seeker	5	1.0%
Not working	1	<0.1%
Buys food for household		
Respondent	3	1.4%
Other household member	285	98.6%
Who buys food for household		
Housewife	110	40.7%
Head of house	150	53.4%
Servant	7	0.2%
Other person	21	5.7%
Talked to professional about diet		
Yes	46	14.6%
No	173	58.9%
Unknown	69	26.6%
Tried to lose weight		
Yes	94	31.4%
No	188	68.0%
Unknown	6	0.6%
Has disease		
Hypertension	1	<0.1%
Diabetes	0	0%
Heart disease	0	0%
Overweight or obesity	12	3.6%

4.1.2. Knowledge

Table 21 shows the large majority of adolescents in all subgroups scored quite poorly on the knowledge index for oil and fat. In fact, overall and in all subgroups, 80% or more of respondents had low scores on this index.

Table 21. Composite index for oil/ fat knowledge of adolescents 14-18 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	160	92.4%	(85.5, 96.2)	6.0%	(2.9, 12.1)	1.6%	(0.2, 9.8)	0.160
Female	127	82.5%	(74.9, 88.2)	12.8%	(7.9, 20.1)	4.6%	(1.6, 12.6)	
Educational level								
Primary	19	92.2%	(56.8, 99.1)	7.8%	(0.9, 43.2)	0%	-	
Elementary	118	85.4%	(76.2, 91.4)	9.9%	(4.9, 19.0)	4.7%	(1.6, 12.8)	0.758
Secondary or more	150	90.0%	(82.6,94.4)	8.4%	(4.3,15.7)	1.6%	(0.4,6.5)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Governorate								
Muscat	27	88.9%	(78.3, 94.7)	3.7%	(0.6, 20.8)	7.4%	(2.5, 19.8)	0.879
Dhofar	16	93.8%	(77.0, 98.5)	6.3%	(1.5, 23.0)	0%	-	
Ad Dakhliyah	25	80.0%	(60.3, 91.3)	16.0%	(6.6, 33.9)	4.0%	(0.7, 20.6)	
Ash Sharqiyah North	26	88.5%	(77.8, 94.4)	7.7%	(3.0, 18.4)	3.8%	(0.5, 23.4)	
Ash Sharqiyah South	29	82.8%	(65.8, 92.3)	17.2%	(7.7, 34.2)	0%	-	
Al Batinah North	29	93.1%	(78.1, 98.1)	6.9%	(1.9, 21.9)	0%	-	
Al Batinah South	26	80.8%	(79.4, 82.1)	15.4%	(9.8, 23.4)	3.8%	(0.6, 21.1)	
Adh Dhahirah	24	91.7%	(84.7, 95.6)	8.3%	(4.4, 15.3)	0%	-	
Al Buraymi	24	100%	-	-	-	-	-	
Musandam	32	84.4%	NA*	12.5%	NA*	3.1%	NA*	
Al Wusta	29	96.6%	(80.1, 99.5)	3.4%	(0.5, 19.9)	0%	-	
Who buys food for household								
Housewife	110	85.3%	(76.4, 91.3)	11.2%	(6.1, 19.8)	3.5%	(0.9, 12.7)	0.896
Head of house	149	90.2%	(84.2, 94.1)	6.9%	(3.8, 12.3)	2.9%	(0.8, 9.5)	
Servant	7	100%	-	0%	-	0%	-	
Other person	21	85.9%	(52.3, 97.1)	14.1%	(2.9, 47.7)	0%	-	
Talked to professional about diet								
Yes	46	82.5%	(65.0, 92.3)	11.8%	(4.1, 29.4)	5.7%	(1.2, 22.4)	0.762
No	173	87.3%	(82.4, 91.0)	9.1%	(5.6, 14.5)	3.6%	(1.2, 10.0)	
Tried to lose weight								
Yes	94	85.0%	(74.9, 91.4)	9.2%	(4.6, 17.8)	5.8%	(1.7, 17.5)	0.319
No	187	89.7%	(83.8, 93.6)	8.7%	(5.2, 14.3)	1.6%	(0.3, 7.5)	
TOTAL	287	88.0%	(83.6, 91.3)	9.1%	(6.0, 13.4)	2.9%	(1.2, 6.9)	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

The majority of adolescent respondents reported that they consumed an appropriate amount of dietary oil and fat per day (Figure 59). Another one-quarter of adolescents reported consuming more than the appropriate amount.

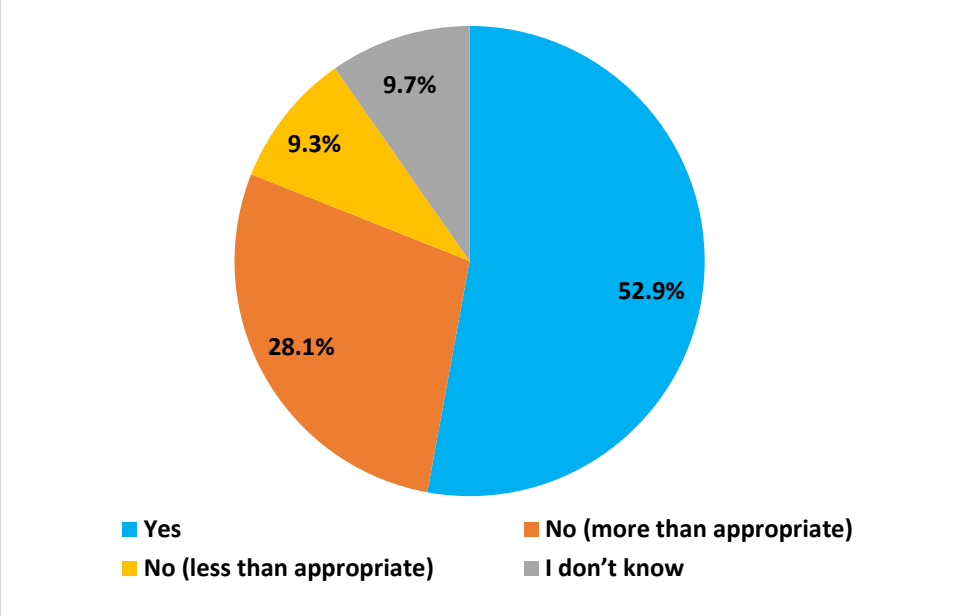

Figure 59 Respondents' perception on whether or not they were consuming the appropriate amount of fat per day, adolescents 14-18 years of age

Overall, 170 (62.2%) of 288 adolescents knew that there are ways of cooking to reduce the amount of dietary fat; 53 (18.8%) reported no, and 65 (18.9%) did not know. The distribution of these values in each governorate is shown in Table S11.

Overall, 272 (93.7%) of 288 adolescents reported that consumption of too much fat is bad for one's health. Only 4 (2.4%) thought it was good for health, and 8 (3.0%) thought it had no effect on health. 'Don't know' was reported by 4 (0.9%) adolescents. The distribution of values by governorate is shown in Table S12.

The majority of adolescent respondents correctly identified high blood fat and cholesterol and heart disease as potential consequences of high fat consumption (Figure 60). Fewer adolescents identified hypertension and stroke as consequences of high fat consumption. Although diabetes can result from high fat consumption largely because such a diet increases the risk of obesity, excess oil and fat consumption does not directly raise the risk of diabetes. Nonetheless, one-third of adolescents identified this as a disease resulting from high dietary fat. Relatively few adolescents identified obesity or atherosclerosis as health consequences.

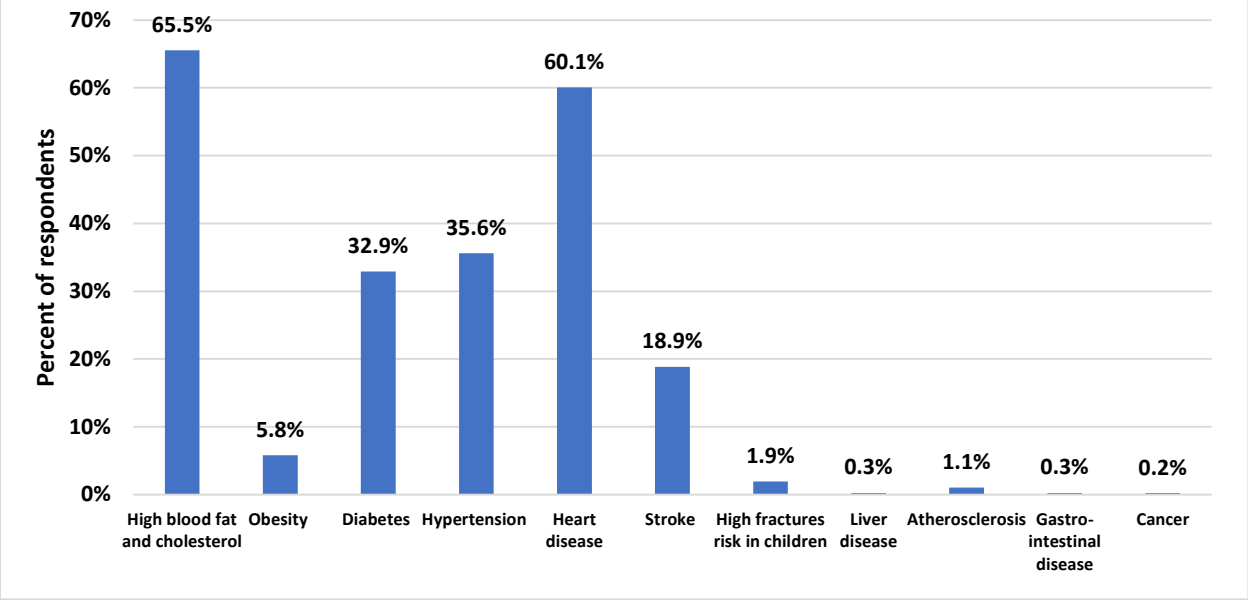

Figure 60 Respondents' reported diseases or health problems that may be caused or exacerbated by eating foods with a high amount of fat, adolescents 14-18 years of age

A majority of adolescent respondents correctly selected fast food, fried dishes, canned meat, fried potatoes and chips, Omani halwa, chocolate, and Arabic sweets as having a high fat content from a list of selected foods, as shown in Figure 61. Fewer identified nuts, ice cream, and cream as high-fat foods.

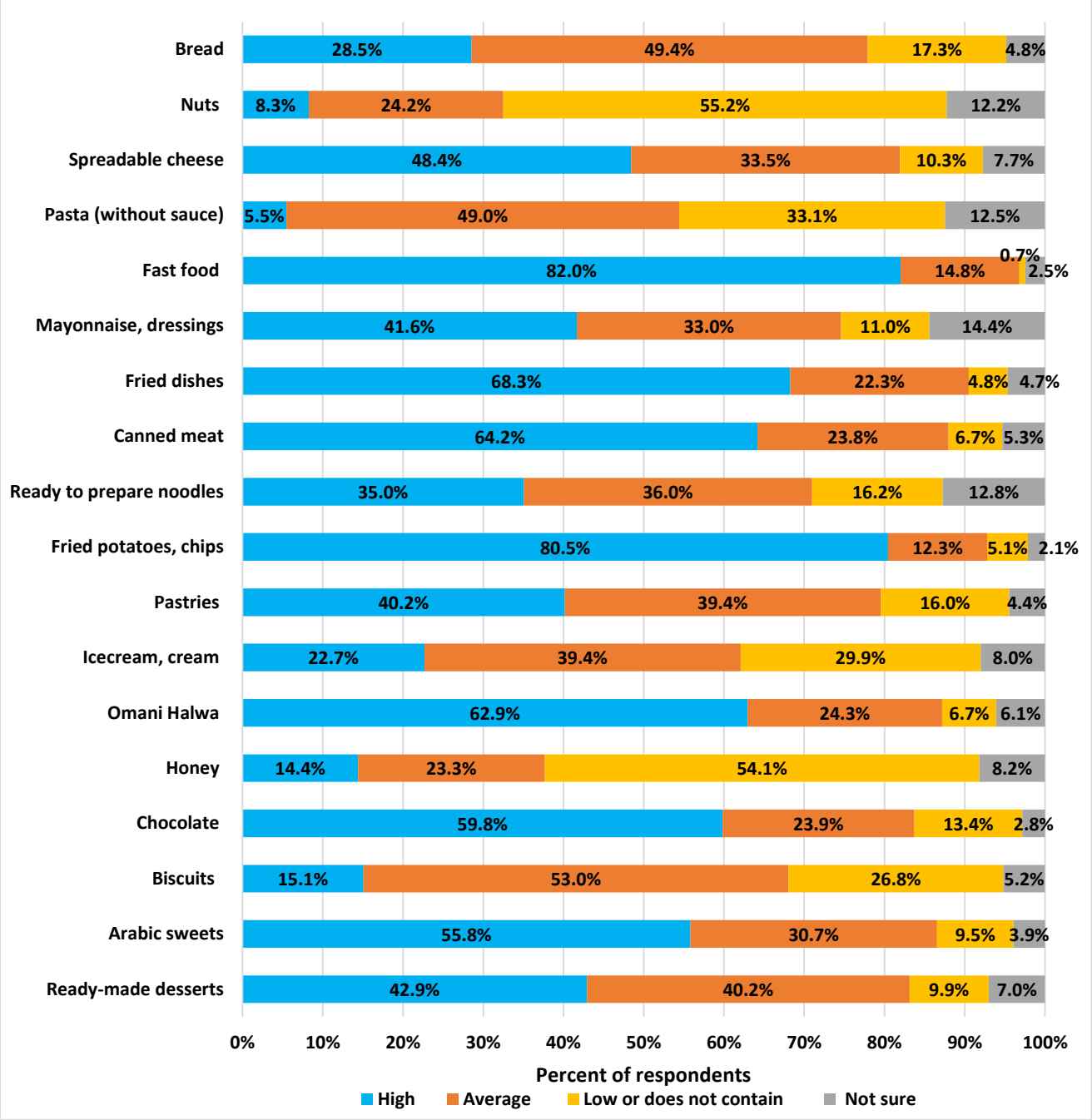

Figure 61 Respondents' report of total fat content of different foods, adolescents 14-18 years of age

Overall, 86 (80.8%) of the 110 adolescents who had heard of saturated fats reported that consumption of saturated fat raised blood cholesterol, and 95 (90.2%) knew that such consumption increased the risk of cardiovascular disease. In addition, 35 (30.1%) knew that cow's milk contained saturated fat. Sixty-nine (60.0%) of these adolescents knew that saturated fat is found in animal fat, and 50 (46.0%) knew that saturated fat is found in many vegetable oils, such as sunflower and corn oil. In addition, 51 (47.7%) knew that many

tropical oils, such as palm oil and coconut oil, contain saturated fats. And finally, only 10 (7.5%) of adolescents reported that saturated fat does not have a negative effect on health. These proportions are presented by governorate in Table S13 through Table S19.

Adolescent respondents rated sunflower oil, palm oil, and coconut oil about equal in saturated fat content even though sunflower oil contains little saturated fat (Figure 62). Relatively few respondents identified olive oil as high in saturated fat. More than one-half of adolescents correctly identified butter animal ghee as high in saturated fat.

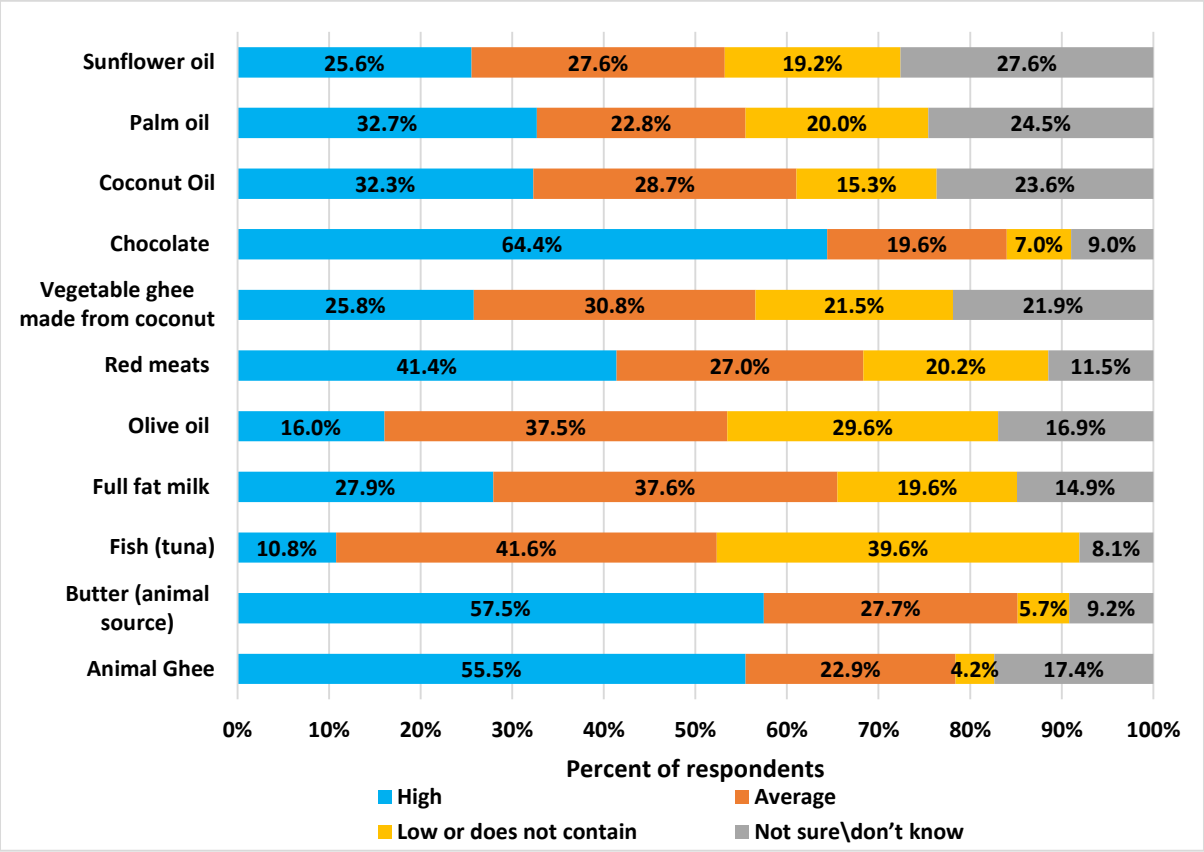

Figure 62 Among those who have heard of saturated fat, reported content in different foods, adolescents 14-18 years of age

The proportion of adolescents who had heard of trans fats who correctly identified selected health effects of trans fats consumption is shown in Table S20.

A large proportion of adolescents identified fried potatoes in restaurants and hydrogenated vegetable butter as important source of trans-fat in the Omani diet (Figure 63). Several other sources were also correctly cited by survey subjects.

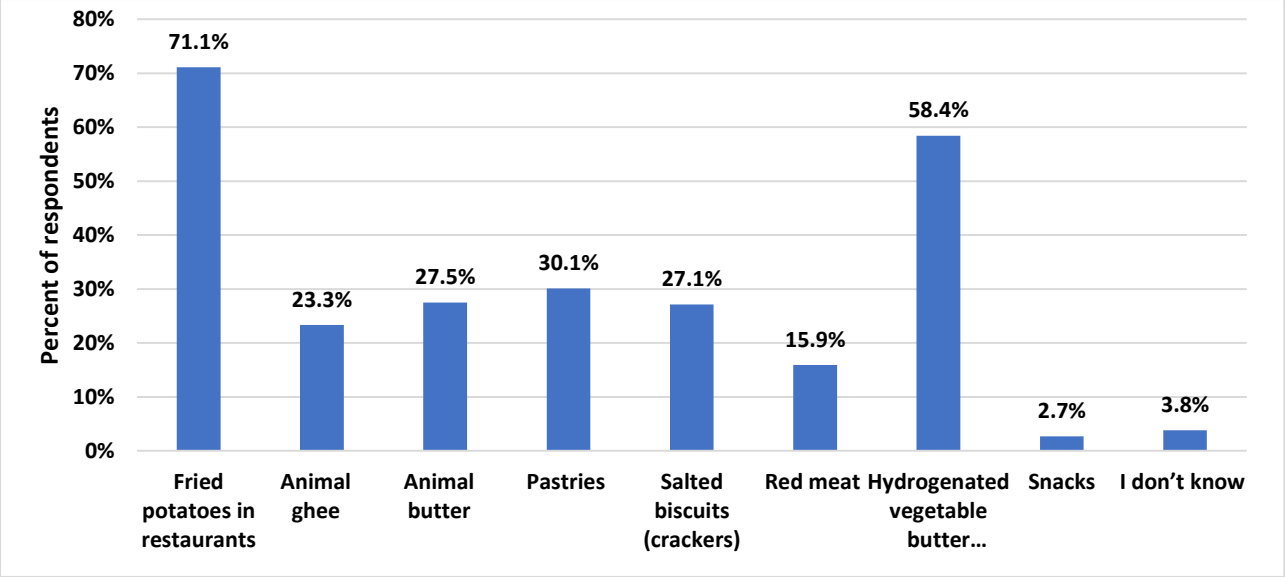

Figure 63 Respondents' reported foods high in trans fats or hydrogenated oils, adolescents 14-18 years of age

4.1.3. Attitudes

As with the general healthy eating index, adolescent respondents overall and in each subgroup had much better scores on oil and fat attitudes than they did on oil and fat knowledge (**Table 22**). There were some statistically significant differences in score among governorates, and respondents who reported trying to lose weight in the past scored better than those who did not.

Table 22. Composite index for oil and fat attitudes of adolescents 14-18 years, by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	160	28.0%	(20.0, 37.7)	49.7%	(38.7, 60.8)	22.3%	(16.5, 29.4)	0.141
Female	127	23.4%	(14.6, 35.4)	41.7%	(32.5, 51.6)	34.8%	(27.3, 43.3)	
Educational level								
Primary	19	14.0%	(4.3, 36.8)	63.5%	(35.0, 84.9)	22.6%	(6.4, 55.4)	0.246
Elementary	118	27.4%	(18.6, 38.5)	49.9%	(38.9, 60.9)	22.7%	(15.1, 32.7)	
Secondary or more	150	26.7%	(18.5, 36.9)	38.7%	(26.9, 52.0)	34.6%	(26.5, 43.6)	
Governorate								
Muscat	27	25.9%	(14.8, 41.3)	51.9%	(33.3, 70.0)	22.2%	(11.2, 39.3)	<0.05
Dhofar	16	37.5%	(21.3, 57.1)	37.5%	(16.2, 65.1)	25.0%	(13.6, 41.4)	
Ad Dakhliyah	25	24.0%	(12.0, 42.2)	44.0%	(24.0, 66.1)	32.0%	(18.2, 49.9)	
Ash Sharqiyah North	26	19.2%	(9.4, 35.3)	57.7%	(43.6, 70.6)	23.1%	(14.1, 35.5)	
Ash Sharqiyah South	29	31.0%	(22.9, 40.5)	37.9%	(25.1, 52.7)	31.0%	(18.5, 47.2)	
Al Batinah North	29	27.6%	(12.4, 50.5)	55.2%	(35.3, 73.5)	17.2%	(8.8, 31.1)	
Al Batinah South	26	11.5%	(5.1, 24.0)	38.5%	(22.6, 57.2)	50.0%	(36.9, 63.1)	
Adh Dhahirah	24	33.3%	(14.4, 59.7)	45.8%	(24.3, 69.1)	20.8%	(14.7, 28.6)	
Al Buraymi	24	37.5%	(21.9, 56.2)	16.7%	(16.7, 16.7)	45.8%	(29.2, 63.5)	
Musandam	32	18.8%	NA*	46.9%	NA*	34.4%	NA*	
Al Wusta	29	27.6%	(8.6, 60.8)	17.2%	(9.9, 28.4)	55.2%	(25.8, 81.3)	
Who buys food for household								
Housewife	110	20.7%	(12.6, 32.2)	47.8%	(36.3, 59.5)	31.5%	(22.6, 42.1)	0.449
Head of house	149	28.7%	(20.2, 39.1)	44.3%	(35.2, 53.7)	27.0%	(20.4, 35.0)	
Servant	7	0%	-	0%	-	100%	-	
Other person	21	38.4%	(12.3, 73.5)	53.6%	(22.0, 82.6)	7.9%	(1.9, 28.0)	
Talked to professional about diet								
Yes	46	17.4%	(7.0, 36.8)	46.0%	(28.8, 64.2)	36.6%	(20.9, 55.8)	0.545
No	173	26.5%	(19.7, 34.6)	45.1%	(34.5, 56.1)	28.5%	(21.4, 36.7)	
Tried to lose weight								
Yes	94	13.3%	(7.0, 23.8)	49.7%	(36.4, 63.0)	37.0%	(26.7, 48.7)	<0.01
No	187	31.7%	(23.5, 41.2)	44.7%	(36.0, 53.8)	23.6%	(17.8, 30.5)	
TOTAL	**287**	**25.9%**	**(19.9, 33.0)**	**46.1%**	**(38.0, 54.4)**	**27.9%**	**(22.8, 33.7)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

For the most part, a large proportion of adolescents expressed a desire to decrease overall dietary fat as well as dietary saturated fat and trans fat (Figure 64). However, more than one-third expressed the view that reducing fat intake is difficult.

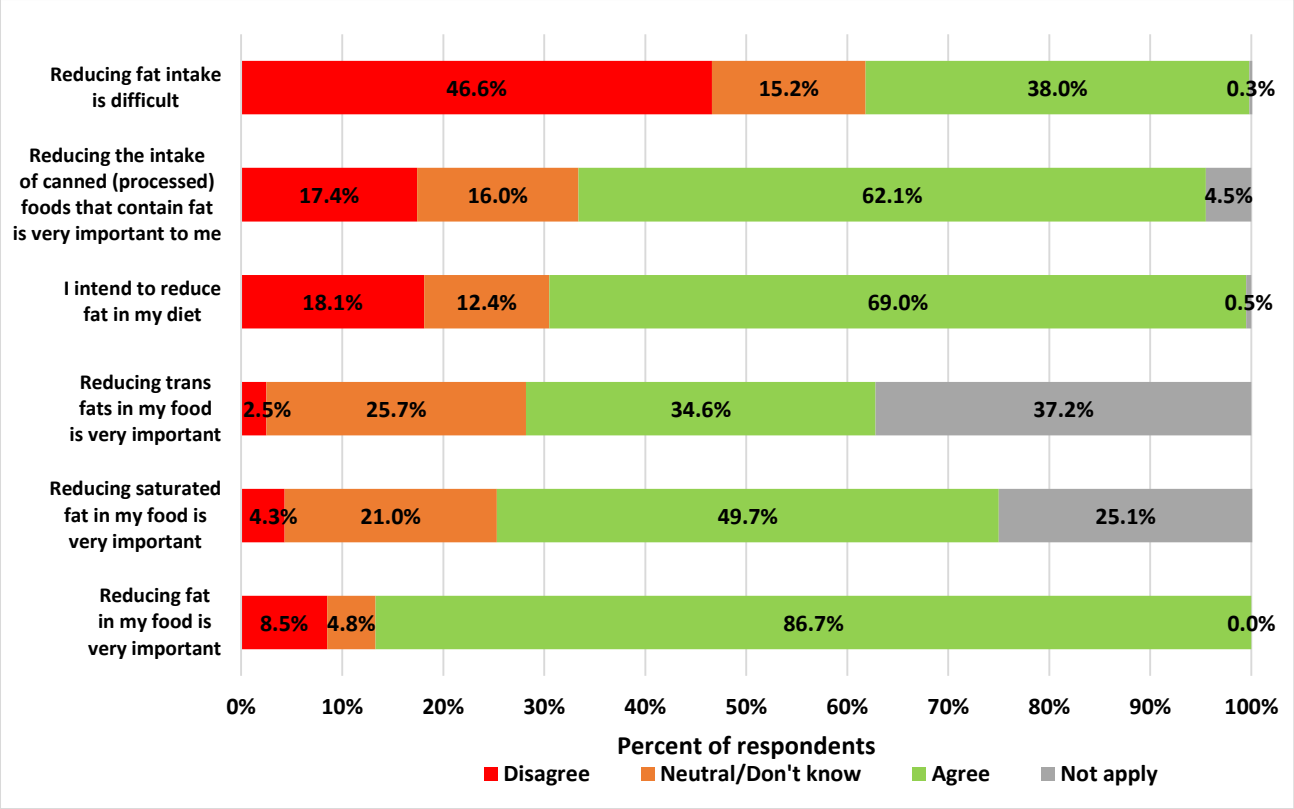

Figure 64 Respondents' agreement with statement about dietary fat or oil, adolescents 14-18 years of age

Almost one-third (28.7%) of 287 responding adolescents reported that they were at risk for heart disease because of fat intake; 64.0% felt that they were not at risk; 2.1% were neutral; and 20 (5.3%) reported that they did not know. Among those 71 adolescents who reported that they were at risk, 37% reported low or very low risk, 44% reported average risk, and 19% reported high or very high risk.

Reported risk of cardiovascular disease in adolescents is not statistically significantly correlated with practices regarding dietary fat or oil intake (Table 23).

Table 23. Number (weighted %) respondents with or without reported risk of cardiovascular disease with low, medium, or high scores on oil practices index - Adolescents 14-18 years of age

	Adolescents' oil practices index			
Reported risk of cardiovascular disease due to fat intake	**Low**	**Medium**	**High**	**P value**
Yes	67 (93.5%)	2 (3.5%)	2 (3.0%)	0.461
No	178 (93.8%)	7 (5.7%)	2 (0.4%)	
Unknown	27 (96.7%)	2 (3.3%)	0	

The most common reasons for adolescents reporting low risk of cardiovascular disease pertained to low dietary fat or oil intake (Figure 65). However, even more respondents reported not knowing why they felt they were at low risk.

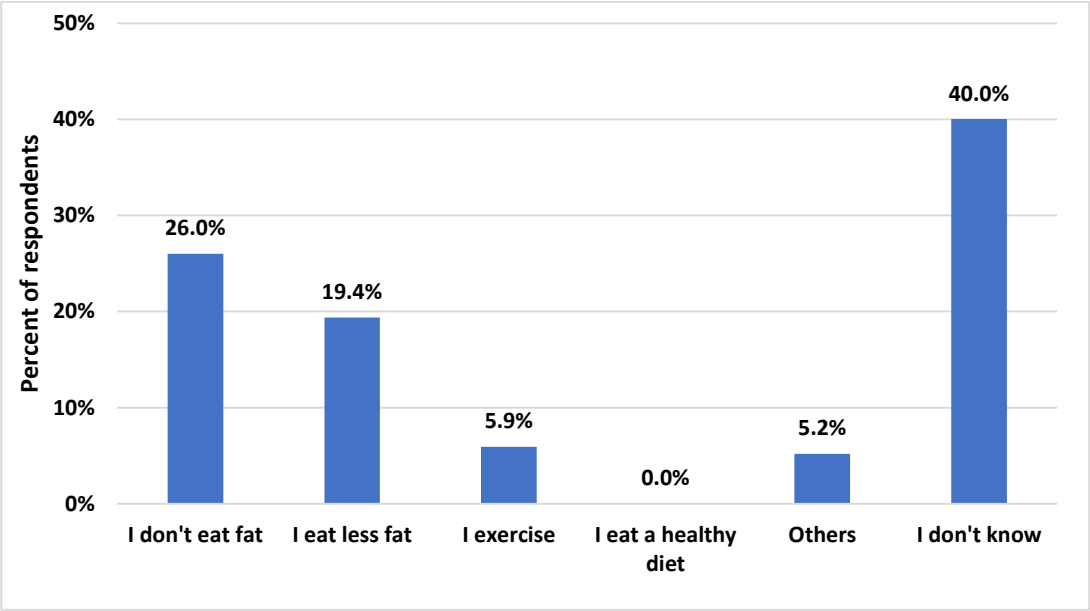

Figure 65 Of those reporting low risk of cardiovascular disease, respondents' reason why, adolescents 14-18 years of age

Adolescent respondents reported a variety of concerns about the food they eat (Figure 66). Specifically, almost one-third were concerned about artificial flavors and artificial colors. A higher proportion of adolescents were concerned about sugar content of their food, and a lower proportion were concerned about salt, calories, saturated fat, and trans fat. The distribution of concerns by governorate is shown in **Table S21** through **Table S29**.

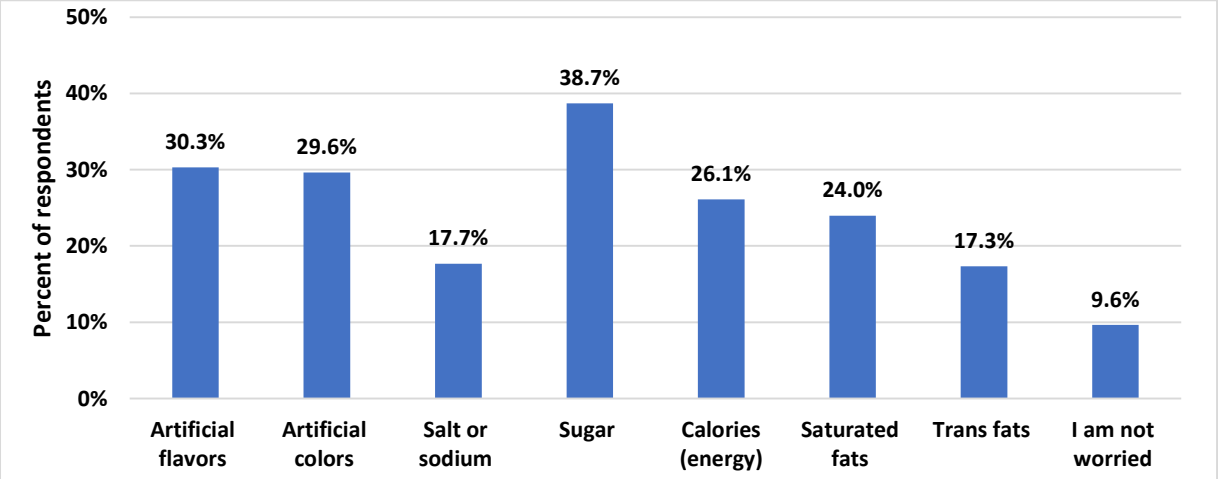

Figure 66 Proportion of participants concerned about eating foods that contain certain ingredients, adolescents 14-18 years of age

Of those reporting concerns, 74.0% said it was because the substance of concern causes disease, 6.4% because these substances are chemicals, 1.9% reported other reasons, and 10.8% said they did not know.

Among the factors reported by adolescents which would help them reduce dietary fat, healthy cooking, eating a healthy diet, and being active in sports were the most commonly cited (Figure 67).

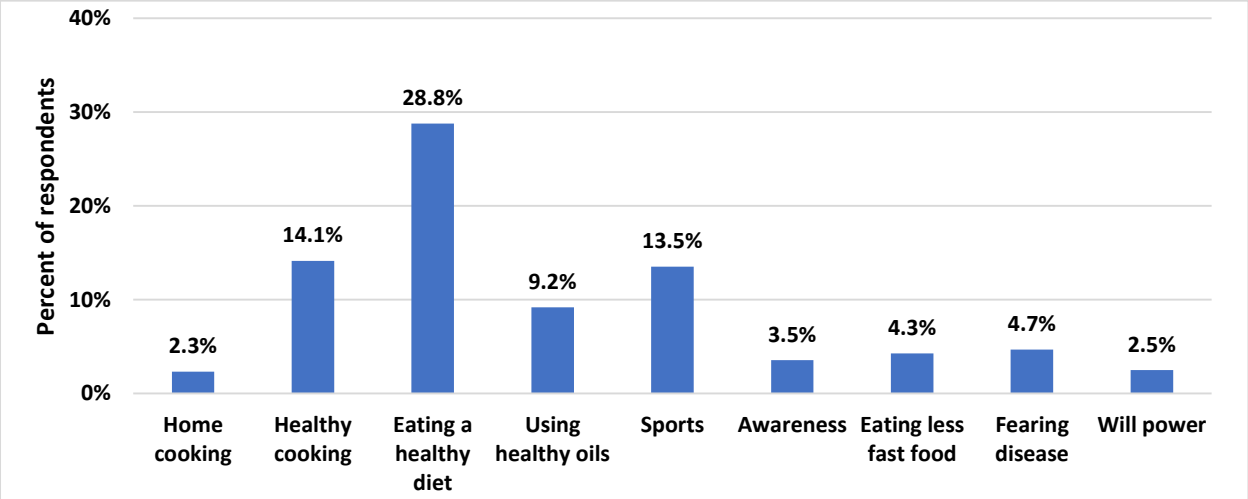

Figure 67 Respondents' reported factors which will help them reduce dietary fat consumption, adolescents 14-18 years of age

Adolescent respondents also reported on factors which may motivate them to reduce dietary fat consumption. Among those mentioned most commonly were a change in my health condition and advice from a family member or friend (Figure 68). On the other hand, more than one quarter of respondents could not cite a motivating factor.

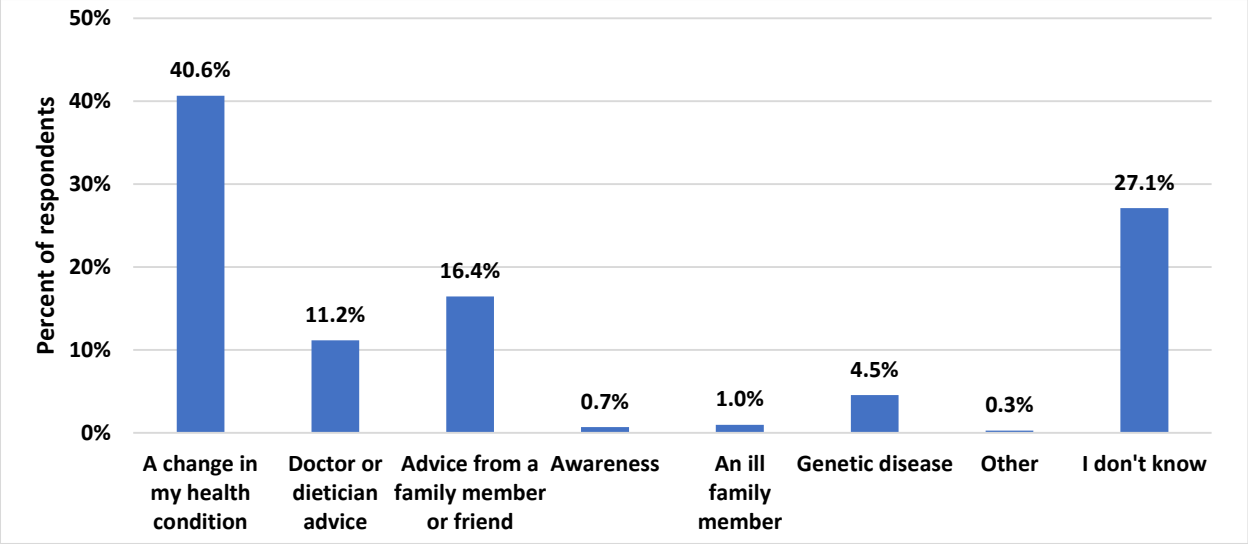

Figure 68 Respondents' reported motives to reduce dietary fat consumption, adolescents 14-18 years of age

While almost one-half of adolescent respondents said there were no obstacles or barriers to their reducing dietary fat, more than one quarter said that they like the flavor of fat or oil in foods. Other barriers were cited much less frequently (Figure 69).

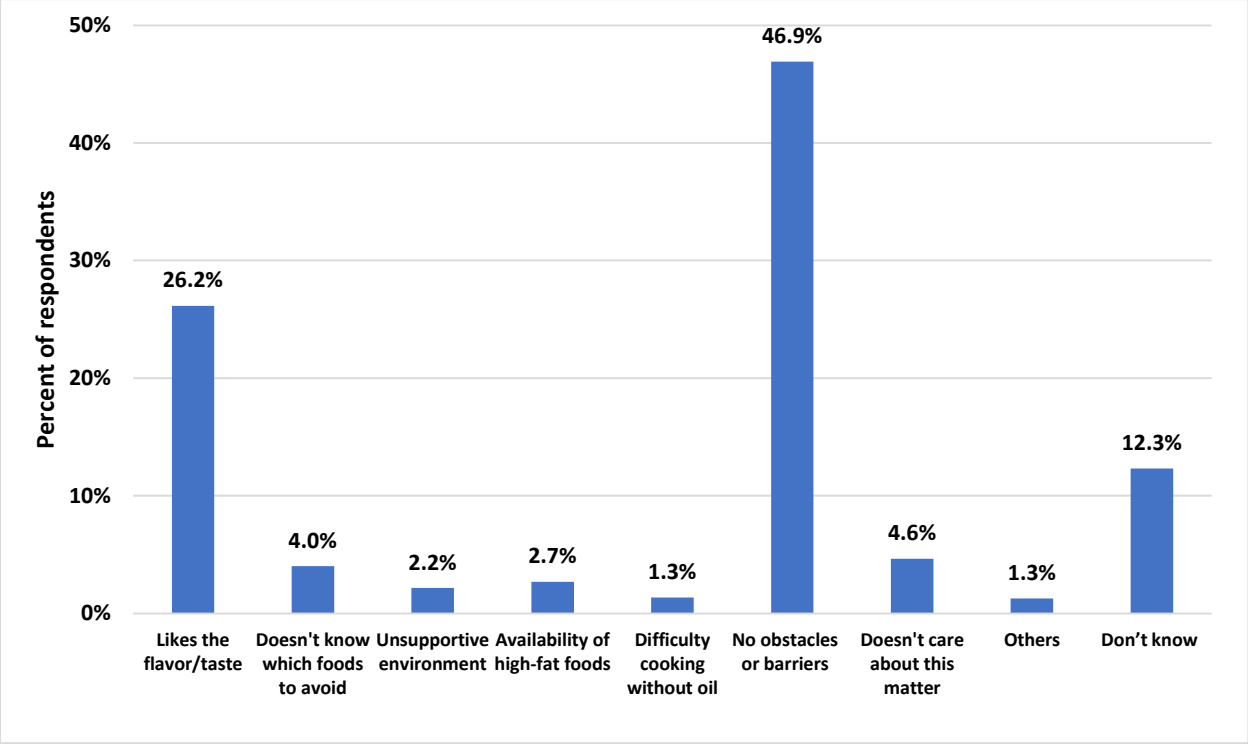

Figure 69 Respondents' reported barriers to reducing dietary fat consumption, adolescents 14-18 years of age

4.1.4. Practices

Generally, adolescent respondents had quite poor scores for the oil and fat practices index, and in every subgroup examined, fewer than 4% of adolescents scored high on this index (**Table 24**).

Table 24. Composite index for oil/ fat practices of adolescents 14-18 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	161	95.5%	(88.7, 98.3)	2.6%	(0.7, 9.6)	1.9%	(0.4, 8.9)	0.110
Female	127	92.1%	(84.5, 96.2)	7.7%	(3.7, 15.5)	0.2%	(0.1, 0.4)	
Educational level								
Primary	19	100%	-	0%	-	0%	-	0.362
Elementary	119	91.2%	(84.4, 95.2)	6.6%	(3.1, 13.4)	2.3%	(0.5, 9.9)	
Secondary or more	150	95.9%	(86.5, 98.8)	4.0%	(1.1, 13.6)	0.2%	(0.1, 0.4)	
Governorate								
Muscat	27	85.2%	(69.1, 93.7)	11.1%	(5.3, 21.7)	3.7%	(0.6, 19.4)	0.900
Dhofar	16	100%	-	0%	-	0%	-	
Ad Dakhliyah	25	88.0%	(75.5, 94.6)	12.0%	(5.4, 24.5)	0%	-	
Ash Sharqiyah North	26	100%	-	0%	-	0%	-	
Ash Sharqiyah South	29	96.6%	(82.8, 99.4)	0%	-	3.4%	(0.6,17.2)	
Al Batinah North	30	100%	-	0%	-	0%	-	
Al Batinah South	26	96.2%	(80.4, 99.3)	3.8%	(0.7, 19.6)	0%	-	
Adh Dhahirah	24	95.8%	(83.5, 99.0)	4.2%	(1.0, 16.5)	0%	-	
Al Buraymi	24	100%	-	0%	-	0%	-	
Musandam	32	90.6%	NA*	6.3%	NA*	3.1%	NA*	
Al Wusta	29	93.1%	(74.0, 98.5)	3.4%	(0.8, 13.8)	3.4%	(0.8, 13.8)	
Who buys food for household								
Housewife	110	92.6%	(83.9, 96.7)	5.3%	(2.1, 12.9)	2.1%	(0.3, 12.9)	0.584
Head of house	150	94.5%	(86.6, 97.9)	5.0%	(1.8, 13.2)	0.5%	(0.1, 3.4)	
Servant	7	71.4%	NA**	14.3%	NA**	14.3%	NA**	
Other person	21	100%	-	0%	-	0%	-	
Talked to professional about diet								
Yes	46	90.5%	(76.4, 96.6)	9.2%	(3.3, 23.6)	0.2%	(0.0, 1.6)	0.453
No	173	92.5%	(83.9, 96.7)	6.0%	(2.9, 12.1)	1.5%	(0.2, 9.1)	
Tried to lose weight								
Yes	94	89.4%	(78.0, 95.3)	7.8%	(3.0, 18.5)	2.8%	(0.4, 16.3)	0.147
No	188	96.3%	(90.8, 98.6)	3.3%	(1.1, 9.1)	0.4%	(0.1, 2.7)	
TOTAL	**288**	**94.0%**	**(89.0, 96.8)**	**4.9%**	**(2.7, 8.6)**	**1.1%**	**(0.3, 4.9)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.
** Confidence intervals do not compute correctly.

Of the 288 adolescent respondents, 123 (39.2%) reported not preparing meals, and almost half reported adding oil sometimes, often, or always during cooking (Figure 70).

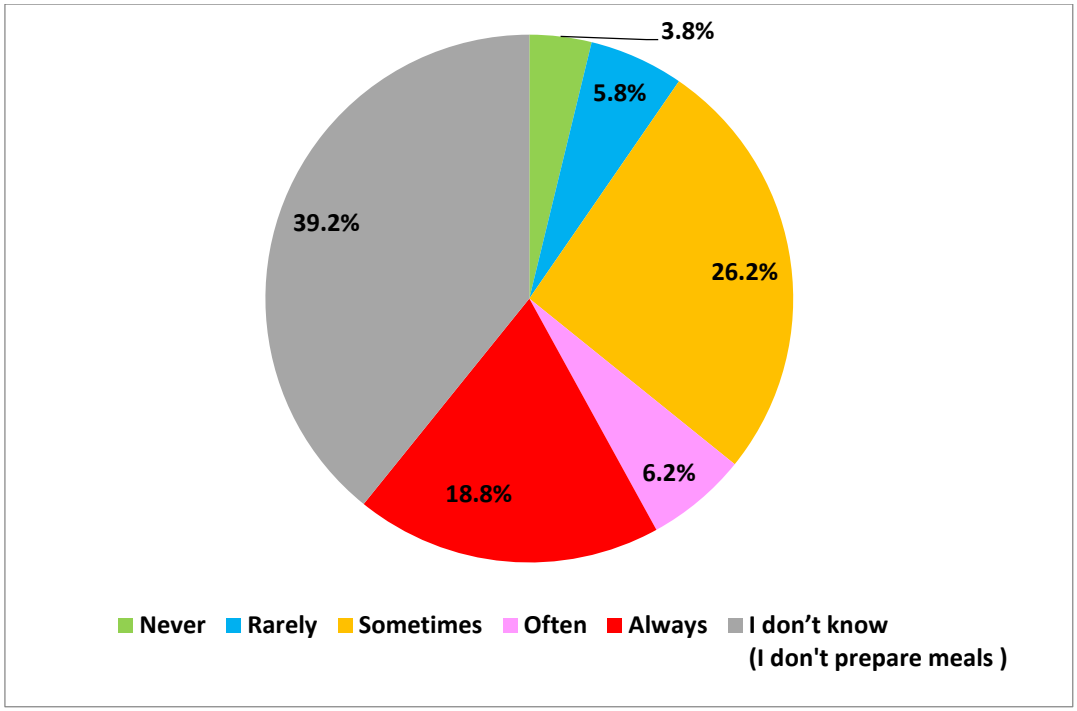

Figure 70 Respondents' reported frequency of adding oil or fat to food during cooking, adolescents 14-18 years of age

Among the 158 (54.9%) adolescents who reported adding oil or fat food while cooking, the most commonly used oils were olive oil or some type of vegetable oil (Figure 71). Animal products, such as butter, and other less healthy fats, such as margarine, were used much less frequently.

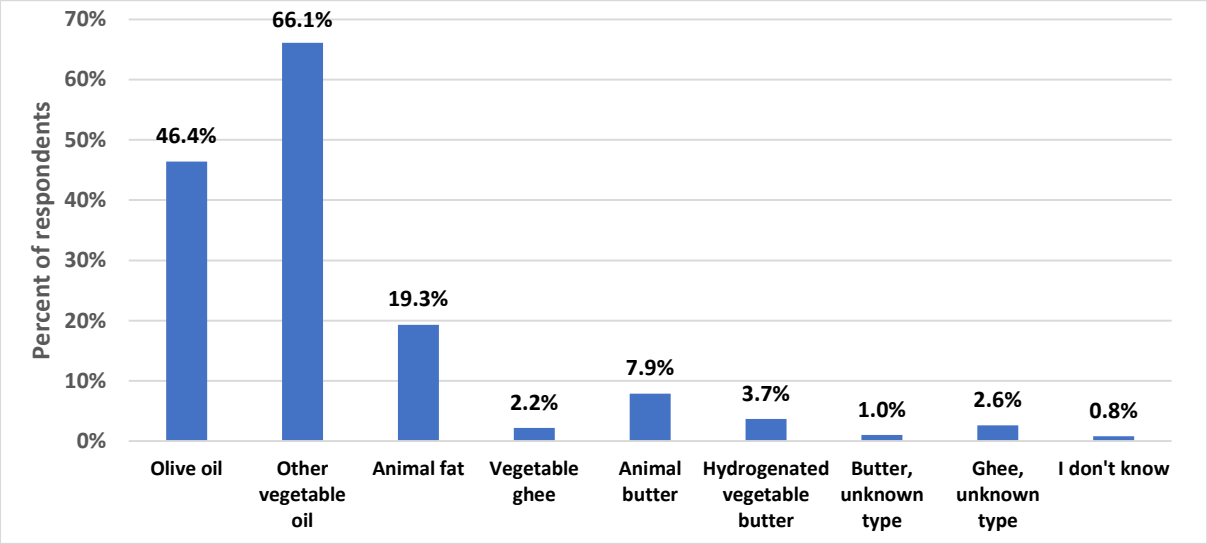

Figure 71 If cook with fat or oil, what type used, adolescents 14-18 years of age

Among the seven adolescent respondents who reported never adding fat or oil during cooking, alternative methods of cooking without oil or fat included grilling, mentioned by two (23%); using fat spray, mentioned by one (22%); steaming, mentioned by two (44%), and boiling, mentioned by three (43%).

More than one-half of adolescents reported never adding oil or fat to their food while eating (Figure 72). Most of the remaining adolescents reported sometimes adding oil or fat to their food when eating. Other frequencies, such as rarely, often, and always, were much less commonly reported.

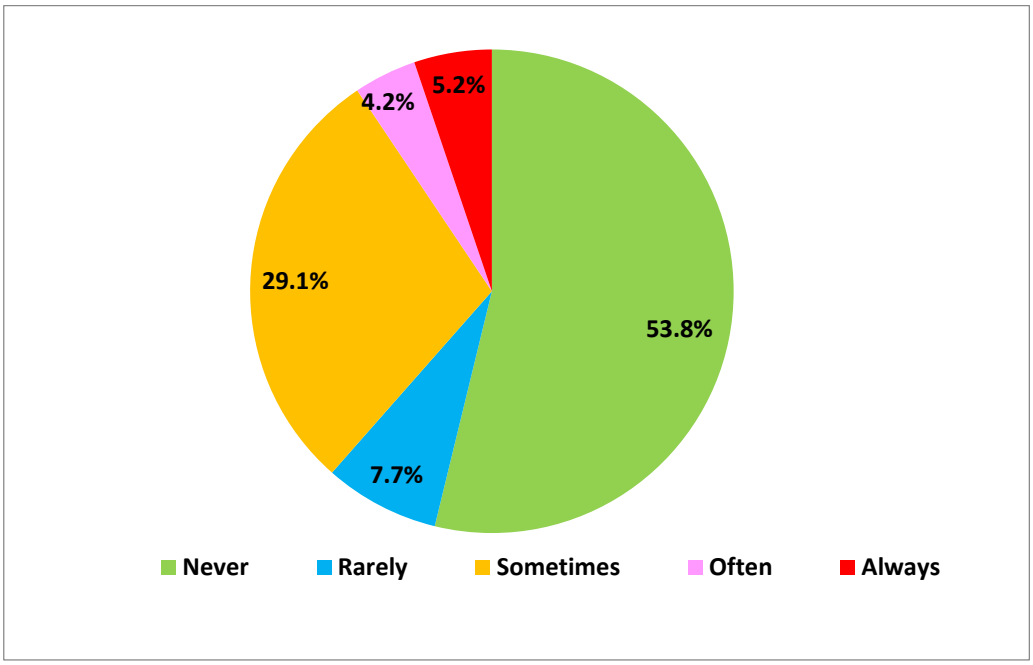

Figure 72 Do you add fat or oil to your food when eating, adolescents 14-18 years of age

Unlike the oil or fat added during cooking, the most common oil or fat added by adolescent respondents during eating was animal fat (Figure 73). The second most commonly cited oil or fat was olive oil. Other forms of oil or fat were much less commonly used.

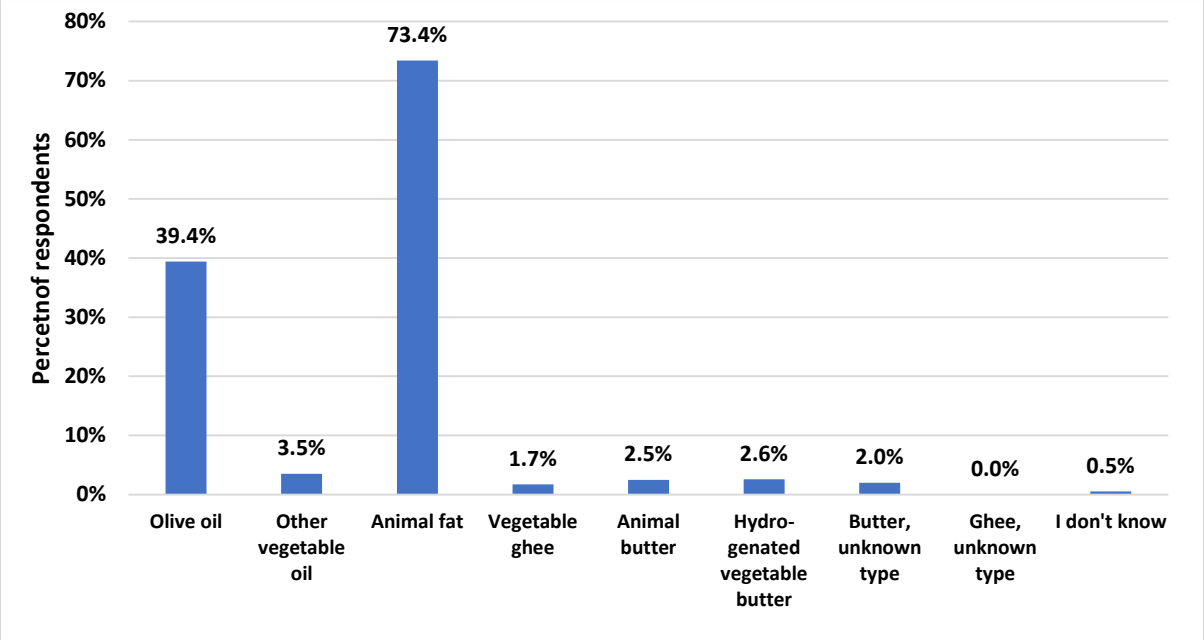

Figure 73 If add fat or oil when eating, what type of fat or oil, adolescents 14-18 years of age

The most commonly cited methods of adding oil or fat to food during cooking was directly from the package; however, almost one-third of adolescents did not know how oil or fat was added (Figure 74).

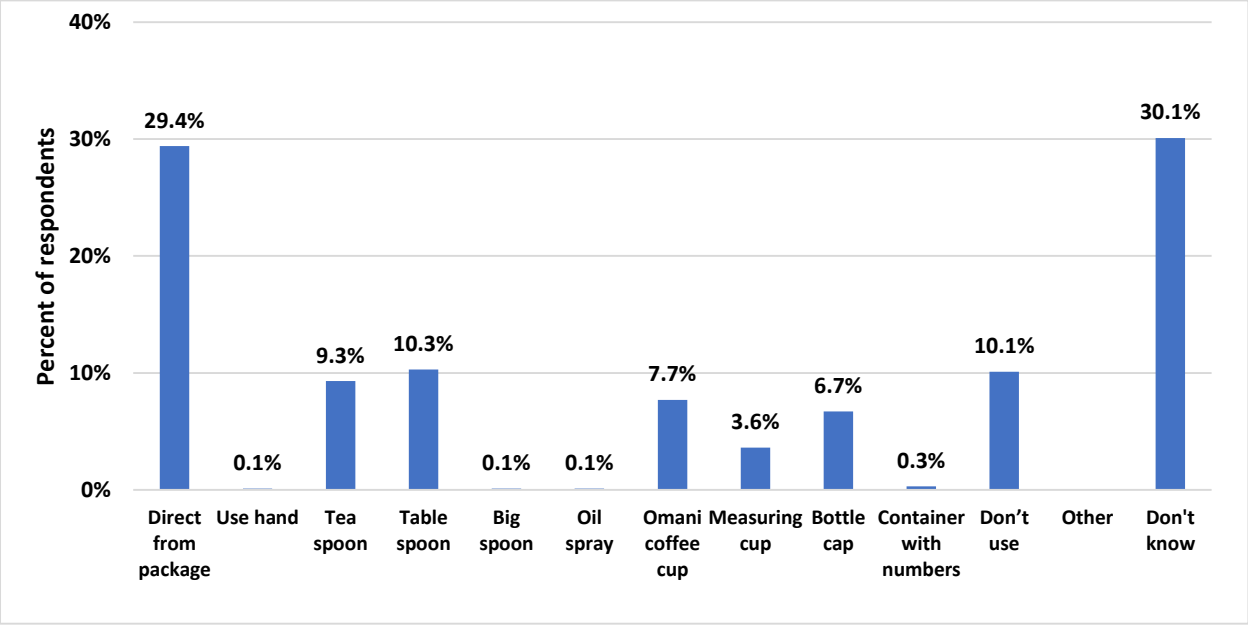

Figure 74 When adding oil or fat during cooking, what instrument is used to measure, adolescents 14-18 years of age

Almost one-half of adolescents reported not adding oil or fat to food at the time of consumption (Figure 75). Of those that did add oil or fat, the most common method was directly from the package.

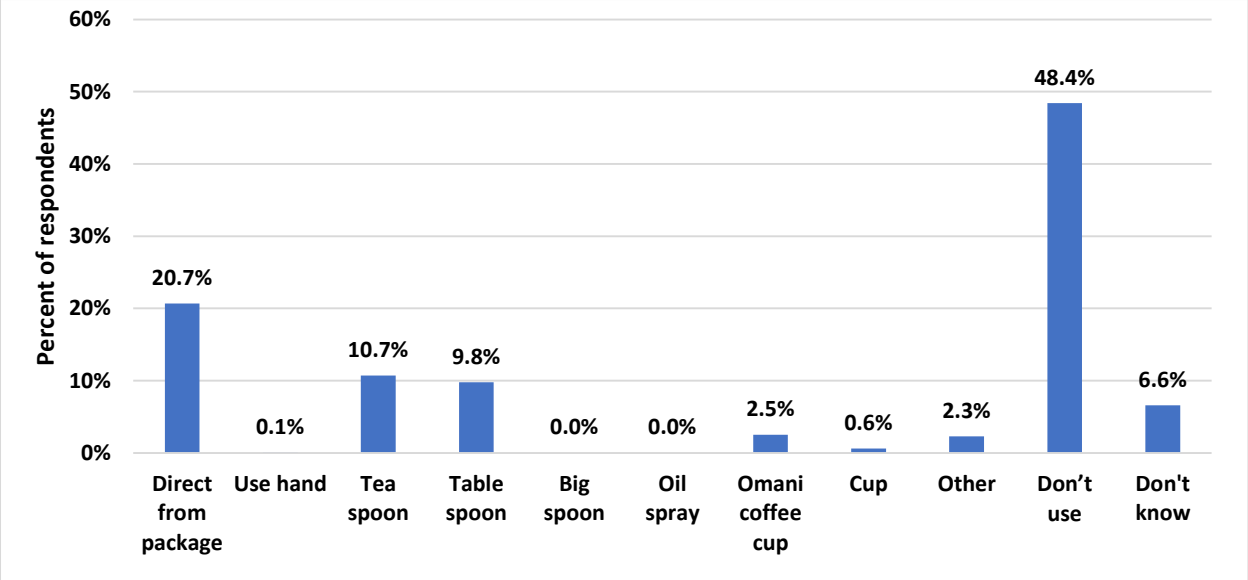

Figure 75 When adding oil or fat when eating, what instrument is used to measure, adolescents 14-18 years of age

Fewer than one-quarter of adolescent respondents often or always tried to reduce dietary fat while eating (Table 25). Almost two-thirds never or rarely checked ingredients on food package labels, and one-half never or rarely changed purchasing habits to reduce intake of total fat or trans fats. In addition, about one-half never or rarely looked for information on total fat, trans fats, saturated fat, or tropical oils on nutrition labels; however, more than one-third could not answer such questions. These distributions are given by sex and governorate of residence in **Table S30** through **Table S37**.

Table 25. Frequency of selected behaviors regarding food purchases and food packaging nutrition information, adolescents 14-18 years of age

Question	Never or rarely	Some-times	Often or always	Don`t know or not applicable
When you eat your meals, do you try to reduce fat while eating?	39.4%	33.6%	24.2%	2.8%
Do you check food ingredient labels when you shop?	62.7%	15.9%	13.9%	7.5%
Have you ever changed your purchasing habits to reduce your total fat intake?	48.6%	16.9%	8.7%	25.8%
Have you ever changed your purchasing habits to reduce your intake of trans fats?	51.7%	7.6%	5.1%	35.6%
Do you check the following information on nutrition labels?				
Total fat	51.7%	7.6%	5.1%	35.6%
Trans fats (hydrogenated)	47.1%	5.1%	3.5%	44.3%
Saturated fat	47.4%	7.7%	5.9%	39.1%
Tropical oils (palm oil, coconut oil)	47.4%	7.4%	3.5%	41.6%

A majority of adolescents reported consuming several high-fat foods only monthly or rarely; these foods included Omani halwa, canned fish in oil, and fried foods (**Table 26**). Other foods were consumed more frequently, and some high-fat foods, such as fried potatoes or chips and spreadable cheese, were consumed almost daily by a large proportion of respondents.

Table 26. Reported frequency* of consumption of selected foods, adolescents 14-18 years of age

Food	Daily	Weekly	Monthly	Rarely
Ready-made sweets (cakes, etc.), Arabic sweets	7.8%	48.0%	18.5%	25.7%
Biscuits	30.1%	29.9%	11.9%	28.1%
Chocolate	36.3%	34.1%	6.7%	22.9%
Omani halwa	1.8%	11.9%	28.4%	57.9%
Ice cream, cream	13.1%	38.4%	18.6%	29.9%
Pastries (quroos, pancakes)	20.2%	43.5%	16.2%	20.1%
Fried potatoes, chips, corn puffs (mino)	44.3%	39.9%	9.3%	6.5%
Yellow or spreadable cheeses	54.5%	22.2%	4.1%	19.2%
Ready to prepare noodles (Indomie)	15.5%	34.0%	13.1%	37.4%
Canned meat, ready-made meat and chicken products	11.9%	37.4%	22.0%	28.7%
Fish and tuna canned in oil	6.6%	30.6%	18.2%	44.6%
Fried dishes	4.2%	28.6%	23.5%	43.7%
Mayonnaise, salad, and sandwiches dressings	14.2%	28.6%	16.1%	41.1%
Fast food	7.7%	39.9%	26.1%	26.3%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

More than three quarters (76.8%) of 288 adolescent respondents reported that their household used predominantly full fat dairy products. Only 13.1% of adolescents reported using low fat dairy products, and less than 1% reported using fat free products.

4.2. Results – Adults 19-60 years of age

4.2.1. Demographic characteristics

Table 27 below shows the characteristics of adults responding to the oil and fat questionnaire.

Table 27. Distribution of various demographic characteristics among adults 19-60 years of age responding to the oil and fat questionnaire

Characteristic	Unweighted number	Weighted percent
Sex		
Male	556	50.6%
Female	537	49.4%
Age (in years)		
19-29	346	31.2%
30-39	384	35.4%
40-49	261	23.8%
50-60	102	9.5%
Educational level		
Primary	56	4.7%
Elementary	112	9.3%
Secondary	519	46.7%
Diploma	137	12.5%
Bachelors or more	219	23.5%
Unknown	50	3.2%
Marital status		
Single	280	24.6%
Married	813	75.4%
Household income		
<200 OMR	213	20.0%
200-499 OMR	346	31.1%
500-999 OMR	205	18.8%
1000+ OMR	116	11.5%
Don't know	213	18.6%
Type of job		
Government	305	25.4%
Private	161	16.9%
Military	89	7.3%
Retired	52	6.9%
Student	55	6.7%
Job seeker	132	11.4%
Not working	299	25.3%
Works in health field		
Yes	46	4.6%
No	796	95.4%
Buys food for household		
Respondent	457	41.4%
Other household member	636	58.6%

Characteristic	Unweighted number	Weighted percent
Governorate		
Muscat	102	10.0%
Dhofar	64	6.1%
Ad Dakhliyah	91	8.5%
Ash Sharqiyah North	88	8.1%
Ash Sharqiyah South	115	10.7%
Al Batinah North	110	10.3%
Al Batinah South	99	9.1%
Adh Dhahirah	115	10.3%
Al Buraymi	90	9.0%
Musandam	113	8.3%
Al Wusta	106	9.6%
Buys food for household		
Respondent	457	41.4%
Other household member	636	58.6%
Who buys food for household		
Housewife	390	38.2%
Head of house	575	52.9%
Servant	6	0.1%
Other person	122	8.8%
Talked to professional about diet		
Yes	352	34.1%
No	494	43.1%
Unknown	247	22.9%
Tried to lose weight		
Yes	508	49.4%
No	569	50.2%
Unknown	16	0.4%
Has disease		
Hypertension	103	10.2%
Diabetes	73	7.0%
Heart disease	11	1.4%
Overweight or obesity	165	16.8%

4.2.2. Knowledge

Table 28 shows the large majority of adults in most subgroups scored low on the knowledge index for oil and fat. Scores were higher with higher educational level and higher household income. Adults who were married, who had talked to a doctor about nutrition, or who had tried to lose weight in the past had statistically significantly higher scores than adults who were unmarried or who had never talked to a doctor or tried to lose weight.

Table 28. Composite index for oil and fat knowledge of adults 19-60 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	556	74.3%	(69.2, 78.9)	23.7%	(19.4, 28.6)	2.0%	(1.0, 3.8)	0.133
Female	537	71.5%	(65.5, 76.8)	24.0%	(19.5, 29.2)	4.5%	(2.8, 7.3)	
Age								
19-29	346	77.5%	(72.0, 82.1)	19.7%	(14.8, 25.7)	2.8%	(0.9, 8.3)	0.488
30-39	384	69.7%	(63.9, 75.1)	26.5%	(21.8, 31.7)	3.8%	(2.0, 7.0)	
40-49	261	71.3%	(65.3, 76.6)	24.3%	(19.1, 30.4)	4.4%	(2.1, 8.9)	
50-60	102	73.2%	(58.0, 84.3)	26.1%	(15.1, 41.3)	0.7%	(0.1, 5.0)	
Educational level								
Primary	56	87.2%	(72.9, 94.5)	12.8%	(5.5, 27.1)	0%	-	<0.001
Elementary	112	85.2%	(74.5, 91.9)	14.1%	(7.6, 24.8)	0.8%	(0.1, 4.7)	
Secondary	519	82.4%	(77.7, 86.3)	15.7%	(12.1, 20.0)	1.9%	(1.0, 3.9)	
Diploma	137	65.5%	(57.8, 72.4)	31.5%	(23.7, 40.5)	3.0%	(0.8, 10.4)	
Bachelors or more	219	46.8%	(40.1, 53.6)	44.7%	(38.2, 51.5)	8.4%	(5.0, 13.9)	
Marital status								
Not married	280	76.3%	(70.0, 81.7)	21.8%	(16.3, 28.5)	1.9%	(0.5, 6.6)	0.350
Married	813	71.7%	(67.4, 75.6)	24.5%	(21.0, 28.2)	3.8%	(2.7, 5.3)	
Governorate								
Muscat	102	62.7%	(54.6, 70.1)	30.3%	(22.6, 39.3)	7.0%	(4.2, 11.5)	0.277
Dhofar	64	87.5%	(79.3, 92.7)	10.9%	(6.8, 17.0)	1.6%	(0.3, 7.0)	
Ad Dakhliyah	91	62.6%	(54.2, 70.3)	31.7%	(24.9, 39.5)	5.7%	(4.0, 8.1)	
Ash Sharqiyah North	88	79.0%	(72.2, 84.5)	18.6%	(12.6, 26.6)	2.4%	(0.7, 8.5)	
Ash Sharqiyah South	115	65.2%	(56.2, 73.3)	29.6%	(22.2, 38.2)	5.2%	(2.6, 10.0)	
Al Batinah North	110	82.9%	(77.6, 87.1)	17.1%	(12.9, 22.4)	0%	-	
Al Batinah South	99	72.8%	(67.9, 77.2)	26.2%	(23.2, 29.4)	1.0%	(0.2, 6.0)	
Adh Dhahirah	115	81.9%	(62.3, 92.6)	16.3%	(6.2, 36.7)	1.7%	(0.3, 9.7)	
Al Buraymi	90	71.4%	(55.1, 83.6)	26.4%	(12.3, 47.7)	2.2%	(0.4, 10.5)	
Musandam	113	80.3%	NA*	17.3%	NA*	2.4%	NA*	
Al Wusta	106	88.3%	(81.4, 92.9)	11.7%	(7.1, 18.6)	0%	-	
Household income								
<200 OMR	213	83.0%	(75.7, 88.4)	14.6%	(9.8, 21.1)	2.4%	(0.9, 6.2)	<0.001
200-499 OMR	346	81.5%	(72.4, 88.1)	14.6%	(9.0, 22.9)	3.8%	(2.0, 7.2)	
500-999 OMR	205	56.8%	(48.5, 64.7)	38.0%	(30.5, 46.1)	5.2%	(2.5, 10.7)	
1000+ OMR	116	53.1%	(40.9, 65.0)	43.5%	(31.6, 56.2)	3.4%	(1.2, 9.2)	
Do not know	213	75.9%	(67.9, 82.4)	22.6%	(15.8, 31.3)	1.5%	(0.3, 6.9)	
Type of job								
Government	305	62.5%	(54.5, 69.9)	31.1%	(24.1, 39.2)	6.3%	(3.5, 11.2)	0.070
Private	161	71.7%	(63.9, 78.3)	24.9%	(18.6, 32.6)	3.4%	(1.2, 9.2)	
Military	89	80.8%	(68.7, 89.0)	15.5%	(8.3, 27.2)	3.7%	(1.1, 11.9)	
Retired	52	72.7%	(55.1, 85.3)	27.1%	(14.6, 44.8)	0.1%	(0.1, 0.2)	
Student	55	74.5%	(58.9, 85.7)	22.2%	(11.9, 37.7)	3.3%	(0.4, 21.2)	
Looking for work	132	78.2%	(68.8, 85.3)	21.8%	(14.7, 31.2)	0%	-	
Not working	299	78.9%	(70.8, 85.2)	18.5%	(12.8, 26.0)	2.6%	(1.3, 5.2)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Works in health field								
Yes	46	64.9%	(47.3, 79.2)	24.8%	(11.2, 46.3)	10.4%	(4.1, 23.9)	0.181
No	796	69.9%	(66.1, 73.4)	26.5%	(23.1, 30.2)	3.6%	(2.4, 5.4)	
Buys food for household								
Yes	457	68.5%	(61.6, 74.7)	26.6%	(21.2, 32.8)	4.9%	(3.1, 7.6)	0.053
No	636	75.9%	(72.0, 79.5)	21.8%	(18.5, 25.6)	2.2%	(1.2, 4.1)	
Who buys food for household								
Housewife	390	64.4%	(57.9, 70.5)	29.2%	(23.7, 35.4)	6.4%	(4.2, 9.6)	<0.001
Head of house	575	77.2%	(73.2, 80.8)	21.1%	(17.3, 25.4)	1.7%	(0.8, 3.6)	
Servant	6	30.2%	(5.2, 77.5)	69.8%	(22.5, 94.8)	0%	-	
Other person	122	83.7%	(73.3, 90.5)	16.2%	(9.4, 26.6)	0.1%	(0.1, 0.2)	
Talked to professional about diet								
Yes	352	65.0%	(58.4, 71.2)	32.5%	(26.4, 39.2)	2.4%	(1.1, 5.2)	<0.05
No	494	75.5%	(69.7, 80.5)	19.8%	(15.0, 25.6)	4.8%	(2.7, 8.2)	
Tried to lose weight								
Yes	508	67.9%	(63.0, 72.5)	29.2%	(24.5, 34.5)	2.8%	(1.6, 5.0)	<0.01
No	569	77.8%	(74.2, 81.0)	18.4%	(15.2, 22.0)	3.8%	(2.3, 6.4)	
Has hypertension								
Yes	103	86.6%	(76.5, 92.8)	13.4%	(7.2, 23.5)	0%	-	<0.01
No	990	71.3%	(67.8, 74.5)	25.0%	(21.9, 28.3)	3.7%	(2.7, 5.1)	
Has diabetes								
Yes	73	63.6%	(47.3, 77.2)	32.6%	(19.6, 49.0)	3.8%	(1.2, 12.1)	0.310
No	1020	73.6%	(69.9, 76.9)	23.2%	(20.0, 26.6)	3.3%	(2.3, 4.7)	
Has heart disease								
Yes	11	52.8%	(20.4, 83.0)	47.2%	(17.0, 79.6)	0%	-	0.291
No	1082	73.1%	(69.6, 76.4)	23.5%	(20.2, 27.0)	3.4%	(2.4, 4.7)	
Is overweight or obese								
Yes	165	65.7%	(57.7, 72.9)	31.9%	(24.5, 40.5)	2.4%	(1.0, 5.4)	<0.05
No	928	74.3%	(70.8, 77.6)	22.2%	(19.2, 25.5)	3.5%	(2.4, 5.1)	
TOTAL	**1093**	**72.9%**	**(69.4,76.0)**	**23.8%**	**(20.7,27.2)**	**3.3%**	**(2.4,4.6)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

The majority of adult respondents reported that they consumed an appropriate amount of dietary oil and fat per day (Figure 76). Another one-quarter of adults reported consuming more than the appropriate amount.

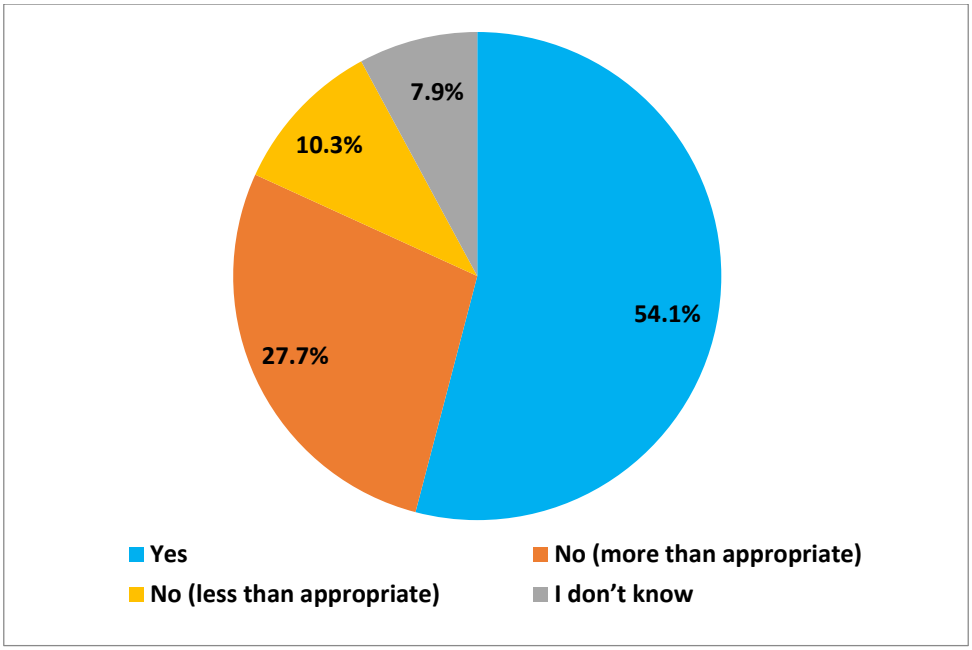

Figure 76 Respondents' perception on whether or not they were consuming the appropriate amount of fat per day, adults 19-60 years of age

Overall, 811 (76.0%) of 1093 adults knew that there are ways of cooking to reduce the amount of dietary fat; 123 (9.7%) reported that they did not know of such ways, and 159 (14.3%) reported not knowing. The distribution of these values in each governorate is shown in **Table S38**.

The vast majority of the 1093 adult respondents (1042 [96.6%]) reported that consumption of too much fat is bad for one's health. Only 26 adults (2.1%) reported that it was good for oneself or has no effect on health, and 25 (1.3%) reported not knowing. The distribution of these values by governorate is shown in **Table S39**.

The majority of adult respondents correctly identified high blood fat and cholesterol and heart disease as potential consequences of high fat consumption (Figure 77). Fewer adults identified hypertension and stroke as consequences of high fat consumption. Although diabetes can result from high fat consumption largely because such a diet increases the risk of obesity, excess oil and fat consumption does not directly raise the risk of diabetes. Nonetheless, more than one-third of adults identified this as a disease resulting from high dietary fat. Relatively few adults identified obesity or atherosclerosis as health consequences.

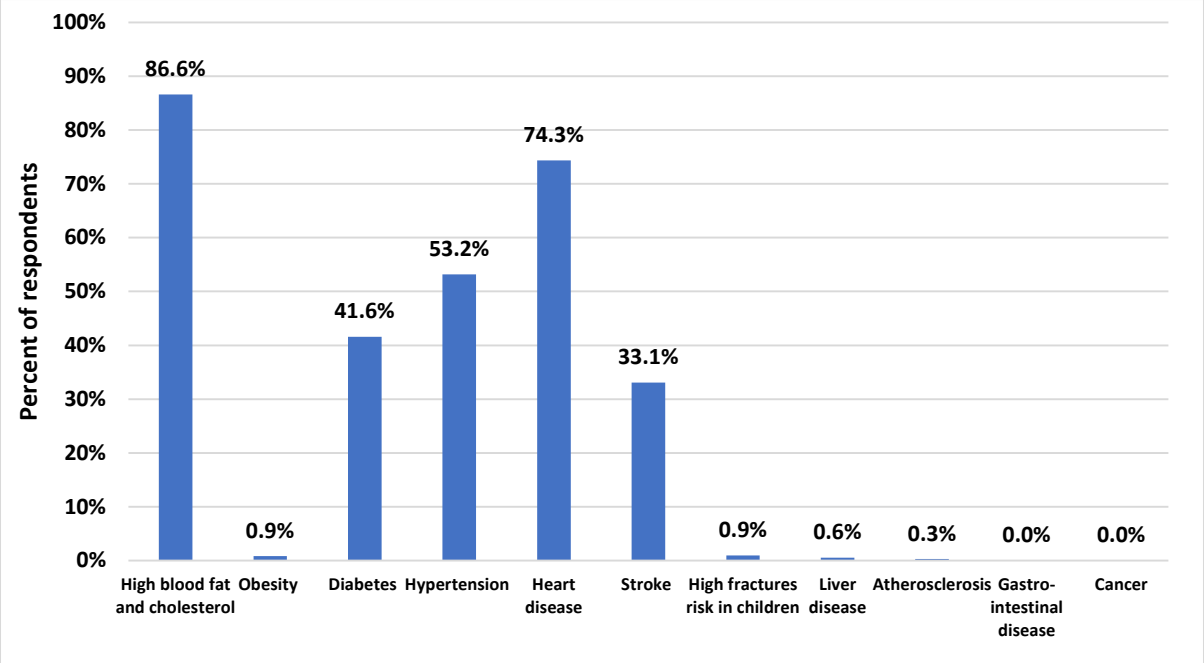

Figure 77 Respondent's reported diseases or health problems that may be caused by eating foods with a high amount of fat, adults 19-60 years of age

A majority of majority of adult respondents correctly selected spreadable cheese, fast food, mayonnaise and dressings, fried dishes, canned meat, fried potatoes and chips, Omani halwa, chocolate, Arabic sweets, and ready-made desserts as having a high fat content from a list of selected foods, as shown in Figure 78. Fewer identified nuts, ice cream, and cream as high-fat foods.

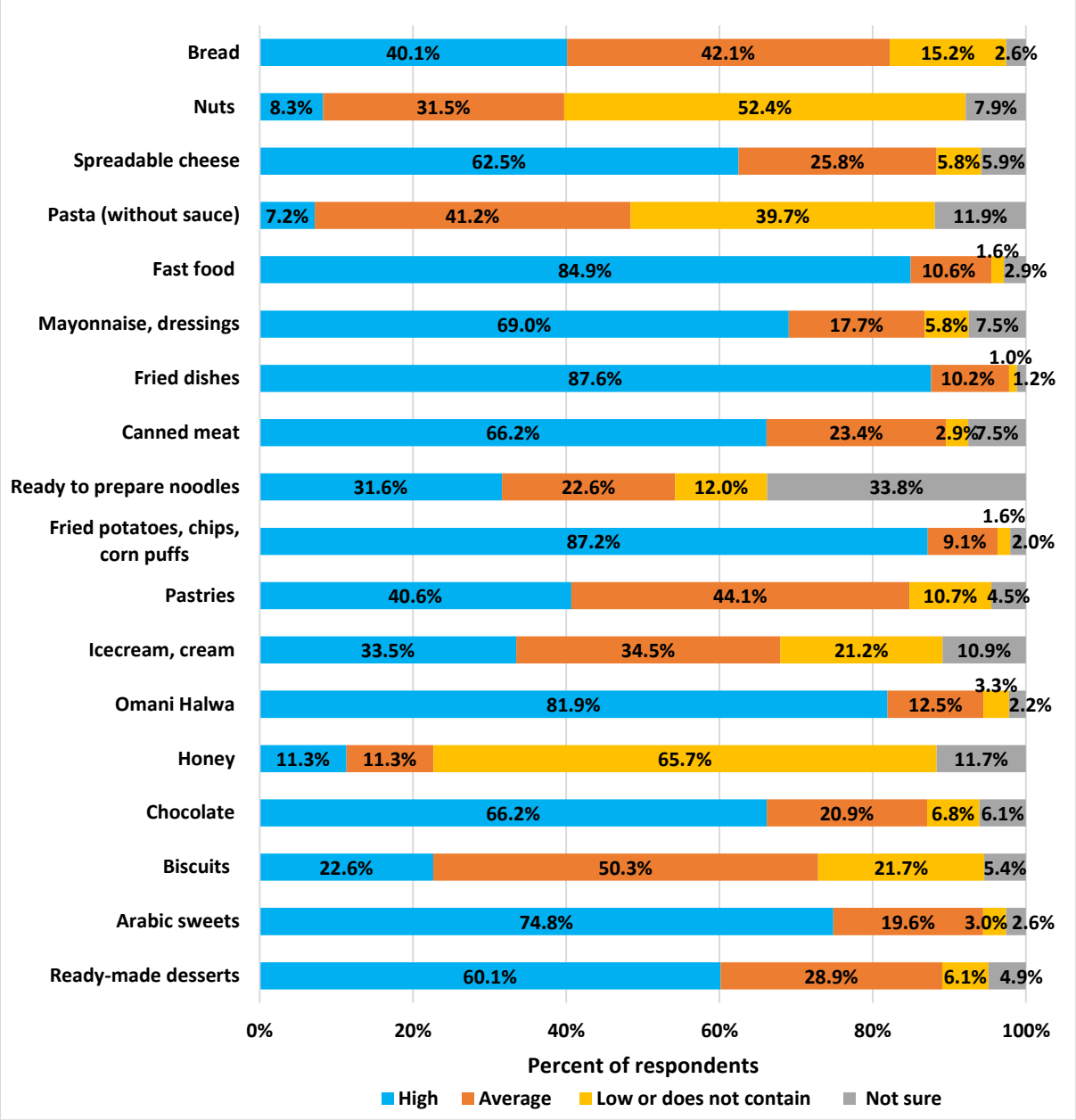

Figure 78 Respondents' report of total fat content of different foods, adults 19-60 years of age

Overall, 388 (92.2%) of the 420 adults who had heard of saturated fats reported that consumption of saturated fat raised blood cholesterol, and 391 (95.2%) knew that such consumption increased the risk of cardiovascular disease. In addition, 187 (43.1%) knew that cow's milk contained saturated fat, 277 (65.8%) of these adults knew that saturated fat is found in animal fat, and 228 (53.4%) knew that saturated fat is found in many vegetable oils, such as sunflower and corn oil. Furthermore, 191 (45.8%) knew that many tropical oils, such as palm oil and coconut oil, contain saturated fats. And finally, only 38 (7.3%) of adults

reported that saturated fat does not have a negative effect on health. These proportions are presented by educational level and governorate in **Table S40** through **Table S46**.

Adult respondents rated sunflower oil and palm oil about equal in saturated fat content even though sunflower oil contains little saturated fat (Figure 79). Relatively few respondents identified olive oil as high in saturated fat. Fewer than one-half of adults correctly identified butter and animal ghee as high in saturated fat.

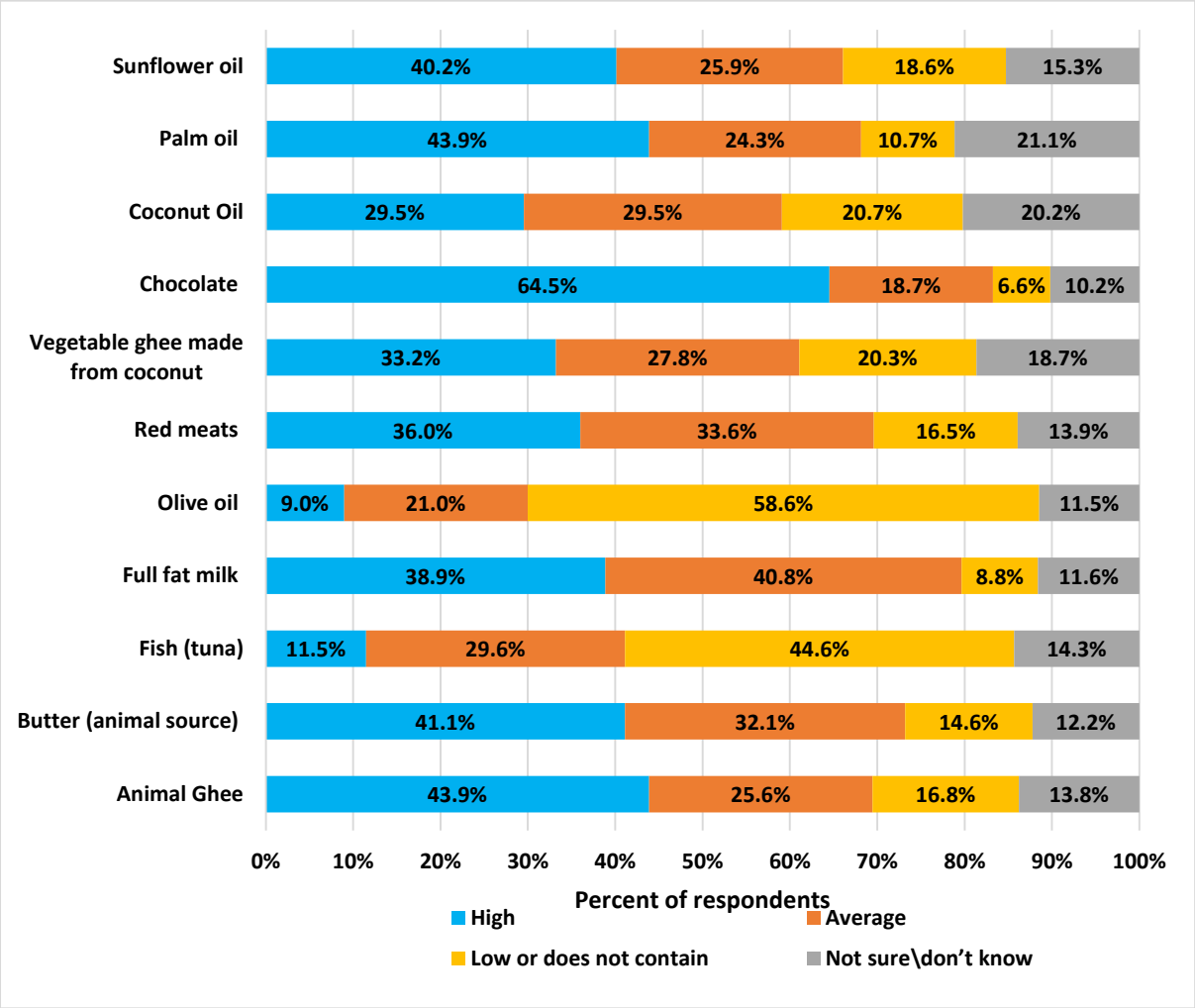

Figure 79 Among those who have heard of saturated fat, reported content in different foods, adults 19-60 years of age

The proportion of adults who had heard of trans fats who correctly identified selected health effects of trans fats consumption is shown in **Table S47**.

A large proportion of adults identified fried potatoes in restaurants and hydrogenated vegetable butter as important source of trans-fat in the Omani diet (Figure 80). Several other sources were also correctly cited by survey subjects.

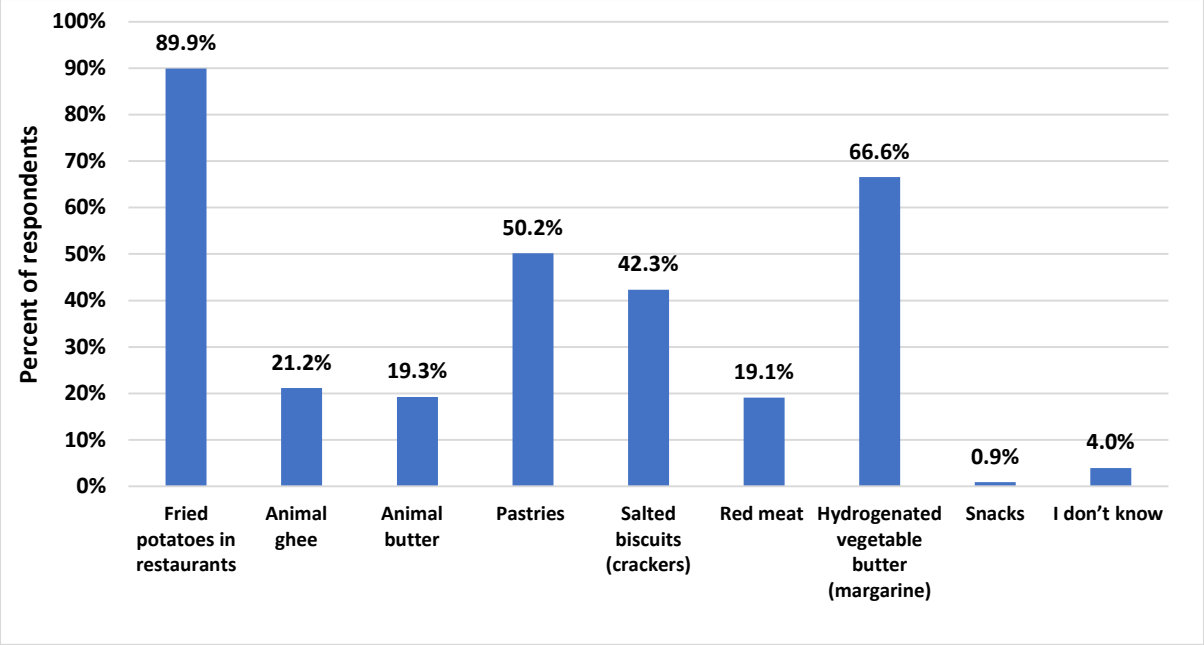

Figure 80 Respondents' reported foods high in trans fats or hydrogenated oils, adults 19-60 years of age

4.2.3. Attitudes

In general, adults scored reasonably well on the composite index of attitudes regarding dietary oil and fat (**Table 29**). The composite score was statistically significantly lower in the youngest age group, and increased with increasing household income. In addition, married adults at a significantly higher score than unmarried adults. Substantial differences existed among governorates. Adults who had consulted a professional about nutrition and adults who reported trying to lose weight had higher scores than those who did not.

Table 29. Composite index for oil and fat attitudes of adults 19-60 years, by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	556	8.9%	(6.0, 12.9)	35.7%	(29.7, 42.3)	55.4%	(48.6, 62.0)	0.168
Female	537	6.2%	(4.2, 9.2)	42.7%	(37.9, 47.7)	51.0%	(45.6, 56.5)	
Age								
19-29	346	11.7%	(8.4, 15.9)	48.3%	(42.4, 54.2)	40.0%	(34.9, 45.5)	<0.001
30-39	384	7.2%	(4.4, 11.6)	33.2%	(27.5, 39.3)	59.6%	(51.9, 66.9)	
40-49	261	2.9%	(1.2, 6.7)	37.7%	(30.0, 46.1)	59.4%	(50.6, 67.7)	
50-60	102	6.8%	(2.6, 16.6)	35.6%	(23.9, 49.3)	57.5%	(43.7, 70.3)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Educational level								
Primary	56	13.0%	(6.6, 24.0)	59.8%	(45.4, 72.8)	27.2%	(15.2, 43.7)	<0.001
Elementary	112	5.4%	(2.0, 13.7)	56.2%	(44.1, 67.6)	38.4%	(28.8, 49.1)	
Secondary	519	8.4%	(5.9, 11.9)	41.5%	(36.2, 47.1)	50.1%	(44.9, 55.2)	
Diploma	137	6.5%	(2.9, 13.9)	26.4%	(18.0, 36.8)	67.2%	(55.9, 76.8)	
Bachelors or more	219	6.1%	(3.2, 11.3)	26.6%	(21.5, 32.3)	67.3%	(59.7, 74.1)	
Marital status								
Not married	280	14.9%	(10.9, 20.0)	48.9%	(43.1, 54.7)	36.2%	(30.6, 42.3)	<0.001
Married	813	5.1%	(3.5, 7.5)	36.0%	(31.6, 40.7)	58.8%	(53.6, 63.8)	
Governorate								
Muscat	102	6.8%	(3.5, 12.7)	31.5%	(24.2, 39.7)	61.7%	(51.5, 71.0)	<0.05
Dhofar	64	17.2%	(11.7, 24.5)	53.1%	(39.8, 66.0)	29.7%	(17.2, 46.2)	
Ad Dakhliyah	91			36.4%	(28.9, 44.6)	63.6%	(55.4, 71.1)	
Ash Sharqiyah North	88	8.7%	(4.8, 15.4)	52.1%	(43.9, 60.2)	39.2%	(30.1, 49.1)	
Ash Sharqiyah South	115	9.6%	(5.5, 16.2)	42.6%	(37.9, 47.5)	47.8%	(44.7, 50.9)	
Al Batinah North	110	5.5%	(3.0, 9.9)	45.4%	(38.8, 52.3)	49.1%	(40.5, 57.7)	
Al Batinah South	99	8.1%	(3.8, 16.6)	35.4%	(29.2, 42.2)	56.4%	(45.9, 66.4)	
Adh Dhahirah	115	13.3%	(5.7, 27.8)	33.7%	(21.6, 48.3)	53.1%	(43.5, 62.4)	
Al Buraymi	90	5.9%	(3.5, 9.8)	25.8%	(25.5, 26.1)	68.3%	(64.8, 71.6)	
Musandam	113	10.8%	NA*	37.5%	NA*	51.7%	NA*	
Al Wusta	106	20.6%	(9.0, 40.5)	35.2%	(21.4, 52.0)	44.2%	(21.3, 69.9)	
Household income								
<200 OMR	213	7.6%	(3.9, 14.3)	49.3%	(39.4, 59.3)	43.0%	(33.9, 52.7)	<0.01
200-499 OMR	346	4.9%	(2.9, 8.2)	42.1%	(35.1, 49.5)	53.0%	(45.4, 60.4)	
500-999 OMR	205	8.7%	(4.5, 16.1)	29.1%	(22.8, 36.3)	62.2%	(54.6, 69.3)	
1000+ OMR	116	8.8%	(4.2, 17.6)	23.4%	(15.4, 33.9)	67.8%	(54.7, 78.6)	
Do not know	213	9.9%	(5.8, 16.3)	43.4%	(35.6, 51.5)	46.7%	(39.2, 54.4)	
Type of job								
Government	305	6.9%	(4.1, 11.3)	25.0%	(18.8, 32.6)	68.1%	(58.6, 76.3)	<0.001
Private	161	3.1%	(1.2, 7.6)	40.1%	(30.9, 50.1)	56.8%	(47.1, 66.1)	
Military	89	7.0%	(2.4, 18.7)	34.5%	(21.1, 50.8)	58.5%	(43.0, 72.4)	
Retired	52	5.6%	(1.5, 18.5)	28.0%	(14.8, 46.7)	66.3%	(48.3, 80.6)	
Student	55	22.6%	(12.7, 36.9)	54.2%	(42.1, 65.9)	23.2%	(13.8, 36.3)	
Looking for work	132	13.3%	(7.6, 22.2)	41.7%	(33.3, 50.5)	45.0%	(34.3, 56.3)	
Not working	299	5.3%	(3.2, 8.7)	52.1%	(45.9, 58.2)	42.6%	(36.1, 49.4)	
Works in health field								
Yes	46	1.8%	(0.3, 9.6)	33.6%	(17.2, 55.1)	64.7%	(43.3, 81.5)	0.411
No	796	7.5%	(5.5, 10.1)	34.2%	(30.6, 38.0)	58.4%	(53.6, 63.0)	
Buys food for household								
Yes	457	5.4%	(3.2, 9.0)	30.7%	(25.4, 36.5)	63.9%	(57.8, 69.6)	<0.001
No	636	9.1%	(6.6, 12.3)	45.2%	(40.3, 50.2)	45.7%	(39.9, 51.7)	
Who buys food for household								
Housewife	390	6.8%	(4.2, 10.6)	35.3%	(29.9, 41.2)	57.9%	(51.6, 64.0)	0.276
Head of house	575	7.8%	(5.5, 11.0)	40.5%	(35.3, 45.9)	51.7%	(45.8, 57.6)	
Servant	6	0%	-	69.0%	(21.6, 94.7)	31.0%	(5.3, 78.4)	
Other person	122	9.5%	(4.8, 18.1)	47.9%	(35.6, 60.5)	42.5%	(30.9, 55.0)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Talked to professional about diet								
Yes	352	4.4%	(2.5, 7.7)	36.0%	(29.4, 43.1)	59.6%	(52.4, 66.4)	<0.05
No	494	10.2%	(6.9, 14.8)	36.8%	(32.4, 41.3)	53.1%	(46.9, 59.1)	
Tried to lose weight								
Yes	508	4.3%	(2.6, 7.0)	36.3%	(31.9, 41.1)	59.4%	(54.3, 64.2)	<0.001
No	569	10.7%	(8.2, 13.8)	42.0%	(37.9, 46.3)	47.3%	(42.2, 52.5)	
Has hypertension								
Yes	103	5.2%	(2.1, 12.0)	45.1%	(31.9, 59.0)	49.7%	(36.1, 63.4)	0.470
No	990	7.8%	(6.0, 10.1)	38.5%	(35.1, 42.0)	53.7%	(49.7, 57.6)	
Has diabetes								
Yes	73	4.4%	(1.0, 18.2)	39.6%	(26.1, 54.9)	56.0%	(40.2, 70.7)	0.724
No	1020	7.8%	(6.0, 10.0)	39.2%	(35.9, 42.6)	53.1%	(49.0, 57.1)	
Has heart disease								
Yes	11	0%	-	39.7%	(14.2,72.4)	60.3%	(27.6,85.5)	0.675
No	1082	7.6%	(5.9, 9.8)	39.2%	(35.9, 42.6)	53.2%	(49.1, 57.2)	
Is overweight or obese								
Yes	165	4.8%	(2.5, 9.3)	33.9%	(26.0, 42.9)	61.2%	(52.8, 69.0)	0.070
No	928	8.1%	(6.1, 10.6)	40.3%	(36.9, 43.8)	51.6%	(47.5, 55.8)	
TOTAL	**1093**	**7.5%**	**(5.8,9.7)**	**39.2%**	**(35.9,42.6)**	**53.3%**	**(49.2,57.2)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

For the most part, a large proportion of adults expressed a desire to decrease overall dietary fat as well as dietary saturated fat and trans fat (Figure 81). However, about one-quarter expressed the view that reducing fat intake is difficult.

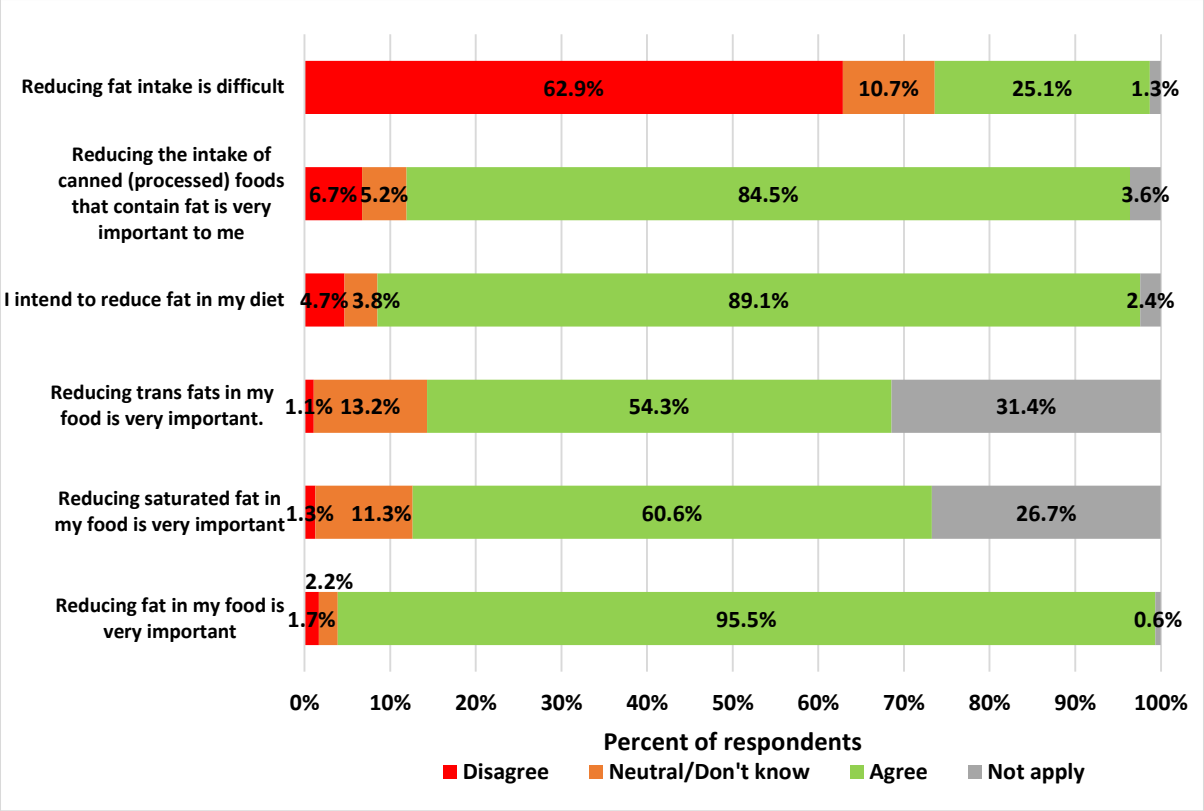

Figure 81 Respondents' agreement with statement about dietary fat or oil, adults 19-60 years of age

Almost one-half (45.1%) of 1093 responding adults reported that they were at risk for heart disease because of fat intake; 490 (42.6%) felt that they were not at risk; 63 (4.1%) were neutral; 15 (1.9%) reported that they were currently ill; and 91 (6.4%) failed to give an answer or reported that they did not know. Among those 434 adults who reported that they were at risk, 46.0% reported low or very low risk, 32.6% reported average risk, and 21.5% reported high or very high risk.

Reported risk of cardiovascular disease in adults is not statistically significantly correlated with practices regarding dietary fat or oil intake (**Table 30**).

Table 30. Number (weighted %) of adults 19-60 years of age with or without reported risk of cardiovascular disease with low, medium, or high scores on oil practices index

	Adults' oil practices index			
Reported risk of cardiovascular disease due to fat intake	**Low**	**Medium**	**High**	**P value**
Yes	365 (80.7%)	64 (14.9%)	19 (4.4%)	0.749
No	421 (82.6%)	51 (12.2%)	18 (5.1%)	
Unknown	135 (86.5%)	13 (10.2%)	6 (3.5%)	

Among the most common reasons for adults reporting a low risk of cardiovascular disease pertained to low dietary fat or oil intake and exercise (Figure 82). However, more than one-quarter of respondents reported not knowing why they felt they were at low risk.

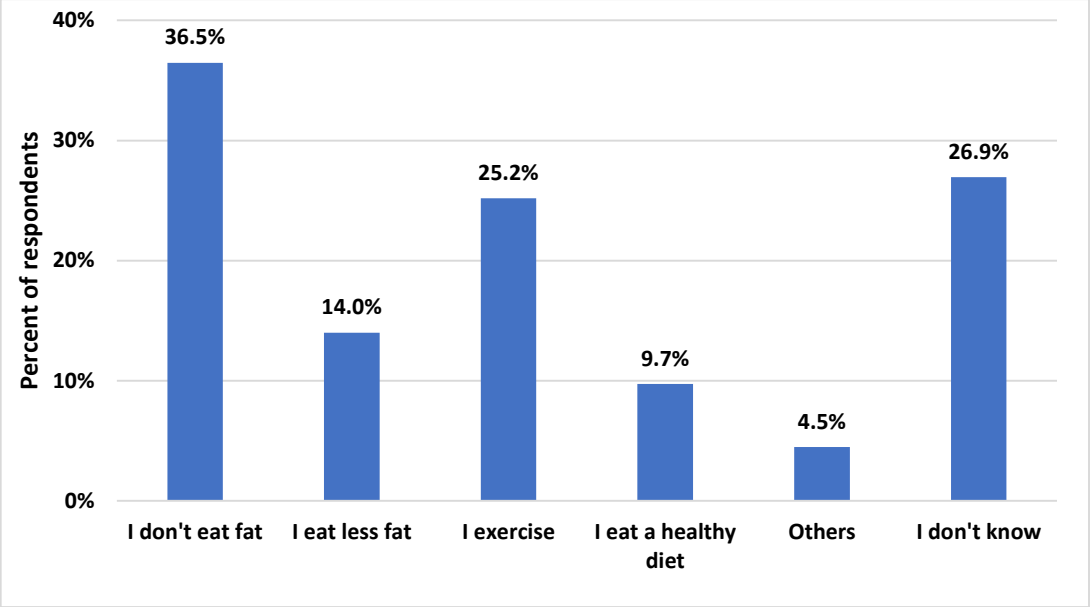

Figure 82 Of those reporting low risk of cardiovascular disease, respondents' reason why, adults 19-60 years of age

Adult respondents reported a variety of concerns about the food they eat (Figure 83). Specifically, almost one-half were concerned about artificial flavors and artificial colors. A higher proportion of adults were concerned about sugar content of their food, and a lower proportion were concerned about salt, calories, saturated fat, and trans fat. The distribution of concerns by governorate is shown in **Table S48** through **Table S56**.

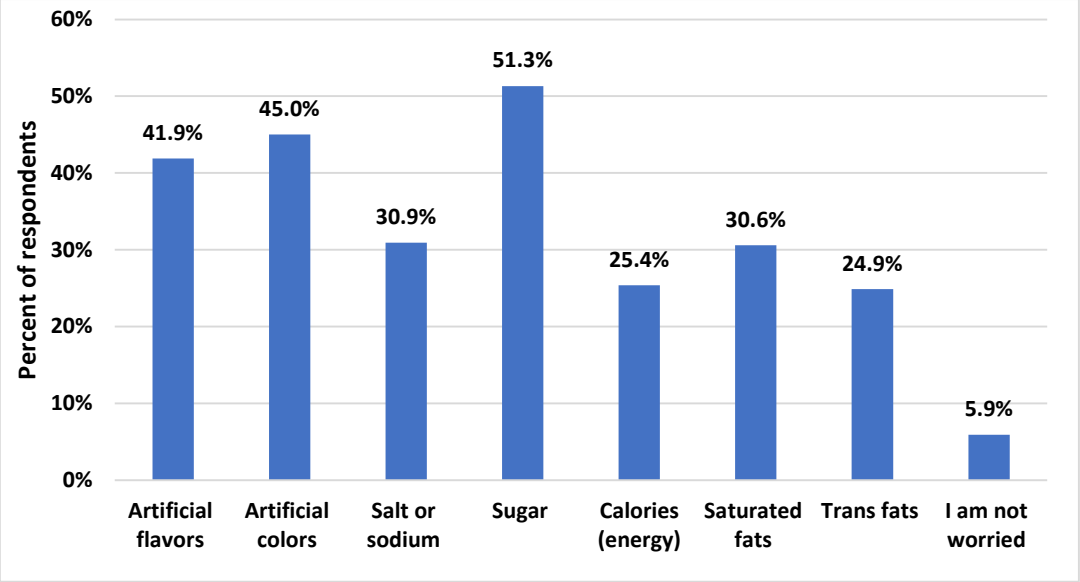

Figure 83 Respondents' reported concern about various contents of foods, adults 19-60 years of age

Of all 1093 responding adults, 80.5% said it was because the substance of concern causes disease, 7.7% because these substances are chemicals, 1.7% reported other reasons, and 7.5% said they did not know.

Among the factors reported by adults which would help them reduce dietary fat, healthy cooking, eating a healthy diet, using healthy oils, and being active in sports were the most commonly cited (Figure 84).

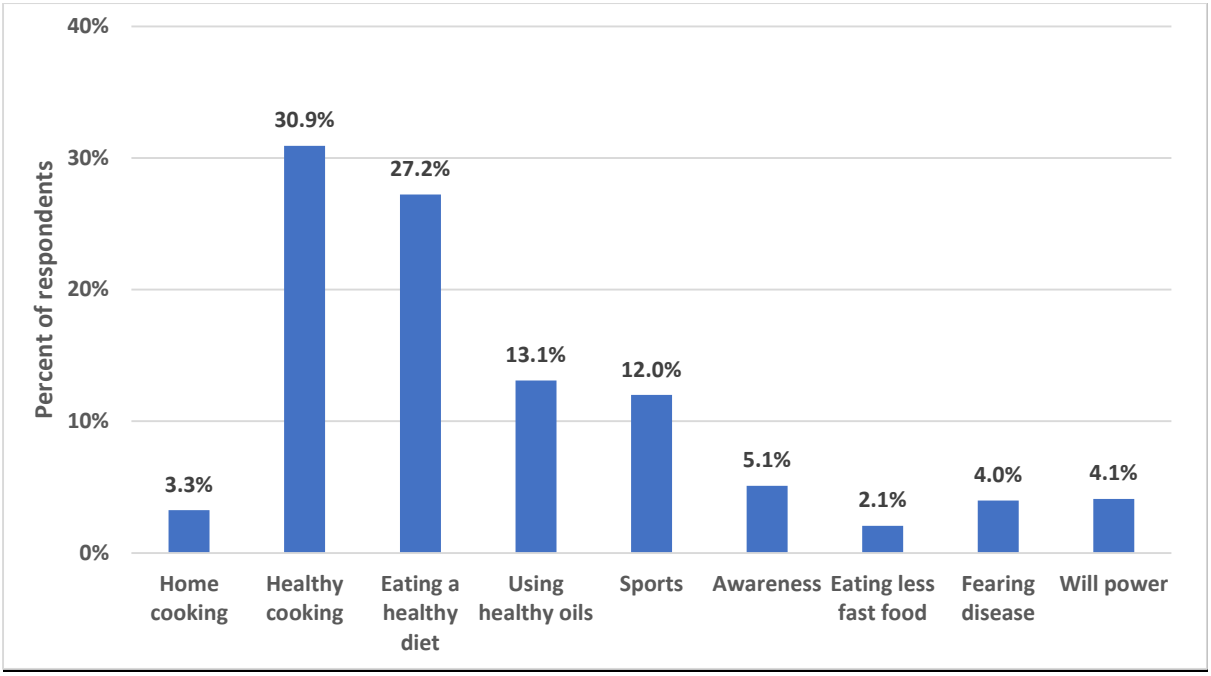

Figure 84 Respondents' reported factors which will help them reduce dietary fat consumption, adults 19-60 years of age

Adult respondents also reported on factors which may motivate them to reduce dietary fat consumption (Figure 85). By far the most commonly cited factor was a change in health conditions. Advice from a professional or a family member or friend was also cited, but much less commonly.

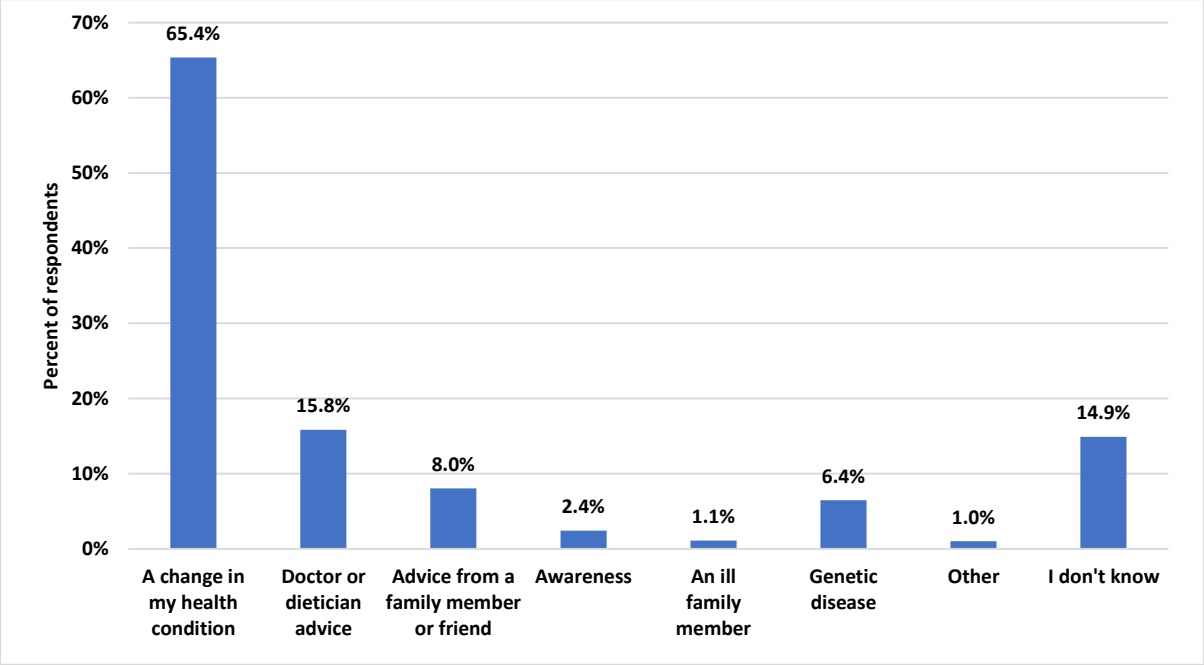

Figure 85 Respondents' reported motives to reduce dietary fat consumption, adults 19-60 years of age

While more than one-half of adult respondents said there were no obstacles or barriers to their reducing dietary fat, about one quarter said that they like the flavor of fat or oil in foods. Other barriers were cited much less frequently (Figure 86).

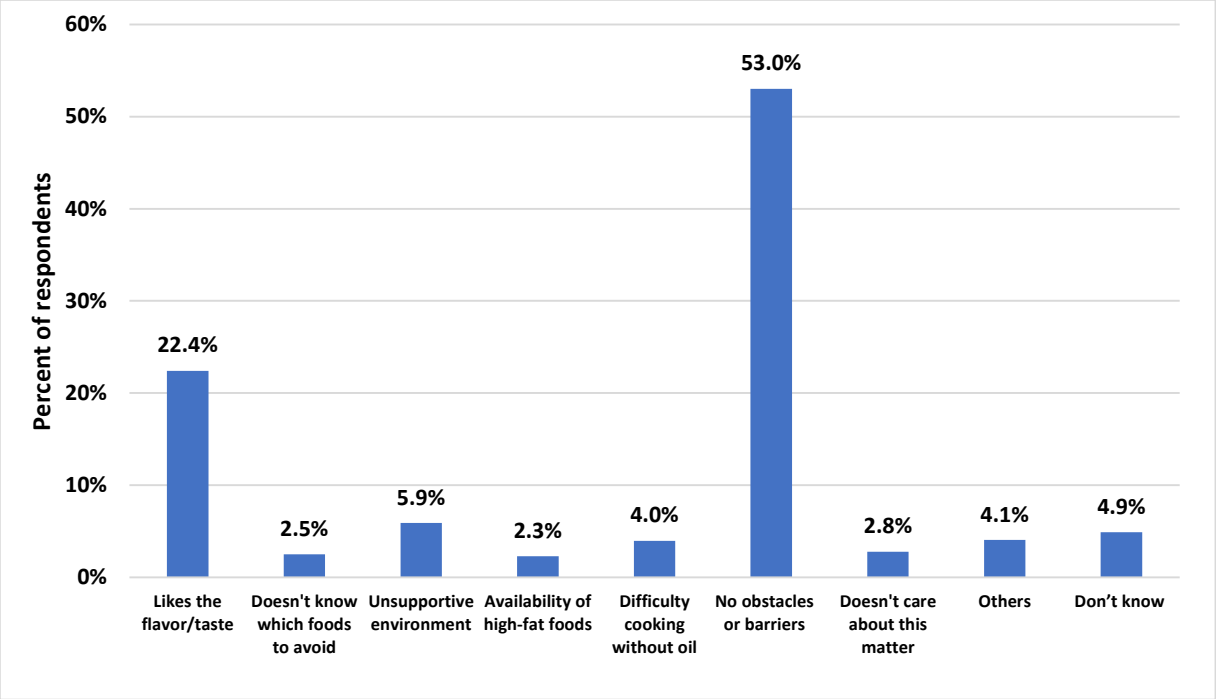

Figure 86 Respondents' reported barriers to reducing dietary fat consumption, adults 19-60 years of age

4.2.4. Practices

Generally, adult respondents had quite poor scores for the oil and fat practices index, and in every subgroup examined, fewer than 11% of adults scored high on this index (**Table 31**).

Table 31. Composite index for oil/ fat practice of adults 19-60 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	555	82.8%	(78.1, 86.6)	12.7%	(9.6, 16.5)	4.6%	(2.7, 7.6)	0.869
Female	537	81.5%	(76.1, 86.0)	13.9%	(10.6, 18.1)	4.6%	(2.5, 8.1)	
Age								
19-29	346	83.3%	(78.0, 87.6)	11.9%	(8.2, 17.0)	4.7%	(2.3, 9.4)	0.733
30-39	384	80.6%	(75.6, 84.8)	13.4%	(9.7, 18.1)	6.0%	(3.5, 10.0)	
40-49	260	81.8%	(73.1, 88.2)	14.9%	(9.6, 22.4)	3.3%	(1.5, 7.2)	
50-60	102	84.4%	(74.2, 91.0)	13.3%	(7.4, 22.9)	2.3%	(0.3, 15.2)	
Educational level								
Primary	56	95.7%	(82.6, 99.0)	4.3%	(1.0, 17.4)	0%	-	<0.01
Elementary	112	90.2%	(80.1, 95.5)	8.5%	(3.6, 18.8)	1.3%	(0.3, 5.0)	
Secondary	519	85.4%	(81.0, 89.0)	11.7%	(8.7, 15.5)	2.9%	(1.7, 5.0)	
Diploma	137	76.3%	(63.4, 85.7)	18.8%	(11.7, 28.8)	4.9%	(1.1, 18.5)	
Bachelors or more	218	70.2%	(62.2, 77.0)	19.1%	(13.3, 26.5)	10.8%	(6.0, 18.6)	
Marital status								
Not married	280	83.8%	(76.4, 89.2)	13.5%	(8.4, 20.9)	2.7%	(0.9, 7.7)	0.472
Married	812	81.6%	(77.4, 85.1)	13.2%	(10.8, 16.0)	5.2%	(3.2, 8.5)	
Governorate								
Muscat	101	74.1%	(63.2, 82.6)	16.0%	(9.8, 25.0)	10.0%	(5.1, 18.5)	<0.05
Dhofar	64	92.2%	(79.1, 97.4)	7.8%	(2.6, 20.9)	0%	-	
Ad Dakhliyah	91	81.3%	(73.9, 87.0)	14.4%	(9.2, 21.7)	4.3%	(2.0, 8.8)	
Ash Sharqiyah North	88	87.3%	(80.8, 91.8)	10.4%	(5.5, 18.9)	2.3%	(1.0, 5.0)	
Ash Sharqiyah South	115	90.4%	(82.0, 95.2)	7.0%	(3.0, 15.2)	2.6%	(1.5, 4.6)	
Al Batinah North	110	84.4%	(79.3, 88.4)	12.9%	(9.4, 17.4)	2.8%	(0.8, 9.5)	
Al Batinah South	99	75.8%	(61.9, 85.8)	19.1%	(11.4, 30.4)	5.1%	(2.7, 9.3)	
Adh Dhahirah	115	81.0%	(75.5, 85.5)	15.5%	(10.3, 22.6)	3.5%	(1.4, 8.4)	
Al Buraymi	90	93.4%	(91.2, 95.2)	5.1%	(4.9, 5.2)	1.5%	(0.4, 5.0)	
Musandam	113	83.0%	NA*	10.2%	NA*	6.8%	NA*	
Al Wusta	106	90.4%	(80.9, 95.5)	7.6%	(4.1, 13.5)	2.0%	(0.5, 7.7)	
Household income								
<200 OMR	213	82.8%	(73.8, 89.2)	11.2%	(6.9, 17.6)	6.0%	(2.7, 13.0)	0.089
200-499 OMR	346	85.6%	(80.9, 89.3)	12.0%	(8.6, 16.6)	2.4%	(1.0, 5.4)	
500-999 OMR	205	75.4%	(65.1, 83.5)	18.8%	(13.1, 26.3)	5.8%	(2.4, 13.5)	
1000+ OMR	115	76.0%	(63.7, 85.1)	13.3%	(6.8, 24.5)	10.6%	(4.5, 23.2)	
Do not know	213	86.0%	(78.5, 91.2)	12.1%	(6.9, 20.2)	1.9%	(0.5, 7.1)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Type of job								
Government	304	75.4%	(68.7, 81.1)	18.4%	(12.6, 26.0)	6.2%	(2.9, 12.7)	0.269
Private	161	79.0%	(67.2, 87.3)	15.5%	(8.7, 26.2)	5.5%	(2.3, 12.3)	
Military	89	84.5%	(68.5, 93.2)	13.8%	(5.6, 30.2)	1.6%	(0.4, 5.8)	
Retired	52	83.0%	(68.0, 91.9)	11.6%	(5.2, 23.7)	5.4%	(1.2, 20.4)	
Student	55	94.2%	(84.2, 98.0)	5.8%	(2.0, 15.8)	0%	-	
Looking for work	132	80.0%	(67.8, 88.3)	13.2%	(8.0, 20.9)	6.9%	(2.7, 16.5)	
Not working	299	87.7%	(82.6, 91.5)	9.0%	(5.7, 14.0)	3.3%	(1.4, 7.6)	
Works in health field								
Yes	46	72.4%	(47.8, 88.2)	20.4%	(8.2, 42.6)	7.2%	(1.9, 23.4)	0.669
No	795	79.6%	(75.0, 83.5)	14.9%	(11.9, 18.5)	5.5%	(3.4, 8.8)	
Buys food for household								
Yes	457	77.7%	(70.7, 83.5)	17.2%	(12.8, 22.8)	5.1%	(2.6, 9.7)	0.053
No	635	85.2%	(81.3, 88.5)	10.5%	(7.6, 14.2)	4.3%	(2.7, 6.8)	
Who buys food for household								
Housewife	390	80.1%	(73.8, 85.2)	14.2%	(9.4, 20.8)	5.7%	(2.9, 10.8)	0.682
Head of house	574	83.7%	(79.5, 87.1)	12.1%	(9.2, 15.8)	4.2%	(2.7, 6.6)	
Servant	6	85.3%	(33.1, 98.5)	14.7%	(1.5, 66.9)	0%	-	
Other person	122	81.4%	(70.7, 88.8)	16.4%	(9.3, 27.4)	2.2%	(0.3, 13.4)	
Talked to professional about diet								
Yes	352	73.7%	(66.5, 79.8)	16.3%	(11.6, 22.4)	10.0%	(6.4, 15.4)	<0.001
No	493	85.8%	(80.9, 89.5)	12.6%	(9.0, 17.4)	1.6%	(0.6, 4.4)	
Tried to lose weight								
Yes	507	76.7%	(71.2, 81.3)	16.8%	(13.3, 21.0)	6.5%	(3.9, 10.6)	<0.001
No	569	87.4%	(83.2, 90.7)	9.8%	(7.1, 13.4)	2.8%	(1.6, 4.9)	
Has hypertension								
Yes	103	87.2%	(76.7, 93.4)	11.5%	(5.6, 22.3)	1.3%	(0.4, 4.4)	0.215
No	989	81.5%	(77.5, 85.0)	13.5%	(10.8, 16.6)	5.0%	(3.2, 7.7)	
Has diabetes								
Yes	73	70.3%	(57.2, 80.8)	17.8%	(9.2, 31.7)	11.9%	(5.8, 22.7)	<0.05
No	1019	83.0%	(79.1, 86.3)	12.9%	(10.4, 15.9)	4.1%	(2.5, 6.6)	
Has heart disease								
Yes	11	72.9%	(33.8, 93.4)	10.5%	(1.5, 47.7)	16.6%	(2.2, 63.2)	0.298
No	1081	82.2%	(78.5, 85.4)	13.3%	(10.8, 16.3)	4.4%	(2.7, 7.1)	
Is overweight or obese								
Yes	165	77.2%	(68.4, 84.1)	18.7%	(12.4, 27.2)	4.2%	(1.6, 10.5)	0.228
No	927	83.1%	(78.8, 86.7)	12.2%	(9.6, 15.3)	4.7%	(2.8, 7.7)	
TOTAL	**1092**	**82.1%**	**(78.3,85.4)**	**13.3%**	**(10.8,16.3)**	**4.6%**	**(3.0,7.1)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

Of 1093 adult respondents, almost one-quarter reported not preparing meals, and about two-thirds reported adding oil sometimes, often, or always during cooking (Figure 87).

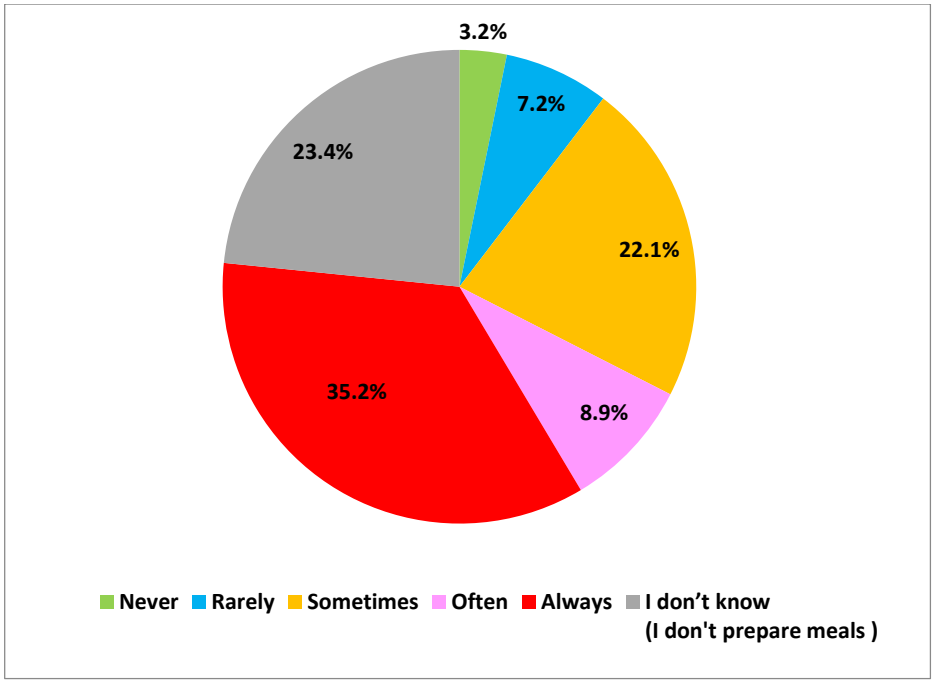

Figure 87 Respondents' reported frequency of adding oil or fat to food during cooking, adults 19-60 years of age

Among the 761 (69.6%) adults who reported adding oil or fat food while cooking, the most commonly used oils were olive oil or some type of vegetable oil (Figure 88). Animal products, such as butter, and other less healthful fats, such as margarine, were used less frequently.

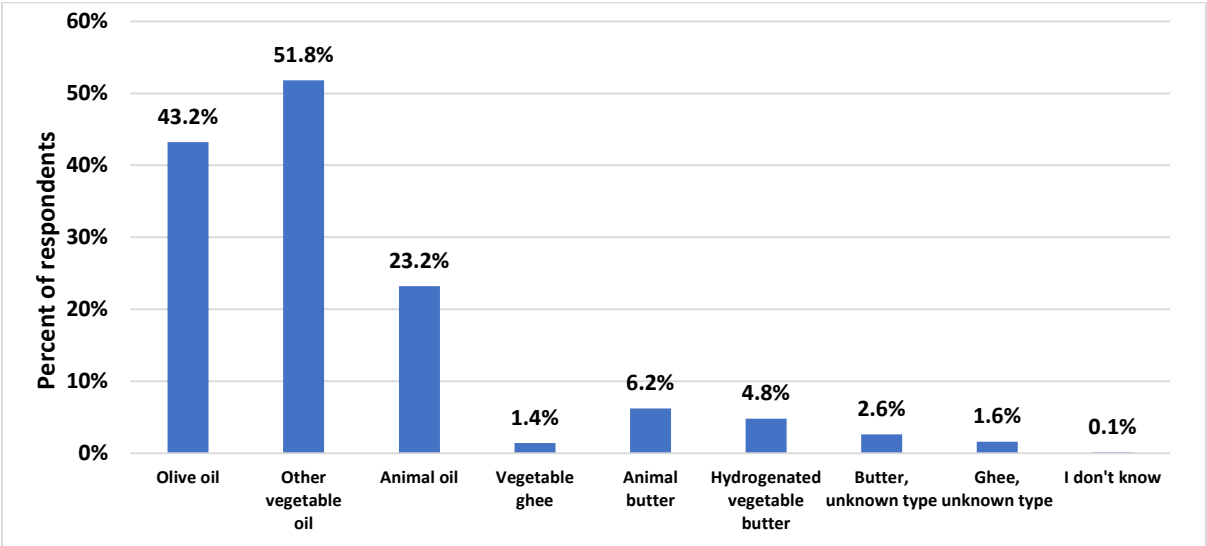

Figure 88 If cook with fat or oil, what type used, adults 19-60 years of age

Of the 28 adult respondents who reported never adding oil and fat during cooking, 72% grill their foods, 33% steam it, 11% boil it, and 14% use water instead of oil.

Almost one-half of adults reported never adding oil or fat to their food while eating (Figure 89). Most of the remaining adults reported sometimes adding oil or fat to their food when eating. Other frequencies, such as rarely, often, and always, were much less commonly reported.

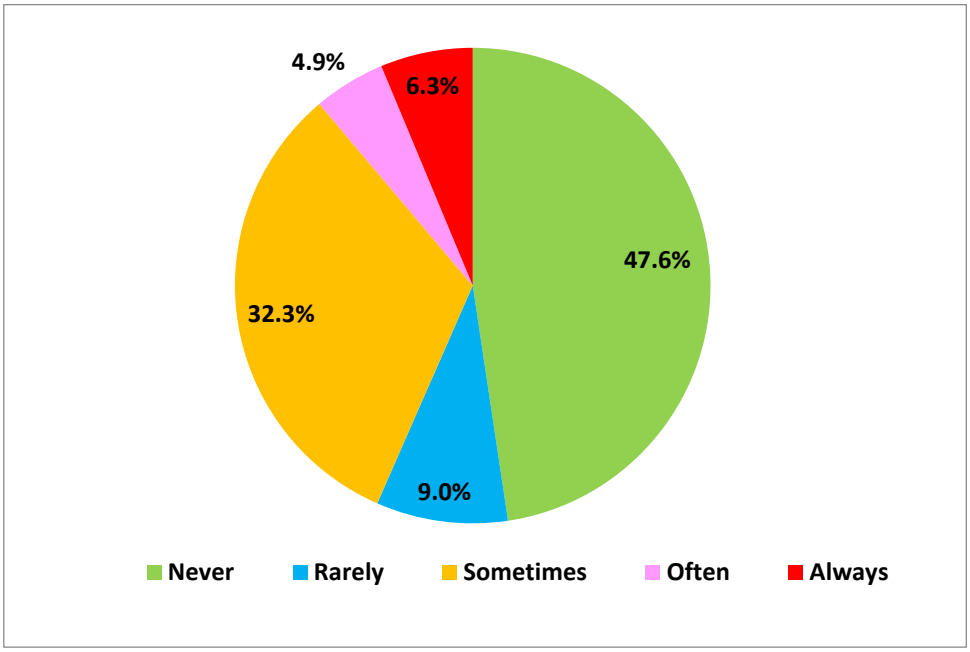

Figure 89 Do you add fat or oil to your food when eating, adults 19-60 years of age

Unlike the oil or fat added during cooking, the most common oil or fat added by adult respondents during eating was animal fat (Figure 90). The second most commonly cited oil or fat was olive oil. Other forms of oil or fat were much less commonly used.

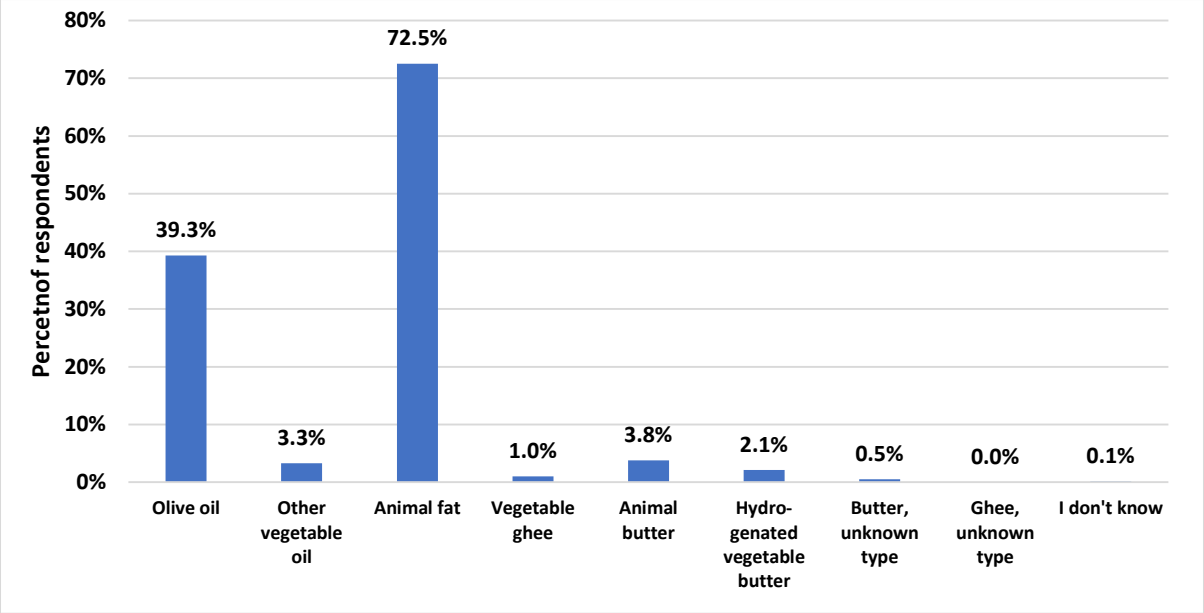

Figure 90 If add fat or oil when eating, what type of fat or oil, adults 19-60 years of age

The most commonly cited methods of adding oil or fat to food during cooking was directly from the package and using a tablespoon or teaspoon; however, almost one-fifth of adults did not know how oil or fat was added (Figure 91).

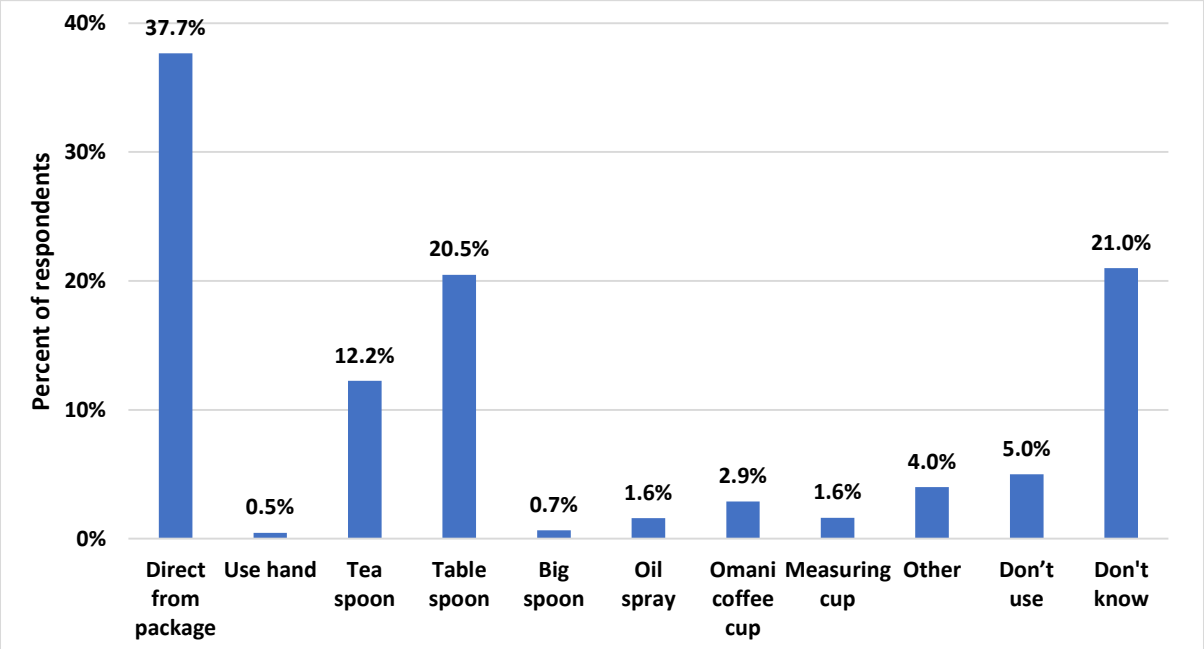

Figure 91 When adding oil or fat during cooking, what instrument is used to measure, adults 19-60 years of age

Almost one-half of adults reported not adding oil or fat to food at the time of consumption (Figure 92). Of those that did add oil or fat, the most common methods were directly from the package, using a teaspoon, or using a table spoon.

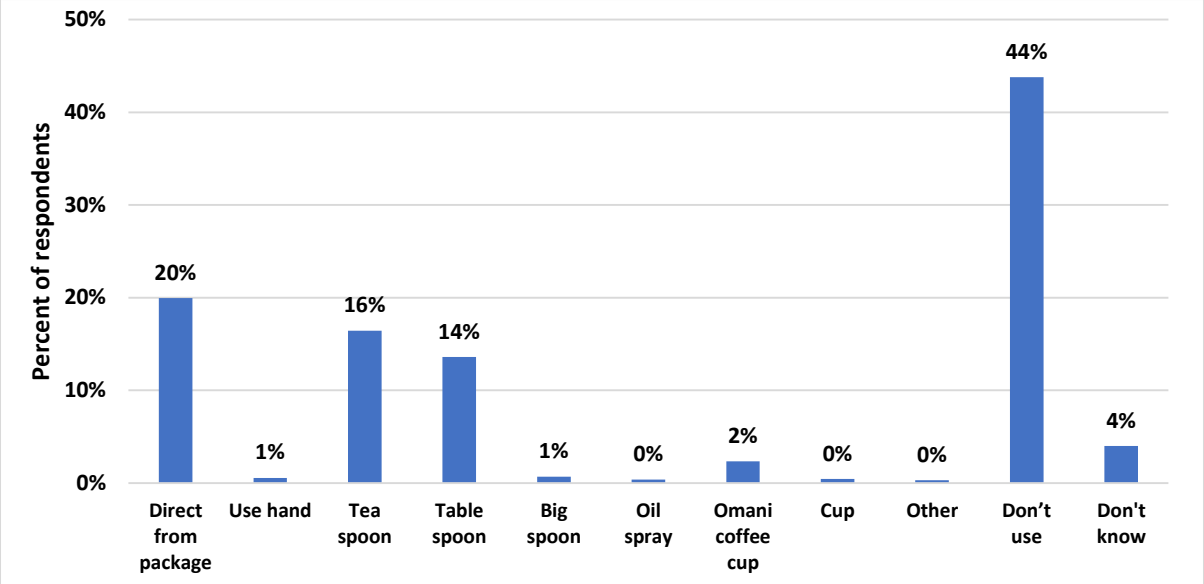

Figure 92 When adding oil or fat when eating, what instrument is used to measure, adults 19-60 years of age

About one-half of adult respondents often or always try to reduce dietary fat while eating (**Table 32**). About one-half never or rarely checked ingredients on food package labels, and more than one-third never or rarely changed purchasing habits to reduce intake of total fat or trans fats. In addition, almost one-half never or rarely looked for information on total fat, trans fats, saturated fat, or tropical oils on nutrition labels; however, about one-third could not answer such questions. These distributions are given by sex, educational level, and governorate of residence in **Table S57** through **Table S64**.

Table 32. Frequency of selected behaviors among adults 19-60 years of age regarding food purchases and food packaging nutrition information

Question	Never or rarely	Some-times	Often or always	Don`t know or not applicable
When you eat your meals, do you try to reduce fat while eating?	19.2%	26.5%	51.3%	3.0%
Do you check food ingredient labels when you shop?	48.4%	19.0%	28.9%	3.7%
Have you ever changed your purchasing habits to reduce your total fat intake?	37.7%	18.5%	28.2%	15.7%
Have you ever changed your purchasing habits to reduce your intake of trans fats?	42.4%	10.2%	22.0%	25.4%
Do you check the following information on nutrition labels?				
Total fat	45.3%	12.4%	14.8%	27.5%
Trans fats (hydrogenated)	44.2%	7.5%	14.4%	33.9%
Saturated fat	43.7%	9.3%	13.4%	33.7%
Tropical oils (palm oil, coconut oil)	46.5%	8.5%	12.9%	32.1%

More than one-half of adults reported consuming several high-fat foods only monthly or rarely; these foods included ready-made sweets, Omani halwa, ice cream, ready to prepare noodles, canned meat, canned fish in oil, fried foods, mayonnaise or dressings, and fast food (**Table 33**). Other foods were consumed more frequently, and some foods, such as spreadable cheese, were consumed daily or weekly by a large proportion of adults.

Table 33. Reported frequency* of consumption of selected foods by adults 19-60 years of age

Food	Daily	Weekly	Monthly	Rarely
Ready-made sweets (cakes, etc.), Arabic sweets	6.9%	28.6%	25.6%	38.8%
Biscuits	11.3%	29.3%	18.6%	40.8%
Chocolate	13.9%	28.2%	12.9%	45.0%
Omani halwa	1.2%	12.1%	22.1%	64.6%
Ice cream, cream	4.6%	15.9%	17.8%	61.6%
Pastries (quroos, pancakes)	14.9%	44.7%	17.9%	22.5%
Fried potatoes, chips, corn puffs (mino)	16.7%	38.1%	16.3%	29.0%
Yellow or spreadable cheeses	38.0%	31.3%	7.4%	23.2%
Ready to prepare noodles (Indomie)	2.1%	4.6%	7.6%	85.7%
Canned meat, ready-made meat and chicken products	4.7%	23.8%	18.1%	53.4%
Fish and tuna canned in oil	5.3%	36.6%	20.5%	37.6%
Fried dishes	1.8%	24.3%	28.5%	45.3%
Mayonnaise, salad, and sandwiches dressings	9.1%	22.0%	14.5%	54.4%
Fast food	5.7%	27.7%	26.7%	39.9%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

Regarding consumption of dairy products, 759 (69.4%) of adults reported most frequently consuming full fat dairy, 210 (20.7%) reported consuming low fat, only 19 (1.4%) reported consuming fat free, 73 (6.8%) reported not consuming dairy at all, and 32 (1.7%) did not know.

4.3. Discussion

As with general healthy eating knowledge, the composite scores for knowledge of oil and fat were quite poor in both adolescents and adults. In adolescents, scores did not differ substantially by various demographic factors. In contrast, composite scores were higher in adults with higher education, higher household income, those who had spoken to a professional about nutrition, and those who had tried to lose weight in the past. As with general healthy eating, this indicates that the demographic variables measured in this survey may prove less useful in targeting specific nutrition and health messages to subgroups of adolescents than to subgroups of adults. If not identifiable subgroup of adolescents is specifically identified as having lower knowledge composite scores, then educational messages must be targeted to all adolescents. In contrast, messages to adults can be efficiently targeted to those subgroups identified as having lower knowledge scores.

About one-half of adolescents and adults thought they were consuming the appropriate amount of fat and oil per day, and most adolescents and adults reported knowing ways of cooking to reduce dietary fat. In addition, in spite of the overall poor knowledge scores, almost all adolescents and adults knew that consumption of too much oil and fat is bad for one's health, and the majority in both groups could identify high blood fat and cholesterol and heart disease as consequences of excessive oil and fat consumption. In contrast, a smaller proportion identified hypertension, stroke, and diabetes as consequences. It seems that a relatively large proportion of the Omani population understands specific health consequences of excessive oil and fat consumption as well as understanding methods to decrease such consumption. This relatively high level of knowledge of health consequences was also true for consumption of saturated fats. In addition, the majority knew that saturated fat is found in animal fats; however, a smaller proportion of respondents reported that saturated fat is also found in some vegetable oils and tropical oils.

Most adolescents and adults could correctly identify from a list of specific selected foods which foods contained high fat content, although the majority failed to identify several foods, including nuts, ice cream, and cream, as high-fat foods. In addition, many adolescents and adults failed to identify those vegetable oils and tropical oils with high saturated fat content. Most correctly identified butter and ghee as high in saturated fat. The majority of adolescent and adult respondents correctly identified margarine and fried potatoes in restaurants as foods containing a high level of trans fat. However, such knowledge is less relevant since the Sultanate of Oman banned the use of trans fat shortly before data collection for the survey was begun.

Overall, the composite scores for attitudes towards oil and fat were reasonably high, with adults scoring somewhat better than adolescents. Although many respondents agreed that reducing dietary trans fats and saturated fat is important, a large proportion reported not knowing why. In addition, a large proportion of all survey subjects felt that reducing fat

intake is difficult. This is in contrast to near universal agreement that reducing overall fat intake is important. In spite of the results presented above regarding knowledge of the fat content of specific foods, these results highlight a potential relative lack of understanding specific to trans fats and saturated fat.

A large proportion of both adolescents and adults reported that they were at risk of heart disease because of oil and fat intake; however, among those reporting risk, the assessment of the level of risk was not associated with the oil and fat practices index score. Among those survey subjects who felt that they were at low risk, a large proportion reported that they did not eat fat or oil, in spite of generally poor scores on the oil practices composite index. These results highlight the disconnect between self-assessed health risk, understanding of the sources of risk, and actual behaviour.

Adolescent and adult respondents were asked on both the oil and fat and the salt questionnaires if they had concerns about various contents of the food they ate; however, the two questions were worded slightly differently. In addition, respondents were asked the reason for their concern, but the open-ended responses were coded differently. For this reason, the responses from these two questions will be presented separately. On the oil and fat questionnaire, the largest number of both adolescents and adults reported concern about the sugar content of their food. For both groups, more respondents reported concern about artificial flavors and colors than reported concern about caloric content, salt, saturated fat, or trans-fat. The predominant reason reported for this concern was because these ingredients “caused disease”.

The largest proportion of both adolescents and adults reported that a change in health conditions would motivate them to reduce fat consumption. Moreover, the most commonly reported response regarding barriers to such reduction was that there were no barriers. Unfortunately, by the time the health consequences from excessive fat consumption become manifested as deteriorating health, it is too late to avoid at least some of these consequences. In addition, if there were truly no barriers, then behavior should change long before an individual’s health is damaged by excessive consumption. Thus, there is a disjuncture between beliefs, attitudes, and actual behavior.

The composite scores for oil and fat practices were quite poor, with a large majority of both adolescents and adults scoring in the low range. As with other composite scores, adolescents showed no statistically significant differences by several demographic factors. On the other hand, fat practices scores were significantly higher in adults with better education, those who had talked to a professional about diet, and those who had tried to lose weight in the past. There were also differences by governorate of residence. Adults with diabetes or heart disease also had better scores, but only the difference between adults with and without self-reported diabetes reached statistical significance.

More than one-half of adolescents and adults reported adding oil or fat to food during cooking, and the most common fats and oils were olive oil and vegetable oil. About one-half reported never adding oil or fat during eating, but among those who did, the majority added animal fat. As seen in the results from the general healthy eating questionnaire, adolescents and adults tended to not check food ingredient labels when shopping for food, nor do they use this information to change purchasing habits to minimize dietary intake of total fat or trans-fat.

Both adolescents and adults reported consumption of some high-fat foods daily or weekly. Adolescents reported consuming such foods substantially more frequently than adults. The majority of both adolescent and adult respondents reported using full-fat dairy products instead of low-fat or fat-free.

5. Salt Results – Adolescents 14-18 years of age

5.1.1. Demographic characteristics

The characteristics of adolescents completing the salt questionnaire are shown in **Table 34**. As with other questionnaires and adolescent respondents, several of these characteristics were not included in further analysis of data from adolescents because the subgroups were of grossly unequal size; for example, marital status, type of job, and whether or not the survey subject buys food for household had very few adolescents in some subgroups. In addition, more than two thirds of adolescents did not know their household income.

Table 34. Distribution of various demographic characteristics among adolescents 14-18 years of age responding to the salt questionnaire

Characteristic	Unweighted number	Weighted percent
Sex		
Male	147	50.9%
Female	126	49.1%
Educational level		
Primary	17	7.0%
Elementary	116	48.2%
Secondary or more	139	44.8%
Marital status		
Single	268	97.8%
Married	5	2.2%
Governorate		
Muscat	30	11.0%
Dhofar	16	5.9%
Ad Dakhliyah	24	8.8%
Ash Sharqiyah North	22	8.1%
Ash Sharqiyah South	32	11.7%
Al Batinah North	26	9.5%
Al Batinah South	24	8.8%
Adh Dhahirah	25	9.2%
Al Buraymi	22	8.1%
Musandam	27	9.9%
Al Wusta	25	9.2%

Characteristic	Unweighted number	Weighted percent
Household income		
<200 OMR	14	6.5%
200-499 OMR	29	13.3%
500-999 OMR	25	9.4%
1000+ OMR	14	3.9%
Don't know	191	66.9%
Type of job		
Private	2	0.7%
Student	260	94.6%
Job seeker	6	2.6%
Not working	5	2.1%
Buys food for household		
Respondent	5	1.0%
Other household member	268	99.0%
Who buys food for household		
Housewife	109	39.0%
Head of house	144	55.4%
Servant	2	0.1%
Other person	18	5.5%
Talked to professional about diet		
Yes	36	12.3%
No	217	77.4%
Unknown	20	10.3%
Tried to lose weight*		
Has disease		
Hypertension	2	0.8%
Diabetes	0	0%
Heart disease	1	0.2%
Overweight or obesity	18	6.9%

***Question about ever having tried to lose weight was not asked on the salt questionnaire

5.1.2. Knowledge

The level of knowledge of salt among adolescent respondents was low for all adolescents together and for all subgroups (**Table 35**).

Table 35. Composite index for salt knowledge of adolescents 14-18 years, by various demographic characteristics

Salt knowledge								
		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	147	93.6%	(87.4, 96.8)	5.0%	(2.6, 9.6)	1.4%	(0.2, 10.1)	<0.01
Female	126	83.1%	(73.0, 90.0)	16.6%	(9.8, 26.7)	0.3%	(0.0, 2.2)	
Educational level								
Primary	17	78.8%	(56.1, 91.5)	21.2%	(8.5, 43.9)	0%	-	0.422
Elementary	116	91.2%	(83.3, 95.6)	8.8%	(4.4, 16.7)	0%	-	
Secondary or more	139	87.0%	(78.2, 92.5)	11.1%	(6.3, 19.0)	1.9%	(0.3, 10.3)	
Governorate								
Muscat	30	90.0%	(75.2, 96.4)	10.0%	(3.6, 24.8)	0%	-	0.906
Dhofar	16	93.8%	(74.6, 98.7)	6.3%	(1.3, 25.4)	0%	-	
Ad Dakhliyah	24	79.2%	(63.5, 89.2)	20.8%	(10.8, 36.5)	0%	-	
Ash Sharqiyah North	22	90.9%	(75.5, 97.0)	9.1%	(3.0, 24.5)	0%	-	
Ash Sharqiyah South	32	96.9%	(83.3, 99.5)	3.1%	(0.5, 16.7)	0%	-	
Al Batinah North	26	88.5%	(70.7, 96.1)	7.7%	(1.8, 27.0)	3.8%	(0.6, 21.7)	
Al Batinah South	24	91.7%	(77.0, 97.3)	8.3%	(2.7, 23.0)	0%	-	
Adh Dhahirah	25	72.0%	(65.2, 78.0)	28.0%	(22.0, 34.8)	0%	-	
Al Buraymi	22	90.9%	(73.4, 97.3)	4.5%	(1.4, 14.0)	4.5%	(1.4, 14.0)	
Musandam	27	88.9%	NA*	11.1%	NA*	0%	NA*	
Al Wusta	25	96.0%	(76.4, 99.4)	4.0%	(0.6, 23.6)	0%	-	
Who buys food for household								
Housewife	109	90.5%	(82.3, 95.1)	9.2%	(4.6, 17.4)	0.4%	(0.0, 2.8)	0.747
Head of house	144	86.2%	(79.4, 91.1)	12.5%	(7.8, 19.4)	1.3%	(0.2, 8.7)	
Servant	2	100	-	0%	-	0%	-	
Other person	18	96.1%	(74.5, 99.5)	3.9%	(0.5, 25.5)	0%	-	
Talked to professional about diet								
Yes	36	82.0%	(61.7, 92.8)	18.0%	(7.2, 38.3)	0%	-	0.422
No	217	90.8%	(85.6, 94.2)	8.1%	(5.0, 13.1)	1.1%	(0.2, 5.8)	
Unknown	20	78.8%	(59.1, 90.5)	21.2%	(9.5, 40.9)	0%	-	
Tried to lose weight**								
TOTAL	**273**	**88.4%**	**(83.6, 92.0)**	**10.7%**	**(7.3, 15.5)**	**0.9%**	**(0.2, 4.6)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

** Question about ever having tried to lose weight was not asked on the salt questionnaire

An overwhelming majority (87.5%) of the 273 adolescent respondents reported that consumption of too much salt is bad for health. Only 7 (1.4%) said it was good for health, and 17 (7.1%) said it had no effect on health.

A majority of adolescents identified several major health consequences (kidney disease, hypertension, and heart disease) of high dietary salt intake (Figure 93). A smaller proportion of respondents identified other health consequences of salt intake. About one-quarter of respondents identified the lesser-known increased risk of stomach cancer with excess dietary salt.

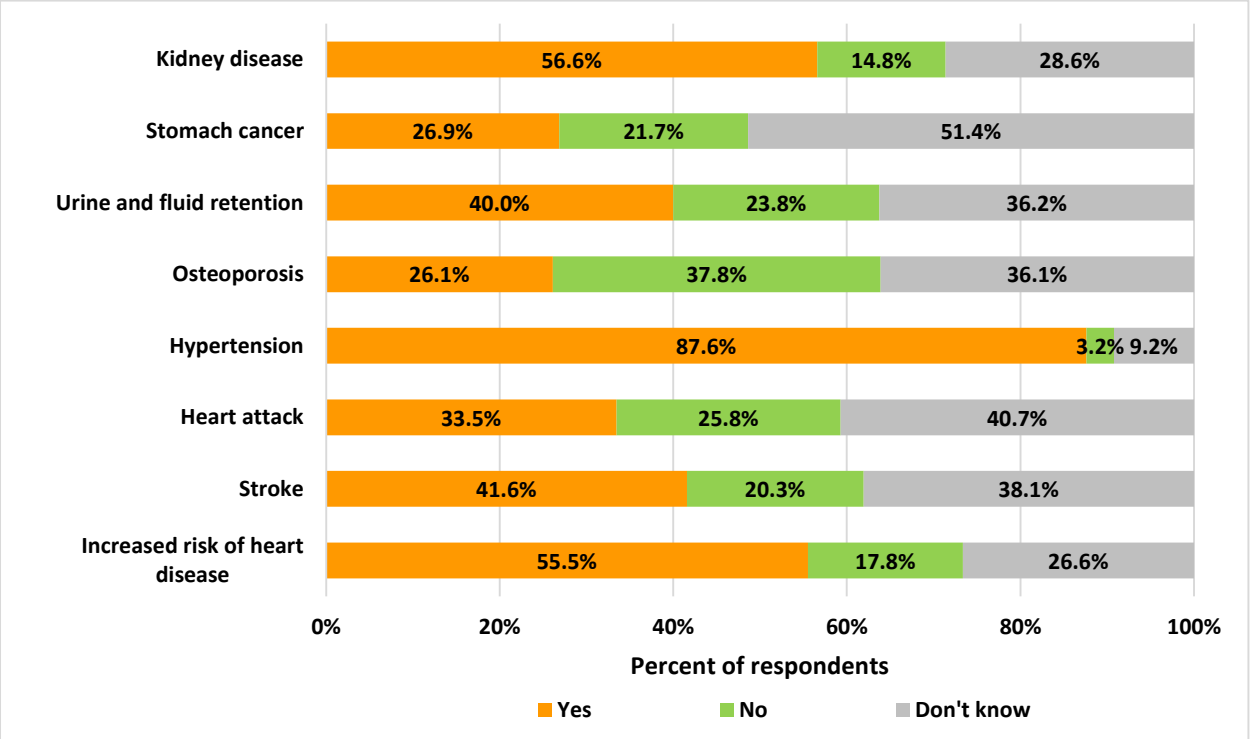

Figure 93 Do you think the following health problems caused or worsened by high dietary salt, adolescents 14-18 years of age

The majority (50.9%) of the 273 responding adolescents stated that they did not know the relationship between salt and sodium; 21.8% said there was no difference between salt and sodium, and 3.0% said sodium contains salt. Only 24.3% correctly stated that salt contains sodium.

Only about one quarter of adolescents correctly identified one teaspoon of salt as the recommended maximum intake (Figure 94). Almost one-half did not know the recommended maximum intake.

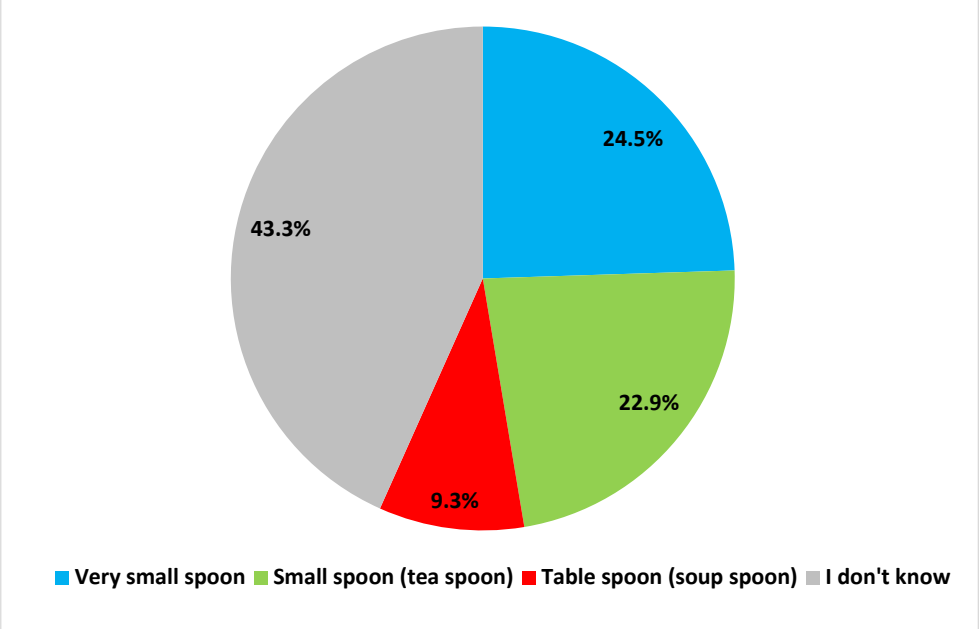

Figure 94 How much dietary salt is allowed for adults per day, adolescents 14-18 years of age

More than three-quarters of adolescent respondents thought that their salt intake was appropriate, and fewer than one in eight thought their salt intake was higher than appropriate (Figure 95).

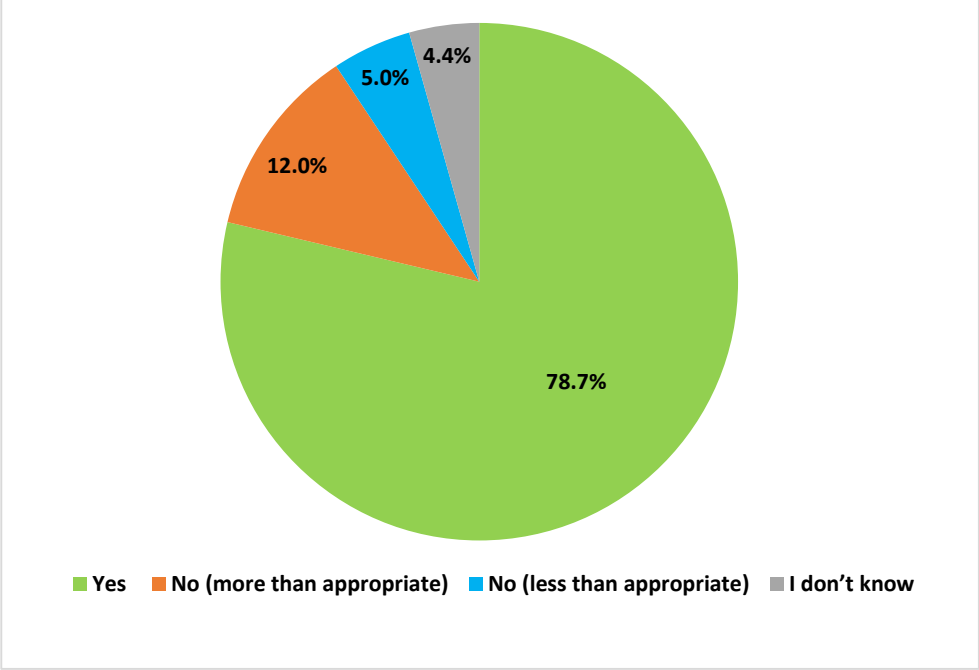

Figure 95 Do you think that the daily amount of salt you use in your meals is an appropriate amount, adolescents 14-18 years of age

Almost one-half of the 273 (43.3%) responding adolescents felt that it is easy to understand food labels; 80 (29.7%) thought it was not easy to understand, and another 83 (27.0%) did not know.

A large majority of adolescents reported that the main source of salt in the Omani diet is adding salt during cooking (Figure 96).

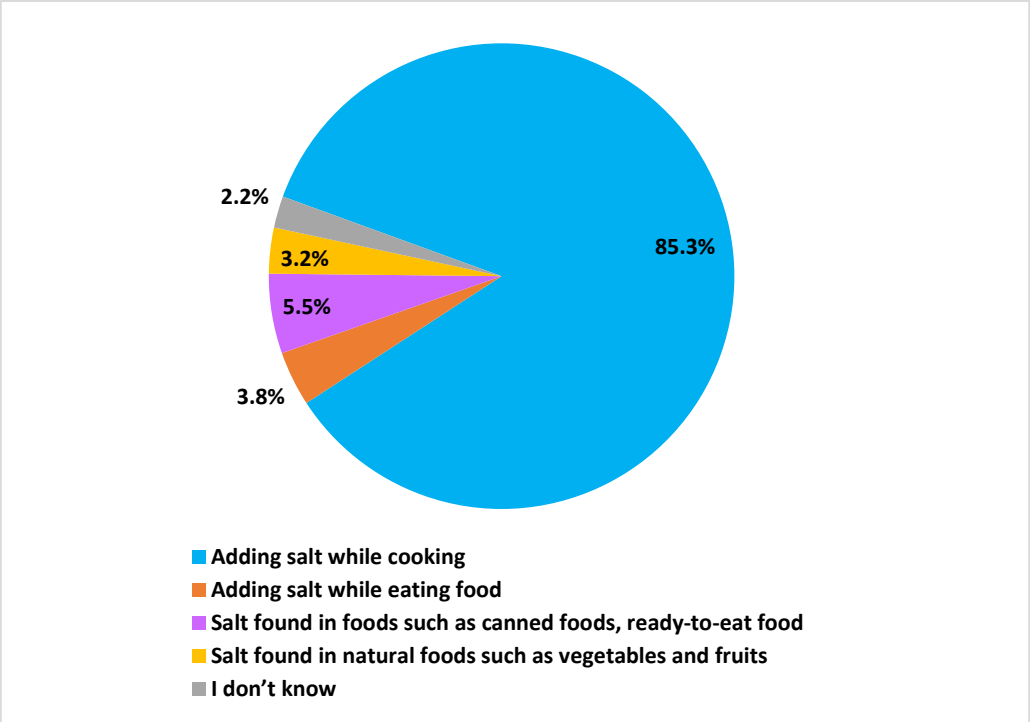

Figure 96 Respondents' reported main source of salt in the Omani diet, adolescents 14-18 years of age

A large proportion of adolescents correctly identified several high-salt foods as major contributors to their dietary salt intake, including fast food, salty snacks, Maggi cubes, pickles, and cheeses (Figure 97).

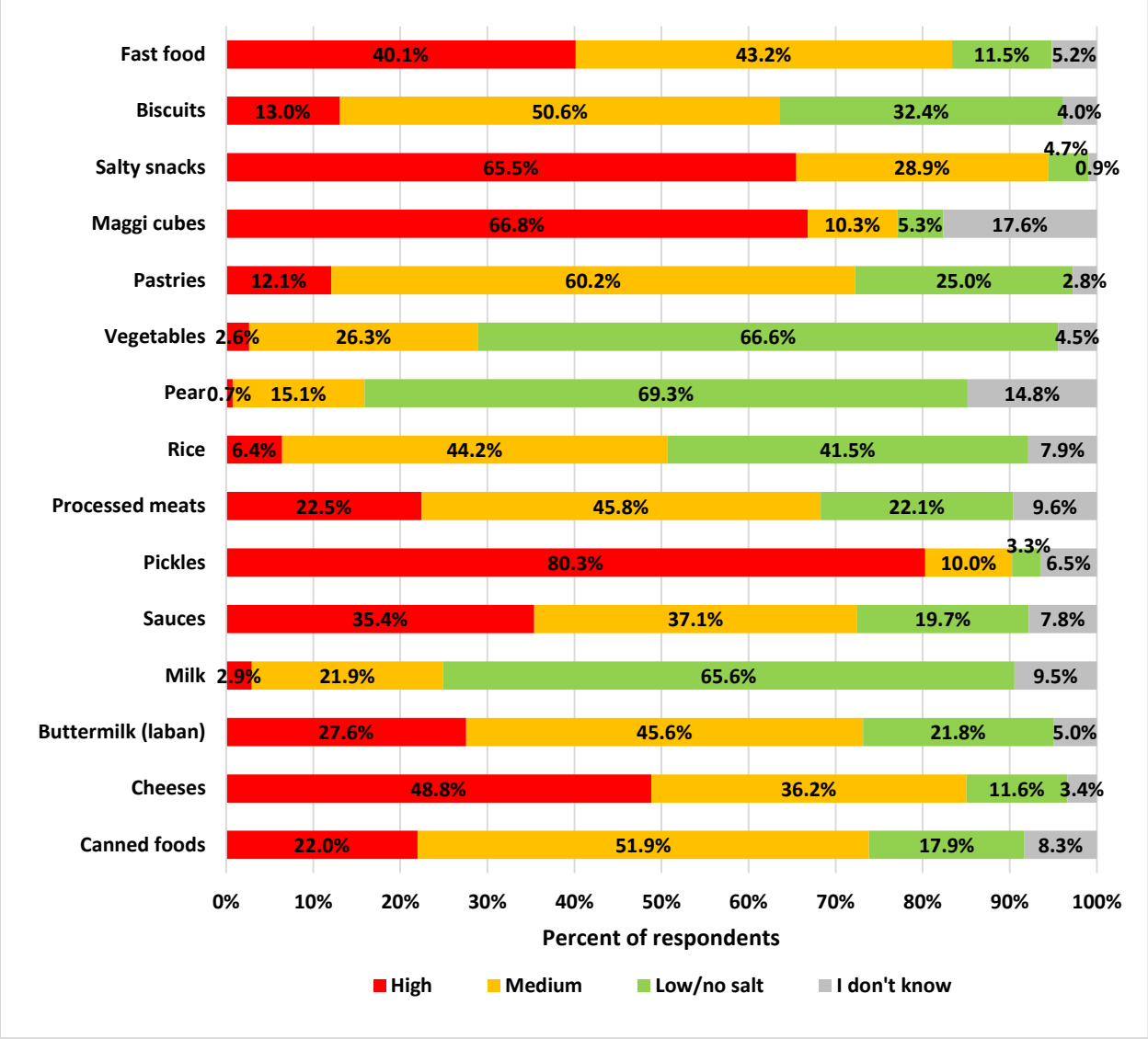

Figure 97 Respondents' estimate of contribution of various foods to daily dietary salt intake, adolescents 14-18 years of age

Of responding adolescents, 58.5% of 273 reported knowing of traditional or local foods which contain salt, 21.9% did not know of any such foods, and 19.6% did not know if such foods contained salt.

Maleh, Owaal, and Qashea were the most frequently cited traditional or local foods with high salt content (Figure 98).

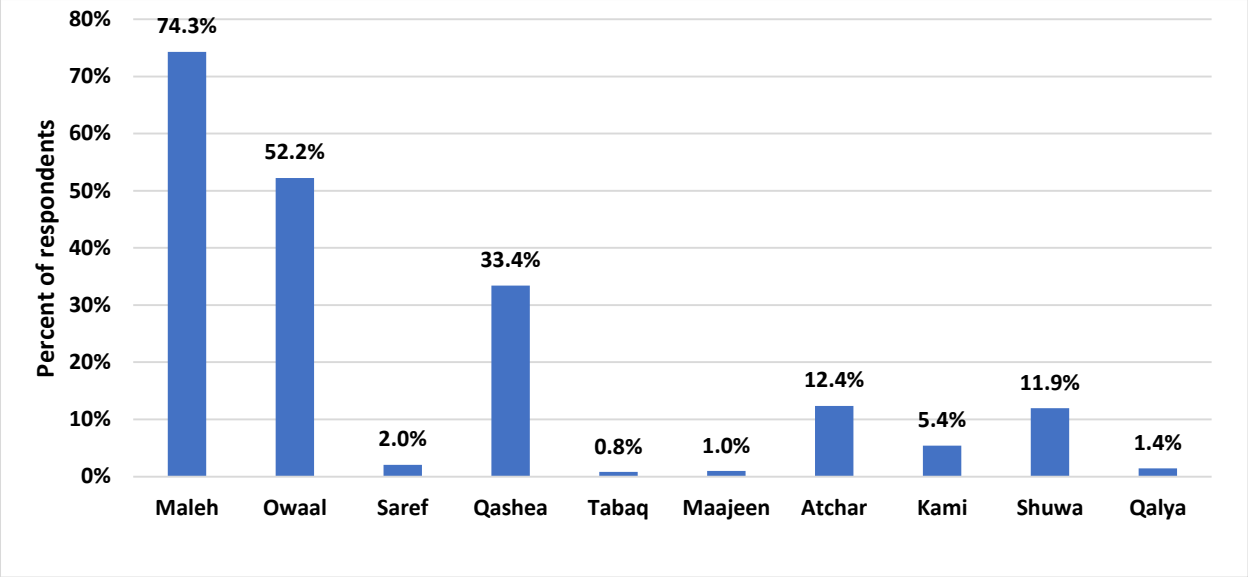

Figure 98 Respondents' reported traditional or local foods with high salt content, adolescents 14-18 years of age

When asked about artificial substitutes for salt which might help decrease dietary salt consumption, 93.0% of the 273 responding adolescents said they did not know. Only 3.9% reported a valid salt alternative (potassium salt), and 1.1% reported other forms of sodium chloride, such as Maggi cubes or local natural salt.

When asked what information on food labels gives information about the amount of salt, adolescents reported food sodium level, ingredient list, and claims of low salt content; however, almost one-third did not know (Figure 99). The distribution of this variable by sex and governorate is shown in Table S65.

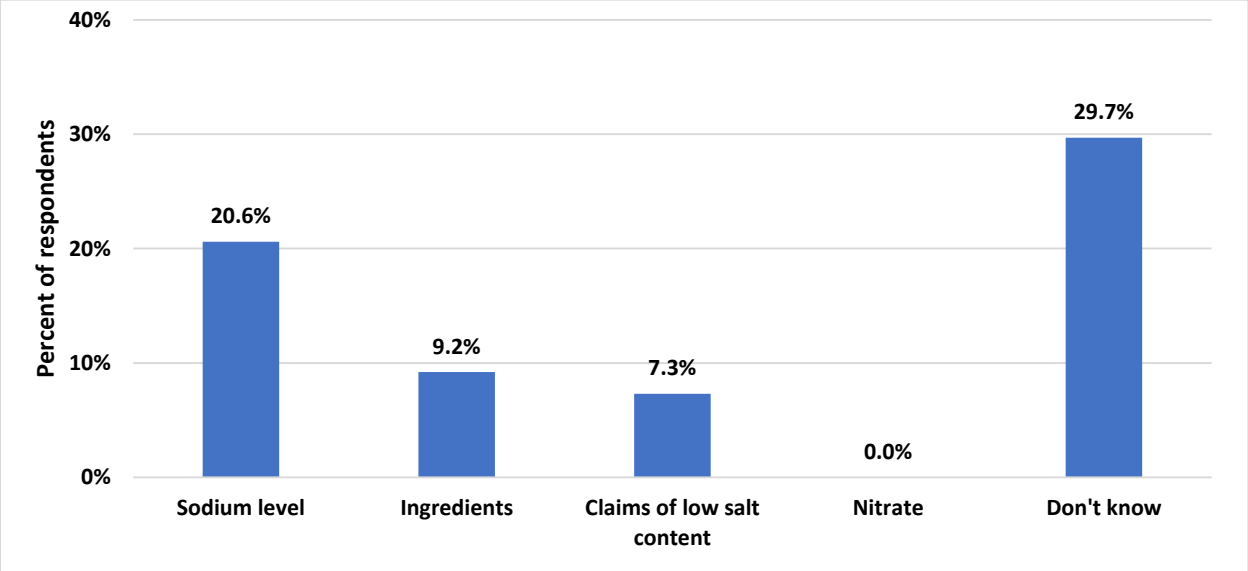

Figure 99 Information reported which tells you about salt content of a food, adolescents 14-18 years of age

5.1.3. Attitudes

The majority of adolescent respondents overall had moderate scores on the salt attitude index (Table 36). This is also true in most subgroups. Adolescents with a secondary level education or more had higher scores than adolescents with less education.

Table 36. Composite index for salt attitudes of adolescents 14-18 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	147	22.6%	(15.9, 31.1)	61.7%	(50.5, 71.8)	15.7%	(10.0, 23.9)	0.459
Female	126	30.0%	(30.0, 21.7)	53.0%	(53.0, 42.5)	17.1%	(17.1, 10.9)	
Educational level								
Primary	17	32.3%	(11.4, 63.9)	49.9%	(28.4, 71.5)	17.7%	(5.8, 42.9)	<0.05
Elementary	116	35.0%	(26.1, 45.1)	54.6%	(44.8, 64.0)	10.4%	(6.1, 17.2)	
Secondary or more	139	15.7%	(9.6, 24.7)	61.7%	(52.3, 70.2)	22.6%	(15.5, 31.8)	
Governorate								
Muscat	30	26.7%	(18.1, 37.4)	60.0%	(50.2, 69.1)	13.3%	(5.6, 28.3)	0.240
Dhofar	16	12.5%	(4.9, 28.4)	81.3%	(62.0, 92.0)	6.3%	(0.7, 38.3)	
Ad Dakhliyah	24	33.3%	(20.8, 48.8)	45.8%	(30.0, 62.5)	20.8%	(13.4, 30.9)	
Ash Sharqiyah North	22	31.8%	(14.5, 56.3)	54.5%	(35.1, 72.7)	13.6%	(8.4, 21.4)	
Ash Sharqiyah South	32	21.9%	(13.0, 34.5)	56.3%	(42.8, 68.8)	21.9%	(10.0, 41.5)	
Al Batinah North	26	26.9%	(14.5, 44.4)	53.8%	(32.1, 74.2)	19.2%	(10.5, 32.6)	
Al Batinah South	24	29.2%	(13.8, 51.5)	54.2%	(34.3, 72.8)	16.7%	(12.4, 22.1)	
Adh Dhahirah	25	20.0%	(5.9, 49.8)	72.0%	(50.9, 86.4)	8.0%	(3.6, 16.9)	
Al Buraymi	22	22.7%	(11.9, 38.9)	45.5%	(23.4, 69.4)	31.8%	(21.8, 43.9)	
Musandam	27	25.9%	NA*	44.4%	NA*	29.6%	NA*	
Al Wusta	25	44.0%	(15.9, 76.6)	44.0%	(26.0, 63.7)	12.0%	(3.0, 37.2)	
Who buys food for household								
Housewife	109	26.2%	(17.4, 37.3)	57.9%	(46.9, 68.2)	15.9%	(9.6, 25.0)	0.554
Head of house	144	24.6%	(17.8, 33.1)	57.1%	(46.4, 67.1)	18.3%	(12.6, 25.8)	
Servant	2	100%	-	0%	-	0%	-	
Other person	18	41.4%	(16.0, 72.3)	57.5%	(27.0, 83.2)	1.2%	(0.1, 8.6)	
Talked to professional about diet								
Yes	36	21.6%	(9.0, 43.5)	64.4%	(42.5, 81.7)	14.0%	(5.5, 31.1)	0.636
No	217	25.5%	(19.3, 32.8)	56.6%	(48.4, 64.5)	17.9%	(13.4, 23.5)	
Unknown	20	37.2%	(18.3, 61.2)	54.9%	(35.8, 72.6)	7.9%	(1.1, 40.2)	
Tried to lose weight**								
TOTAL	**273**	**26.2%**	**(21.2, 31.9)**	**57.4%**	**(50.5, 64.0)**	**16.4%**	**(12.4, 21.3)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

** Question about ever having tried to lose weight was not asked on the salt questionnaire

More than one-half of adolescent respondents intended to reduce salt intake, but more than one-third also reported that it is difficult to do so (Figure 100). A majority also agreed that reducing consumption of both sodium and canned foods and reducing the addition of salt to food is important. More than two thirds disagreed with a statement that there is no need to use salt.

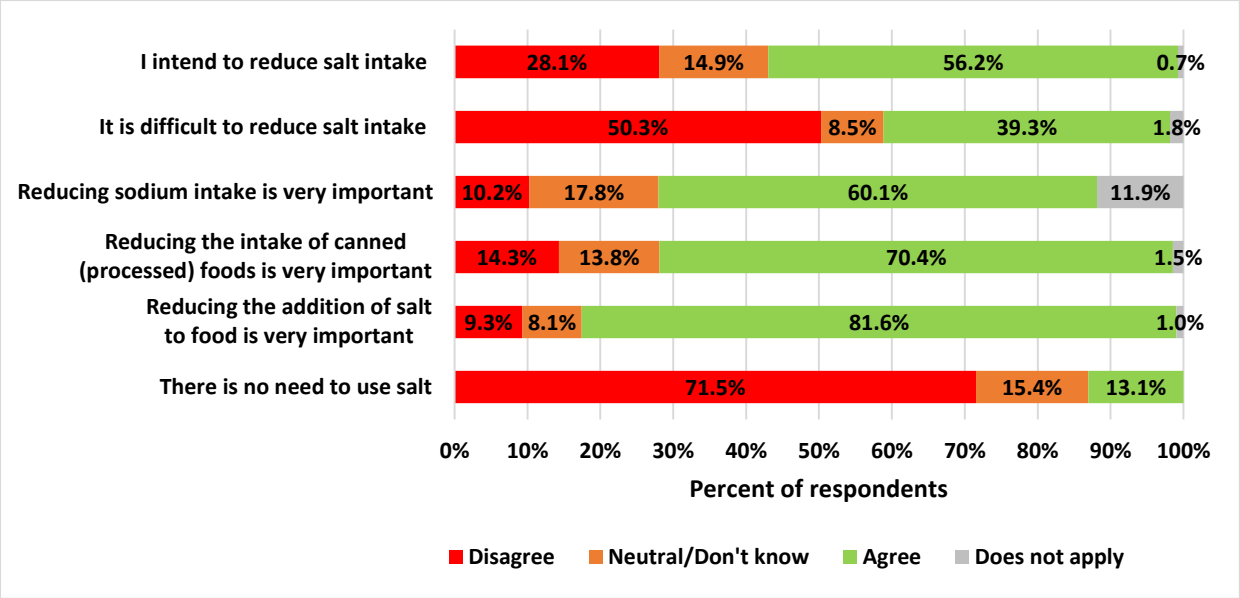

Figure 100 Proportion of participants agreeing or disagreeing with various statements about dietary salt, adolescents 14-18 years of age

Adolescent respondents reported a wide variety of concerns about the food they eat (Figure 101). Specifically, almost one-third were concerned about artificial colors, total fat, and saturated fat. More than one-quarter were concerned about consumption of sugar and calories.

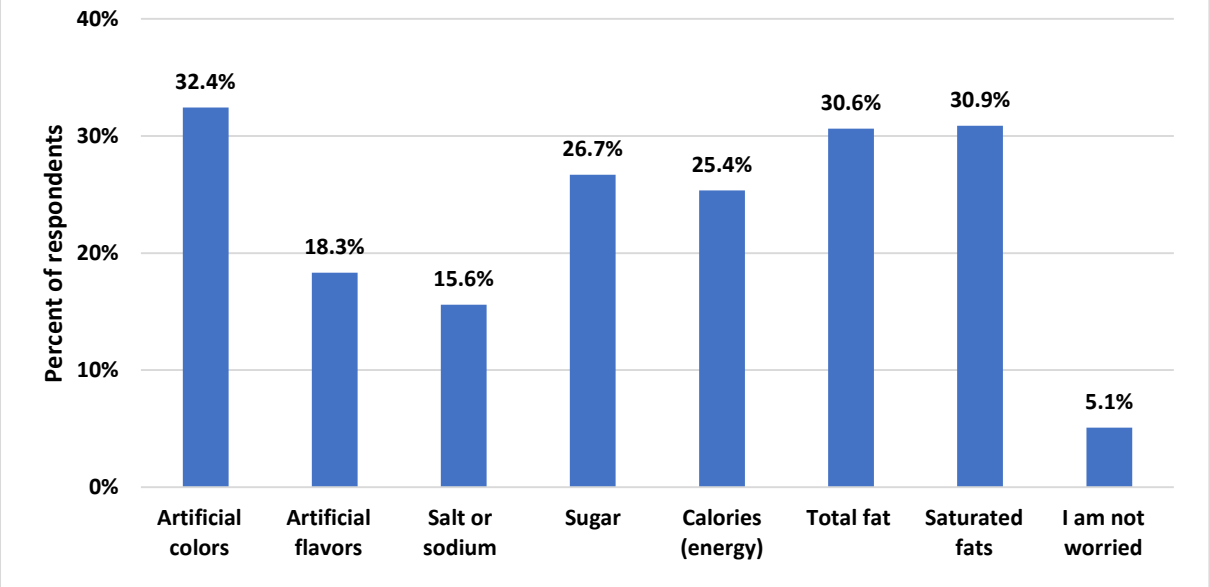

Figure 101 Proportion of participants concerned about eating foods that contain certain ingredients, adolescents 14-18 years of age

Among reasons most commonly cited for concern about various food ingredients were that they were "harmful", they cause non-communicable diseases, and they affect body weight. Several other reasons were also cited, albeit less commonly, as listed below in Figure 102.

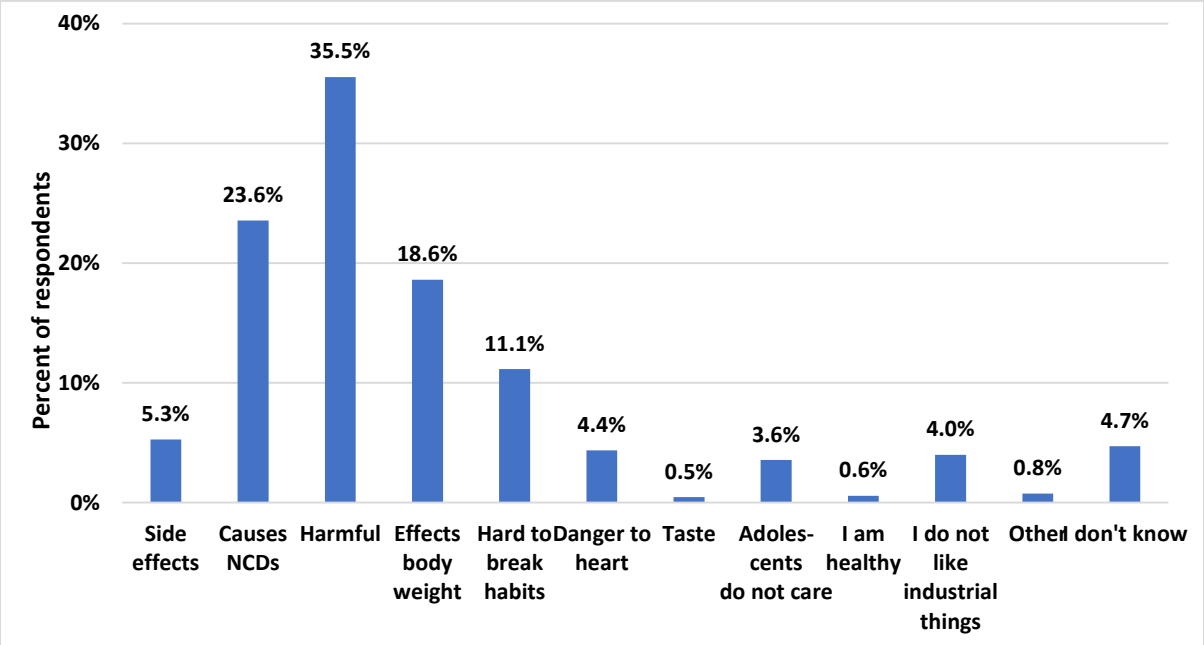

Figure 102 Why are participants concerned, adolescents 14-18 years of age

Most adolescent respondents did not think they were at risk of developing hypertension due to salt intake (Figure 103).

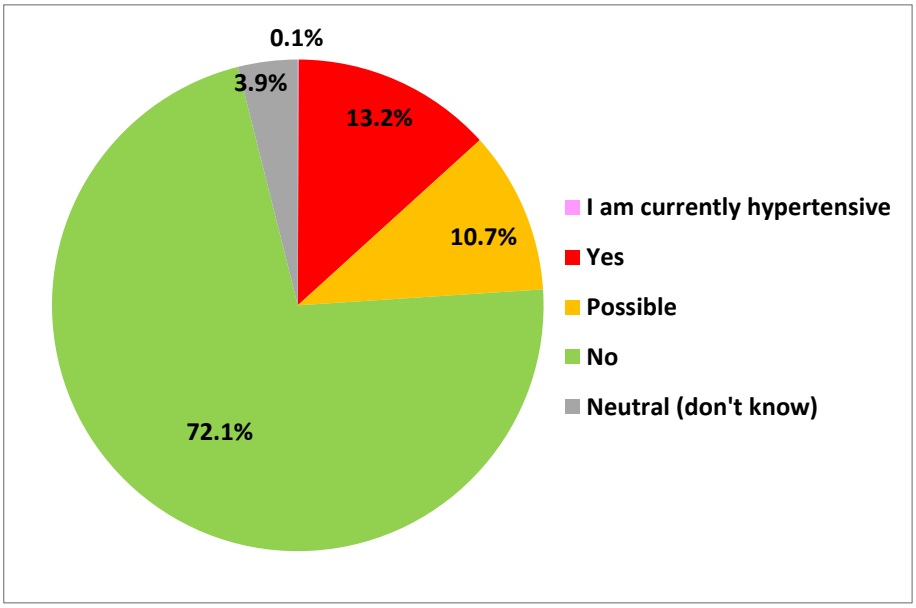

Figure 103 Respondents' report if at risk for hypertension because of salt intake, adolescents 14-18 years of age

Out of those 61 (24.0%) adolescents who stated that they were at risk of hypertension or might be at risk for hypertension because of salt intake, 51.8% rated their risk as low or very low, 36.8% as average, and 11.4% as high or very high. Of those 16 respondents reporting very low risk, 95.8% said this low risk resulted from following a low salt diet. The remainder gave lifestyle as a reason for this low risk.

Adolescents who reported a risk of hypertension did not have statistically significantly better scores on the salt practices index than adolescents reporting no risk (**Table 37**).

Table 37. Number (weighted %) of adolescents 14-18 years of age with or without reported risk of hypertension with low, medium, or high scores on salt practices index

	Adolescents' salt practices index score			
Adolescent reported risk of hypertension due to salt intake	**Low**	**Medium**	**High**	**P value**
Yes	52 (87.9%)	9 (12.1%)	0%	0.477
No	163 (77.3%)	39 (22.6%)	1 (0.1%)	
Unknown	7 (84.6%)	2 (15.4%)	0%	

Adolescent respondents cited several factors which would help them reduce salt consumption, including getting used to a low salt diet, using salt alternatives, and having a healthy life style (Figure 104).

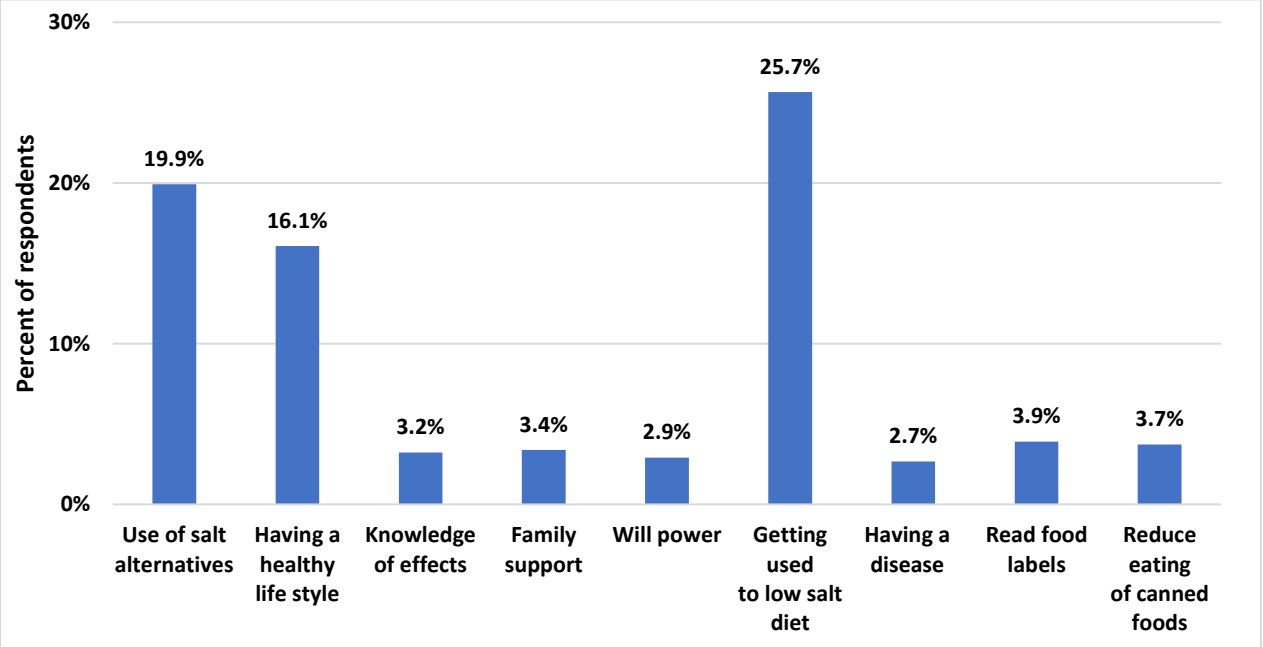

Figure 104 Respondents' reported factors which will help them reduce dietary salt consumption, adolescents 14-18 years of age

More than one-half of adolescent respondents said that a change in their health condition would motivate them to reduce dietary salt (Figure 105). Other motives were cited less frequently.

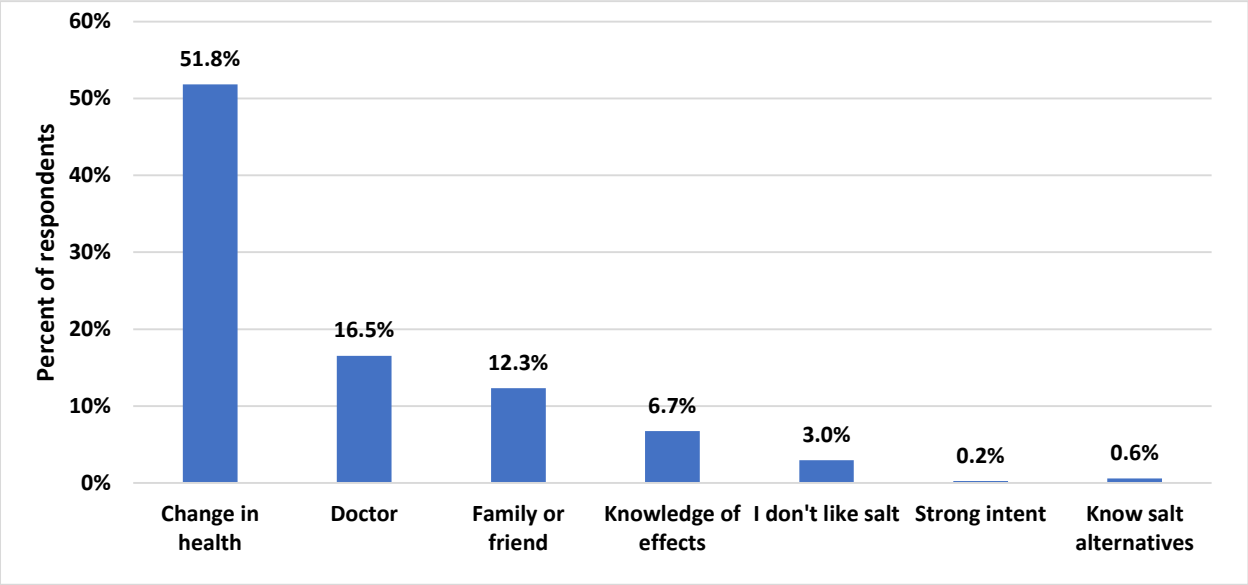

Figure 105 Respondents' reported motives to reduce dietary salt consumption, adolescents 14-18 years of age

The largest proportion of adolescents said there were no barriers to their reducing salt consumption (Figure 106).

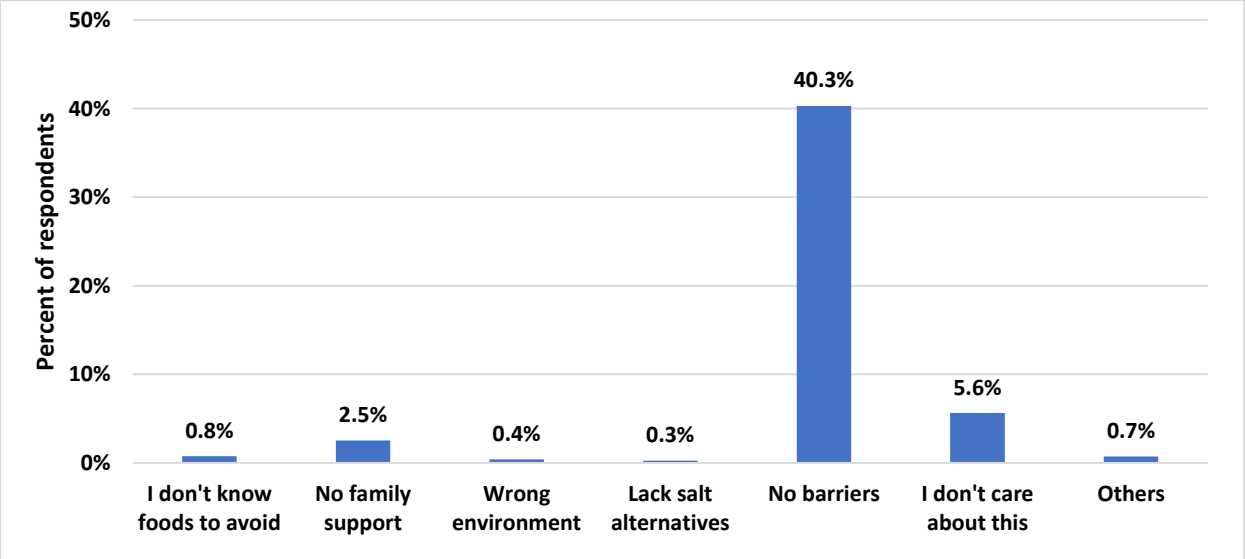

Figure 106 Respondents' reported barriers to reducing dietary salt consumption, adolescents 14-18 years of age

5.1.4. Practices

Similar to practices regarding oil and fat consumption, adolescents scored quite poorly on practices regarding salt consumption (**Table 38**). In almost all subgroups, more than 70% of respondents scored in the low category, and very few adolescents overall score in the high category.

Table 38. Composite index for salt practices of adolescents 14-18 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	147	82.4%	(75.1, 87.9)	17.6%	(12.1, 24.9)	0.1%	(0.0, 0.6)	0.409
Female	126	77.8%	(67.6, 85.5)	22.2%	(14.5, 32.4)	0%	-	
Educational level								
Primary	17	93.4%	(77.4, 98.3)	6.6%	(1.7, 22.6)	0%	-	0.245
Elementary	116	83.8%	(74.5, 90.2)	16.2%	(9.8, 25.5)	0%	-	
Secondary or more	139	74.1%	(63.0, 82.8)	25.8%	(17.1, 37.0)	0.1%	(0.0, 0.7)	
Governorate								
Muscat	30	80.0%	(71.6, 86.4)	20.0%	(13.6, 28.4)	0%	-	0.918
Dhofar	16	81.3%	(81.3, 69.1)	18.8%	(18.8, 10.7)	0%	-	
Ad Dakhliyah	24	83.3%	(66.9, 92.5)	16.7%	(7.5, 33.1)	0%	-	
Ash Sharqiyah North	22	81.8%	(46.1, 95.9)	18.2%	(4.1, 53.9)	0%	-	
Ash Sharqiyah South	32	93.8%	(84.1, 97.7)	6.3%	(2.3, 15.9)	0%	-	
Al Batinah North	26	84.6%	(64.1, 94.4)	15.4%	(5.6, 35.9)	0%	-	
Al Batinah South	24	54.2%	(40.3, 67.4)	45.8%	(32.6, 59.7)	0%	-	
Adh Dhahirah	25	88.0%	(69.5, 95.9)	12.0%	(4.1, 30.5)	0%	-	
Al Buraymi	22	72.7%	(66.4, 78.2)	27.3%	(21.8, 33.6)	0%	-	
Musandam	27	96.3%	NA*	-	NA*	3.7%	NA*	
Al Wusta	25	72.0%	(50.8, 86.5)	28.0%	(13.5, 49.2)	0%	-	
Who buys food for household								
Housewife	109	72.5%	(62.6, 80.7)	27.4%	(19.2, 37.4)	0.1%	(0.0, 0.8)	0.258
Head of house	144	84.3%	(76.1, 90.1)	15.7%	(9.9, 23.9)	0%	-	
Servant	2	100%	-		-	0%	-	
Other person	18	91.8%	(57.0, 99.0)	8.2%	(1.0, 43.0)	0%	-	
Talked to professional about diet								
Yes	36	76.7%	(55.4, 89.6)	23.3%	(10.3, 44.6)	0%	-	0.981
No	217	80.4%	(72.8, 86.3)	19.5%	(13.7, 27.1)	0.1%	(0.0, 0.4)	
Tried to lose weight**								
TOTAL	**273**	**80.1%**	**(74.4, 84.9)**	**19.8%**	**(15.1, 25.6)**	**<0.1%**	**(0, 0.3)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid

** Question about ever having tried to lose weight was not asked on the salt questionnaire

The frequency of various behaviors and practices regarding salt consumption are shown below in Figure 107. Few respondents added salt to food or drinks at the table, but the majority added salt to food during cooking.

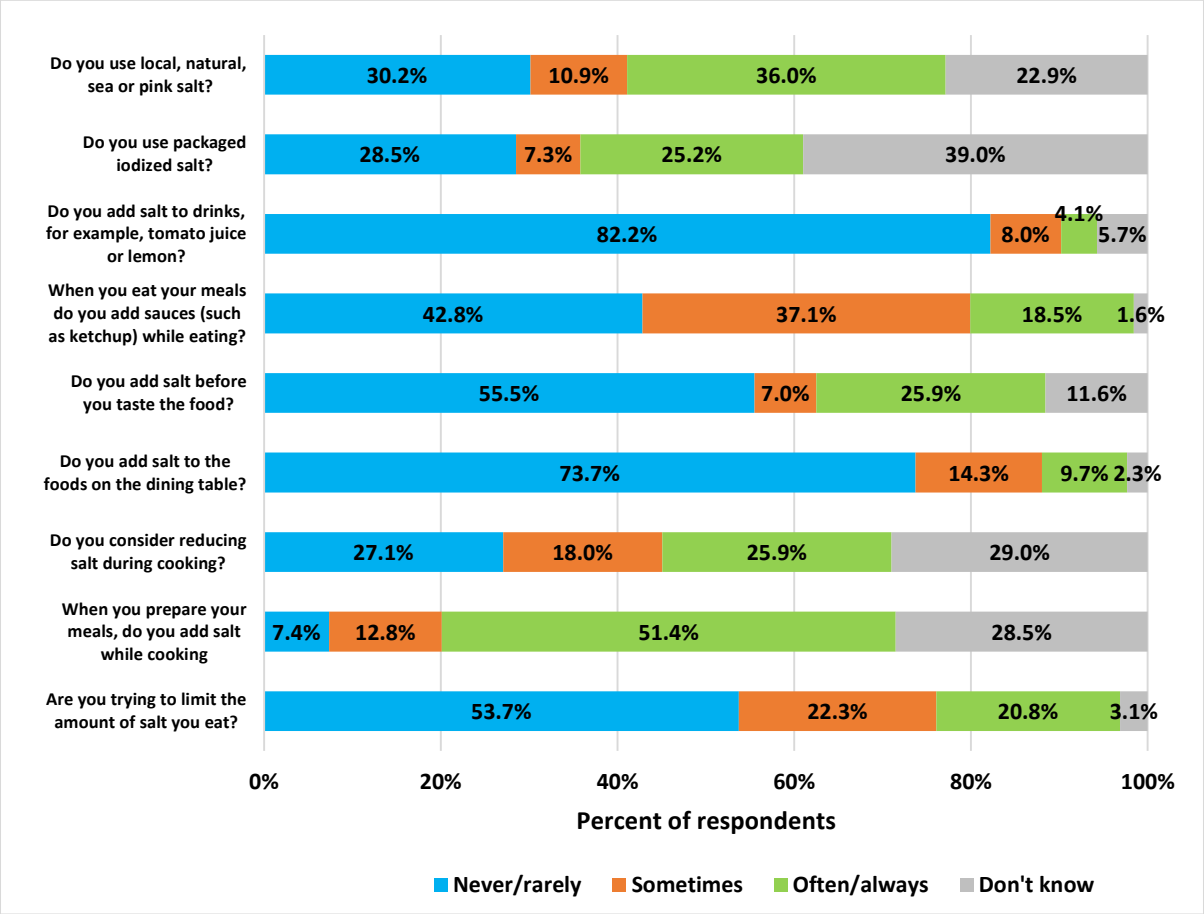

Figure 107 Respondents' replies to various questions pertaining to salt practices, adolescents 14-18 years of age

The majority of adolescents rarely or never check the salt content of foods when shopping (Table 39). In addition, few adolescent respondents reported that reading food labels affected food purchases sometimes, often, or always; however, a large proportion reported that they did not know. About one-half of adolescents report never or rarely purchasing foods labelled as low-sodium or low-salt, but again, a large proportion of adolescents who report that they do not know how often they purchased food labeled as low salt or low sodium. **Table S66**, **Table S67**, and **Table S68** present the distribution of these three frequencies by sex and governorate of residence.

Table 39. Percent of respondents who reported frequencies of various behaviors related to checking food labels for salt or sodium content - Adolescents 14-18 years

		Frequency			
Question	**N**	**Never/rarely**	**Sometimes**	**Often/always**	**Do not know**
How often check salt or sodium content of foods	273	68.8%	13.7%	9.5%	7.9%
How often reading of food label affects purchases	108	38.0%	19.3%	23.3%	19.4%
How often buy foods labeled as low salt or low sodium	273	53.0%	13.3%	6.6%	27.1%

When asked what natural salt substitutes they used, a large proportion of adolescents said they do not use salt substitutes, and almost one-third said they did not know (Figure 108). The most common natural salt substitutes reported were lemon and spices. Other substitutes were reported by fewer respondents.

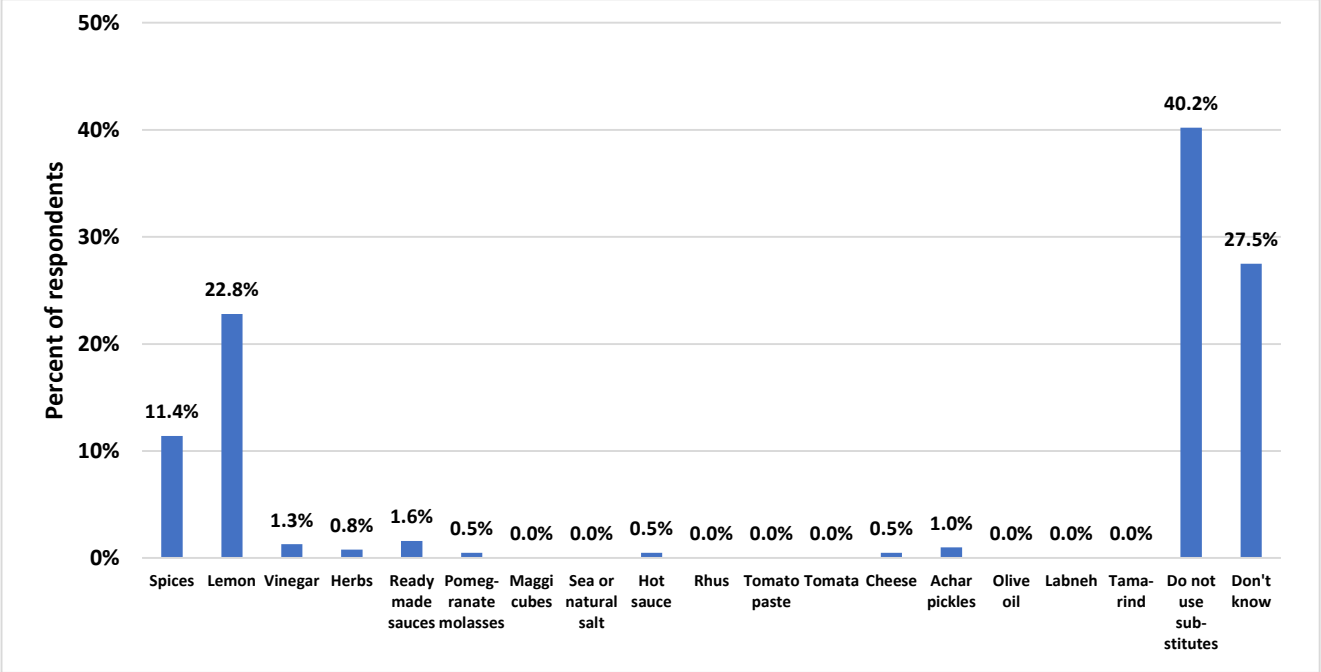

Figure 108 Natural salt substitutes reported using, adolescents 14-18 years of age

When asked what artificial salt substitutes they used, 61.0% of 273 adolescent respondents reported that they did not know, and 37.6% reported that they used no artificial salt substitutes. Only three (1.1%) reported using potassium salt and six (1.7%) merely mentioned other forms of sodium chloride.

Among the 155 adolescents who reported a method of adding salt to food during cooking, the most commonly reported method was using a teaspoon (Figure 109). Other methods were reported by fewer than 20% of adolescents.

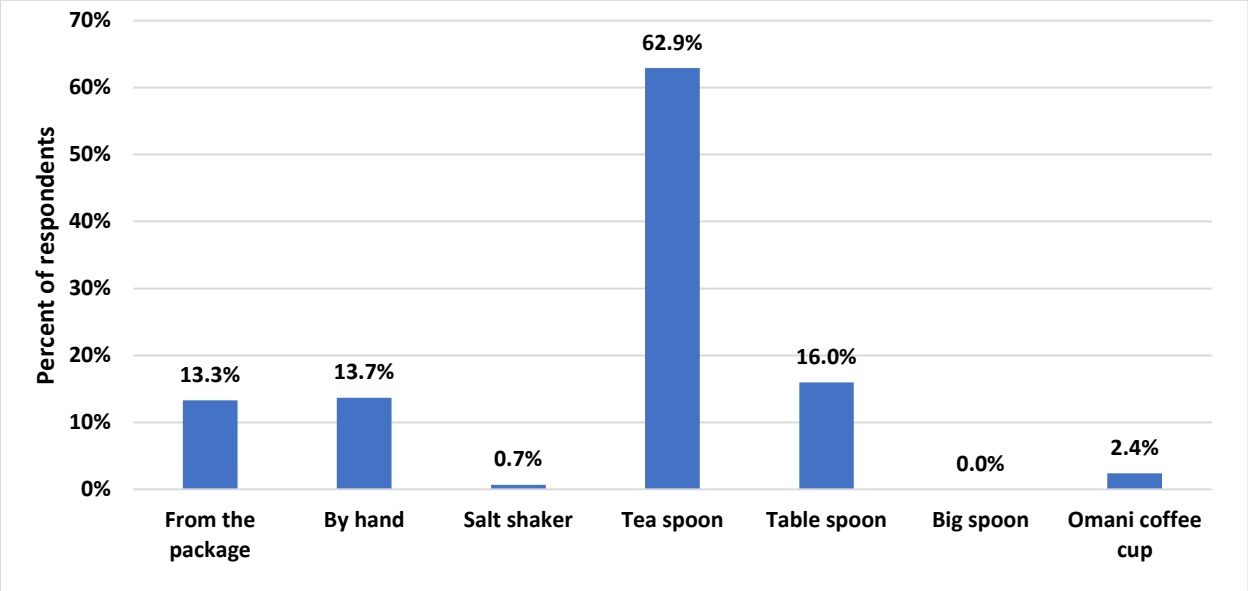

Figure 109 What scale is used to add salt during cooking, adolescents 14-18 years of age

Among the 80 adolescents who reported adding salt to food when eating, adding salt by hand or using a teaspoon was reported by about one-third of adolescents. Other methods were reported less commonly (Figure 110).

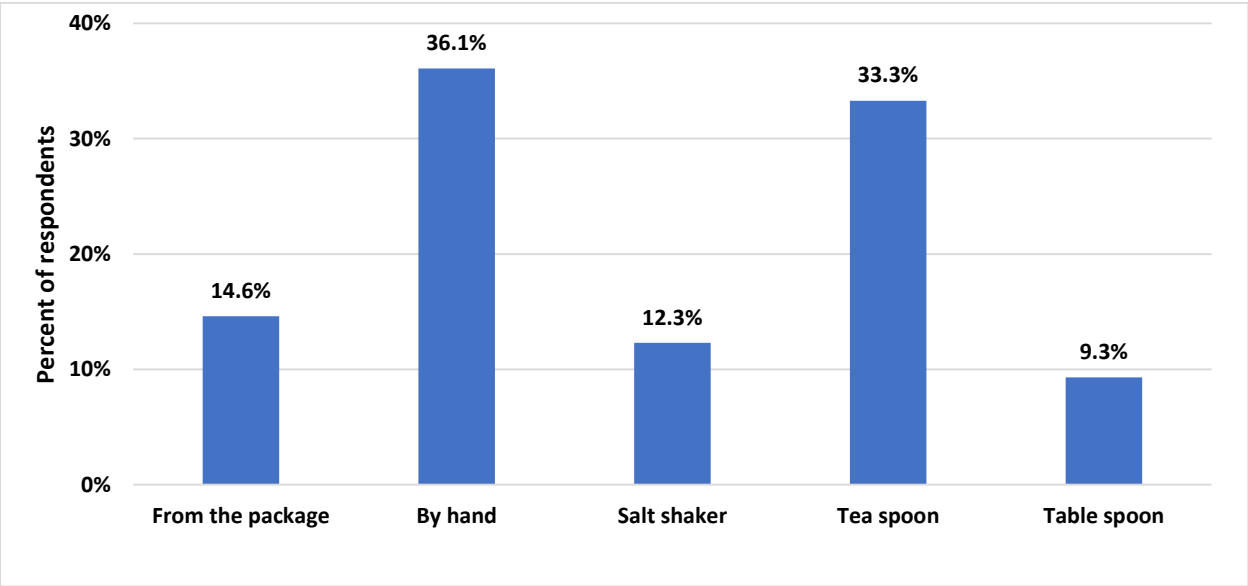

Figure 110 What scale is used to add salt during eating, adolescents 14-18 years of age

Adolescents reported consuming several high-salt foods only monthly or rarely; these foods included pickles or canned achar, salted butter or margarine, maleh, ouwaal or Qashaa', and local cheese or Kami (Table 40). On the other hand, several high-salt foods were consumed almost daily, including cheese and other dairy products and potato crisps or chips. The median number of times per month each of these foods was consumed by governorate is presented in **Table S69**.

Table 40. Reported frequency* of consumption of selected foods by adolescents 14-18 years of age

Food	Daily	Weekly	Monthly	Rarely
Canned food	4.4%	49.6%	17.3%	28.7%
Cheese, milk, labneh	66.1%	26.9%	0.9%	6.2%
Sauces	30.0%	33.9%	4.9%	31.2%
Pickles or canned achar	8.4%	17.7%	9.4%	64.4%
Processed meat	11.2%	47.6%	18.9%	22.3%
Potato crisps, chips	56.1%	31.5%	3.9%	8.5%
Salted nuts	11.3%	29.7%	13.5%	45.5%
Salted butter or margarine	5.9%	6.5%	5.4%	82.2%
Pastries	24.7%	45.8%	16.3%	13.1%
Maggi cubes or other spices with salt	28.4%	12.7%	7.0%	51.9%
Fast food	12.2%	47.3%	24.7%	15.7%
Maleh	0.6%	13.6%	17.8%	68.1%
Ouwaal or Qashaa'	2.7%	16.7%	15.8%	64.8%
Homemade achar	11.6%	12.9%	9.4%	66.0%
Local cheese or Kami	4.8%	11.0%	7.3%	76.9%
Instant noodles	15.1%	31.3%	17.3%	36.3%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

5.2. Results – Adults 19-60 years of age

5.2.1. Demographic characteristics

The characteristics of adults completing the salt questionnaire are shown below in (Table 41).

Table 41. Distribution of various demographic characteristics among adults 19-60 years of age responding to the salt questionnaire

Characteristic	Unweighted number	Weighted percent
Sex		
Male	550	50.5%
Female	534	49.5%
Age (in years)		
19-29	337	33.5%
30-39	400	35.9%
40-49	244	21.8%
50-60	103	8.8%
Educational level		
Primary	49	4.2%
Elementary	126	11.6%
Secondary	516	49.2%
Diploma	125	12.2%
Bachelors or more	212	22.7%
Marital status		
Single	295	26.9%
Married	789	73.1%
Governorate		
Muscat	102	10.0%
Dhofar	61	6.0%
Ad Dakhliyah	89	8.5%
Ash Sharqiyah North	93	8.5%
Ash Sharqiyah South	111	10.7%
Al Batinah North	110	10.2%
Al Batinah South	101	9.3%
Adh Dhahirah	110	10.2%
Al Buraymi	85	8.4%
Musandam	115	8.8%
Al Wusta	107	9.5%

Characteristic	Unweighted number	Weighted percent
Household income		
<200 OMR	199	18.8%
200-499 OMR	329	32.2%
500-999 OMR	191	20.0%
1000+ OMR	75	7.6%
Don't know	290	21.4%
Type of job		
Government	282	23.5%
Private	169	16.8%
Military	96	8.7%
Retired	50	4.9%
Student	57	6.7%
Job seeker	134	12.4%
Not working	296	26.8%
Works in health field		
Yes	51	5.6%
No	764	94.4%
Buys food for household		
Respondent	460	40.3%
Other household member	624	59.7%
Who buys food for household		
Housewife	450	40.1%
Head of house	526	51.7%
Servant	7	0.1%
Other person	100	8.1%
Talked to professional about diet		
Yes	353	33.3%
No	682	61.1%
Unknown	49	5.6%
Tried to lose weight*		
Has disease		
Hypertension	103	9.5%
Diabetes	61	5.1%
Heart disease	10	0.8%
Overweight or obesity	155	15.6%

***Question about ever having tried to lose weight was not asked on the salt questionnaire

5.2.2. Knowledge

The level of knowledge of salt among adult respondents was low for all adults together and for all subgroups (Table 42). In no demographic subgroup did more than 5% of survey subjects have a high level of knowledge about dietary salt.

Table 42. Composite index for salt knowledge of adults 19-60 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	549	81.6%	(76.9, 85.5)	18.1%	(14.2, 22.8)	0.3%	(0.0, 2.2)	0.350
Female	532	79.8%	(74.9, 84.0)	19.0%	(14.9, 24.0)	1.2%	(0.3, 4.1)	
Age								
19-29	335	82.9%	(77.2, 87.4)	16.0%	(11.3, 22.1)	1.1%	(0.1, 7.4)	0.513
30-39	400	76.8%	(70.5, 82.2)	22.4%	(17.1, 28.8)	0.8%	(0.2, 2.4)	
40-49	244	82.2%	(73.4, 88.5)	17.5%	(11.3, 26.3)	0.3%	(0.1, 1.5)	
50-60	102	84.7%	(74.9, 91.1)	15.3%	(8.9, 25.1)	0%	-	
Educational level								
Primary	49	93.7%	(82.7, 97.9)	6.3%	(2.1, 17.3)	0%	-	<0.01
Elementary	126	84.7%	(75.2, 90.9)	14.9%	(8.6, 24.5)	0.5%	(0.1, 3.3)	
Secondary	515	82.5%	(77.1, 86.8)	17.0%	(12.7, 22.6)	0.5%	(0.1, 1.9)	
Diploma	125	71.5%	(60.1, 80.8)	24.9%	(17.0, 34.9)	3.6%	(0.7, 16.8)	
Bachelors or more	210	74.0%	(66.8, 80.1)	26.0%	(19.9, 33.1)	0.1%	(0.0, 0.1)	
Marital status								
Not married	295	82.8%	(75.5, 88.2)	15.9%	(10.5, 23.3)	1.3%	(0.2, 9.2)	0.372
Married	786	80.0%	(75.8, 83.6)	19.6%	(16.0, 23.8)	0.5%	(0.2, 1.2)	
Governorate								
Muscat	102	74.4%	(61.9, 83.9)	25.6%	(16.1, 38.1)	0%	-	0.903
Dhofar	61	93.4%	(83.0, 97.6)	6.6%	(2.4, 17.0)	0%	-	
Ad Dakhliyah	89	81.0%	(73.6, 86.8)	17.9%	(11.9, 26.0)	1.1%	(0.2, 7.1)	
Ash Sharqiyah North	93	89.3%	(83.4, 93.3)	10.7%	(6.7, 16.6)	0%	-	
Ash Sharqiyah South	111	82.9%	(74.7, 88.8)	17.1%	(11.2, 25.3)	0%	-	
Al Batinah North	107	79.4%	(70.0, 86.4)	18.7%	(11.2, 29.6)	1.9%	(0.3, 10.2)	
Al Batinah South	101	86.1%	(83.7, 88.3)	13.9%	(11.7, 16.3)	0%	-	
Adh Dhahirah	110	73.9%	(66.7, 80.0)	23.5%	(18.9, 28.8)	2.6%	(1.2, 5.6)	
Al Buraymi	85	72.7%	(70.9, 74.4)	27.3%	(25.6, 29.1)	0%	-	
Musandam	115	65.9%	NA*	29.6%	NA*	4.6%	NA*	
Al Wusta	107	84.2%	(72.2, 91.6)	15.8%	(8.4, 27.8)	0%	-	
Household income								
<200 OMR	198	82.4%	(75.0, 87.9)	16.6%	(10.9, 24.6)	1.0%	(0.1, 6.8)	0.174
200-499 OMR	328	78.6%	(71.8, 84.2)	20.4%	(14.9, 27.2)	1.0%	(0.2, 4.1)	
500-999 OMR	191	81.0%	(74.7, 86.0)	18.7%	(13.7, 25.0)	0.3%	(0.1, 1.7)	
1000+ OMR	75	69.0%	(52.1, 82.0)	29.6%	(17.0, 46.3)	1.4%	(0.4, 4.9)	
Do not know	289	86.3%	(77.5, 92.0)	13.5%	(7.9, 22.4)	0.2%	(0.1, 0.2)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Type of job								
Government	282	74.3%	(66.6, 80.7)	25.4%	(19.1, 33.0)	0.3%	(0.1, 1.3)	0.080
Private	168	79.7%	(72.0, 85.6)	20.3%	(14.3, 28.0)	0.1%	(0.1, 0.1)	
Military	96	80.1%	(69.4, 87.8)	18.3%	(10.9, 28.9)	1.6%	(0.2, 11.8)	
Retired	50	77.2%	(63.2, 87.0)	22.8%	(13.0, 36.8)	0%	-	
Student	57	80.6%	(66.1, 89.8)	19.4%	(10.2, 33.9)	0%	-	
Looking for work	133	84.5%	(74.4, 91.1)	12.6%	(7.0, 21.7)	2.9%	(0.4, 18.8)	
Not working	295	86.2%	(81.1, 90.1)	13.3%	(9.5, 18.5)	0.4%	(0.1, 1.3)	
Works in health field								
Yes	51	56.5%	(41.8, 70.1)	42.3%	(28.6, 57.3)	1.2%	(0.1, 9.1)	<0.001
No	761	79.4%	(74.8, 83.4)	19.8%	(15.8, 24.5)	0.8%	(0.2, 3.0)	
Buys food for household								
Yes	459	77.1%	(72.4, 81.3)	22.4%	(18.2, 27.2)	0.5%	(0.1, 2.2)	0.076
No	622	83.1%	(78.6, 86.9)	16.0%	(12.2, 20.7)	0.9%	(0.2, 3.4)	
Who buys food for household								
Housewife	450	80.0%	(72.7, 85.7)	19.7%	(14.0, 27.0)	0.2%	(0.1, 0.7)	0.667
Head of house	523	81.0%	(75.3, 85.7)	17.8%	(13.3, 23.4)	1.2%	(0.3, 4.2)	
Servant	7	71.6%	(71.6, 71.6)	28.4%	(28.4, 28.4)	0%	-	
Other person	100	82.4%	(69.3, 90.6)	17.6%	(9.4, 30.7)	0%	-	
Talked to professional about diet								
Yes	352	78.0%	(73.1, 82.3)	21.0%	(16.8, 25.9)	1.0%	(0.4, 2.5)	0.341
No	680	83.7%	(77.5, 88.4)	15.7%	(10.9, 22.2)	0.6%	(0.1, 4.0)	
Tried to lose weight**								
Has hypertension								
Yes	103	83.1%	(74.6, 89.1)	16.4%	(10.5, 24.6)	0.6%	(0.1, 4.1)	0.796
No	978	80.5%	(76.2, 84.2)	18.8%	(15.1, 23.2)	0.7%	(0.2, 2.3)	
Has diabetes								
Yes	61	91.5%	(79.0, 96.9)	8.5%	(3.1, 21.0)	0%	-	0.264
No	1020	80.1%	(75.9, 83.8)	19.1%	(15.4, 23.4)	0.7%	(0.2, 2.2)	
Has heart disease								
Yes	10	73.5%	(42.0, 91.4)	26.5%	(8.6, 58.0)	0%	-	0.795
No	1071	80.8%	(77.1, 84.0)	18.5%	(15.2, 22.4)	0.7%	(0.2, 2.1)	
Is overweight or obese								
Yes	155	77.2%	(70.8, 82.5)	21.9%	(16.6, 28.3)	1.0%	(0.1, 6.2)	0.448
No	926	81.4%	(77.5, 84.7)	18.0%	(14.6, 21.9)	0.7%	(0.2, 2.4)	
TOTAL	**1081**	**80.7%**	**(76.9,84.0)**	**18.6%**	**(15.2,22.5)**	**0.7%**	**(0.2,2.1)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

** Question about ever having tried to lose weight was not asked on the salt questionnaire

An overwhelming majority (90.6%) of the 1081 adult respondents reported that consumption of too much salt is bad for health. Only 24 (2.7%) said it was good for health, and 45 (4.3%) said it had no effect on health.

A majority of adults identified several major health consequences (kidney disease, fluid retention, hypertension, stroke, and heart disease) of high dietary salt intake (Figure 111). A smaller proportion of respondents identified other health consequences of salt intake.

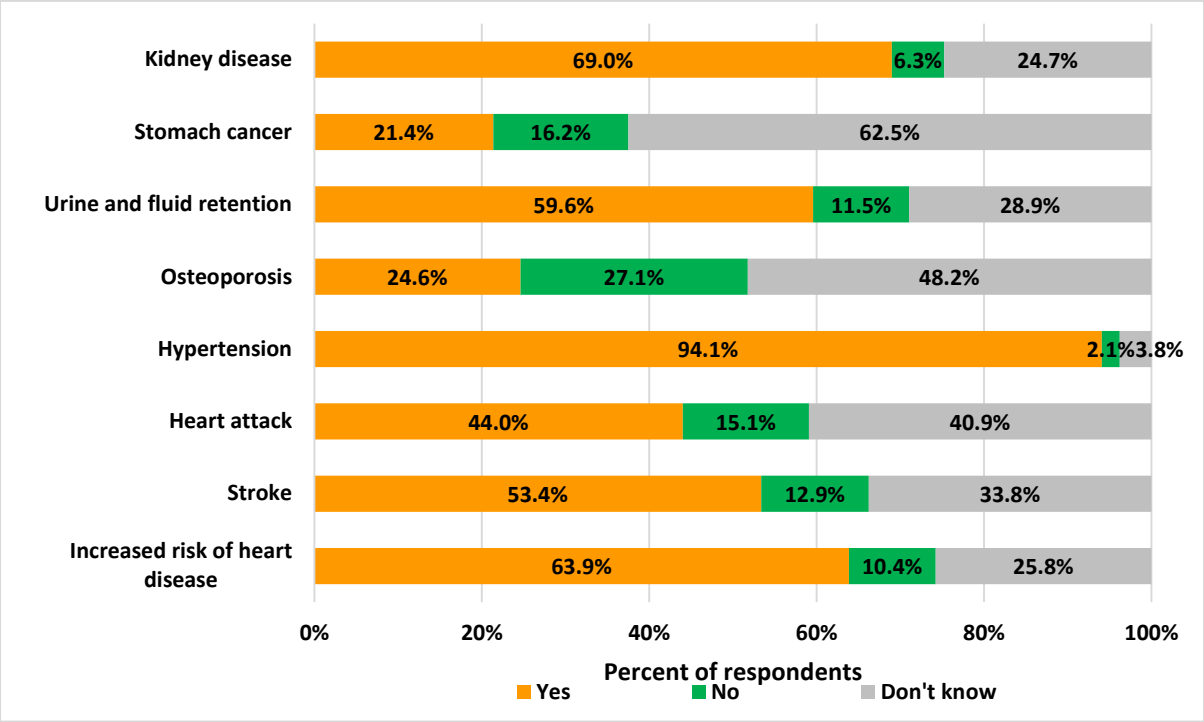

Figure 111 Do you think the following health problems caused or worsened by high dietary salt, adults 19-60 years of age

The majority (54.6%) of the 1081 responding adults stated that they did not know what is the relationship between salt and sodium; 24.0% said there was no difference between salt and sodium, and 3.1% said sodium contains salt. Only 18.3% correctly stated that salt contains sodium.

Less than one quarter of adults correctly identified one teaspoon of salt as the recommended maximum intake (Figure 112). One-half did not know the recommended maximum intake.

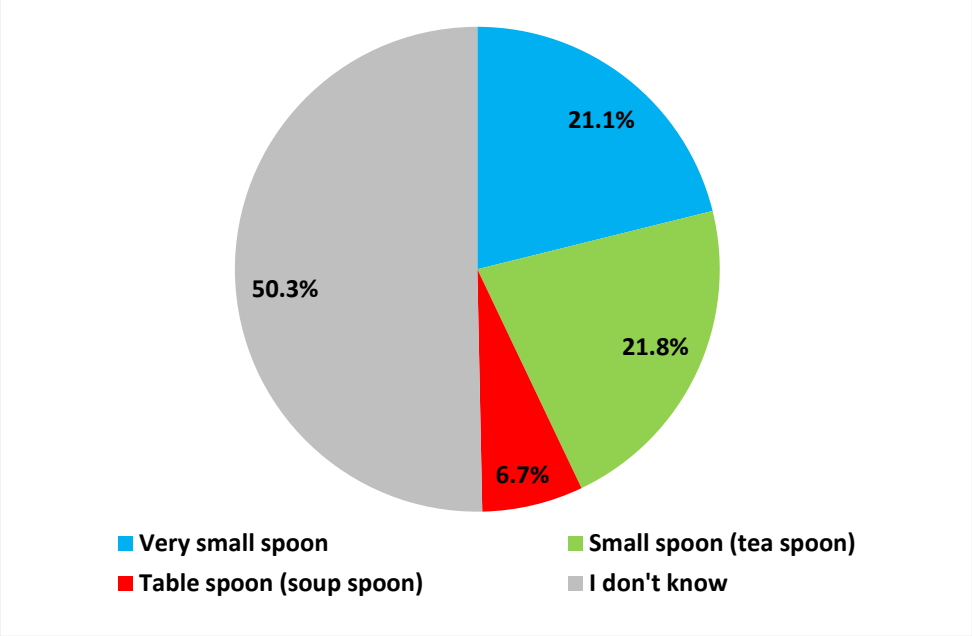

Figure 112 How much dietary salt is allowed for adults per day, adults 19-60 years of age

More than one-half of adult respondents thought that their salt intake was appropriate, while less than one-fifth thought their salt intake was higher than appropriate (Figure 113).

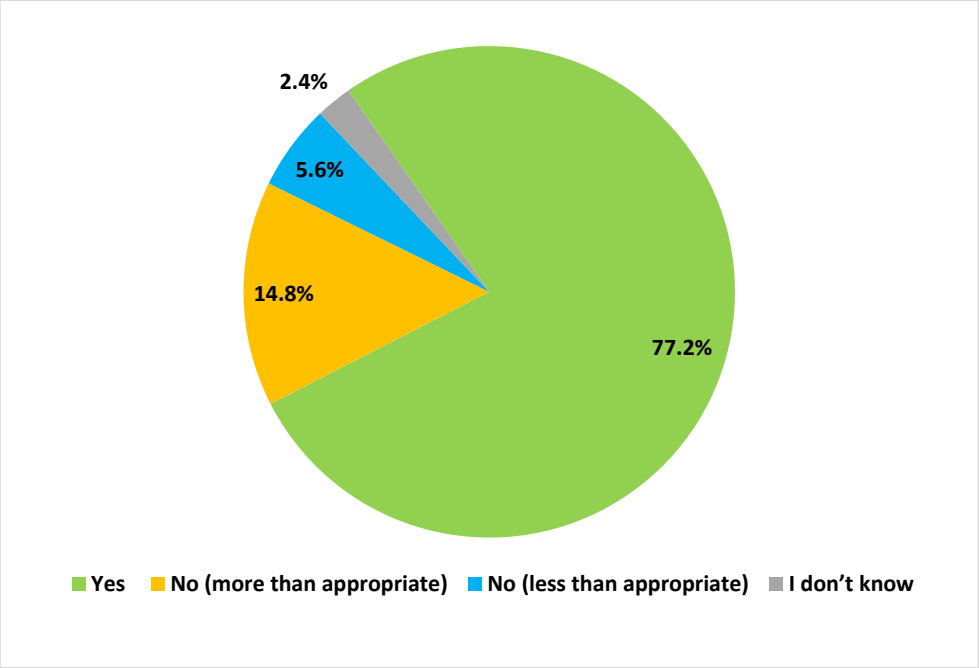

Figure 113 Do you think that the daily amount of salt you use in your meals is an appropriate amount, adults 19-60 years of age

Almost one-half (47.8%) of the 1081 responding adults felt that it is easy to understand food labels; 289 (27.1%) thought it was not easy to understand, and another 281 (25.1%) did not know.

A large majority of adults reported that the main source of salt in the Omani diet is adding salt during cooking (Figure 114).

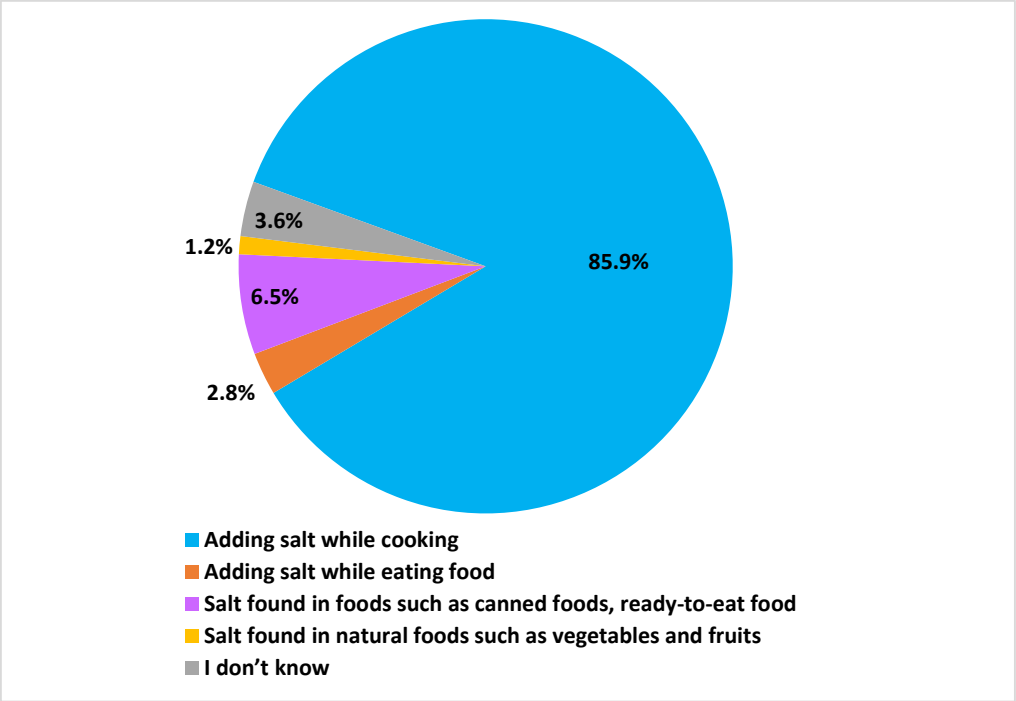

Figure 114 Respondents' reported main source of salt in the Omani diet, adults 19-60 years of age

For the most part, adults correctly identified several high salt foods as major contributors to their dietary salt intake (Figure 115).

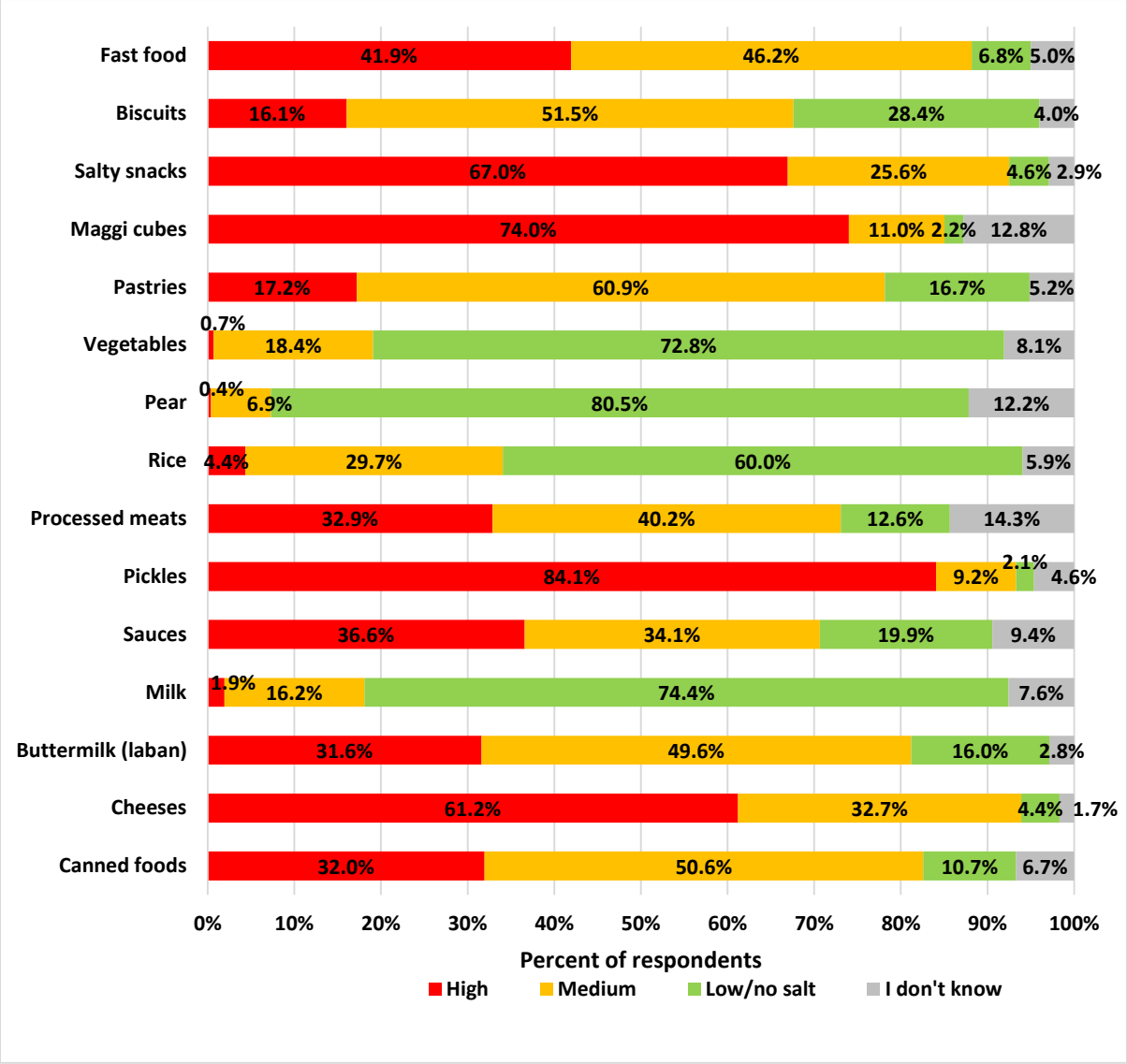

Figure 115 Respondents' estimate of contribution of various foods to daily dietary salt intake, adults 19-60 years of age

Of responding adults, 82.4% of 1081 reported knowing of traditional or local foods which contain salt, 9.8% did not know of any such foods, and 7.8% did not know if such foods contained salt.

Maleh, Owaal, and Qashea were the most frequently cited traditional or local foods with high salt content (Figure 116).

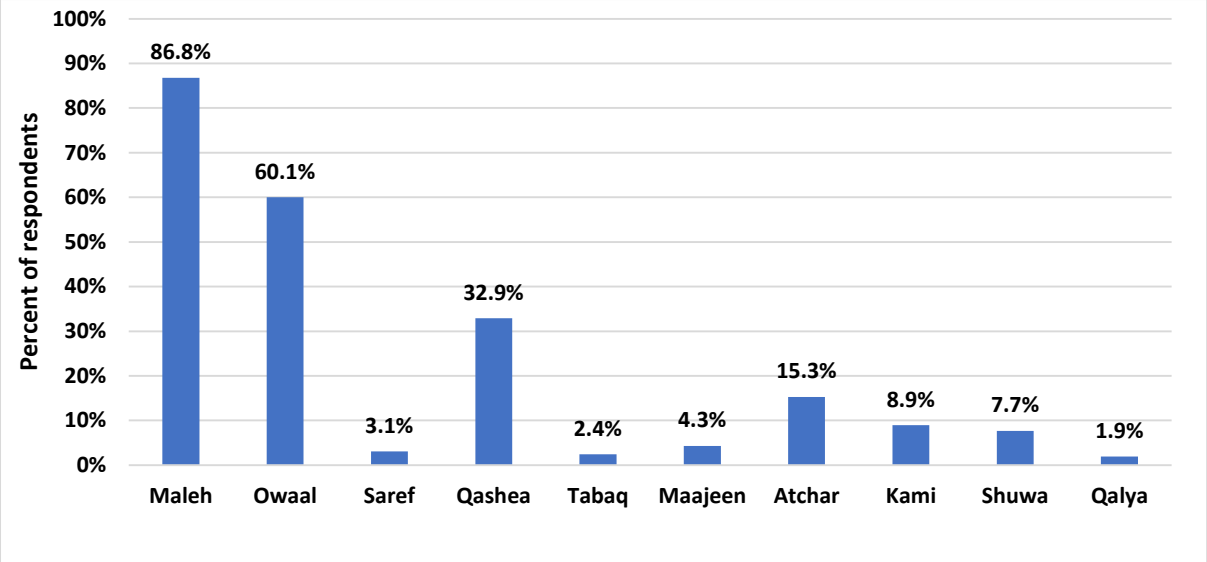

Figure 116 Respondents' reported traditional or local foods with high salt content, adults 19-60 years of age

When asked about artificial substitutes for salt which might help decrease dietary salt consumption, 94.5% of the 1081 responding adults said they did not know of any. Only 2.1% reported a valid salt alternative (potassium salt), and 1.6% reported other forms of sodium chloride, such as Maggi cubes or local natural salt.

When asked what information on food labels gives information about the amount of salt, adults reported food sodium level, ingredient list, and claims of low salt content; however, almost one-third did not know (Figure 117). This distribution of these responses by sex, educational level, and governorate of residence is shown in **Table S70**.

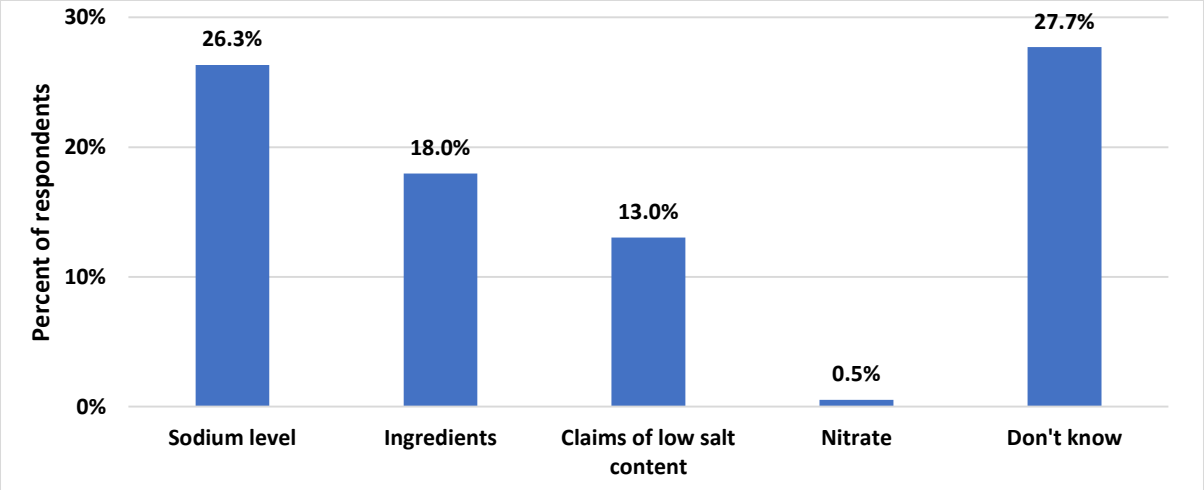

Figure 117 Information reported which tells you about salt content of a food, adults 19-60 years of age

5.2.3. Attitudes

About one-half of adult respondents overall had moderate scores on the salt attitude index, and this was true in most subgroups (Table 43). Although the p value for differences in salt attitudes index score differed with statistical significance by age, there was no substantial progressive change in score with increasing age. Married adults had a marginally greater score than unmarried adults, and there were statistically significant, albeit not very substantial, differences in score among governorates.

Table 43. Composite index for salt attitudes of adults 19-60 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	549	15.9%	(13.0, 19.5)	48.5%	(44.1, 52.9)	35.5%	(30.5, 40.9)	0.625
Female	531	15.9%	(12.4, 20.1)	51.8%	(44.9, 58.6)	32.3%	(27.2, 37.9)	
Age								
19-29	335	25.0%	(20.0, 30.8)	48.1%	(41.4, 54.8)	26.9%	(21.0, 33.7)	<0.01
30-39	400	12.2%	(8.8, 16.6)	52.8%	(46.2, 59.3)	35.0%	(28.4, 42.3)	
40-49	244	10.3%	(6.0, 17.0)	50.0%	(42.9, 57.2)	39.7%	(33.4, 46.4)	
50-60	101	12.3%	(6.4, 22.4)	46.5%	(34.4, 59.1)	41.2%	(29.3, 54.3)	
Educational level								
Primary	49	15.7%	(7.0, 31.7)	52.2%	(34.9, 69.0)	32.1%	(20.5, 46.3)	0.717
Elementary	126	16.3%	(9.5, 26.6)	42.6%	(29.9, 56.3)	41.1%	(28.1, 55.4)	
Secondary	514	17.9%	(14.4, 22.1)	49.6%	(44.5, 54.6)	32.5%	(27.6, 37.8)	
Diploma	125	13.2%	(6.7, 24.4)	51.8%	(40.9, 62.5)	35.0%	(26.3, 44.7)	
Bachelors or more	210	12.1%	(7.5, 18.8)	52.5%	(42.4, 62.3)	35.5%	(27.4, 44.4)	
Marital status								
Not married	295	23.3%	(17.2, 30.8)	47.6%	(39.3, 56.1)	29.1%	(21.8, 37.5)	<0.05
Married	785	13.3%	(11.0, 16.1)	51.0%	(45.9, 56.0)	35.7%	(30.8, 40.9)	
Governorate								
Muscat	102	19.7%	(14.5, 26.1)	41.0%	(33.5, 49.1)	39.3%	(31.5, 47.6)	<0.01
Dhofar	61	15.0%	(8.9, 24.0)	64.9%	(56.8, 72.3)	20.1%	(12.6, 30.4)	
Ad Dakhliyah	89	13.4%	(9.2, 19.0)	55.0%	(43.0, 66.5)	31.6%	(20.1, 45.8)	
Ash Sharqiyah North	93	20.7%	(14.9, 27.8)	51.8%	(43.6, 59.9)	27.6%	(18.7, 38.6)	
Ash Sharqiyah South	111	14.4%	(11.1, 18.4)	53.5%	(42.3, 64.4)	32.1%	(23.0, 42.8)	
Al Batinah North	107	13.1%	(8.0, 20.7)	48.6%	(44.5, 52.7)	38.3%	(31.6, 45.5)	
Al Batinah South	101	19.8%	(11.5, 31.9)	50.5%	(39.7, 61.3)	29.7%	(24.9, 35.0)	
Adh Dhahirah	110	8.2%	(4.4, 15.0)	50.6%	(40.4, 60.7)	41.2%	(32.4, 50.5)	
Al Buraymi	84	17.4%	(13.6, 22.0)	46.5%	(44.9, 48.0)	36.1%	(33.6, 38.8)	
Musandam	115	9.8%	NA*	48.4%	NA*	41.8%	NA*	
Al Wusta	107	29.8%	(15.6, 49.3)	52.4%	(37.7, 66.8)	17.7%	(9.6, 30.5)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Household income								
<200 OMR	198	20.6%	(14.3, 28.8)	49.3%	(41.1, 57.6)	30.1%	(22.9, 38.3)	0.116
200-499 OMR	327	12.7%	(8.8, 18.0)	55.5%	(48.4, 62.5)	31.8%	(25.0, 39.4)	
500-999 OMR	191	16.0%	(10.8, 22.9)	45.5%	(37.9, 53.3)	38.5%	(31.3, 46.4)	
1000+ OMR	75	8.0%	(3.1, 19.0)	47.6%	(35.9, 59.6)	44.4%	(35.5, 53.6)	
Do not know	289	20.0%	(14.8, 26.6)	47.7%	(40.0, 55.5)	32.3%	(25.2, 40.3)	
Type of job								
Government	282	9.1%	(5.6, 14.6)	52.0%	(43.9, 60.0)	38.9%	(31.4, 46.9)	0.093
Private	167	17.7%	(12.5, 24.4)	46.5%	(35.5, 57.9)	35.8%	(27.0, 45.7)	
Military	96	14.5%	(7.7, 25.5)	47.7%	(36.5, 59.1)	37.9%	(26.5, 50.8)	
Retired	50	14.6%	(5.9, 31.7)	43.5%	(28.4, 59.8)	42.0%	(26.1, 59.8)	
Student	57	33.2%	(21.6, 47.2)	44.7%	(29.6, 60.8)	22.2%	(12.9, 35.4)	
Looking for work	133	21.1%	(13.5, 31.3)	51.0%	(38.8, 63.1)	28.0%	(18.4, 40.0)	
Not working	295	15.3%	(10.9, 20.9)	53.6%	(43.9, 63.0)	31.2%	(23.9, 39.4)	
Works in health field								
Yes	51	2.6%	(0.4, 16.4)	51.5%	(34.9, 67.8)	45.8%	(29.7, 62.9)	0.077
No	760	16.0%	(13.4, 19.1)	50.8%	(46.0, 55.5)	33.2%	(29.1, 37.6)	
Buys food for household								
Yes	459	14.0%	(10.4, 18.6)	48.4%	(42.9, 53.9)	37.6%	(31.0, 44.7)	0.180
No	621	17.4%	(14.2, 21.2)	51.2%	(47.0, 55.4)	31.4%	(27.4, 35.7)	
Who buys food for household								
Housewife	449	14.9%	(11.4, 19.2)	49.3%	(43.4, 55.1)	35.8%	(30.0, 42.2)	0.390
Head of house	523	15.7%	(12.0, 20.3)	50.6%	(46.2, 55.0)	33.7%	(29.5, 38.2)	
Servant	7	28.4%	(28.4, 28.4)	57.5%	(57.5, 57.5)	14.2%	(14.2, 14.2)	
Other person	100	23.9%	(14.6, 36.6)	50.7%	(38.3, 63.1)	25.3%	(14.3, 40.9)	
Talked to professional about diet								
Yes	351	10.8%	(7.2, 16.0)	53.0%	(47.3, 58.6)	36.2%	(31.1, 41.6)	0.091
No	680	18.3%	(15.0, 22.0)	49.2%	(44.6, 53.9)	32.5%	(27.6, 37.8)	
Tried to lose weight**								
Has hypertension								
Yes	103	1.4%	(0.3, 7.5)	44.0%	(34.9, 53.6)	54.5%	(44.3, 64.4)	<0.001
No	977	17.6%	(15.1, 20.4)	50.7%	(46.7, 54.7)	31.7%	(28.1, 35.5)	
Has diabetes								
Yes	61	10.8%	(4.1, 25.3)	44.4%	(28.8, 61.3)	44.8%	(27.9, 63.0)	0.329
No	1019	16.3%	(13.9, 19.1)	50.4%	(46.6, 54.2)	33.3%	(29.7, 37.1)	
Has heart disease								
Yes	10	0%	-	51.7%	(30.2, 72.7)	48.3%	(27.3,69.8)	0.492
No	1070	16.2%	(13.7, 19.0)	50.1%	(46.4, 53.7)	33.8%	(30.2, 37.5)	
Is overweight or obese								
Yes	155	18.4%	(13.1, 25.3)	51.7%	(43.3, 60.0)	29.9%	(22.6, 38.3)	0.495
No	925	15.6%	(12.8, 18.9)	49.8%	(46.0, 53.6)	34.6%	(30.7, 38.8)	
TOTAL	**1080**	**16.0%**	**(13.6,18.8)**	**50.1%**	**(46.5,53.7)**	**33.9%**	**(30.4,37.6)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

** Question about ever having tried to lose weight was not asked on the salt questionnaire.

Almost three-quarters of adult respondents intended to reduce salt intake, but more than one-third also reported that it is difficult to do so (Figure 118). A majority also agreed that reducing consumption of both sodium and canned foods and reducing the addition of salt to food is important. Almost three-quarters disagreed with a statement that there is no need to use salt.

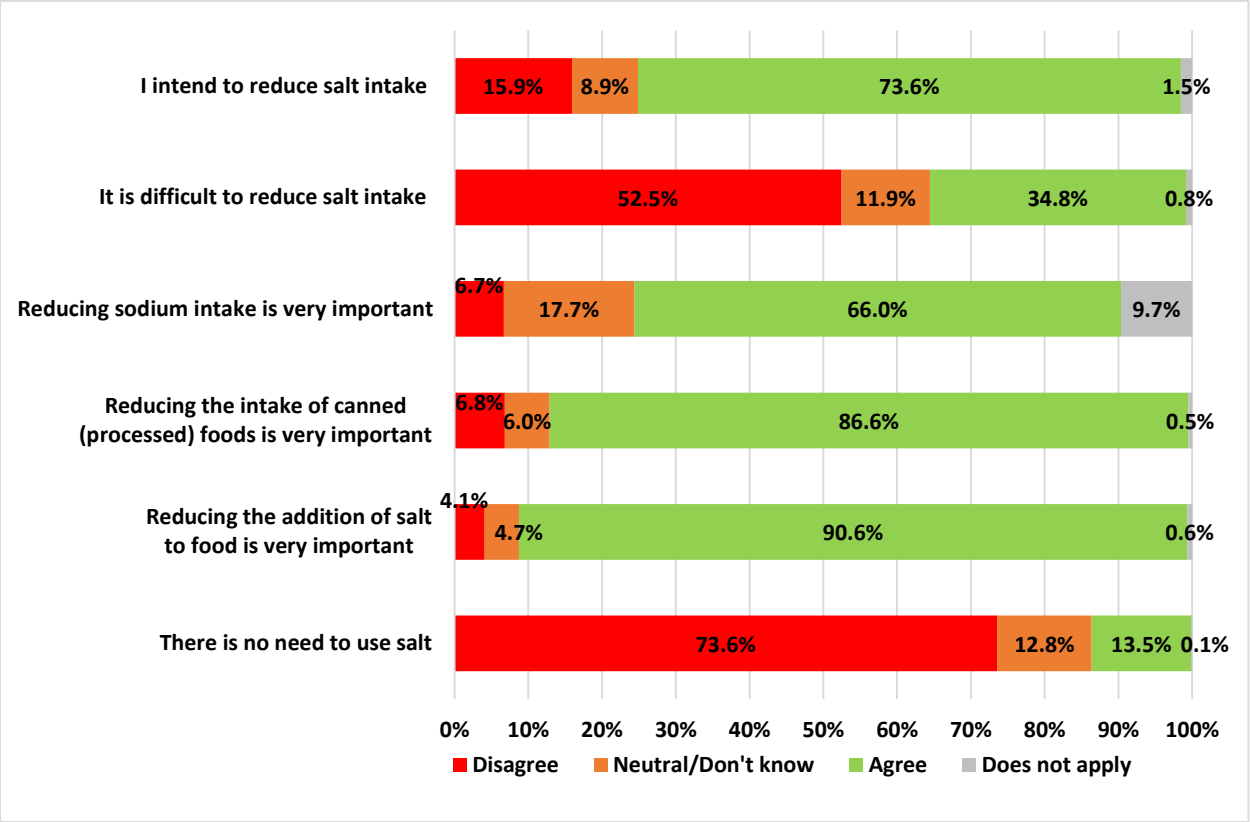

Figure 118 Proportion of participants agreeing or disagreeing with various statements about dietary salt, adults 19-60 years of age

Adult respondents reported a wide variety of concerns about the contents of the food they eat (Figure 119). Specifically, almost one-half were concerned about artificial colors and sugar, another one-third were concerned about artificial flavors, salt, total fat, and saturated fat.

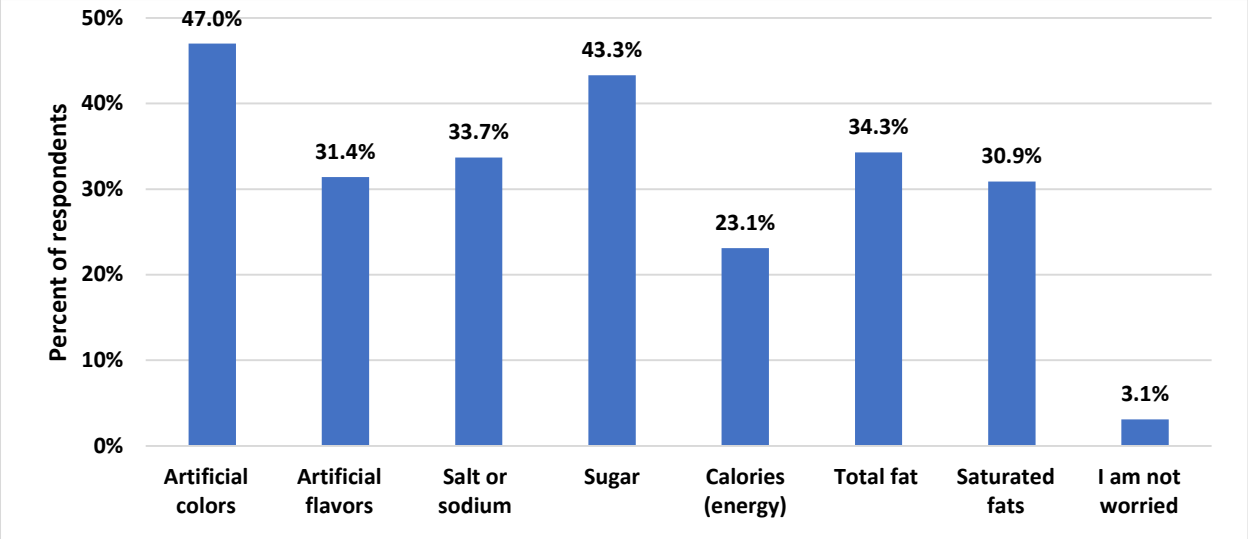

Figure 119 Proportion of participants concerned about eating foods that contain certain ingredients, adults 19-60 years of age

Among reasons most commonly cited for concern about various food ingredients were that they were "harmful", they cause non-communicable diseases, and they effect body weight. Several other reasons were also cited, as listed below in Figure 120.

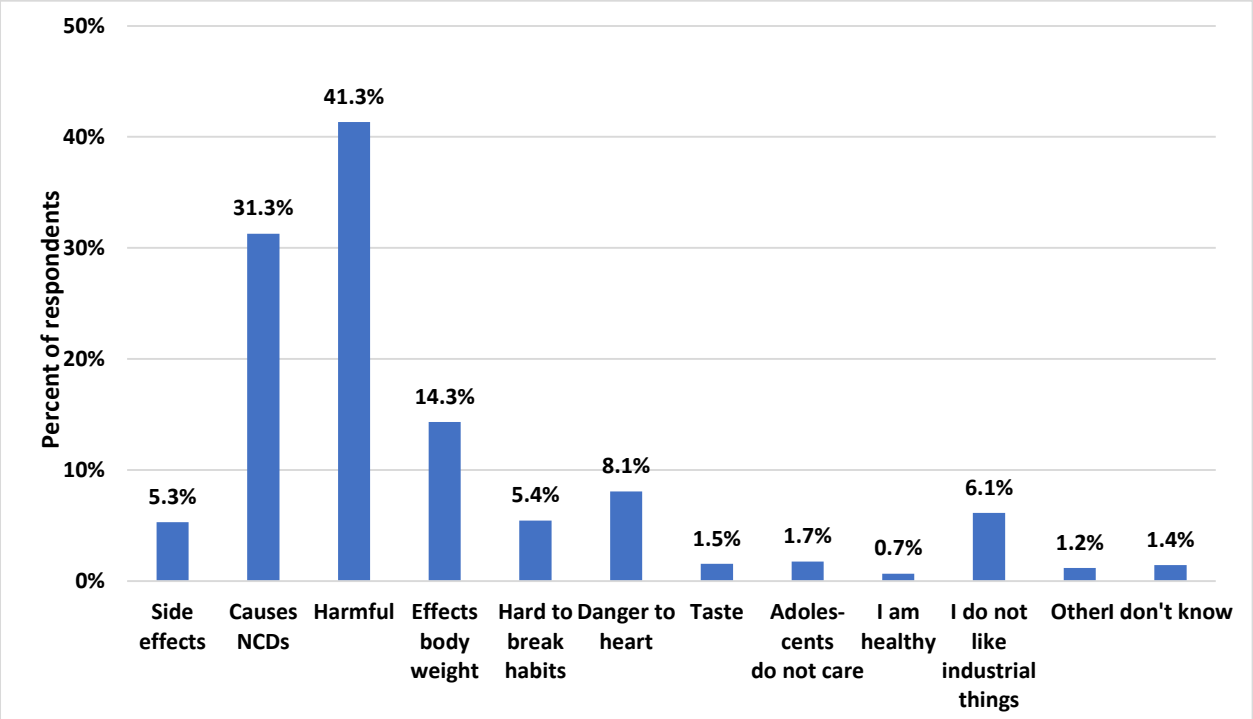

Figure 120 Why are participants concerned, adults 19-60 years of age

Almost one-half of adult respondents did not think they were at risk of developing hypertension due to salt intake, but almost one-third did think they were at risk (Figure 121). Almost 10% reported that they were hypertensive at the time of data collection.

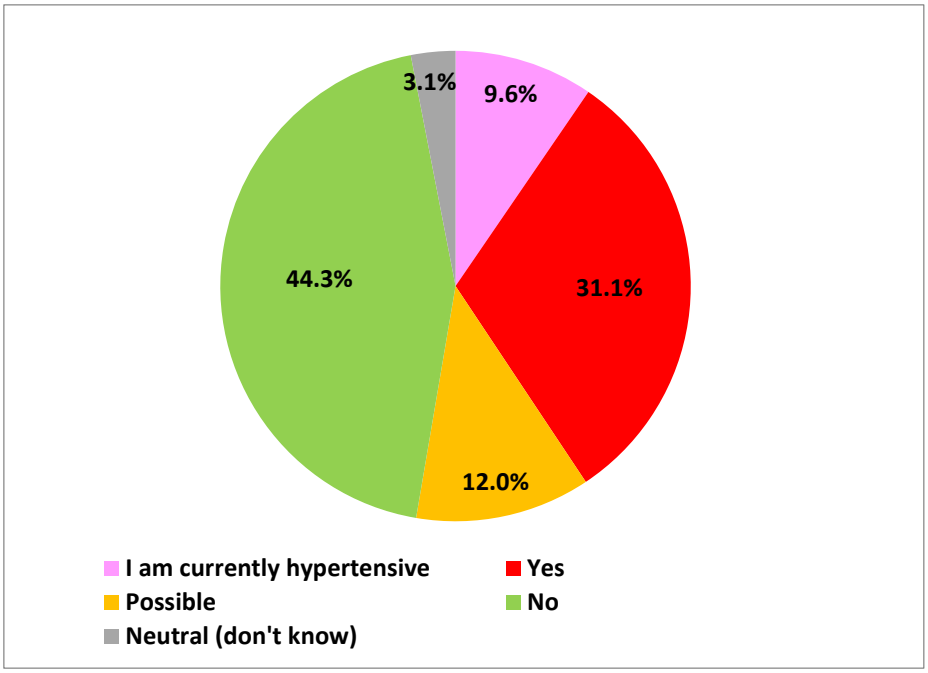

Figure 121 Respondents' report if at risk for hypertension because of salt intake, adults 19-60 years of age

Out of those 438 (40.6%) adults who stated that they had or might be at risk for hypertension because of salt intake, 41.8% rated their risk as low or very low, 43.5% as average, and 14.7% as high or very high. Of those 123 respondents reporting very low risk, 91 (74.0%) said this low risk resulted from following a low salt diet, 25 (22.3%) said it was due to lifestyle, and 12 (6.3%) cited some other reason.

Adults who reported a risk of hypertension did had statistically significantly better scores on the salt practices index than adults reporting no risk (**Table 44**).

Table 44. Number (weighted %) of adults 19-60 years of age with or without reported risk of hypertension with low, medium, or high scores on salt practices index

	Adults' salt practices index score			
Adult reported risk of hypertension due to salt intake	**Low**	**Medium**	**High**	**P value**
Yes	297 (52.5%)	234 (45.9%)	8 (1.5%)	<0.01
No	324 (65.4%)	171 (33.5%)	7 (1.1%)	
Unknown	22 (63.2%)	15 (36.6%)	1 (0.2%)	

Adult respondents cited several factors which would help them reduce salt consumption, including use of salt alternatives, having a healthy lifestyle, and getting used to a low salt diet (Figure 122).

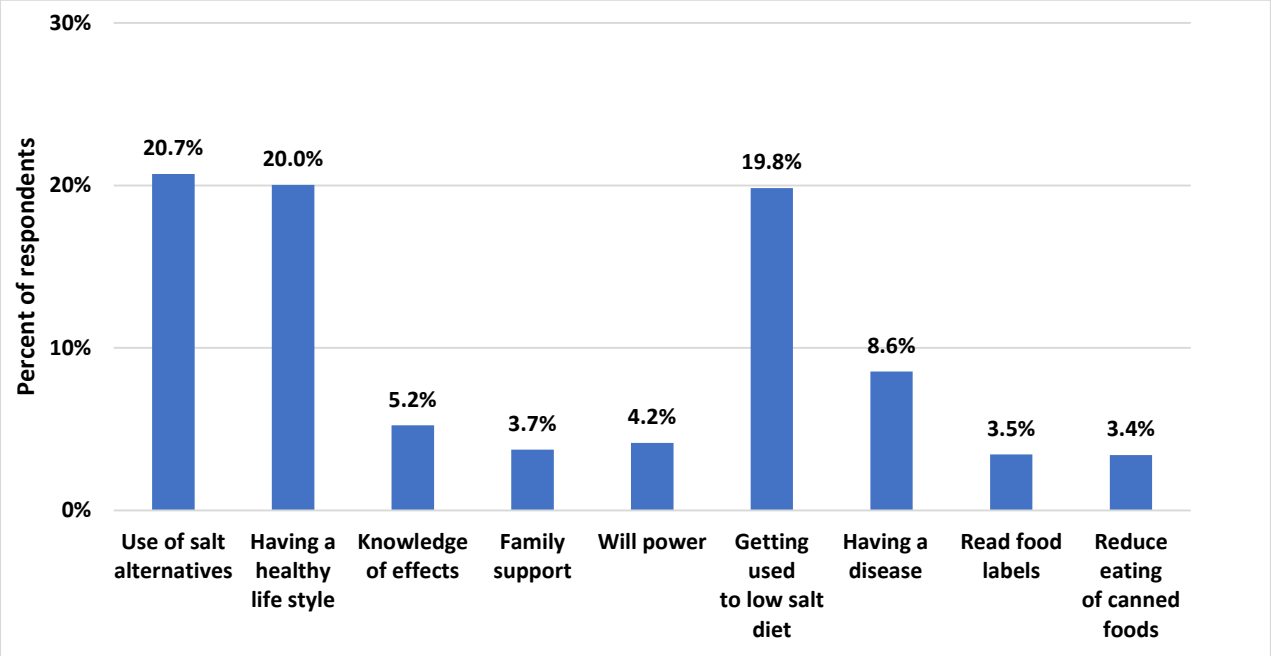

Figure 122 Respondents' reported factors which will help them reduce dietary salt consumption, adults 19-60 years of age

More than two-thirds of adult respondents said that a change in their health condition would motivate them to reduce dietary salt (Figure 123). Other motives were cited less frequently.

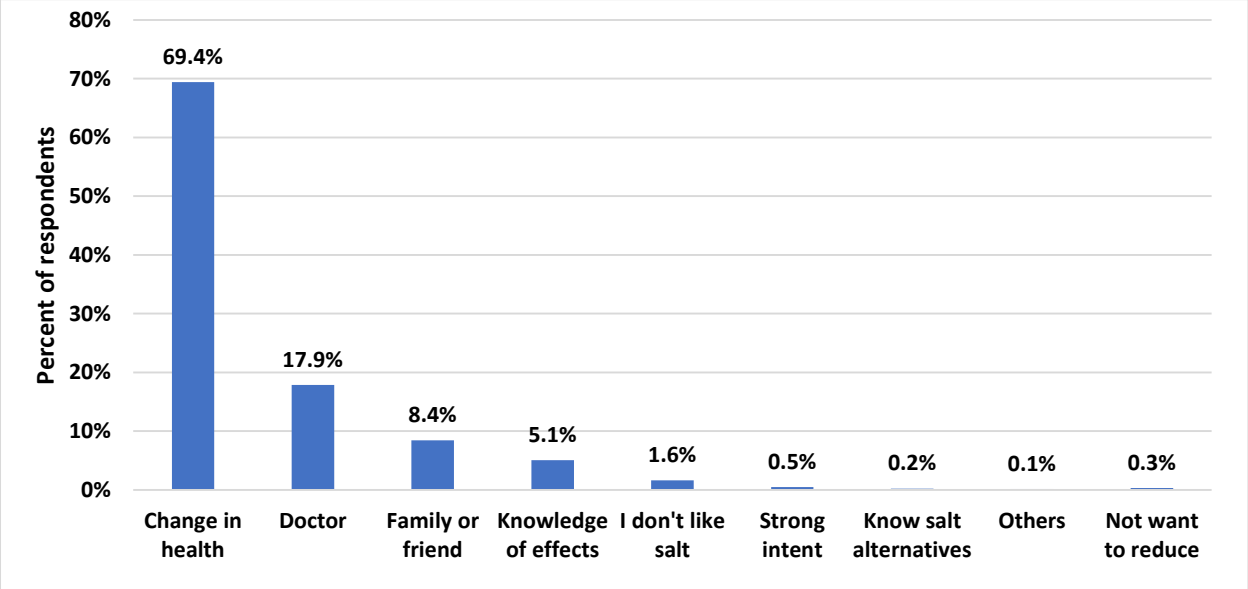

Figure 123 Respondents' reported motives to reduce dietary salt consumption, adults 19-60 years of age

The largest proportion of adults said there were no barriers to their reducing salt consumption (Figure 124).

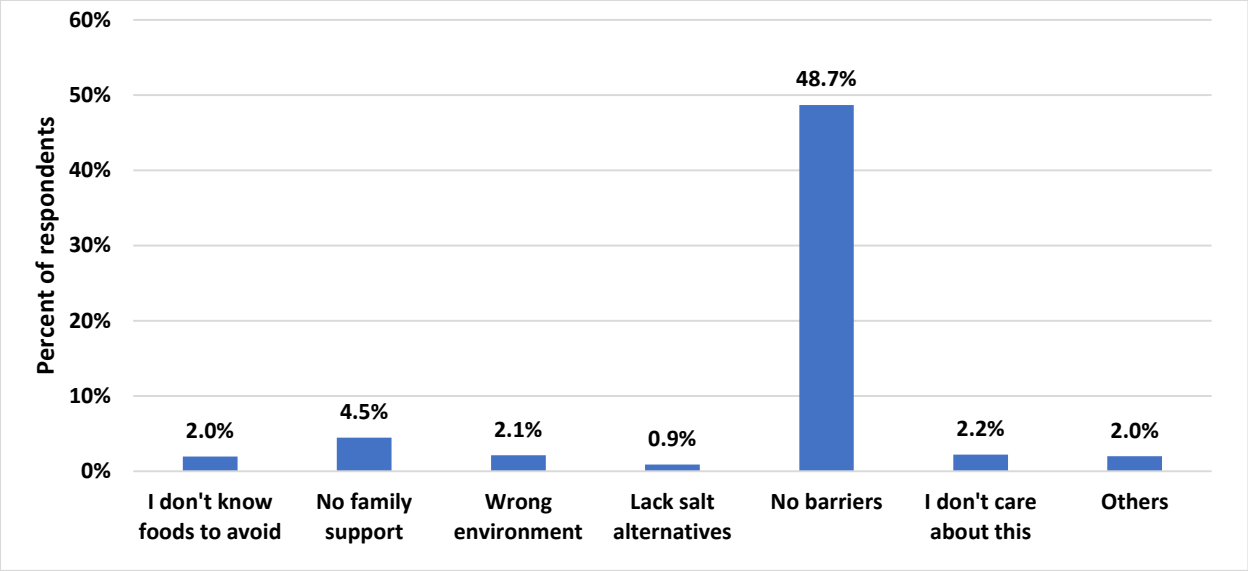

Figure 124 Respondents' reported barriers to reducing dietary salt consumption, adults 19-60 years of age

5.2.4. Practices

Similar to practices regarding oil and fat consumption, adults scored quite poorly on practices regarding salt consumption (**Table 45**). In most subgroups, the majority of respondents scored in the low category, and very few adults overall score in the high category.

Table 45. Composite index for salt practice of adults 19-60 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	549	61.5%	(55.9, 66.8)	37.8%	(32.6, 43.3)	0.7%	(0.2, 2.5)	0.089
Female	534	54.9%	(49.3, 60.4)	43.1%	(37.8, 48.6)	2.0%	(1.0, 3.9)	
Age								
19-29	336	65.6%	(58.3, 72.2)	33.7%	(27.0, 41.1)	0.7%	(0.2, 3.1)	<0.05
30-39	400	57.8%	(52.3, 63.1)	41.3%	(36.2, 46.5)	1.0%	(0.2, 3.9)	
40-49	244	53.4%	(46.3, 60.4)	43.6%	(36.7, 50.7)	3.0%	(1.3, 6.9)	
50-60	103	46.1%	(35.2, 57.3)	53.3%	(42.0, 64.2)	0.7%	(0.1, 4.9)	
Educational level								
Primary	49	50.3%	(33.5, 67.1)	48.3%	(31.9, 65.0)	1.4%	(0.2, 9.8)	0.405
Elementary	125	59.8%	(47.2, 71.2)	38.3%	(26.9, 51.1)	2.0%	(0.4, 9.1)	
Secondary	516	59.5%	(54.5, 64.3)	38.6%	(33.8, 43.6)	2.0%	(0.9, 4.1)	
Diploma	125	57.7%	(45.9, 68.6)	41.6%	(30.6, 53.4)	0.8%	(0.2, 3.7)	
Bachelors or more	212	53.7%	(46.7, 60.6)	46.2%	(39.3, 53.2)	0.1%	(0.1, 0.1)	
Marital status								
Not married	295	66.5%	(59.3, 73.0)	31.2%	(24.9, 38.2)	2.4%	(0.8, 6.5)	<0.01
Married	788	55.4%	(51.3, 59.5)	43.6%	(39.6, 47.7)	0.9%	(0.4, 1.9)	
Governorate								
Muscat	102	53.8%	(47.9, 59.6)	45.2%	(38.9, 51.7)	1.0%	(0.1, 6.5)	0.399
Dhofar	61	66.5%	(51.6, 78.8)	32.0%	(21.8, 44.2)	1.5%	(0.2, 8.9)	
Ad Dakhliyah	89	60.4%	(52.7, 67.5)	38.4%	(32.5, 44.8)	1.2%	(0.2, 7.6)	
Ash Sharqiyah North	92	76.3%	(54.6, 89.6)	22.6%	(10.2, 42.9)	1.0%	(0.2, 6.2)	
Ash Sharqiyah South	111	69.6%	(58.4, 78.9)	29.4%	(19.8, 41.4)	0.9%	(0.1, 6.7)	
Al Batinah North	110	63.7%	(52.5, 73.5)	35.4%	(25.9, 46.2)	0.9%	(0.1, 6.1)	
Al Batinah South	101	39.6%	(34.5, 44.9)	57.4%	(52.6, 62.0)	3.0%	(1.3, 6.7)	
Adh Dhahirah	110	48.5%	(41.8, 55.3)	49.6%	(43.0, 56.3)	1.8%	(0.7, 4.9)	
Al Buraymi	85	51.7%	(45.3, 57.9)	48.3%	(42.1, 54.7)	0%	-	
Musandam	115	62.1%	NA*	33.2%	NA*	4.7%	NA*	
Household income								
<200 OMR	199	61.0%	(52.5, 68.9)	36.6%	(29.0, 45.0)	2.4%	(0.7, 8.4)	0.431
200-499 OMR	328	61.0%	(54.2, 67.4)	38.3%	(32.0, 44.9)	0.7%	(0.2, 3.1)	
500-999 OMR	191	53.0%	(44.2, 61.7)	46.0%	(37.6, 54.7)	1.0%	(0.2, 4.0)	
1000+ OMR	75	48.8%	(39.6, 58.0)	49.6%	(40.0, 59.2)	1.6%	(0.2, 10.1)	
Do not know	290	60.6%	(51.3, 69.3)	38.0%	(29.4, 47.3)	1.4%	(0.6, 3.5)	
Type of job								
Government	282	51.9%	(43.6, 60.1)	46.2%	(38.0, 54.5)	1.9%	(0.6, 5.7)	0.419
Private	168	66.5%	(57.2, 74.7)	32.1%	(24.0, 41.4)	1.4%	(0.4, 4.7)	
Military	96	56.7%	(42.1, 70.3)	43.3%	(29.7, 57.9)	0%	-	
Retired	50	56.1%	(37.7, 73.0)	43.9%	(27.0, 62.3)	0%	-	
Student	57	69.6%	(58.0, 79.1)	28.5%	(19.3, 39.7)	2.0%	(0.3, 13.4)	
Looking for work	134	60.1%	(49.1, 70.1)	39.9%	(29.9, 50.9)	0%	-	
Not working	296	56.4%	(49.2, 63.3)	41.8%	(34.9, 48.9)	1.9%	(0.6, 5.5)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Works in health field								
Yes	51	42.1%	(28.8, 56.7)	56.0%	(41.5, 69.6)	1.9%	(0.3, 10.4)	0.079
No	764	57.7%	(52.9, 62.3)	41.0%	(36.5, 45.7)	1.3%	(0.6, 2.7)	
Buys food for household								
Yes	459	52.9%	(47.6, 58.1)	45.5%	(40.2, 51.0)	1.6%	(0.6, 4.1)	0.068
No	624	62.1%	(56.4, 67.5)	36.8%	(31.6, 42.2)	1.1%	(0.5, 2.6)	
Al Wusta	107	69.2%	(43.7, 86.7)	30.8%	(13.3, 56.3)	0%	-	
Who buys food for household								
Housewife	450	55.5%	(49.8, 61.0)	42.5%	(37.1, 48.1)	2.0%	(0.9, 4.4)	0.120
Head of house	525	58.3%	(52.2, 64.2)	40.8%	(35.2, 46.6)	0.9%	(0.3, 2.6)	
Servant	7	85.8%	(85.8, 85.8)	14.2%	(14.2, 14.2)	0%	-	
Other person	100	73.5%	(59.9, 83.8)	26.5%	(16.2, 40.1)	0%	-	
Talked to professional about diet								
Yes	353	47.8%	(42.5, 53.1)	50.6%	(45.0, 56.1)	1.7%	(0.7, 3.8)	<0.05
No	681	64.5%	(59.0, 69.7)	34.2%	(29.3, 39.6)	1.2%	(0.5, 3.1)	
Tried to lose weight**								
Has hypertension								
Yes	103	42.8%	(32.3, 53.9)	54.2%	(43.2, 64.9)	3.0%	(0.8, 10.5)	<0.05
No	980	60.0%	(55.9, 64.1)	38.8%	(34.9, 42.9)	1.1%	(0.6, 2.3)	
Has diabetes								
Yes	61	56.7%	(40.5, 71.5)	40.3%	(25.9, 56.6)	3.1%	(0.4, 20.0)	0.647
No	1022	58.5%	(54.5, 62.4)	40.3%	(36.6, 44.1)	1.2%	(0.6, 2.3)	
Has heart disease								
Yes	10	33.0%	(6.1, 78.9)	67.0%	(21.1, 93.9)	0%	-	0.492
No	1073	58.6%	(54.8, 62.3)	40.1%	(36.5, 43.7)	1.3%	(0.7, 2.4)	
Is overweight or obese								
Yes	154	52.8%	(42.5, 62.9)	47.1%	(37.0, 57.5)	0.1%	(0.1, 0.1)	0.084
No	929	59.4%	(55.2, 63.5)	39.0%	(35.2, 43.0)	1.5%	(0.8, 2.8)	
TOTAL	**1083**	**58.4%**	**(54.6,62.1)**	**40.3%**	**(36.8,43.9)**	**1.3%**	**(0.7,2.4)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

** Question about ever having tried to lose weight was not asked on the salt questionnaire

The frequency of various behaviors and practices regarding salt consumption are shown below in Figure 125.

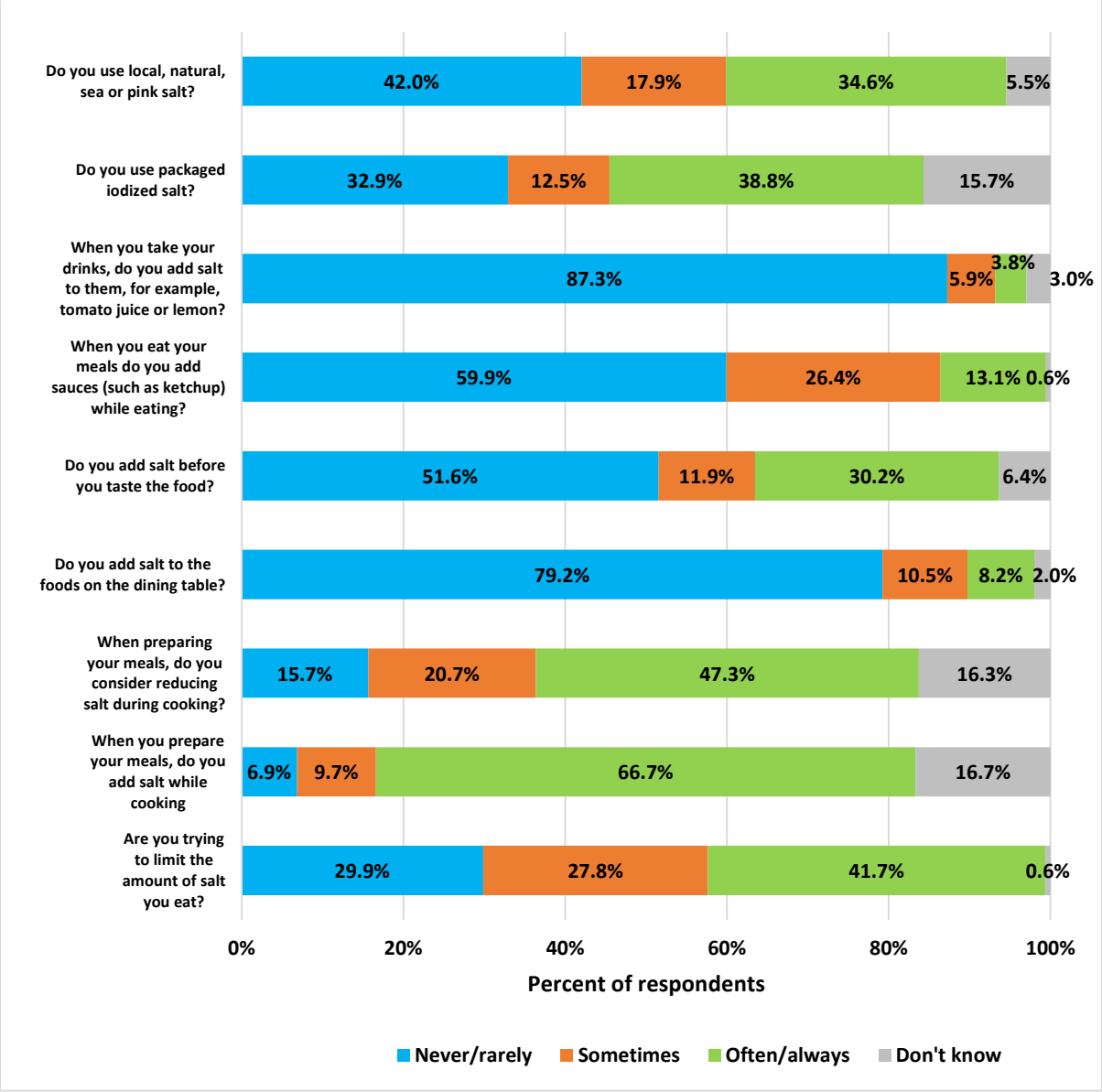

Figure 125 Respondents' replies to various questions pertaining to salt practices, adults 19-60 years of age

The majority of adults rarely or never check the salt content of foods when shopping (**Table 46**. On the other hand, among those who did, about two-thirds reported that reading food labels affected food purchases sometimes, often, or always; however, about one-third reported that they did not know. About one-half of adults reported never or rarely purchasing foods labelled as low-sodium or low-salt, but a large proportion reported not knowing how often they purchased food labeled as low salt or low sodium.

Table S71, **Table S72**, and **Table S73** present the distribution of these three variables by sex, educational level, and governorate of residence.

Table 46. Percent of respondents who reported frequencies of various behaviors related to checking food labels for salt or sodium content - Adults 19-60 years of age

		Frequency			
Question	**N**	**Never/rarely**	**Sometimes**	**Often/always**	**Do not know**
How often check salt or sodium content of foods	1084	61.0%	14.7%	17.7%	6.6%
How often reading of food label affects purchases	567	34.4%	11.8%	19.6%	34.3%
How often buy foods labeled as low salt or low sodium	1084	47.2%	18.0%	16.2%	18.5%

Overall, the majority of adults rarely or never check the salt content of foods when shopping, and this was true in all but one governorate (**Table 47**). Differences among the governorates are statistically significant ($p<0.01$).

Table 47. How often adults 19-60 years of age check the salt or sodium content of foods when shopping, by governorate

Governorate	N	Never/rarely	Sometimes	Often/always	Unknown
Muscat	102	57.6%	15.8%	21.7%	4.8%
Dhofar	61	71.3%	9.9%	15.5%	3.3%
Ad Dakhliyah	89	51.5%	22.7%	8.0%	17.9%
Ash Sharqiyah North	93	60.0%	15.2%	8.4%	16.4%
Ash Sharqiyah South	111	71.2%	15.4%	8.8%	4.6%
Al Batinah North	110	63.7%	8.2%	25.4%	2.7%
Al Batinah South	101	61.4%	11.9%	23.7%	3.0%
Adh Dhahirah	110	63.4%	17.4%	14.4%	4.8%
Al Buraymi	85	54.8%	25.8%	10.0%	9.4%
Musandam	115	43.2%	23.3%	27.0%	6.6%
Al Wusta	107	60.9%	18.6%	10.3%	10.2%
Total	1084	59.9%	16.7%	15.9%	7.5%

More than one-half of adult respondents who gave a response reported that sometimes, often, or always reading food labels affected food purchases (Table 48), and this is true in all but one governorate. However, a large but highly variable proportion reported that they did not know. As with the frequency of reading food labels presented above, differences among governments were statistically significant ($P <0.001$).

Table 48. How often among adults 19-60 years of age does reading food labels affect your purchase of a food product, by governorate

Governorate	N	Never/rarely	Sometimes	Often/always	Unknown
Muscat	102	46.9%	11.9%	21.6%	19.6%
Dhofar	61	42.0%	6.3%	31.7%	20.1%
Ad Dakhliyah	89	23.5%	10.2%	15.8%	50.5%
Ash Sharqiyah North	93	21.7%	15.0%	9.7%	53.6%
Ash Sharqiyah South	111	13.4%	15.2%	9.0%	62.4%
Al Batinah North	110	23.6%	10.9%	20.0%	45.5%
Al Batinah South	101	47.5%	11.9%	22.7%	17.9%
Adh Dhahirah	110	49.0%	14.7%	18.9%	17.4%
Al Buraymi	85	25.0%	16.4%	17.2%	41.5%
Musandam	115	42.5%	16.9%	30.5%	10.0%
Al Wusta	107	62.7%	14.0%	11.2%	12.1%
Total	**1084**	**36.1%**	**13.2%**	**18.5%**	**32.2%**

Table 49 below shows the proportion of adult respondents who buy foods labelled as low-salt or low-sodium. Overall, almost one-half of adults reported never or rarely purchasing foods labelled as low-sodium or low-salt. Nonetheless, there is a statistically significant difference ($p<0.001$) among governorates. In some governorates, there is also a large proportion of adults who reported that they do not know.

Table 49. Percent of adults 19-60 years of age reporting frequencies of various salt-related food purchasing behaviors

		Frequency			
Question	N	Never/rarely	Sometimes	Often/always	Unknown
How often check salt or sodium content of foods	102	49.7%	22.6%	16.7%	11.0%
How often reading of food label affects purchases	61	45.3%	20.9%	15.8%	18.0%
How often buy foods labeled as low salt or low sodium	89	56.2%	16.0%	8.8%	19.0%

When asked what natural salt substitutes they used, almost one-half of adults said they do not use salt substitutes, and a large proportion said they did not know (Figure 126). The most common natural salt substitutes reported were lemon and spices. Other substitutes were reported by fewer respondents.

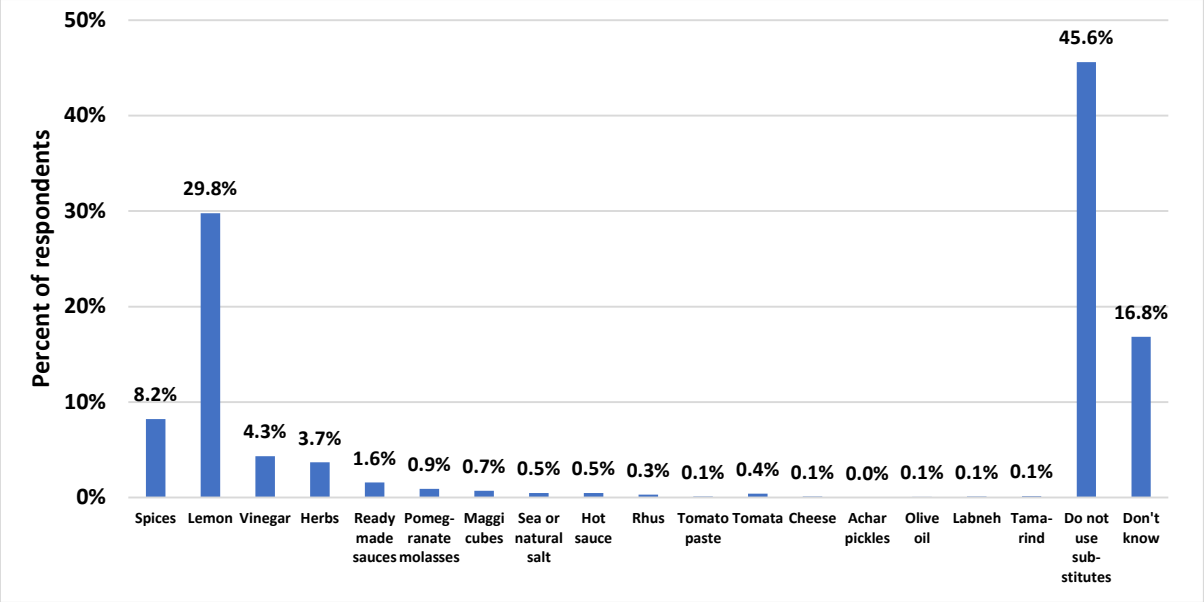

Figure 126 Natural salt substitutes reported using, adults 19-60 years of age

When asked what artificial salt substitutes they used, 50.0% of 1084 adults reported not using artificial salt substitutes at all, and 48.7% reported not knowing what artificial salt substitutes they used. The remaining adults reported using potassium salt, hot sauce, or other forms of sodium chloride.

Among the 755 adults who reported a method of adding salt to food during cooking, the most commonly reported method was using a teaspoon (Figure 127). Other methods were reported by fewer than 20% of adults.

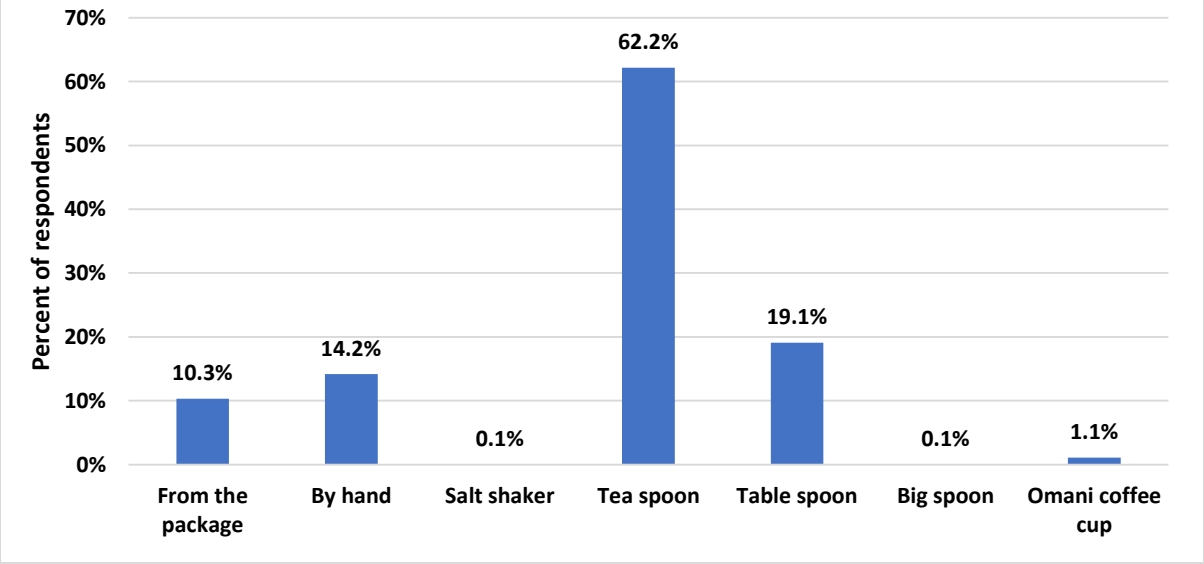

Figure 127 What scale is used to add salt during cooking, adults 19-60 years of age

Among the 327 adults who reported how they added salt to food when eating, adding salt by hand or using a teaspoon was reported by more than one-third of adults. Other methods were reported less commonly (Figure 128).

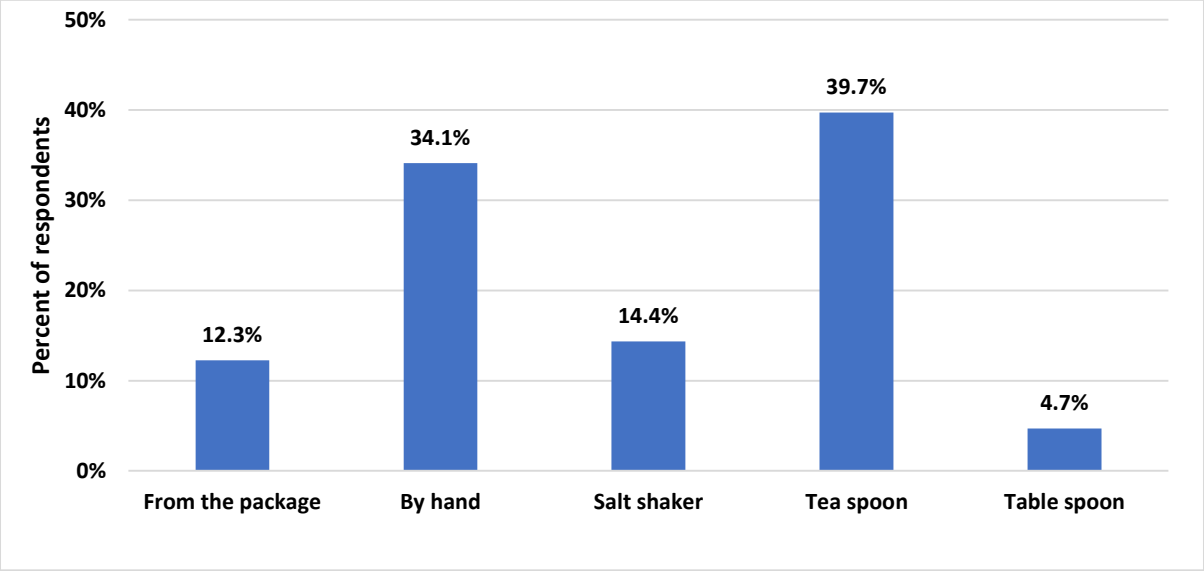

Figure 128 What scale is used to add salt during eating, adults 19-60 years of age

Adults reported consuming several high-salt foods only monthly or rarely; these foods included pickles or canned achar, processed meat, salted nuts, salted butter or margarine, maleh, ouwaal or Qashaa', homemade achar, local cheese or Kami, and instant noodles (**Table 50**). On the other hand, several high-salt foods were consumed almost daily, including cheese and other dairy products and potato crisps or chips. The median number of times each food was consumed per month is presented by governorate in **Table S74**.

Table 50. Reported frequency* of consumption of selected foods among adults 19-60 years of age

Food	Daily	Weekly	Monthly	Rarely
Canned food	6.1%	44.4%	20.6%	28.9%
Cheese, milk, labneh	54.9%	35.0%	4.2%	5.9%
Sauces	18.3%	32.2%	10.6%	38.9%
Pickles or canned achar	6.7%	16.8%	13.1%	63.5%
Processed meat	6.5%	28.4%	18.3%	46.7%
Potato crisps, chips	27.3%	36.0%	10.7%	26.0%
Salted nuts	9.8%	27.2%	22.0%	41.1%
Salted butter or margarine	5.4%	9.1%	8.4%	77.1%
Pastries	17.1%	40.7%	18.8%	23.4%
Maggi cubes or other spices with salt	18.7%	17.3%	7.9%	56.0%
Fast food	10.8%	31.9%	22.8%	34.5%
Maleh	1.1%	9.4%	23.9%	65.5%
Ouwaal or Qashaa'	1.2%	16.0%	27.4%	55.4%
Homemade achar	7.9%	13.6%	9.1%	69.4%
Local cheese or Kami	3.5%	11.2%	9.9%	75.4%
Instant noodles	2.7%	6.0%	10.9%	80.5%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

5.3. Discussion

As with general healthy eating and oil and fat, the composite index score for knowledge of dietary salt was quite poor in both adolescents and adults. In adolescents, this score was higher in females, but even in this group, fewer than 20% had a moderate or high score. Adolescents' scores did not differ with statistical significance by other demographic variables. In adults, the index scores were higher in those with more education and in those who worked in the health care field, but did not differ significantly by governorate of residence or other variables. Thus, demographic factors will be less useful in targeting specific messages about salt than such targeting with messages about general healthy eating or oil and fat.

In contrast to the findings presented above for oil and fat, a substantially larger proportion of adolescents and adults thought they were consuming an appropriate amount of salt, even though relatively few could identify the recommended maximum daily salt intake. A larger majority thought that consumption of excessive salt is bad for health; however, knowledge of specific diseases resulting from excessive salt consumption was sporadic. The most

predominant disease, hypertension, was widely recognized, but other conditions, such as osteoporosis and stomach cancer, were incorrectly identified by a substantial portion of subjects. These findings may indicate that respondents, although understanding the generally poor effect of salt consumption on health, may not be able to accurately identify specific diseases which result therefrom nor the level of intake which increases the risk of these diseases.

Adolescents and adults identified salt added during cooking as the main source of dietary salt to the Omani diet. Although adolescents and adults correctly identified the relative amount of salt contained in several Omani foods, many survey subjects failed to identify other foods high in salt, such as processed meats and sauces. Moreover, very few adolescents and adults reported using an artificial salt substitute. Among the one-third of respondents who used a natural salt substitute, most report using lemon juice or other spices. There is a substantial knowledge gap in the availability and use of salt substitutes to minimize the dietary intake of sodium.

As with attitudes towards generally healthy eating and oil and fat, the composite index score for attitudes towards dietary salt was relatively high in both adolescents and adults. In adolescents, there were no clear associations between the index scores and demographic variables; however, in adults, scores increased with increasing age, were higher in married people, and were higher in those reporting that they had hypertension. Moreover, scores differed by governorate of residence. Survey subjects agreed with statements regarding reduction of dietary sodium, consumption of high-salt foods, and reducing the addition of salt to food during cooking or eating. However, a high proportion of all survey subjects disagreed with the statement that there is no need to use salt. Thus, while understanding that dietary intake of sodium and high-salt foods should be reduced, survey subjects still felt there was a need to use salt.

Only about one quarter of adolescents felt they might be at risk of hypertension because of excessive salt intake; however, these adolescents did not have a higher composite index score for salt practices than adolescents who felt they had no risk. In contrast, a majority of adults felt that they might be at risk of hypertension or reporting they already had hypertension due to excessive salt intake, and those who reported this had a somewhat higher combined index score for salt practices. It appears that feeling at risk of hypertension does not have much influence on salt consumption in adolescents, but it does have some, albeit minimal, influence on adults' practices.

As described above, adolescent and adult respondents were asked on both the oil and fat and the salt questionnaires if they had concerns about various contents of the food they ate; however, the two questions were worded slightly differently. In addition, respondents were asked the reason for their concern, but the open-ended responses were coded differently. For this reason, they will be presented separately. On the salt questionnaire, the largest

number of adolescents reported concern about artificial colors in their food. Almost as many adolescents reported concern about total fat and saturated fat in their food. The three predominant reasons for this concern were “Harmful”, “Causes NCDs”, and “Effects body weight”. As with adolescents, the most commonly reported concern among adult respondents was for artificial colors; however, concern about the sugar content of their food was second most commonly cited, followed by total fat, artificial flavors, and saturated fat. The two predominant reasons reported for this concern was because these ingredients are “Harmful” and “Causes NCDs”.

As with oil and fat dietary consumption, the factor most frequently cited by adolescent and adult respondents which would reduce dietary salt consumption was a change in health condition. Also similar to oil and fat, almost half of adolescents and two thirds of adults reported that there were no obstacles or barriers to reducing dietary salt consumption. Nonetheless, the composite index scores for salt practices were very poor in both target groups. Many adolescents and adults reported eating several selected high-salt foods either daily or weekly. For many foods, especially high-salt snacks such as potato crisps, the reported frequency of consumption among adolescents was somewhat higher than in adults.

So, in spite of appreciating the health risks of excessive salt intake, feeling at risk of these poor health outcomes, and reporting that there were no barriers to reducing consumption, actual dietary behaviour regarding salt was poor, as discussed below.

The composite scores for salt practices were quite poor, with a majority of both adolescents and adults scoring in the low range. As with other composite scores for adolescents, the salt practice score did not differ with statistical significance by various demographic characteristics. On the other hand, in adults, scores were better with increasing age, in married people, those who had talked to a professional about diet, and those who reported having hypertension.

A large proportion of adolescents and adults rarely practiced several specific behaviors which can reduce dietary salt, such as purchasing food which is labeled low-salt, reading nutrition labels, or checking for packaging statements about salt content, reducing salt added to food during cooking, or trying to limit dietary salt. Health education programs could stress the importance of all these methods of gathering information on food salt content to assist in selecting foods to minimize the dietary intake of sodium.

6. Sugar

6.1. Results – Adolescents 14-18 years of age

6.1.1. Demographic characteristics

The distribution of various characteristics in the adolescents to whom the sugar questionnaire was administered is shown below in **Table 51**. In contrast to the other questionnaires, the adolescents contained in this sample did not have an equal sex distribution; they were disproportionately male. Similar to the other questionnaires, several of these characteristics were not included in further analysis of data from adolescents because the subgroups were of grossly unequal size; for example, marital status, type of job, and whether or not the survey subject buys food for household had very few adolescents in some subgroups. In addition, almost two-thirds of adolescents did not know their household income.

Table 51. Distribution of various demographic characteristics among adolescents 14-18 years of age responding to the sugar questionnaire

Characteristic	Unweighted number	Weighted percent
Sex		
Male	171	59.0%
Female	112	41.0%
Educational level		
Primary	14	4.8%
Elementary	117	44.4%
Secondary or more	150	50.8%
Marital status		
Single	279	98.9%
Married	4	1.1%
Governorate		
Muscat	27	9.5%
Dhofar	13	4.6%
Ad Dakhliyah	28	9.9%
Ash Sharqiyah North	25	8.8%
Ash Sharqiyah South	33	11.7%
Al Batinah North	28	9.9%
Al Batinah South	24	8.5%
Adh Dhahirah	27	9.5%
Al Buraymi	23	8.1%
Musandam	29	10.2%
Al Wusta	26	9.2%
Household income		
<200 OMR	26	7.8%
200-499 OMR	37	14.7%
500-999 OMR	22	8.1%
1000+ OMR	14	4.9%

Characteristic	Unweighted number	Weighted percent
Don't know	184	64.4%
Type of job		
Private	2	1.0%
Student	265	92.0%
Job seeker	7	3.3%
Not working	9	3.7%
Buys food for household		
Respondent	3	0.6%
Other household member	280	99.4%
Who buys food for household		
Housewife	101	34.0%
Head of house	153	61.2%
Servant	9	0.3%
Other person	20	4.6%
Talked to professional about diet		
Yes	46	16.5%
No	173	61.7%
Unknown	64	21.8%
Tried to lose weight		
Yes	93	34.0%
No	188	65.9%
Unknown	2	0.1%
Has disease		
Hypertension	0	0.8%
Diabetes	0	0%
Heart disease	1	0.6%
Overweight or obesity	19	7.4%

6.1.2. Knowledge

The level of knowledge about dietary sugar was quite high, with about one-half of adolescent respondents having a high score on the sugar knowledge index (**Table 52**). This is also true for each subgroup examined, with the possible exception of a few governorates in which fewer than one-third of adolescents scored in the high range. The differences among governorates were statistically significant.

Table 52. Composite index for sugar knowledge of adolescents 14-18 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	170	14.7%	(9.9, 21.3)	39.1%	(31.0, 48.0)	46.2%	(37.6, 55.0)	0.282
Female	112	11.4%	(6.4, 19.5)	33.8%	(25.8, 42.9)	54.8%	(45.4, 63.9)	
Educational level								
Primary	14	18.1%	(2.6, 64.3)	43.0%	(14.8, 76.7)	38.9%	(13.9, 71.5)	0.952
Elementary	116	12.6%	(6.7, 22.5)	38.9%	(27.2, 52.1)	48.5%	(36.0, 61.2)	
Secondary or more	150	13.6%	(8.2, 21.8)	35.0%	(25.5, 45.9)	51.3%	(42.4, 60.2)	
Governorate								
Muscat	27	11.1%	(4.5, 24.8)	33.3%	(20.3, 49.5)	55.6%	(40.8, 69.4)	<0.05
Dhofar	13	7.7%	(1.1, 39.3)	38.5%	(12.9, 72.6)	53.8%	(25.5, 79.9)	
Ad Dakhliyah	27	11.1%	(3.4, 30.5)	25.9%	(15.6, 39.8)	63.0%	(42.7, 79.5)	
Ash Sharqiyah North	25	8.0%	(1.6, 31.8)	60.0%	(28.9, 84.7)	32.0%	(14.5, 56.6)	
Ash Sharqiyah South	33	12.1%	(4.9, 27.1)	33.3%	(18.6, 52.2)	54.5%	(30.7, 76.5)	
Al Batinah North	28	25.0%	(17.2, 34.8)	32.1%	(14.0, 57.9)	42.9%	(23.7, 64.4)	
Al Batinah South	24	12.5%	(3.6, 35.5)	41.7%	(30.1, 54.3)	45.8%	(38.5, 53.3)	
Adh Dhahirah	27	3.7%	(0.7, 16.7)	55.6%	(40.1, 70.0)	40.7%	(27.7, 55.3)	
Al Buraymi	23	8.7%	(2.4, 27.1)	60.9%	(49.1, 71.5)	30.4%	(29.9, 31.0)	
Musandam	29	13.8%	NA*	24.1%	NA*	62.1%	NA*	
Al Wusta	26	30.8%	(9.3, 65.8)	46.2%	(26.3, 67.3)	23.1%	(11.0, 42.2)	
Who buys food for household								
Housewife	101	12.5%	(6.3, 23.4)	34.3%	(25.3, 44.5)	53.2%	(41.5, 64.6)	0.955
Head of house	152	13.9%	(8.6, 21.8)	38.1%	(28.1, 49.2)	47.9%	(38.4, 57.6)	
Servant	9	11.1%	(0.8, 65.0)	55.6%	(39.4, 70.6)	33.3%	(18.0, 53.3)	
Other person	20	10.9%	(1.8, 44.7)	40.6%	(16.4, 70.3)	48.6%	(21.7, 76.3)	
Talked to professional about diet								
Yes	46	1.6%	(0.2, 11.2)	39.5%	(23.2, 58.5)	59.0%	(40.2, 75.5)	0.123
No	172	12.4%	(7.6, 19.4)	37.8%	(30.1, 46.1)	49.9%	(41.8, 58.0)	
Tried to lose weight								
Yes	93	6.4%	(2.6, 14.8)	34.2%	(23.7, 46.5)	59.4%	(46.2, 71.4)	0.059
No	187	16.8%	(11.1, 24.8)	38.4%	(30.1 47.5)	44.8%	(36.2, 53.7)	
TOTAL	**282**	**13.3%**	**(9.4, 18.4)**	**37.0%**	**(29.9, 44.6)**	**49.7%**	**(42.3, 57.2)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

A large majority of adolescents, 254 (88.9%) of 283 respondents, correctly responded that excess dietary sugar is bad for their health. Another 8.6% said it had no effect on health, and only 2.5% did not know.

More than one-half of adolescents correctly identified weight gain, obesity, and diabetes as health consequences of eating foods high in sugar (Figure 129).

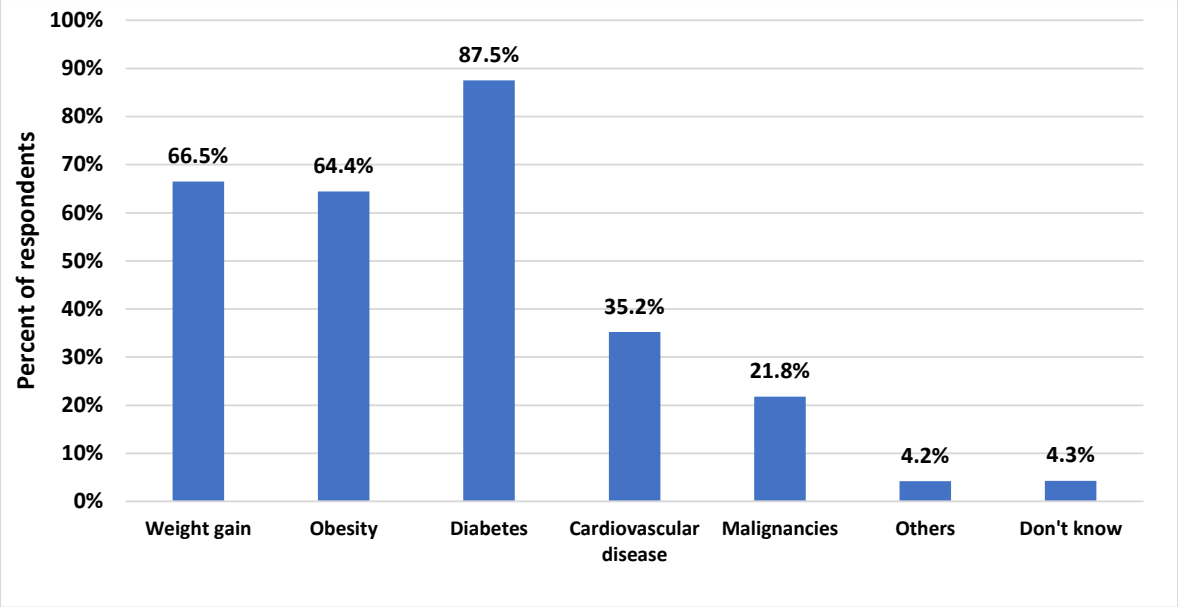

Figure 129 Do you think the following health problems are caused or worsened by eating foods high in sugar, adolescents 14-18 years of age

A majority of adolescent respondents correctly answered most of the questions listed in Figure 130 below, with the exception of the World Health Organization's recommended maximum daily sugar intake. For this question, more than one-half of adolescents did not know.

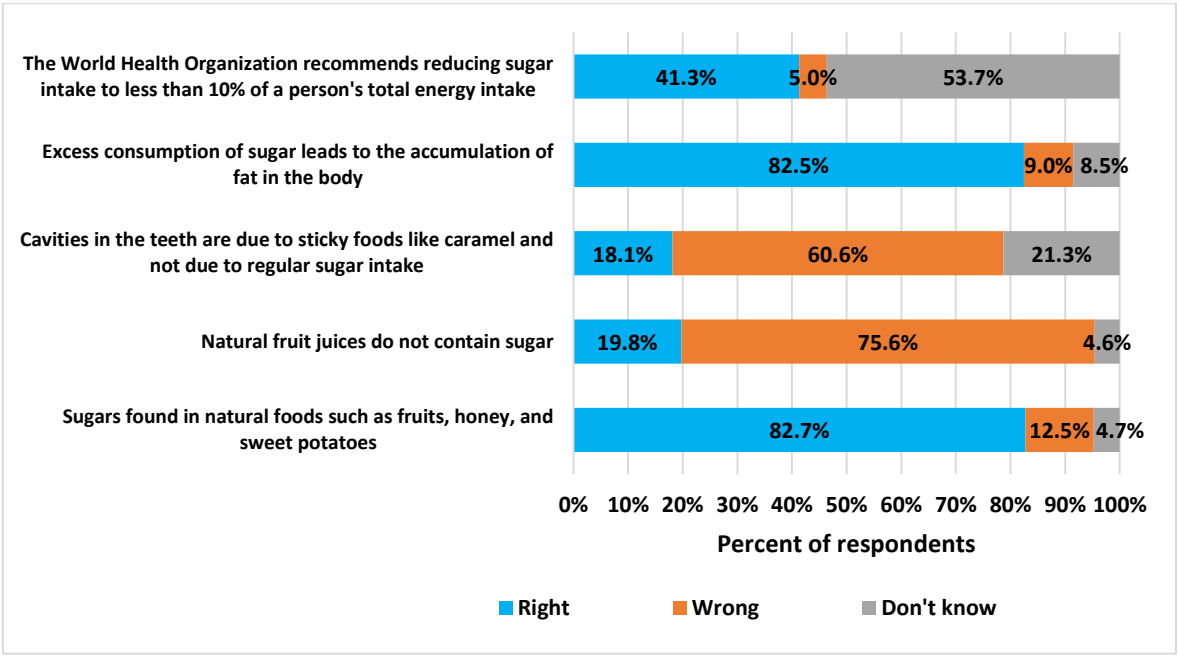

Figure 130 True/false statements about dietary sugar, adolescents 14-18 years of age

Most adolescents correctly estimated the amount of added sugar in the foods listed below in Figure 131. Foods for which adolescents less correctly identified the amount of added sugar included regular chewing gum; canned fruit and jam; natural honey; jelly, crème caramel and custard; and biscuits, cakes, and donuts.

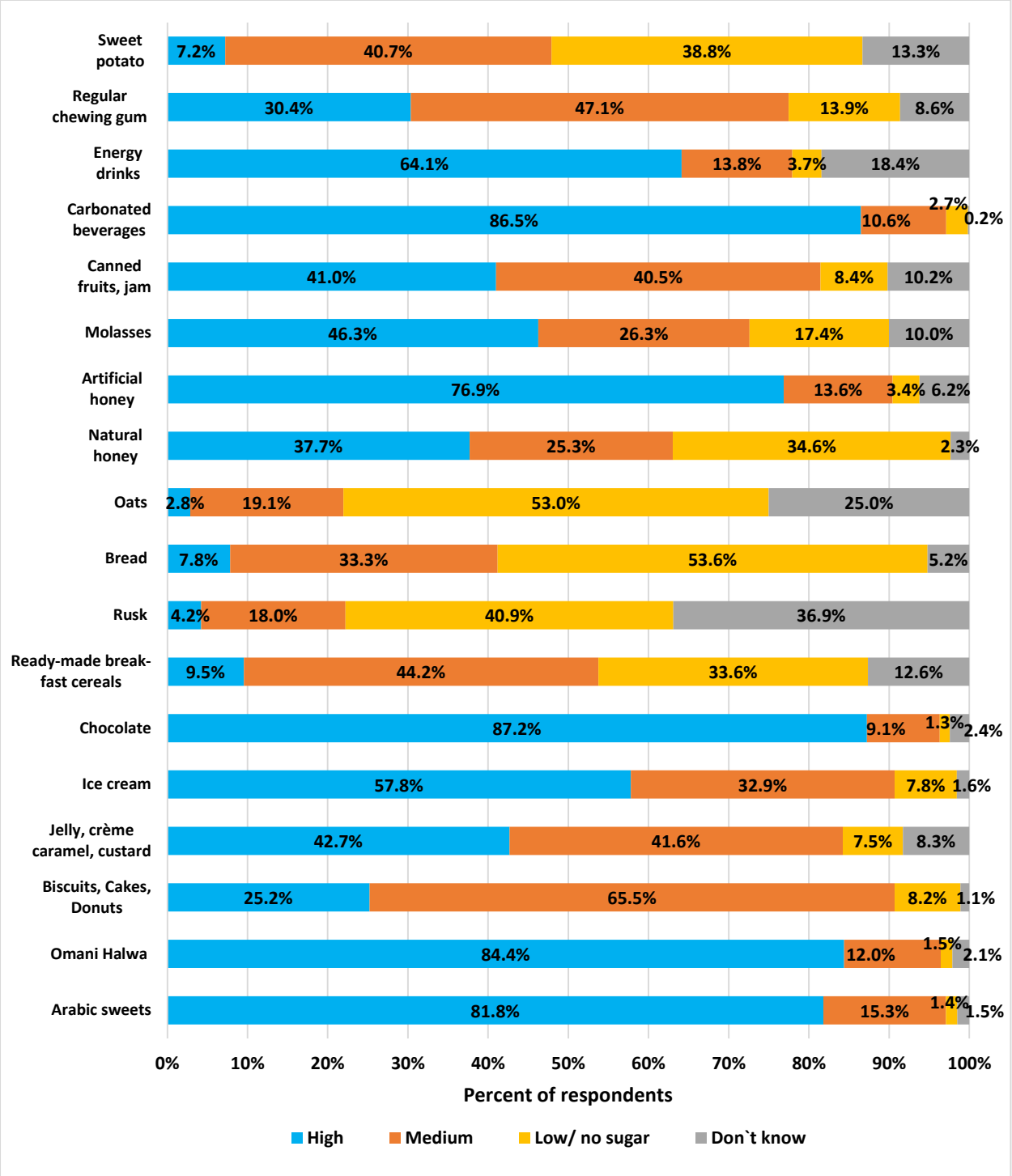

Figure 131 Amount of added sugar in these foods, adolescents 14-18 years of age

More than one-half of adolescents reported that their sugar consumption was appropriate, while one-third felt their sugar consumption was too high (Figure 132).

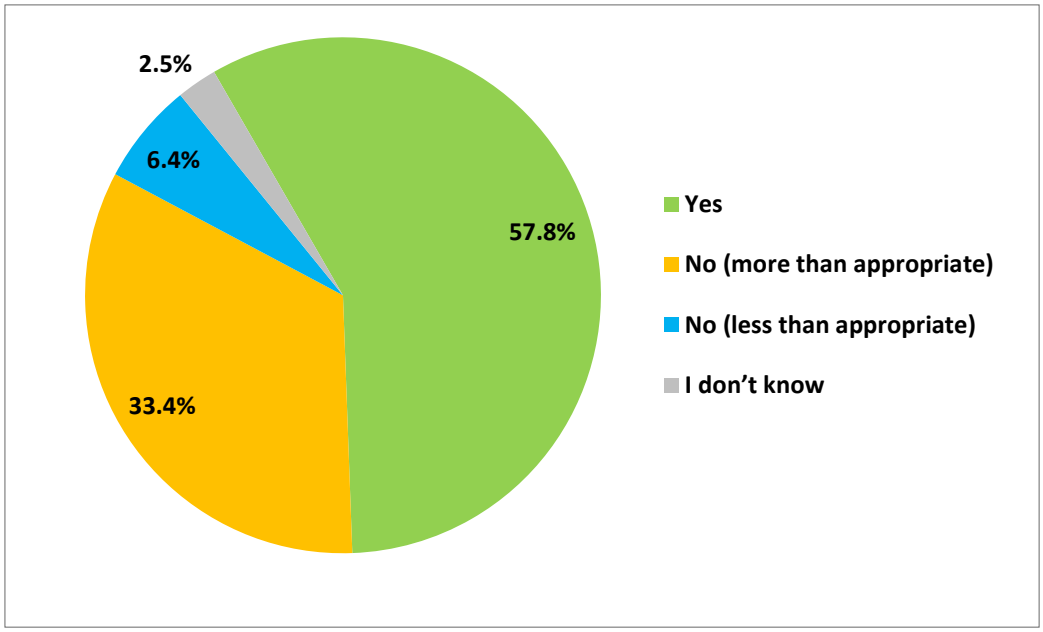

Figure 132 The daily amount of sugar used in meals is an appropriate amount, adolescents 14-18 years of age

More than one-half (58.8% of 282 adolescent respondents) did not know that artificial sugar substitutes existed; 58 (20.3%) did know of substitutes, and 62 (20.9%) did not know whether or not they existed.

6.1.3. Attitudes

A large proportion of adolescent respondents had inappropriate attitudes toward dietary sugar, and, with the exception of whether or not the respondent had tried to lose weight in the past, none of the apparent differences between subgroups were statistically significant (**Table 53**).

Table 53. Composite index for sugar attitudes of adolescents 14-18 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	170	39.8%	(29.1, 51.5)	44.3%	(34.3, 54.7)	16.0%	(10.1, 24.4)	0.469
Female	112	47.5%	(37.8, 57.4)	40.4%	(29.9, 51.9)	12.1%	(6.5, 21.4)	
Educational level								
Primary	14	41.0%	(13.1, 76.2)	50.5%	(20.2, 80.4)	8.5%	(1.2, 42.6)	0.956
Elementary	116	43.8%	(32.7, 55.6)	42.7%	(33.9, 52.0)	13.5%	(7.0, 24.3)	
Secondary or more	150	42.8%	(32.4,53.9)	41.4%	(29.6, 54.2)	15.8%	(9.9,20.6)	
Governorate								
Muscat	27	51.9%	(27.1, 75.7)	37.0%	(15.4, 65.6)	11.1%	(2.5, 37.6)	0.461
Dhofar	13	46.2%	(26.9, 66.7)	30.8%	(13.6, 55.6)	23.1%	(9.6, 46.0)	
Ad Dakhliyah	27	44.4%	(25.3, 65.4)	33.3%	(17.3, 54.4)	22.2%	(12.6, 36.2)	
Ash Sharqiyah North	25	32.0%	(15.0, 55.6)	52.0%	(31.5, 71.8)	16.0%	(11.0, 22.7)	
Ash Sharqiyah South	33	24.2%	(12.8, 41.1)	54.5%	(38.2, 70.0)	21.2%	(13.1, 32.5)	
Al Batinah North	28	46.4%	(29.2, 64.6)	46.4%	(27.4, 66.6)	7.1%	(1.9, 23.5)	
Al Batinah South	24	41.7%	(25.5, 59.8)	45.8%	(30.6, 61.9)	12.5%	(5.6, 25.7)	
Adh Dhahirah	27	37.0%	(25.5, 50.3)	44.4%	(28.1, 62.1)	18.5%	(5.9, 45.3)	
Al Buraymi	23	39.1%	(19.1, 63.6)	60.9%	(36.4, 80.9)	0	-	
Musandam	29	24.1%	NA*	48.3%	NA*	27.6%	NA*	
Al Wusta	26	34.6%	(13.2, 64.9)	61.5%	(37.9, 80.7)	3.8%	(0.6, 19.7)	
Who buys food for household								
Housewife	101	45.3%	(31.8, 59.6)	37.8%	(26.9, 50.2)	16.9%	(8.7, 30.1)	0.160
Head of house	152	44.2%	(34.5, 54.5)	42.8%	(32.1, 54.2)	13.0%	(8.2, 20.0)	
Servant	9	44.4%	(22.9, 68.3)	55.6%	(31.7, 77.1)	0%	-	
Other person	20	8.3%	(1.7, 31.5)	77.1%	(48.0, 92.4)	14.6%	(3.4, 45.9)	
Talked to professional about diet								
Yes	46	57.6%	(41.7, 72.0)	27.0%	(16.8, 40.5)	15.4%	(6.9, 30.8)	0.226
No	172	42.9%	(31.5, 55.2)	43.1%	(31.0, 56.0)	14.0%	(8.2, 22.9)	
Tried to lose weight								
Yes	93	30.3%	(20.4, 42.4)	49.0%	(36.2, 62.0)	20.7%	(11.4, 34.6)	<0.05
No	187	49.5%	(40.6, 58.5)	39.4%	(30.4, 49.1)	11.1%	(6.8, 17.4)	
TOTAL	**282**	**43.0%**	**(34.6, 51.8)**	**42.7%**	**(33.9, 52.0)**	**14.4%**	**(9.8, 20.5)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

A majority of adolescent respondents agreed with statements regarding reduction of dietary sugar intake; however, more than one-third also agreed that reducing sugar intake is difficult (Figure 133).

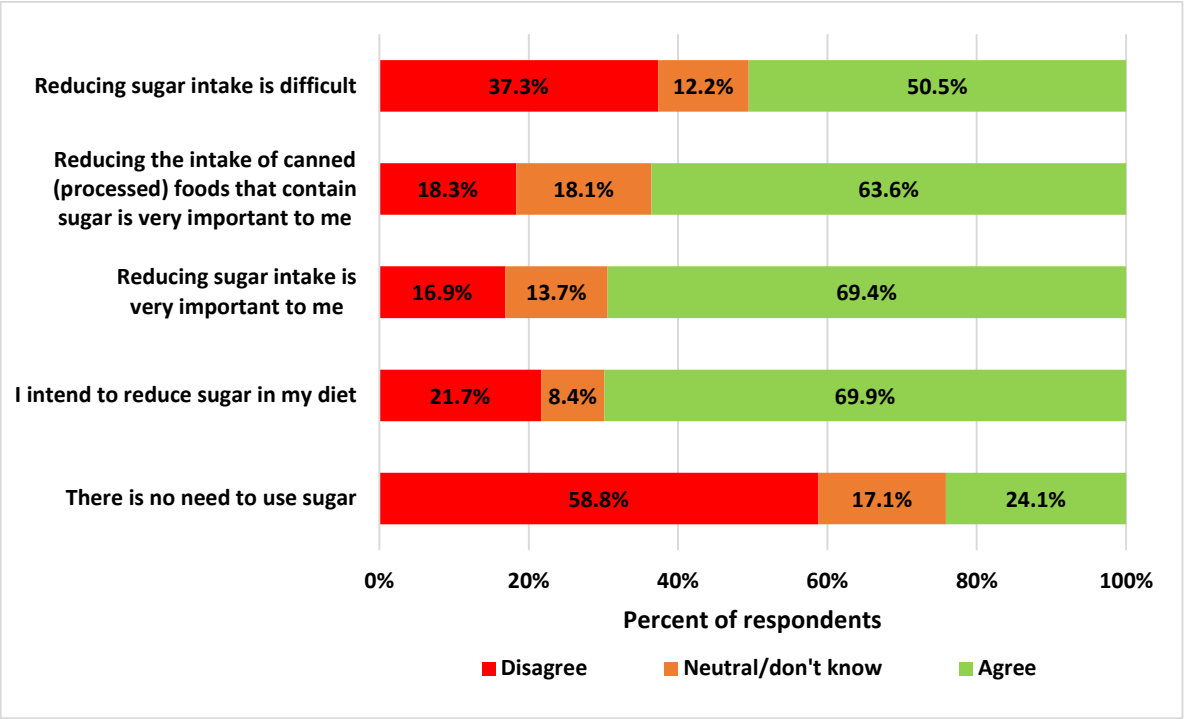

Figure 133 Respondents' agreement with statements about dietary sugar, adolescents 14-18 years of age

A majority of adolescent respondents (60.5% of 282) thought they were not at risk of diabetes from sugar consumption, while 32.6% thought they were, and 7.0% did not know. Out of the 74 respondents with a perceived risk for diabetes because of sugar intake, 46.2% rated their probability of developing diabetes as low or very low, 34.6% as average, and 19.3% as high or very high.

The most commonly cited reason for not being at risk of diabetes was reduced sugar consumption. Other reasons were cited by fewer respondents, and one-fifth said they did not know why they were not at risk (Figure 134).

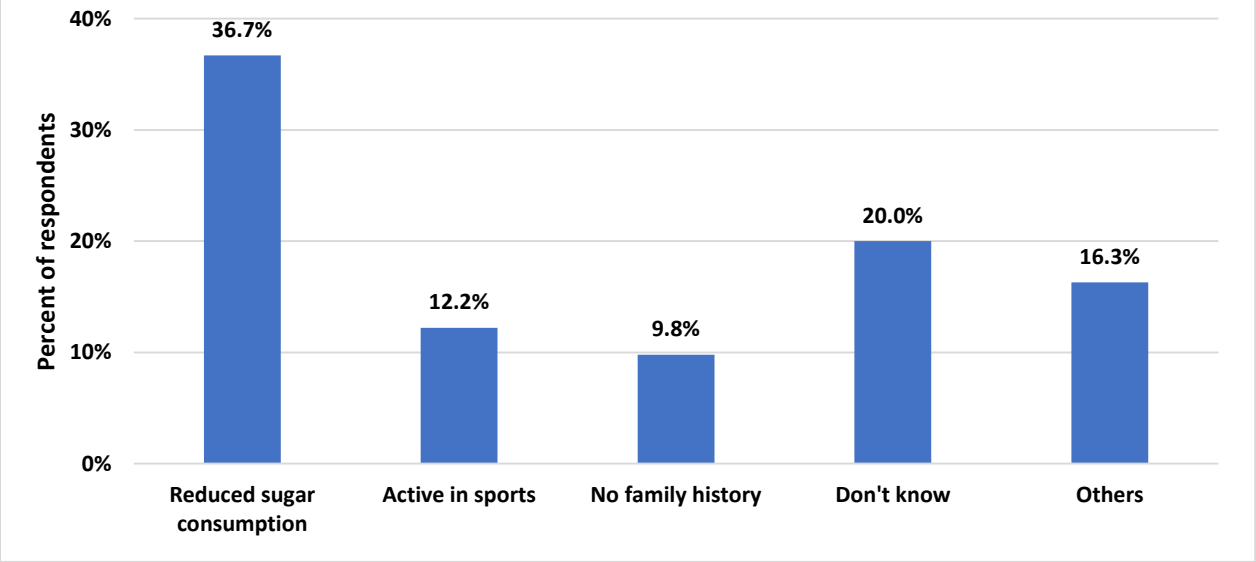

Figure 134 If risk is low, why, adolescents 14-18 years of age

There was no statistically significant difference in the sugar practices index score between those adolescents who thought they were at risk of diabetes and those who did not (Table 54).

Table 54. Number (weighted %) of adolescents 14-18 years of age with or without reported risk of diabetes with low, medium, or high scores on the sugar attitudes index

	Adolescents' sugar attitudes index			
Adolescent reported risk of diabetes due to sugar intake	**Low**	**Medium**	**High**	**P value**
Yes	28 (39.0%)	33 (41.7%)	13 (19.3%)	0.475
No	69 (46.6%)	88 (41.5%)	26 (11.9%)	
Unknown	9 (30.0%)	13 (57.7%)	3 (12.4%)	

The most commonly cited factors cited by respondents which could help them reduce sugar consumption included use of natural substitutes, reducing white sugar consumption, and eating a healthy diet (Figure 135). Several other factors were listed by fewer adolescents.

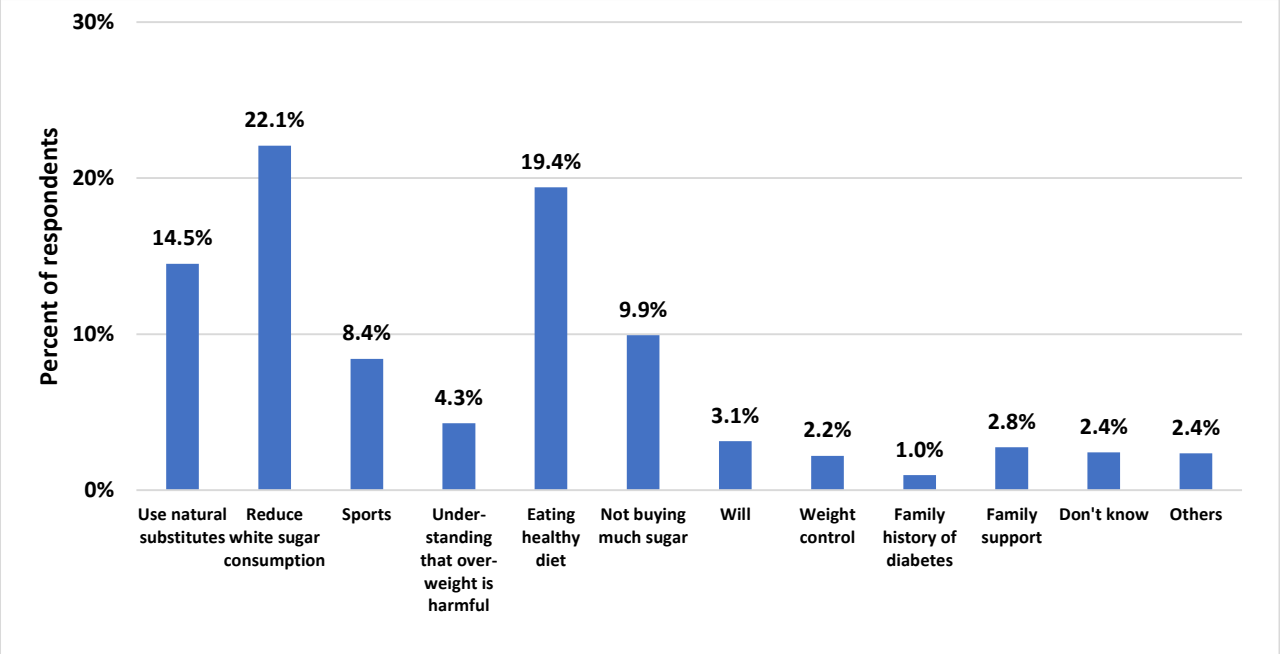

Figure 135 What will help you reduce sugar consumption , adolescents 14-18 years of age

The most commonly cited factor which could help motivate adolescent respondents to reduce sugar consumption was a change in their health condition (Figure 136).

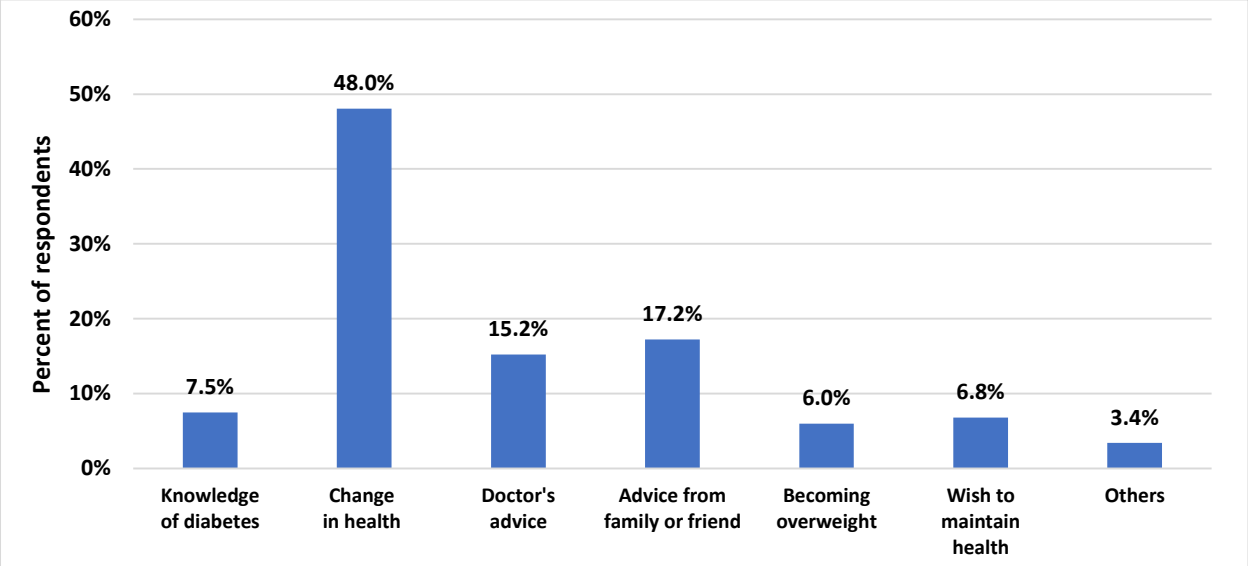

Figure 136 What could motivate you to reduce sugar consumption, adolescents 14-18 years of age

A large proportion of adolescent respondents reported that there were no barriers to their reducing sugar consumption (Figure 137). The most commonly cited barrier was that respondents liked the taste of sugar.

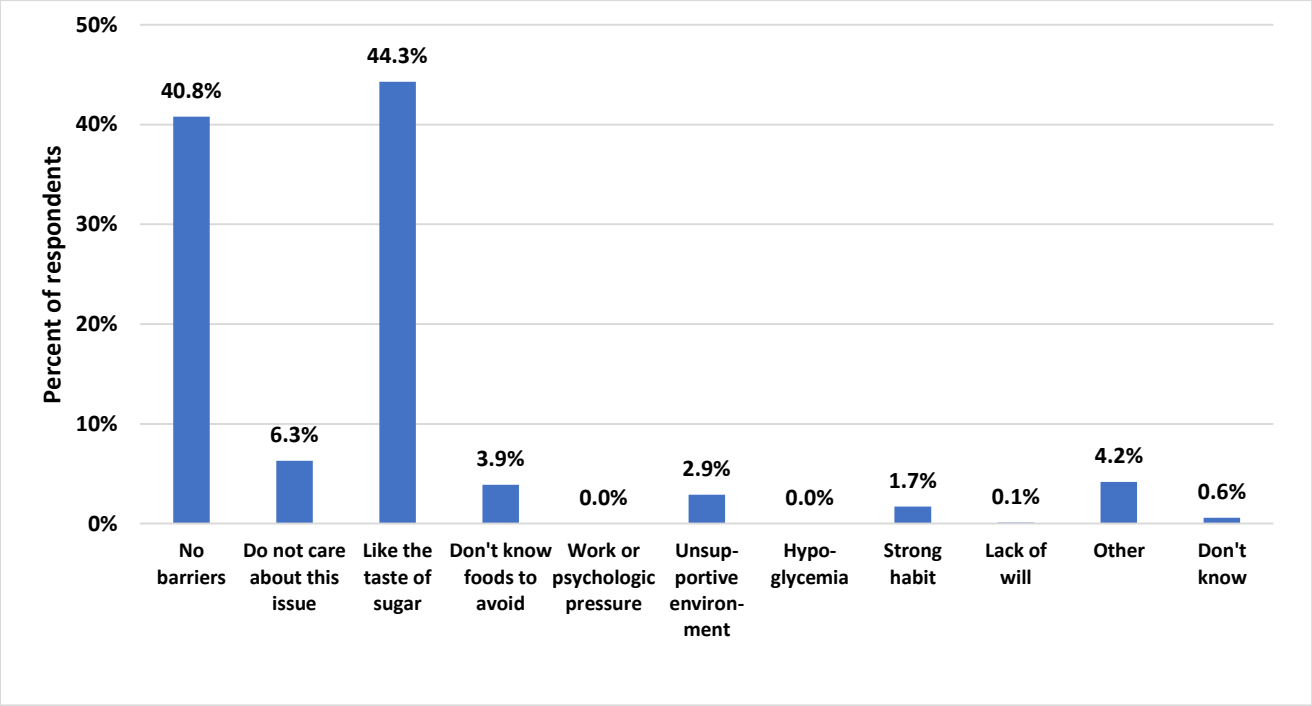

Figure 137 What barriers could prevent you from reducing sugar consumption, adolescents 14-18 years of age

6.1.4. Practices

Overall, almost three quarters of all adolescent respondents scored low on the sugar practices index. No subgroup had more than one-half of respondents scoring in the moderate or high range (**Table 55**). No differences between subgroups were statistically significant.

Table 55. Composite index for sugar practices of adolescents 14-18 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	171	71.8%	(61.4, 80.4)	27.7%	(19.2, 38.2)	0.4%	(0.1, 3.1)	0.696
Female	112	74.9%	(63.8, 83.6)	25.1%	(16.4, 36.2)	0%	-	
Educational level								
Primary	14	77.0%	(45.6, 93.0)	23.0%	(7.0, 54.4)	0%	-	0.914
Elementary	117	73.3%	(63.7, 81.0)	26.2%	(18.5, 35.7)	0.6%	(0.1, 4.0)	
Secondary or more	150	72.3%	(60.4, 81.7)	27.7%	(18.3, 39.6)	0%	-	
Governorate								
Muscat	27	74.1%	(60.7, 84.1)	25.9%	(15.9, 39.3)	-	-	0.879
Dhofar	13	92.3%	(60.7, 98.9)	7.7%	(1.1, 39.3)	-	-	
Ad Dakhliyah	28	57.1%	(45.9, 67.7)	42.9%	(32.3, 54.1)	-	-	
Ash Sharqiyah North	25	80.0%	(51.3, 93.8)	16.0%	(5.8, 36.9)	4.0%	(0.6, 22.0)	
Ash Sharqiyah South	33	81.8%	(67.0, 90.9)	18.2%	(9.1, 33.0)	-	-	
Al Batinah North	28	71.4%	(43.3, 89.1)	28.6%	(10.9, 56.7)	-	-	
Al Batinah South	24	75.0%	(48.3, 90.6)	25.0%	(9.4, 51.7)	-	-	
Adh Dhahirah	27	66.7%	(55.4, 76.3)	33.3%	(23.7, 44.6)	-	-	
Al Buraymi	23	82.6%	(61.5, 93.4)	17.4%	(6.6, 38.5)	-	-	
Musandam	29	55.2%	NA*	44.8%	NA*	-	NA*	
Al Wusta	26	100%	-	-	-	-	-	
Who buys food for household								
Housewife	101	75.9%	(63.1, 85.2)	24.1%	(14.8, 36.9)	0%	-	0.965
Head of house	153	71.8%	(61.5, 80.3)	27.8%	(19.3, 38.1)	0.4%	(0.1, 3.0)	
Servant	9	100%	-	0%	-	0%	-	
Other person	20	68.2%	(36.5, 88.9)	31.8%	(11.1, 63.5)	0%	-	
Talked to professional about diet								
Yes	46	65.1%	(46.2, 80.1)	33.5%	(18.7, 52.4)	1.5%	(0.2, 10.8)	0.177
No	173	75.0%	(67.1, 81.5)	25.0%	(18.5, 32.9)	0%	-	
Tried to lose weight								
Yes	93	66.3%	(51.7, 78.4)	32.9%	(21.1, 47.5)	0.7%	(0.1, 5.3)	0.144
No	188	76.6%	(68.8, 82.9)	23.4%	(17.1, 31.2)	0%	-	
TOTAL	**283**	**73.1%**	**(65.4, 79.6)**	**26.6%**	**(20.2, 34.2)**	**0.2%**	**(0.0, 1.8)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

More than one-half of respondents reported never or rarely adding sugar to food or drink, and one-third never or rarely try to reduce added dietary sugar (Figure 138). While few adolescents use local sugar or brown sugar, almost two thirds reported using white sugar.

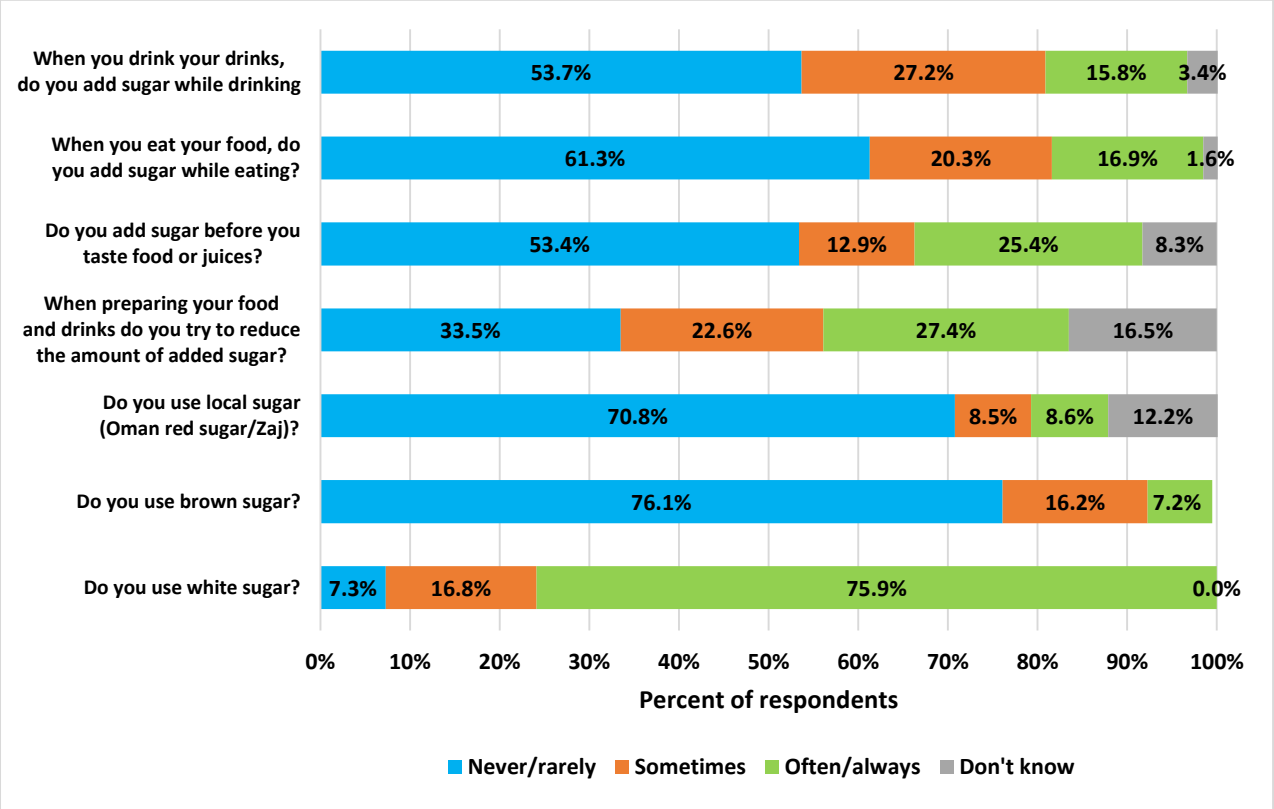

Figure 138 Responses to various questions regarding dietary sugar practices, adolescents 14-18 years of age

Two-thirds of adolescent respondents reported never or rarely checking the sugar content of foods. In addition, a large proportion say they never take into account the labelling on food packages when purchasing food, and one-half never or rarely purchase low sugar foods (**Table 56**). The distributions of these variables by sex and governorate are presented in **Table S75**, **Table S76**, and **Table S77**.

Table 56. Percent of respondents who reported frequencies of various behaviors related to checking food labels for sugar content - Adolescents 14-18 years

		Frequency			
Question	N	Never/rarely	Sometimes	Often/always	Do not know
How often check sugar content of foods	283	67.5%	15.1%	12.8%	4.6%
How often reading of food label about sugar affects purchases	118	34.5%	25.3%	28.4%	11.8%
How often buy foods labeled as low sugar or no added sugar	286	50.3%	15.9%	15.9%	17.9%

Adolescent respondents most commonly reported using a teaspoon, a tablespoon, or an Omani coffee cup to add sugar during cooking (Figure 139). Other methods were reported much less commonly; however, a large proportion said they did not add sugar during cooking or did not know how sugar was added during cooking.

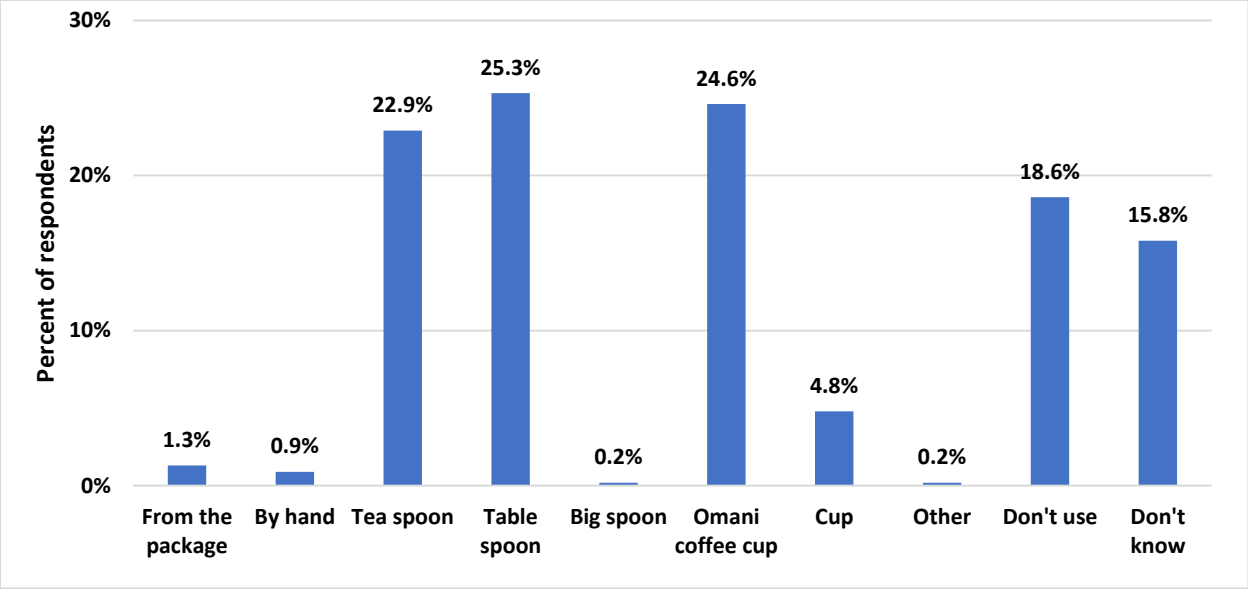

Figure 139 What scale is used when adding sugar during cooking, adolescents 14-18 years of age

Almost one-half of adolescent respondents reported not adding sugar to food when eating. Compared to how sugar was added during cooking, a much lower proportion of adolescent respondents responded "I don't know" when asked about how sugar was added during eating (Figure 140). The most commonly cited method was using a teaspoon.

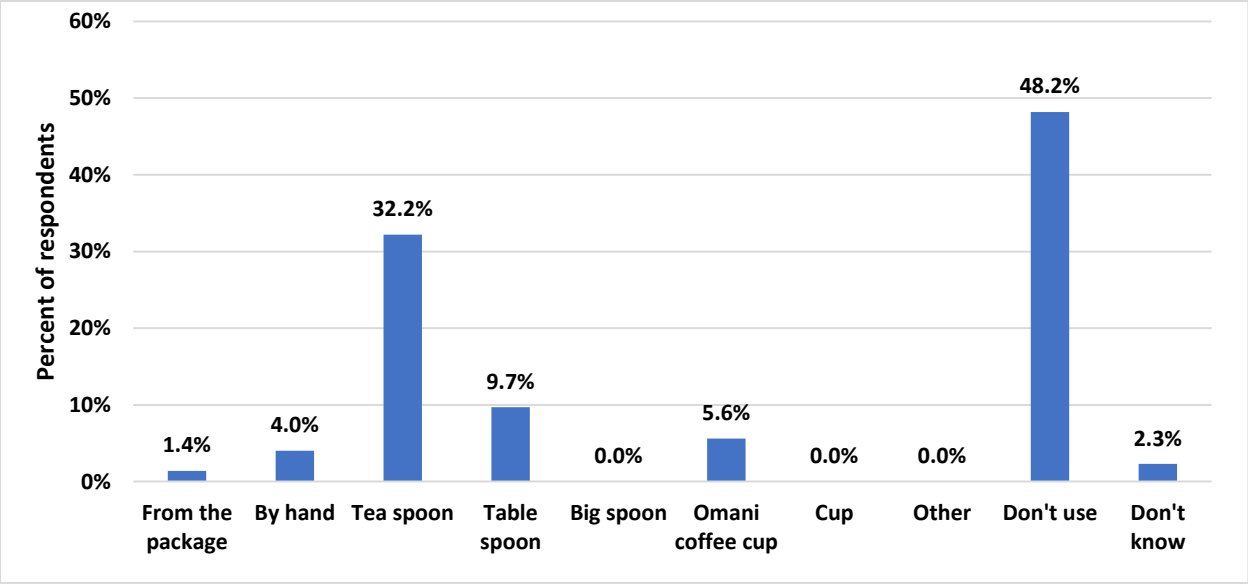

Figure 140 What scale is used when adding sugar when eating, adolescents 14-18 years of age

The most common use of sugar reported by adolescent respondents was adding it to tea (Figure 141). Other uses, reported much less frequently, were adding to sweets, juices, and baked goods.

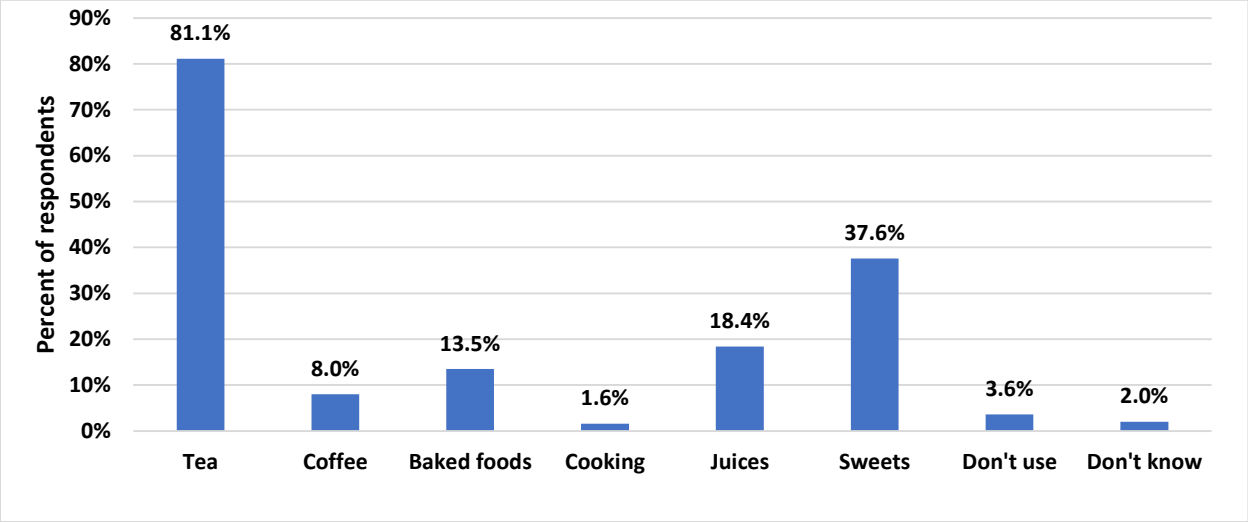

Figure 141 What do you use sugar for most often, adolescents 14-18 years of age

The number of spoons of sugar added to drinks varies by governorate (**Table 57**). Adolescent respondents in Dhofar add subtantially more sugar than in other governorates, and the p value of <0.001 demonstrates that the differences among governorates are statistically significant.

Table 57. Mean number of spoons of sugar added to a cup of drinks by adolescents 14-18 years of age, by governorate

Governorate	N	Mean spoons of sugar added to drinks
Muscat	22	1.7
Dhofar	13	2.2
Ad Dakhliyah	25	1.1
Ash Sharqiyah North	23	1.5
Ash Sharqiyah South	29	1.4
Al Batinah North	25	1.5
Al Batinah South	18	1.3
Adh Dhahirah	24	1.1
Al Buraymi	22	1.7
Musandam	29	1.6
Al Wusta	19	1.2

The amount of sugar added to drinks differed with statistical significance (p <0.001) by the self-assessed appropriateness of adolescent respondents' sugar intake (Table 58). Those respondents who thought their sugar intake was more than appropriate added more sugar to their drinks, and those who thought their sugar intake was appropriate or less than appropriate added less sugar. Respondents who could not assess the appropriateness of their sugar intake had the highest sugar usage.

Table 58. Mean number of spoons of sugar added to a cup of drinks by adolescents 14-18 years of age, by self-reported appropriateness of current sugar intake

Appropriateness	N	Mean spoons of sugar added to drinks
Yes	143	1.4
No (more than appropriate	76	1.6
No (less than appropriate)	18	1.3
Don't know	11	1.9

More than one-half (55.3%) of the 283 responding adolescents reported trying to limit their sugar intake. The remaining 126 (43.8%) reported that they were not trying to limit their sugar intake, and fewer than 1% said they did not know. Of the 153 adolescents who reported trying to limit sugar intake, the two most commonly cited reasons were for health and weight control (Figure 142).

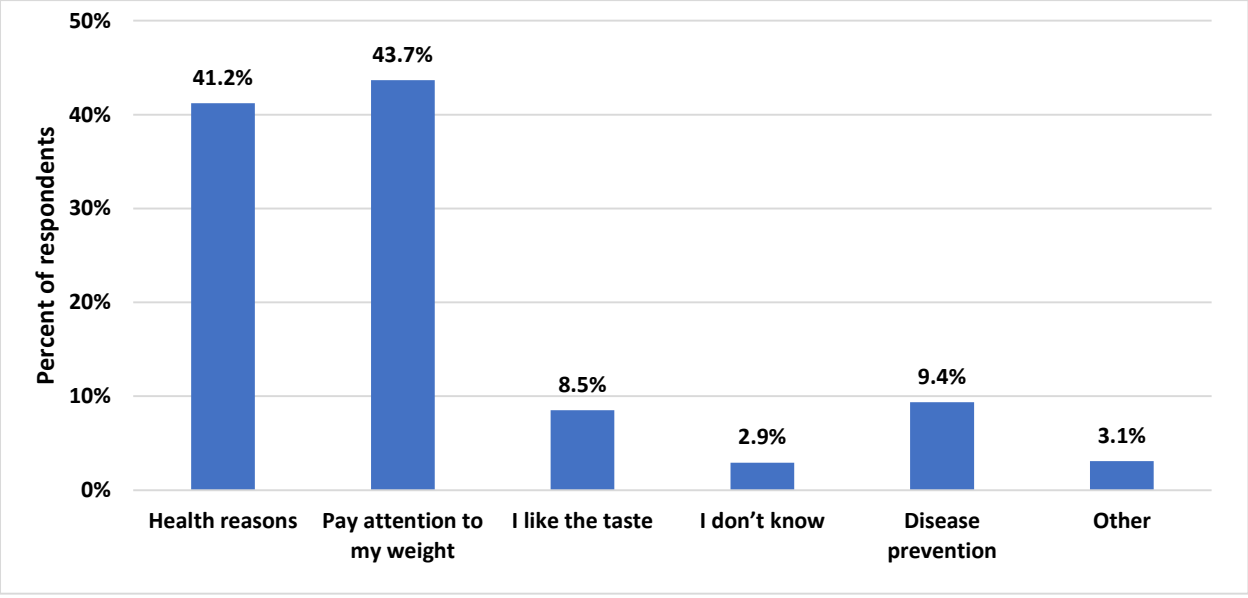

Figure 142 Reason for limiting sugar in diet, adolescents 14-18 years of age

Of the 126 adolescents who reported not trying to limit their sugar intake, two-thirds said it was because of habit (Figure 143). Other reasons were reported by only a few percent of respondents.

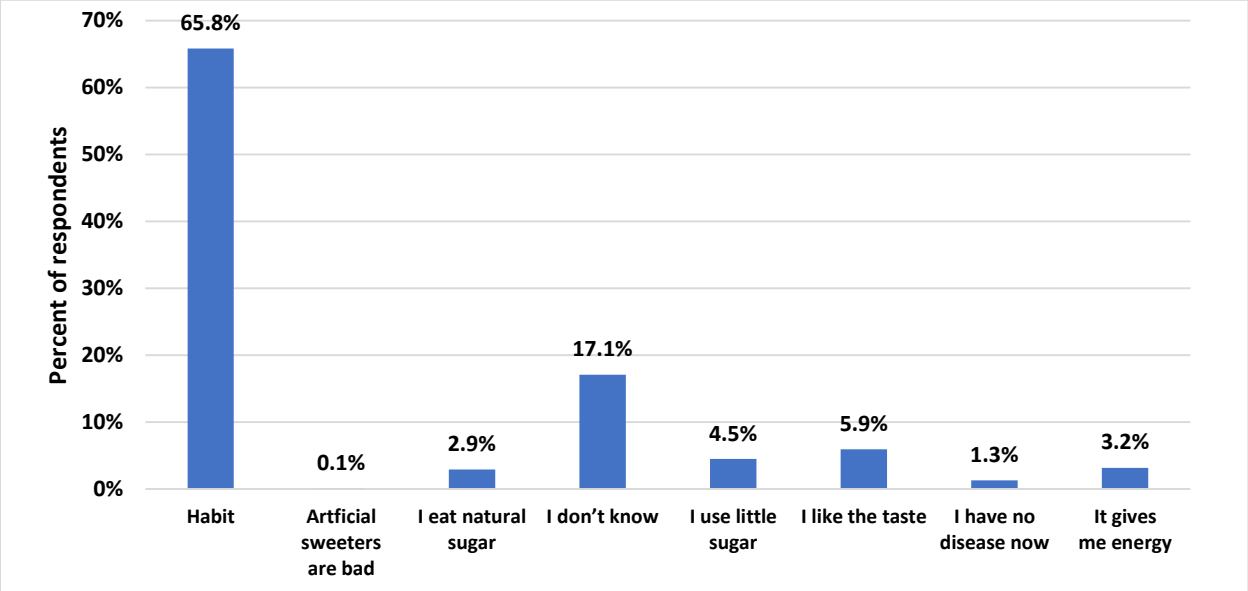

Figure 143 Reason for not limiting amount of sugar in diet, adolescents 14-18 years of age

Use of artificial substitutes for sugar was reported by only 18 (5.9%) of the 283 responding adolescents. The vast majority of adolescents (76.8%) reported not using artificial sugar substitutes, and 17.2% responded that they did not know. Of those who reported using artificial substitutes for sugar, 11 (64.4%) of the 18 respondents reported using Stevia and 4 (26.1%) reported using Steviana.

A much larger proportion of adolescent respondents, 36.6% (94 of 283), reported using natural sugar substitutes. Nonetheless, a large proportion, 52.1%, reported not using natural sugar substitutes, and 11.3% reported "I don't know". As shown in Figure 144 below, the natural substitutes reported by adolescents consisted largely of alternate forms of sugar, including honey, pomegranate syrup, date syrup, and sugarcane molasses.

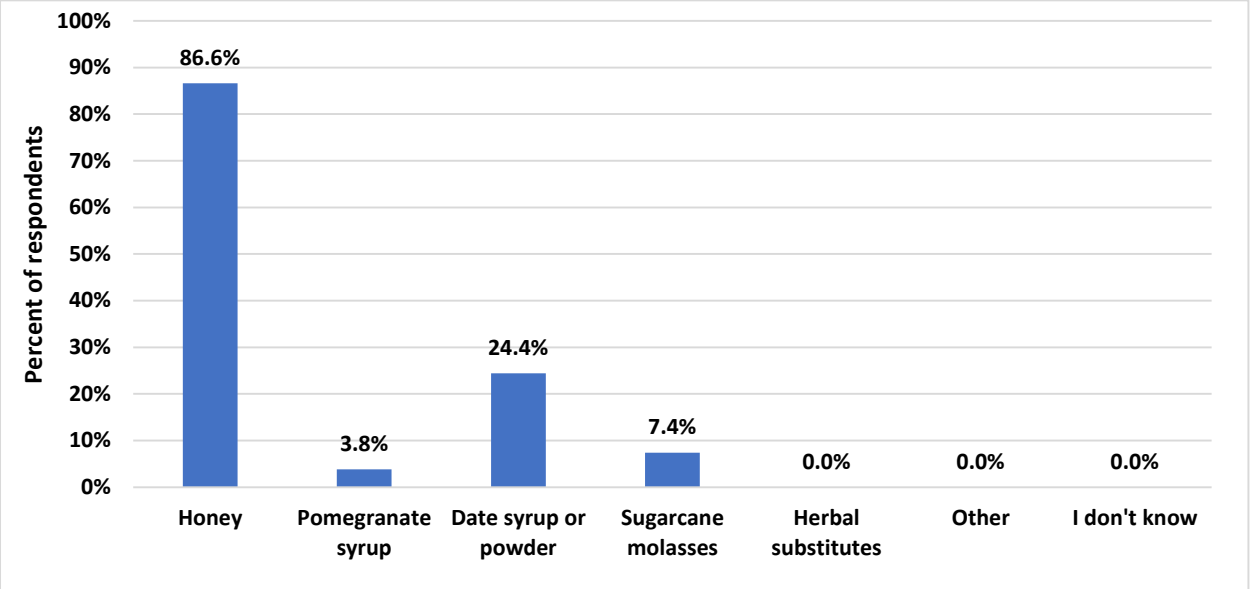

Figure 144 Of those reporting using natural substitutes for sugar, percent using specific substitutes, adolescents 14-18 years of age

Only about one-third of adolescent respondents said that the imposition of a tax on soft drinks and sweetened beverages reduced their consumption (Figure 145). More than one-half said no and about one in 10 said they do not drink sweetened beverages.

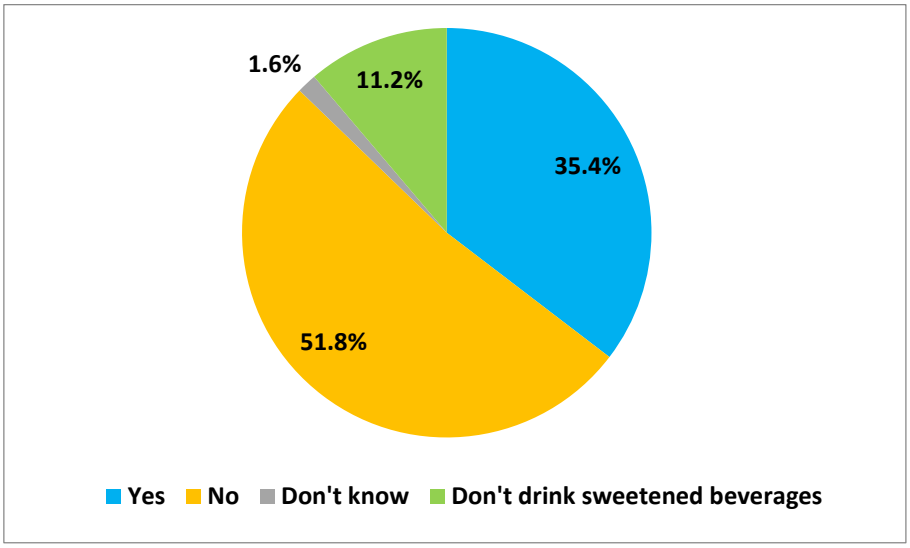

Figure 145 Did imposing a tax on soft drinks and sweetened beverages reduce your consumption, adolescents 14-18 years of age

Many adolescents reported consuming several high-sugar foods less than one time per week, including Arab sweets; Omani halwa; jelly, cream, or custard; canned fruit or jam; and red sugar drink (**Table 59**). On the other hand, several high-sugar foods were consumed much more often, including biscuits, cakes, and donuts; chocolate; honey; canned sweet drinks; natural canned juice with sugar; carbonated drinks; regular chewing gum; coffee or tea with sugar; and sauces. The median number of times each of these foods is consumed per month is shown in **Table S78** for each governorate.

Table 59. Reported frequency* of consuming various foods by adolescents 14-18 years of age

Food	Daily	Weekly	Monthly	Rarely
Arab sweets	2.1%	22.7%	40.0%	35.2%
Omani halwah	2.7%	18.9%	27.4%	51.0%
Biscuits, cakes, donuts	29.1%	43.4%	14.9%	12.6%
Date molasses	10.4%	18.3%	13.2%	58.1%
Jelly, cream, custard	2.1%	10.6%	17.9%	69.3%
Ice cream	17.8%	44.3%	16.8%	21.1%
Chocolate	40.4%	35.9%	7.6%	16.2%
Breakfast cereal	13.5%	17.2%	11.5%	57.8%
Rusk	3.1%	7.4%	8.7%	80.7%
Honey	20.9%	41.3%	13.5%	24.3%
Canned fruit, jam	5.0%	10.8%	6.6%	77.5%
Canned sweet drinks	32.7%	33.7%	10.1%	23.5%
Natural canned juice with sugar	29.0%	39.9%	12.9%	18.2%
Natural juice with no sugar	11.5%	13.3%	8.7%	66.5%
Carbonated drinks	26.6%	35.0%	10.5%	27.9%
Carbonated drinks with no sugar	2.6%	8.9%	3.9%	84.6%
Energy drinks	0.9%	5.0%	7.8%	86.4%
Regular chewing gum	28.8%	29.1%	6.5%	35.6%
Sweet milk	9.5%	25.0%	22.3%	43.1%
Coffee or tea with sugar	63.7%	19.4%	5.4%	11.6%
Sauces	26.1%	32.2%	7.4%	34.3%
Red sugar drink	0.4%	3.2%	0.8%	95.5%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

6.2. Results – Adults 19-60 years of age

6.2.1. Demographic characteristics

The characteristics of adults completing the sugar questionnaire are shown below in **Table 60**.

Table 60. Distribution of various demographic characteristics among adults 19-60 years of age responding to the sugar questionnaire

Characteristic	Unweighted number	Weighted percent
Sex		
Male	545	50.7%
Female	541	49.3%
Age (in years)		
19-29	370	34.2%
30-39	439	39.8%
40-49	192	17.6%
50-60	85	8.4%
Educational level		
Primary	43	3.7%
Elementary	106	9.7%
Secondary	519	48.1%
Diploma	136	13.8%
Bachelors or more	234	24.7%
Marital status		
Single	296	26.4%
Married	790	73.6%
Governorate		
Muscat	102	9.8%
Dhofar	64	6.1%
Ad Dakhliyah	86	8.4%
Ash Sharqiyah North	88	8.0%
Ash Sharqiyah South	110	10.5%
Al Batinah North	112	10.4%
Al Batinah South	101	9.3%
Adh Dhahirah	113	10.6%
Al Buraymi	87	8.7%
Musandam	114	8.5%
Al Wusta	109	9.8%
Household income		
<200 OMR	214	20.3%
200-499 OMR	309	27.4%
500-999 OMR	210	19.2%
1000+ OMR	97	9.4%
Don't know	256	23.7%

Characteristic	Unweighted number	Weighted percent
Type of job		
Government	287	24.5%
Private	160	15.6%
Military	102	8.9%
Retired	38	3.8%
Student	58	6.8%
Job seeker	169	16.1%
Not working	272	24.3%
Works in health field		
Yes	49	4.8%
No	796	95.2%
Buys food for household		
Respondent	434	39.9%
Other household member	652	60.1%
Who buys food for household		
Housewife	450	40.4%
Head of house	508	50.2%
Servant	7	0.1%
Other person	120	9.3%
Talked to professional about diet		
Yes	348	34.1%
No	512	45.2%
Unknown	226	20.8%
Tried to lose weight		
Yes	532	51.6%
No	532	47.5%
Unknown	22	0.9%
Has disease		
Hypertension	88	8.4%
Diabetes	78	7.1%
Heart disease	17	2.3%
Overweight or obesity	147	16.5%

6.2.2. Knowledge

The level of knowledge about dietary sugar was quite high, with more than one-half of adult respondents having a high score on the sugar knowledge index (**Table 61**). This is also true for each subgroup examined, with the exception of the few adults with only a primary education and adults in three governorates. Differences by education and governorate were statistically significant. In addition, adults who had tried to lose weight had statistically significantly higher scores than those who did not.

Table 61. Composite index for sugar knowledge of adults 19-60 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	543	5.6%	(3.7, 8.3)	36.9%	(31.7, 42.5)	57.5%	(51.5, 63.3)	0.452
Female	537	6.3%	(4.3, 9.1)	32.3%	(26.9, 38.2)	61.4%	(54.8, 67.6)	
Age								
19-29	368	8.2%	(5.2, 12.7)	36.0%	(29.6, 42.9)	55.9%	(48.7, 62.8)	0.421
30-39	435	5.3%	(3.3, 8.4)	33.0%	(27.8, 38.6)	61.8%	(55.9, 67.3)	
40-49	192	5.2%	(2.6, 10.2)	34.2%	(26.9, 42.3)	60.6%	(51.7, 68.8)	
50-60	85	1.8%	(0.6, 5.8)	37.5%	(25.5, 51.3)	60.7%	(46.8, 73.0)	
Educational level								
Primary	43	17.5%	(7.0, 37.3)	60.7%	(38.4, 79.2)	21.8%	(10.4, 40.3)	<0.001
Elementary	105	9.6%	(5.0, 17.7)	38.1%	(27.2, 50.4)	52.3%	(37.1, 67.1)	
Secondary	517	6.4%	(4.2, 9.7)	38.5%	(33.6, 43.5)	55.1%	(50.0, 60.1)	
Diploma	135	1.8%	(0.6, 5.5)	26.3%	(18.0, 36.7)	71.9%	(61.1, 80.6)	
Bachelors or more	232	1.8%	(0.5, 5.8)	24.6%	(17.0, 34.2)	73.6%	(63.3, 81.8)	
Marital status								
Not married	294	6.2%	(3.5, 10.6)	36.4%	(29.1, 44.4)	57.4%	(49.9, 64.5)	0.835
Married	786	5.9%	(4.0, 8.5)	33.9%	(29.3, 38.9)	60.2%	(54.9, 65.2)	
Governorate								
Muscat	102	3.0%	(1.2, 7.0)	32.4%	(27.1, 38.1)	64.7%	(58.8, 70.1)	<0.01
Dhofar	63	12.8%	(4.5, 31.3)	49.0%	(36.2, 61.8)	38.2%	(23.6, 55.2)	
Ad Dakhliyah	86	3.5%	(1.5, 7.9)	20.9%	(11.8, 34.5)	75.6%	(61.9, 85.5)	
Ash Sharqiyah North	88	12.4%	(8.8, 17.3)	41.7%	(29.8, 54.6)	45.9%	(30.7, 61.8)	
Ash Sharqiyah South	110	5.5%	(1.8, 15.6)	37.2%	(28.9, 46.4)	57.3%	(46.5, 67.4)	
Al Batinah North	110	5.4%	(3.0, 9.7)	35.6%	(29.0, 42.7)	59.0%	(51.4, 66.1)	
Al Batinah South	101	7.0%	(4.7, 10.2)	38.9%	(28.3, 50.6)	54.1%	(40.7, 67.0)	
Adh Dhahirah	110	3.6%	(1.2, 10.6)	28.2%	(23.1, 33.8)	68.2%	(59.6, 75.7)	
Al Buraymi	87	9.3%	(4.0, 20.1)	35.2%	(34.8, 35.6)	55.5%	(47.5, 63.3)	
Musandam	114	9.9%	NA*	30.4%	NA*	59.7%	NA*	
Al Wusta	109	12.7%	(3.9, 33.9)	54.2%	(44.0, 64.1)	33.2%	(17.2, 54.3)	
Household income								
<200 OMR	213	6.9%	(3.9, 12.1)	35.7%	(26.7, 45.8)	57.4%	(47.5, 66.7)	0.103
200-499 OMR	308	5.5%	(3.2, 9.6)	34.4%	(28.5, 40.7)	60.1%	(53.7, 66.2)	
500-999 OMR	210	2.9%	(1.1, 7.1)	33.5%	(25.7, 42.4)	63.6%	(54.6, 71.8)	
1000+ OMR	96	1.2%	(0.2, 8.1)	29.4%	(20.3, 40.5)	69.4%	(58.4, 78.6)	
Do not know	253	10.1%	(6.5, 15.4)	36.9%	(29.4, 45.0)	53.1%	(43.7, 62.2)	
Type of job								
Government	284	5.5%	(3.2, 9.4)	31.2%	(23.3, 40.4)	63.2%	(54.4, 71.2)	0.225
Private	160	3.5%	(1.5, 8.2)	30.8%	(22.9, 39.9)	65.7%	(56.8, 73.7)	
Military	102	8.2%	(3.3, 19.0)	34.1%	(23.8, 46.3)	57.6%	(46.0, 68.5)	
Retired	38	0%	-	25.4%	(11.0, 48.4)	74.6%	(51.6, 89.0)	
Student	57	3.7%	(0.7, 16.8)	35.3%	(21.4, 52.2)	61.0%	(45.2, 74.8)	
Looking for work	168	5.6%	(2.1, 14.2)	33.0%	(25.5, 41.5)	61.4%	(52.3, 69.8)	
Not working	271	8.9%	(5.5, 14.0)	42.9%	(36.1, 50.0)	48.2%	(40.4, 56.1)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Works in health field								
Yes	49	3.0%	(0.4, 19.6)	20.1%	(7.9, 42.3)	76.9%	(55.9, 89.8)	0.348
No	791	4.5%	(3.1, 6.4)	32.4%	(29.1, 35.9)	63.2%	(59.4, 66.7)	
Buys food for household								
Yes	433	4.9%	(2.8, 8.5)	33.2%	(27.6, 39.3)	61.9%	(55.7, 67.8)	0.511
No	647	6.7%	(4.5, 9.7)	35.5%	(31.2, 40.2)	57.8%	(52.3, 63.1)	
Who buys food for household								
Housewife	449	4.6%	(2.4, 8.4)	34.0%	(28.2, 40.3)	61.4%	(55.3, 67.2)	0.227
Head of house	504	7.1%	(4.9, 10.2)	32.8%	(27.9, 38.2)	60.1%	(54.1, 65.8)	
Servant	7	15.3%	(1.2, 73.4)	70.6%	(45.7, 87.3)	14.1%	(5.1, 33.5)	
Other person	119	6.0%	(2.9, 11.9)	45.6%	(32.9, 58.9)	48.4%	(36.3, 60.7)	
Talked to professional about diet								
Yes	346	3.7%	(1.8, 7.7)	29.7%	(24.6, 35.5)	66.6%	(59.6, 72.8)	0.057
No	510	7.5%	(5.1, 11.0)	34.7%	(30.0, 39.8)	57.7%	(52.3, 63.0)	
Tried to lose weight								
Yes	529	2.8%	(1.5, 5.3)	31.5%	(26.7, 36.8)	65.7%	(60.4, 70.5)	<0.001
No	529	9.2%	(6.9, 12.1)	38.0%	(33.1, 43.2)	52.8%	(47.1, 58.4)	
Has hypertension								
Yes	88	3.8%	(1.1, 12.5)	30.1%	(20.4, 41.9)	66.1%	(54.6, 76.0)	0.425
No	992	6.2%	(4.6, 8.2)	35.0%	(31.7, 38.5)	58.8%	(54.8, 62.8)	
Has diabetes								
Yes	78	2.0%	(0.5, 7.0)	39.3%	(26.1, 54.2)	58.8%	(43.9, 72.2)	0.268
No	1002	6.3%	(4.7, 8.4)	34.2%	(31.0, 37.6)	59.5%	(55.7, 63.2)	
Has heart disease								
Yes	17	13.5%	(3.0, 44.6)	36.6%	(14.1, 67.0)	49.8%	(20.5, 79.3)	0.502
No	1063	5.8%	(4.3, 7.7)	34.5%	(31.3, 37.9)	59.7%	(55.8, 63.4)	
Is overweight or obese								
Yes	147	2.9%	(1.1, 7.7)	34.0%	(25.3, 43.9)	63.1%	(53.4, 71.8)	0.266
No	933	6.6%	(4.9, 8.8)	34.7%	(31.2, 38.4)	58.7%	(54.5, 62.8)	
TOTAL	**1080**	**6.0%**	**(4.4,7.9)**	**34.6%**	**(31.2,38.1)**	**59.4%**	**(55.5,63.3)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

A large majority of adults, 1020 (93.0%) of 1081 respondents, correctly responded that excess dietary sugar is bad for their health. Another 5.5% said it had no effect on health, and only 1.5% did not know.

A large majority of adults correctly identified weight gain, obesity, and diabetes as health consequences of eating foods high in sugar (Figure 146).

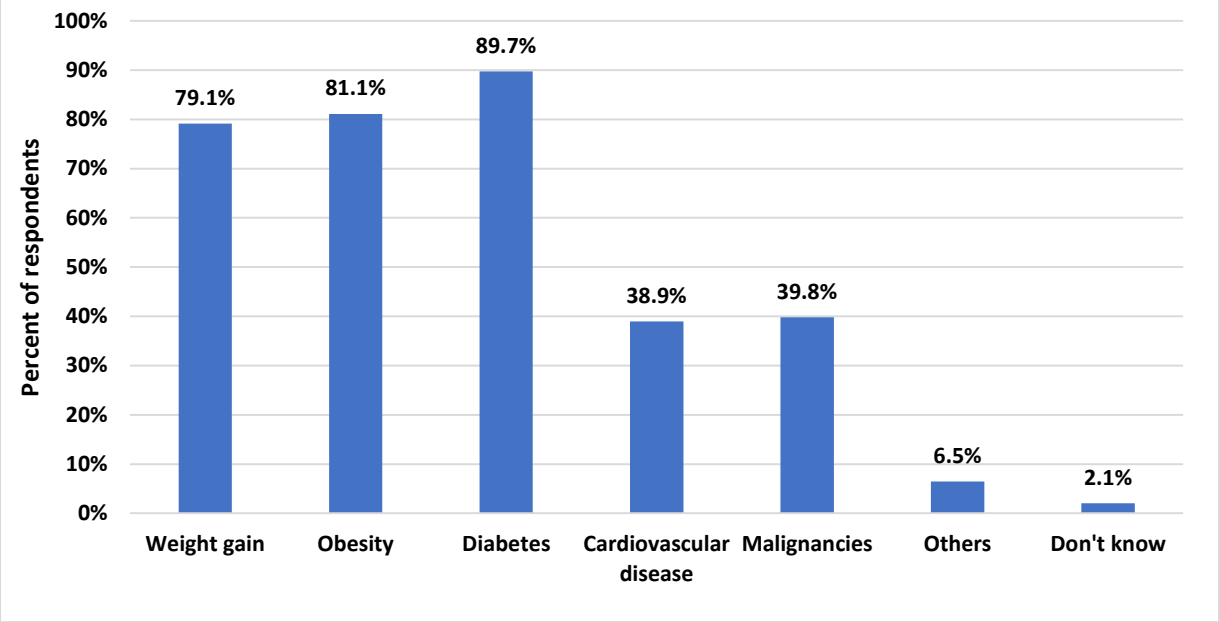

Figure 146 Do you think the following health problems are caused or worsened by eating foods high in sugar, adults 19-60 years of age

A majority of adult respondents correctly answered most of the questions listed in Figure 147 below, with the exception of the World Health Organization's recommended maximum daily sugar intake. For this question, more than one-half of adults did not know.

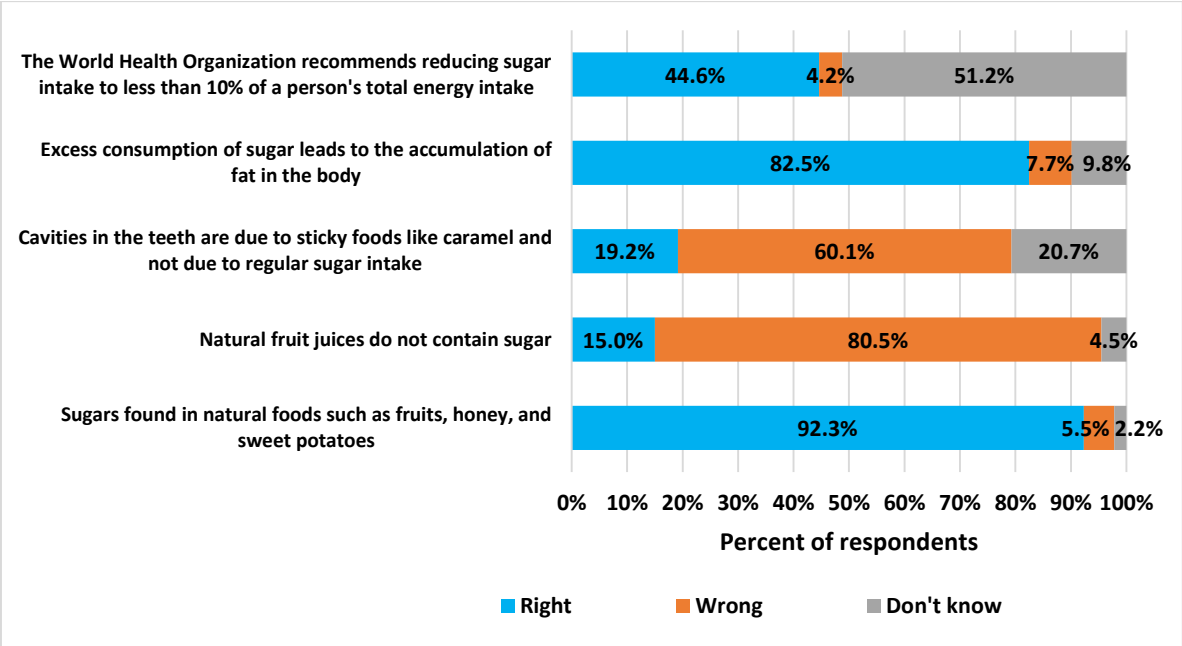

Figure 147 True/false statements about dietary sugar, adults 19-60 years of age

Most adults correctly estimated the amount of added sugar in the foods listed below in Figure 148. Foods for which adults less correctly identified the amount of added sugar included regular chewing gum; natural honey; and biscuits, cakes, and donuts.

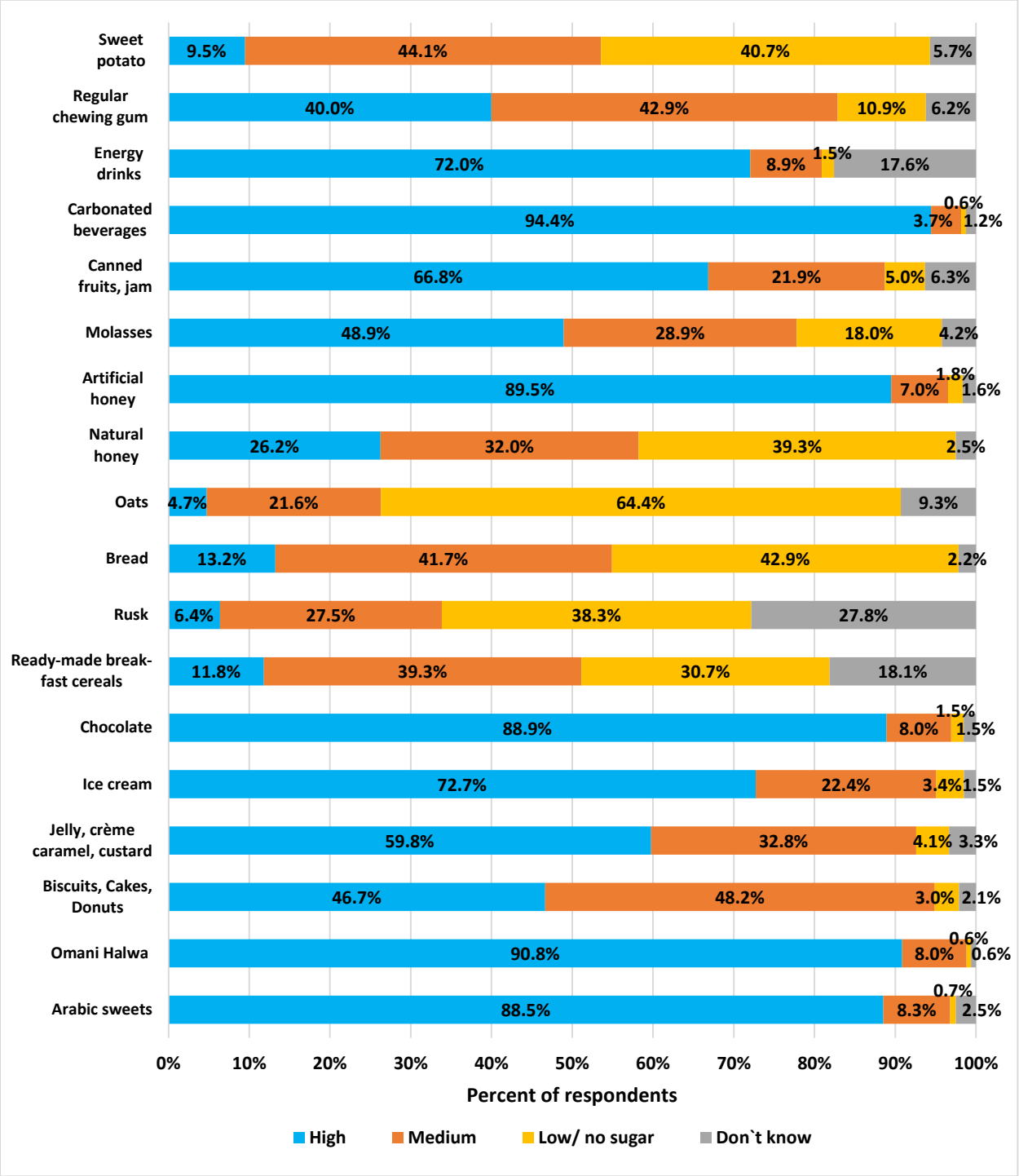

Figure 148 Amount of added sugar in these foods, adults 19-60 years of age

More than one-half of adults reported that their sugar consumption was appropriate, slightly less than one-third felt their sugar consumption was too high (Figure 149).

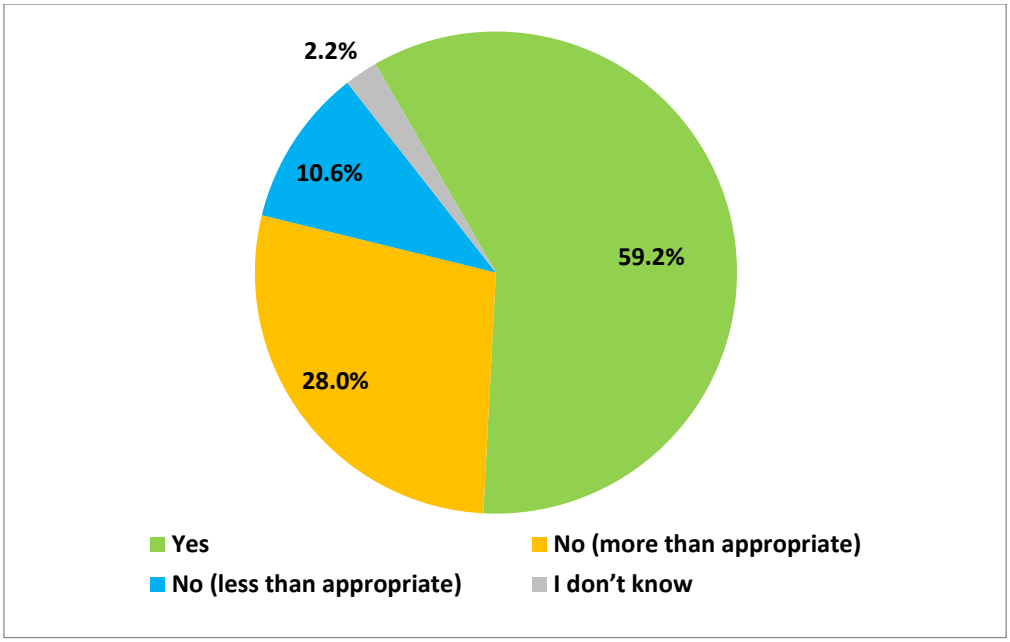

Figure 149 The daily amount of sugar used in meals is an appropriate amount, adults 19-60 years of age

Of 1080 adult respondents, 443 (43.8%) reported knowing that artificial sugar substitutes existed; 410 (37.7%) did not know of such substitutes, and 227 (18.5%) said they did not know whether or not they existed.

6.2.3. Attitudes

A large proportion of adult respondents had moderate or high scores on the sugar attitude index (Table 62). Attitudes improved with age, and possibly with educational level, albeit without statistical significance. Married adults had better attitudes than unmarried adults, and adults who had tried to lose weight also had better attitudes than those who did not.

Table 62. Composite index for sugar attitude of adults 19-60 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	543	17.0%	(12.8, 22.1)	52.1%	(45.6, 58.5)	30.9%	(25.9, 36.4)	0.472
Female	537	20.4%	(16.4, 25.0)	51.9%	(47.0, 56.7)	27.8%	(22.8, 33.4)	
Age								
19-29	368	30.8%	(25.0, 37.2)	47.7%	(42.2, 53.3)	21.5%	(17.2, 26.5)	<0.001
30-39	435	14.9%	(10.8, 20.1)	51.5%	(45.2, 57.7)	33.6%	(27.2, 40.8)	
40-49	192	9.6%	(5.8, 15.5)	62.5%	(50.9, 72.8)	27.9%	(18.8, 39.3)	
50-60	85	6.3%	(1.9, 19.3)	49.4%	(35.8, 63.0)	44.3%	(32.2, 57.1)	
Educational level								
Primary	43	18.6%	(8.3, 36.5)	37.5%	(24.4, 52.7)	44.0%	(27.6, 61.8)	0.207
Elementary	105	11.9%	(5.6, 23.6)	66.1%	(50.0, 79.1)	22.0%	(12.0, 36.8)	
Secondary	517	20.7%	(16.8, 25.2)	53.3%	(47.9, 58.6)	26.1%	(21.7, 31.0)	
Diploma	135	17.5%	(10.5, 27.6)	50.5%	(42.5, 58.4)	32.0%	(22.7, 43.1)	
Bachelors or more	232	18.0%	(12.2, 25.7)	48.9%	(40.9, 56.9)	33.1%	(23.5, 44.4)	
Marital status								
Not married	294	28.3%	(22.4, 35.0)	41.3%	(34.9, 48.1)	30.4%	(24.3, 37.2)	<0.001
Married	786	15.2%	(12.2, 18.8)	55.8%	(51.2, 60.2)	29.0%	(24.2, 34.5)	
Governorate								
Muscat	102	21.5%	(14.1, 31.4)	49.0%	(39.4, 58.7)	29.5%	(20.0, 41.1)	0.133
Dhofar	63	21.0%	(10.9, 36.7)	55.7%	(46.0, 65.0)	23.3%	(14.2, 35.8)	
Ad Dakhliyah	86	16.3%	(8.2, 29.7)	44.2%	(33.4, 55.5)	39.5%	(27.3, 53.2)	
Ash Sharqiyah North	88	22.5%	(17.2, 28.9)	45.2%	(37.5, 53.2)	32.3%	(23.7, 42.2)	
Ash Sharqiyah South	110	13.5%	(9.9, 18.2)	56.4%	(49.9, 62.6)	30.1%	(22.5, 39.0)	
Al Batinah North	110	18.1%	(13.7, 23.5)	53.6%	(42.0, 64.8)	28.3%	(20.1, 38.3)	
Al Batinah South	101	18.9%	(11.5, 29.5)	51.5%	(42.2, 60.7)	29.6%	(22.9, 37.3)	
Adh Dhahirah	110	14.5%	(12.8, 16.5)	64.6%	(60.4, 68.5)	20.9%	(17.8, 24.4)	
Al Buraymi	87	16.9%	(10.2, 26.7)	61.8%	(45.3, 76.0)	21.3%	(14.7, 29.9)	
Musandam	114	18.3%	NA*	50.5%	NA*	31.2%	NA*	
Al Wusta	109	19.9%	(14.3, 26.9)	61.8%	(48.0, 73.8)	18.4%	(11.0, 29.2)	
Household income								
<200 OMR	213	13.9%	(9.0, 20.7)	48.4%	(39.9, 57.1)	37.7%	(28.8, 47.5)	0.153
200-499 OMR	308	17.1%	(11.3, 25.0)	52.5%	(44.5, 60.3)	30.4%	(24.7, 36.9)	
500-999 OMR	210	19.9%	(12.8, 29.5)	55.1%	(46.4, 63.5)	25.0%	(19.4, 31.7)	
1000+ OMR	96	14.4%	(7.1, 26.7)	58.6%	(47.8, 68.6)	27.1%	(17.2, 39.9)	
Do not know	253	25.2%	(18.6, 33.3)	49.2%	(41.5, 56.9)	25.6%	(19.9, 32.2)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Type of job								
Government	284	15.8%	(10.5, 23.1)	54.2%	(47.2, 61.0)	30.0%	(23.0, 38.1)	<0.05
Private	160	12.1%	(6.8, 20.5)	47.6%	(35.7, 59.7)	40.4%	(30.7, 50.8)	
Military	102	15.0%	(8.1, 26.2)	54.3%	(43.1, 65.0)	30.7%	(21.6, 41.6)	
Retired	38	12.4%	(4.7, 29.0)	60.1%	(33.9, 81.5)	27.5%	(12.1, 51.3)	
Student	57	38.1%	(25.2, 52.9)	43.6%	(31.8, 56.1)	18.3%	(11.6, 27.8)	
Looking for work	168	23.3%	(16.6, 31.8)	56.1%	(46.5, 65.2)	20.6%	(13.8, 29.7)	
Not working	271	19.7%	(14.7, 25.7)	50.0%	(42.5, 57.6)	30.3%	(23.7, 37.8)	
Works in health field								
Yes	49	7.3%	(2.0, 22.9)	55.3%	(36.7, 72.6)	37.4%	(21.9, 56.1)	0.203
No	791	19.9%	(16.1, 24.4)	51.1%	(46.4, 55.7)	29.0%	(24.4, 34.1)	
Buys food for household								
Yes	433	10.7%	(8.0, 14.3)	53.8%	(47.3, 60.2)	35.4%	(29.1, 42.3)	<0.001
No	647	23.9%	(19.7, 28.7)	50.7%	(46.2, 55.2)	25.4%	(21.1, 30.2)	
Who buys food for household								
Housewife	449	17.8%	(13.8, 22.6)	50.5%	(44.8, 56.2)	31.8%	(26.3, 37.8)	<0.05
Head of house	504	18.3%	(14.8, 22.5)	56.0%	(51.0, 60.8)	25.7%	(20.8, 31.3)	
Servant	7	42.4%	(37.0, 47.9)	43.5%	(35.6, 51.8)	14.1%	(5.1, 33.5)	
Other person	119	24.3%	(15.3, 36.2)	37.5%	(25.6, 51.2)	38.2%	(27.8, 49.8)	
Talked to professional about diet								
Yes	346	13.6%	(9.2, 19.6)	56.3%	(50.2, 62.3)	30.1%	(23.5, 37.7)	0.079
No	510	21.2%	(16.9, 26.2)	50.4%	(44.6, 56.1)	28.4%	(23.1, 34.5)	
Tried to lose weight								
Yes	529	13.2%	(9.4, 18.2)	52.9%	(47.0, 58.7)	33.9%	(28.9, 39.4)	<0.01
No	529	24.1%	(19.3, 29.6)	51.4%	(46.0, 56.8)	24.5%	(20.1, 29.5)	
Has hypertension								
Yes	88	11.8%	(4.3, 28.4)	45.9%	(31.2, 61.3)	42.3%	(29.6, 56.1)	0.145
No	992	19.3%	(16.2, 22.8)	52.5%	(48.3, 56.7)	28.2%	(24.1, 32.7)	
Has diabetes								
Yes	78	5.8%	(2.0, 15.6)	48.4%	(34.4, 62.6)	45.9%	(31.7, 60.7)	<0.01
No	1002	19.6%	(16.5, 23.2)	52.2%	(48.1, 56.4)	28.1%	(24.3, 32.3)	
Has heart disease								
Yes	17	6.1%	(0.9, 31.8)	40.5%	(22.8, 61.1)	53.4%	(34.2, 71.6)	<0.05
No	1063	18.9%	(15.9, 22.4)	52.2%	(48.2, 56.3)	28.8%	(24.9, 33.1)	
Is overweight or obese								
Yes	147	11.2%	(7.3, 16.9)	55.1%	(48.1, 61.8)	33.7%	(26.8, 41.4)	<0.05
No	933	20.1%	(16.7, 24.1)	51.3%	(46.7, 56.0)	28.5%	(24.0, 33.5)	
TOTAL	**1080**	**18.6%**	**(15.6,22.2)**	**52.0%**	**(47.9,56.0)**	**29.4%**	**(25.4,33.7)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

A majority of adult respondents agreed with statements regarding reduction of dietary sugar intake; however, about one-third also agreed that reducing sugar intake is difficult and one-half disagree that there is no need to use sugar (Figure 150).

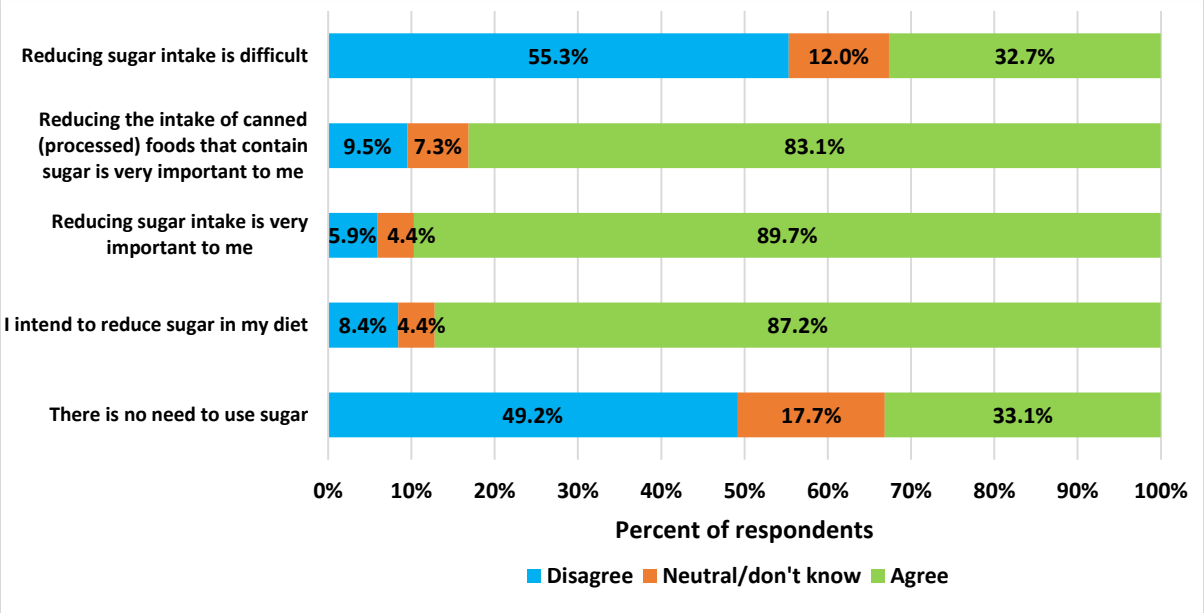

Figure 150 Respondents' agreement with statements about dietary sugar, adults 19-60 years of age

Almost one-half (45.0% of 1080) of adult respondents thought they were not at risk of diabetes from sugar consumption, while 41.1% thought they were, and 7.0% did not know. Seventy-five adults (6.9%) reported being diabetic at the time of data collection. Out of the 403 respondents with a perceived risk for diabetes because of sugar intake, 45.2% rated their probability of developing diabetes as low or very low, 37.0% as average, and 17.9% as high or very high.

The most commonly cited reason for not being at risk of diabetes was reduced sugar consumption. Other reasons were cited by fewer respondents (Figure 151).

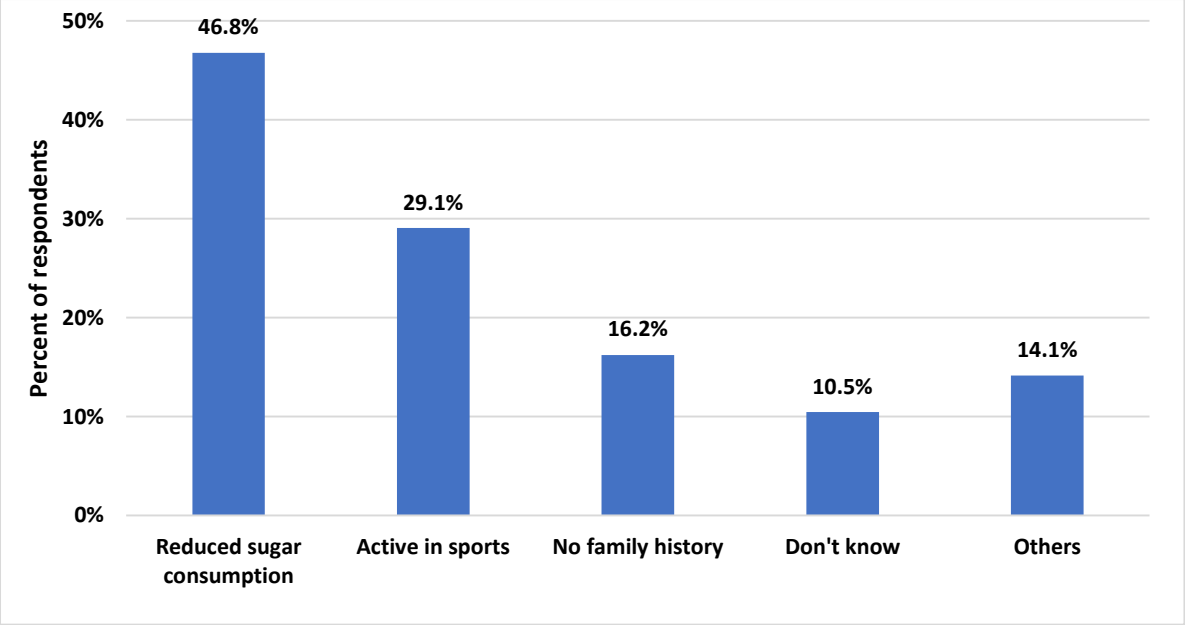

Figure 151 If risk is low, why, adults 19-60 years of age

Adults who reported that they were at risk of developing diabetes had higher sugar index scores than those who reported not being at risk or who did not know (**Table 63**).

Table 63. Number (weighted %) of adults 19-60 years of age with or without reported risk of diabetes with low, medium, or high scores on the sugar attitudes index

	Adults' sugar attitudes index			
Adult reported risk of diabetes due to sugar intake	**Low**	**Medium**	**High**	**P value**
Yes	58 (11.9%)	271 (54.6%)	149 (33.5%)	<0.001
No	115 (24.6%)	278 (51.9%)	118 (23.6%)	
Unknown	23 (26.7%)	34 (34.4%)	34 (38.9%)	

The most commonly cited factors cited by respondents which could help them reduce sugar consumption included use of natural substitutes, reducing white sugar consumption, and eating a healthy diet (Figure 152). Several other factors were listed by fewer adults.

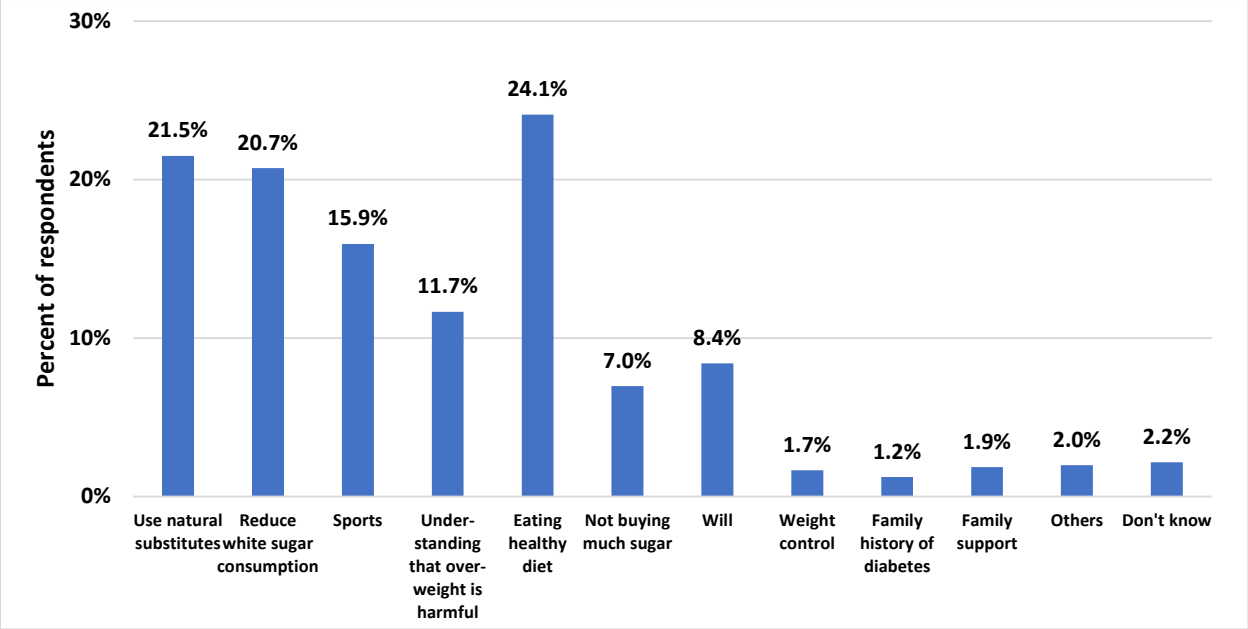

Figure 152 What will help you reduce sugar consumption, adults 19-60 years of age

By far the most commonly cited factor which could help motivate adult respondents to reduce sugar consumption was a change in their health condition (Figure 153).

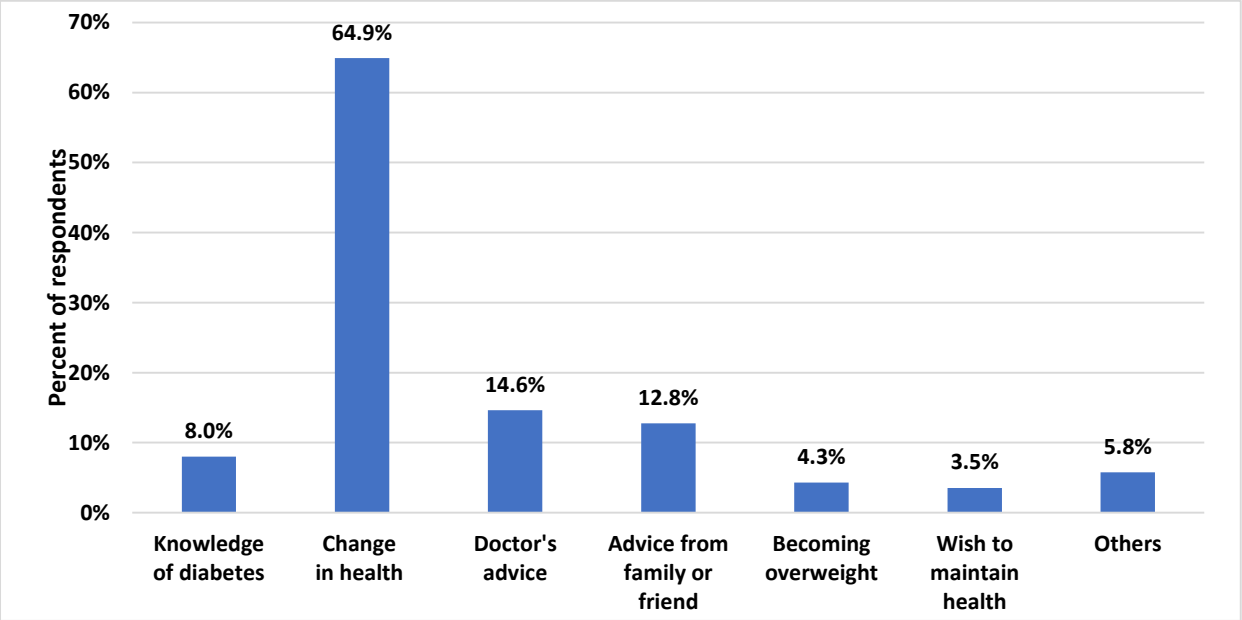

Figure 153 What could motivate you to reduce sugar consumption, adults 19-60 years of age

More than one-half of adult respondents reported that there were no barriers to their reducing sugar consumption (Figure 154). The most commonly cited barrier was that respondents liked the taste of sugar.

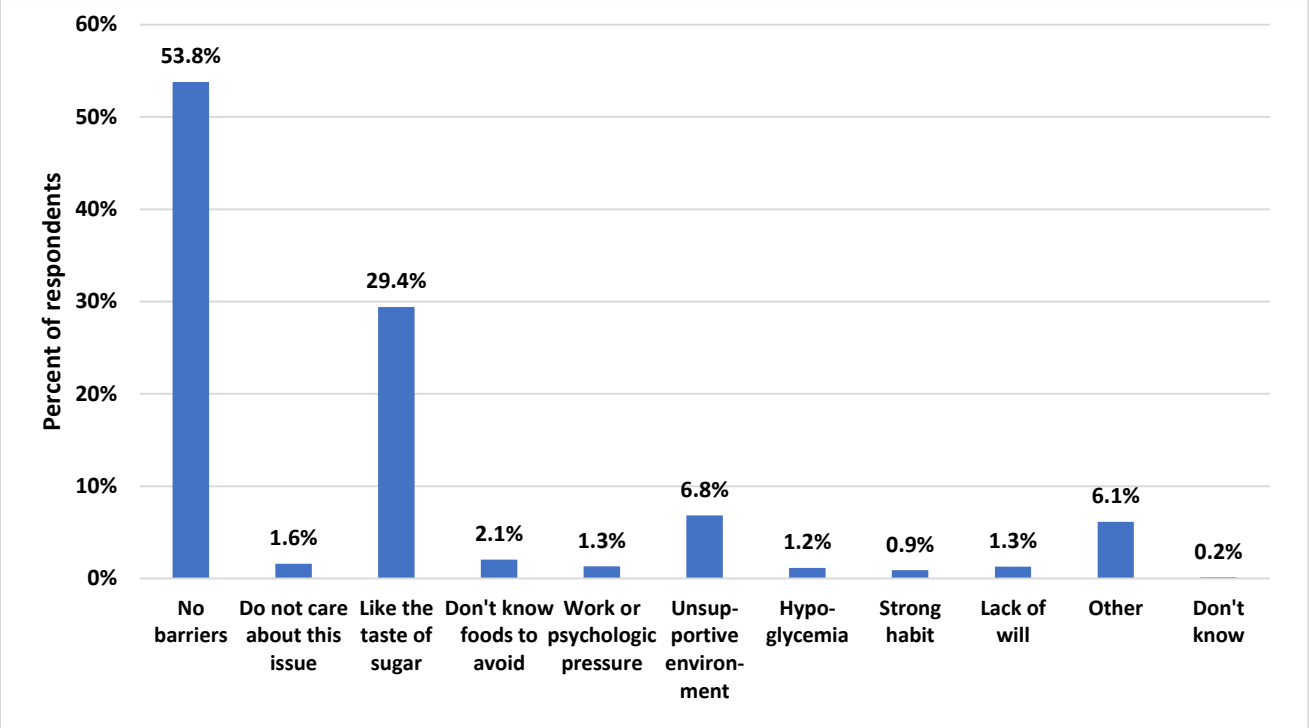

Figure 154 What barriers could prevent you from reducing sugar consumption, adults 19-60 years of age

6.2.4. Practices

Although fewer than one-half of adult respondents scored low on the sugar practices index, fewer than 5% scored high (**Table 64**). This was true in all subgroups except for adults with only a primary education and in two governorates. Index scores were somewhat higher in those adults with better education and in those adults who had spoken to a professional about nutrition and those who had tried to lose weight in the past.

Table 64. Composite index for sugar practice of adults 19-60 years by various demographic characteristics

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Sex								
Male	545	40.8%	(34.6, 47.3)	54.6%	(47.7, 61.3)	4.7%	(2.5, 8.6)	0.418
Female	539	39.9%	(32.8, 47.5)	57.6%	(50.4, 64.5)	2.5%	(1.1, 5.7)	
Age								
19-29	369	45.8%	(38.1, 53.8)	52.6%	(44.6, 60.5)	1.6%	(0.5, 4.8)	0.263
30-39	438	38.2%	(31.7, 45.2)	57.0%	(49.8, 63.9)	4.8%	(2.6, 8.8)	
40-49	192	37.0%	(28.4, 46.4)	58.7%	(49.2, 67.6)	4.3%	(2.2, 8.2)	
50-60	85	34.4%	(21.7, 49.9)	60.8%	(45.5, 74.3)	4.7%	(1.2, 17.0)	
Educational level								
Primary	43	62.5%	(41.6, 79.6)	37.5%	(20.4, 58.4)	0%	-	<0.01
Elementary	105	47.0%	(37.2, 57.0)	48.2%	(39.6, 57.0)	4.8%	(1.5, 14.5)	
Secondary	518	44.6%	(38.3, 51.2)	52.9%	(47.1, 58.6)	2.5%	(1.0, 6.1)	
Diploma	136	32.4%	(23.1, 43.3)	63.4%	(52.7, 72.9)	4.3%	(1.8, 10.0)	
Bachelors or more	234	27.1%	(20.3, 35.2)	66.8%	(57.9, 74.6)	6.1%	(3.3, 11.0)	
Marital status								
Not married	295	44.6%	(35.6, 53.9)	51.5%	(42.3, 60.6)	3.9%	(1.9, 8.0)	0.482
Married	789	38.7%	(32.7, 45.1)	57.8%	(51.4, 63.9)	3.5%	(1.8, 6.6)	
Governorate								
Muscat	102	27.5%	(18.2, 39.3)	66.7%	(54.9, 76.8)	5.8%	(2.3, 13.9)	0.075
Dhofar	64	60.6%	(45.7, 73.8)	37.9%	(24.0, 54.2)	1.4%	(0.3, 6.9)	
Ad Dakhliyah	86	37.2%	(24.0, 52.7)	55.8%	(43.1, 67.8)	7.0%	(3.5, 13.5)	
Ash Sharqiyah North	88	54.3%	(35.1, 72.3)	44.6%	(27.0, 63.6)	1.1%	(0.2, 6.8)	
Ash Sharqiyah South	110	42.7%	(32.8, 53.3)	57.3%	(46.7, 67.2)	0%	-	
Al Batinah North	111	45.0%	(33.0, 57.7)	54.1%	(41.5, 66.1)	0.9%	(0.1, 6.2)	
Al Batinah South	101	34.7%	(27.2, 43.2)	61.2%	(50.2, 71.2)	4.0%	(1.0, 14.2)	
Adh Dhahirah	112	42.9%	(33.2, 53.2)	53.5%	(45.2, 61.6)	3.6%	(1.0, 11.5)	
Al Buraymi	87	39.8%	(18.2, 66.2)	51.1%	(27.8, 73.9)	9.2%	(8.0, 10.4)	
Musandam	114	33.0%	NA*	63.5%	NA*	3.5%	NA*	
Al Wusta	109	55.5%	(40.0, 69.9)	42.7%	(28.4, 58.4)	1.8%	(0.5, 6.1)	
Household income								
<200 OMR	214	40.8%	(29.6, 52.9)	56.0%	(44.5, 66.8)	3.3%	(1.0, 9.9)	0.187
200-499 OMR	309	40.6%	(32.0, 49.9)	56.5%	(47.5, 65.2)	2.8%	(1.2, 6.3)	
500-999 OMR	210	44.9%	(36.0, 54.1)	51.7%	(42.0, 61.3)	3.4%	(1.5, 7.5)	
1000+ OMR	96	23.4%	(13.6, 37.1)	67.5%	(53.0, 79.3)	9.1%	(4.0, 19.6)	
Do not know	255	42.3%	(34.0, 51.1)	54.8%	(46.2, 63.2)	2.8%	(1.0, 7.7)	
Type of job								
Government	287	35.1%	(27.8, 43.2)	59.4%	(51.5, 66.9)	5.5%	(2.6, 11.2)	0.176
Private	160	37.5%	(26.8, 49.5)	56.6%	(44.0, 68.5)	5.9%	(2.6, 13.0)	
Military	102	38.0%	(26.1, 51.6)	57.0%	(44.9, 68.3)	5.0%	(1.7, 13.9)	
Retired	38	32.8%	(20.5, 48.0)	62.2%	(46.4, 75.7)	5.0%	(1.5, 15.2)	
Student	57	45.6%	(32.5, 59.3)	50.3%	(35.5, 65.1)	4.1%	(0.9, 16.0)	
Looking for work	169	42.7%	(33.5, 52.4)	56.3%	(46.6, 65.6)	1.0%	(0.2, 4.8)	
Not working	271	46.2%	(37.6, 55.1)	52.6%	(44.2, 60.9)	1.1%	(0.3, 4.4)	

		Low		Moderate		High		P
Characteristic	**N**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**% [a]**	**(95% CI) [b]**	**value**
Works in health field								
Yes	49	29.2%	(14.7, 49.7)	70.8%	(50.3, 85.3)	0%	-	0.409
No	795	37.6%	(32.0, 43.5)	58.3%	(52.4, 63.9)	4.2%	(2.5, 6.9)	
Buys food for household								
Yes	434	32.1%	(25.4, 39.7)	62.5%	(55.1, 69.3)	5.4%	(2.9, 9.7)	<0.01
No	650	45.7%	(39.4, 52.2)	51.9%	(45.5, 58.1)	2.4%	(1.2, 4.9)	
Who buys food for household								
Housewife	450	35.1%	(29.0, 41.8)	60.8%	(54.2, 67.1)	4.1%	(2.2, 7.4)	0.065
Head of house	506	45.4%	(39.6, 51.2)	51.1%	(45.2, 56.9)	3.6%	(1.8, 7.1)	
Servant	7	71.8%	(49.8, 86.7)	28.2%	(13.3, 50.2)	0%	-	
Other person	120	35.6%	(25.1, 47.6)	62.5%	(50.4, 73.3)	1.9%	(0.3, 10.8)	
Talked to professional about diet								
Yes	348	29.4%	(22.0, 38.0)	66.1%	(57.3, 73.9)	4.5%	(2.3, 8.7)	<0.01
No	511	43.5%	(36.6, 50.8)	52.3%	(45.4, 59.2)	4.1%	(2.4, 7.0)	
Tried to lose weight								
Yes	531	33.6%	(27.9, 39.8)	61.1%	(54.6, 67.3)	5.3%	(3.1, 8.9)	<0.001
No	531	47.0%	(39.9, 54.1)	51.1%	(44.2, 58.0)	1.9%	(0.9, 4.2)	
Has hypertension								
Yes	88	26.8%	(16.9, 39.6)	67.2%	(51.2, 80.0)	6.0%	(2.0, 16.7)	0.062
No	996	41.5%	(36.2, 47.0)	55.1%	(49.7, 60.4)	3.4%	(2.2, 5.3)	
Has diabetes								
Yes	78	25.3%	(14.5, 40.5)	65.2%	(48.3, 79.1)	9.4%	(3.5, 22.8)	<0.05
No	1006	41.4%	(36.0, 47.1)	55.4%	(50.0, 60.7)	3.2%	(1.8, 5.5)	
Has heart disease								
Yes	17	29.1%	(12.2, 54.8)	70.9%	(45.2, 87.8)	0%	-	0.402
No	1067	40.5%	(35.4, 45.9)	55.8%	(50.6, 60.8)	3.7%	(2.3, 5.9)	
Is overweight or obese								
Yes	147	33.8%	(25.6, 43.2)	63.2%	(54.0, 71.6)	2.9%	(1.1, 7.7)	0.164
No	937	41.5%	(36.0, 47.3)	54.7%	(49.1, 60.2)	3.8%	(2.3, 6.1)	
TOTAL	**1084**	**40.3%**	**(35.0,45.8)**	**56.1%**	**(50.8,61.3)**	**3.6%**	**(2.2,5.8)**	

* Because Musandam has only 1 cluster, calculated confidence intervals are invalid.

Relatively few adult respondents add sugar to food or drinks (Figure 155). In addition, few use local sugar or brown sugar.

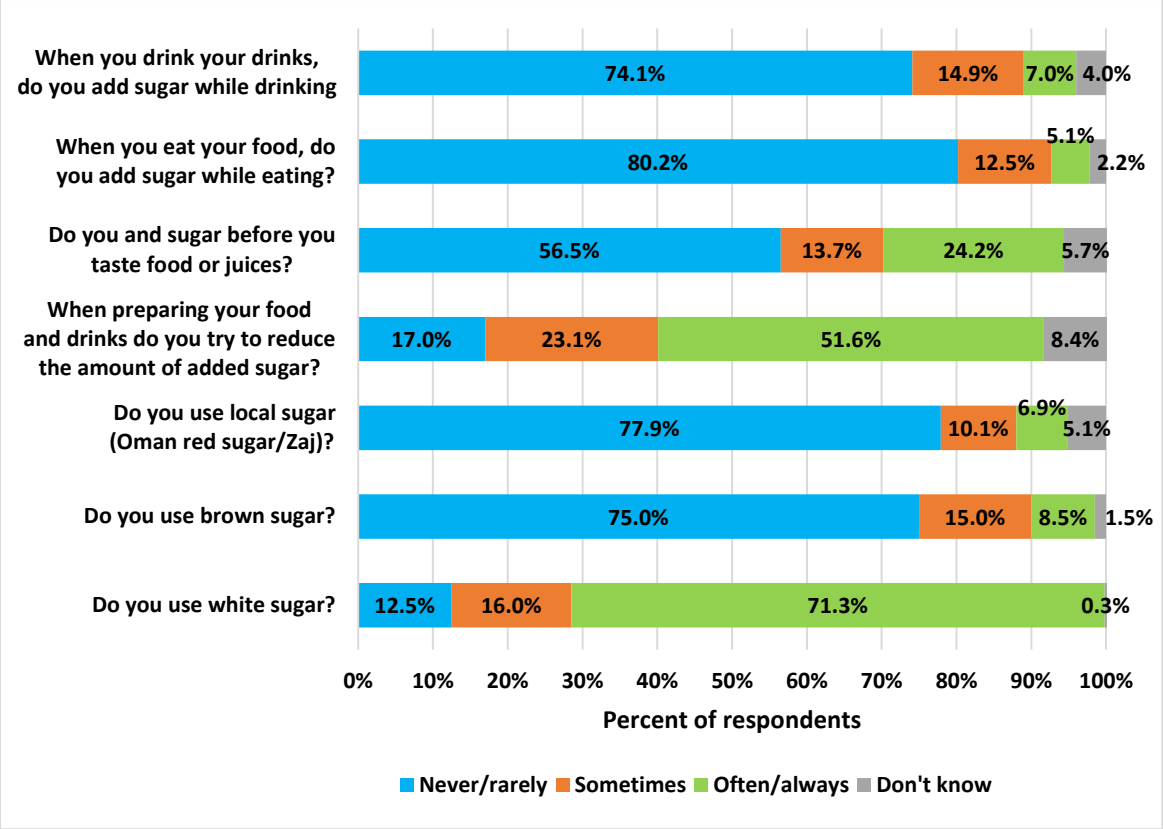

Figure 155 Responses to various questions regarding dietary sugar practices, adults 19-60 years of age

Almost one-half of adult respondents say that they never or rarely check the sugar content of foods when shopping, and relatively few of those who do check allow this information to influence their purchasing decisions (**Table 67**). In addition, about one-half sometimes, often, or always purchase low sugar foods. The distribution of the values for these variables by governorate is shown in tables **Table S79**, **Table S80**, and **Table S81**.

Table 67. Percent of respondents who reported frequencies of various behaviors related to checking food labels for sugar content – Adults 19-60 years of age

		Frequency			
Question	N	Never/rarely	Sometimes	Often/always	Do not know
How often check sugar content of foods	1084	46.3%	20.6%	29.5%	3.6%
How often reading of food label about sugar affects purchases	677	19.0%	30.2%	44.5%	6.3%
How often buy foods labeled as low sugar or no added sugar	1084	36.1%	22.9%	31.2%	9.7%

Adult respondents most commonly reported using a teaspoon, a tablespoon, or an Omani coffee cup to add sugar during cooking (Figure 156). Other methods were reported much less commonly.

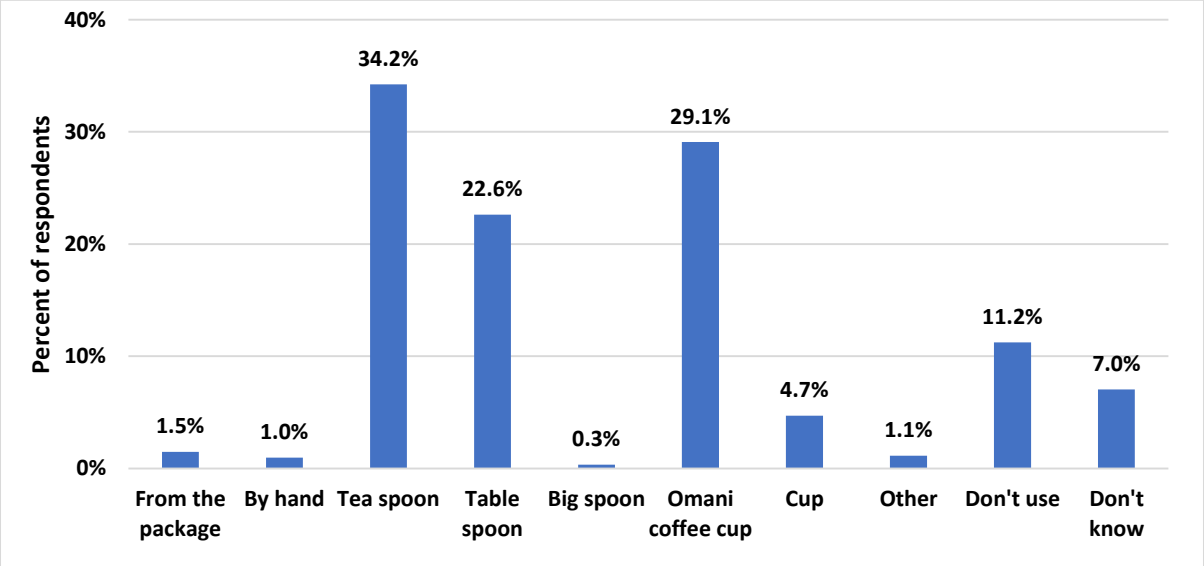

Figure 156 What scale is used when adding sugar during cooking, adults 19-60 years of age

Two-thirds of adult respondents reported not adding sugar to food during eating (Figure 157). For those adults who do add sugar, the most commonly cited method was using a teaspoon.

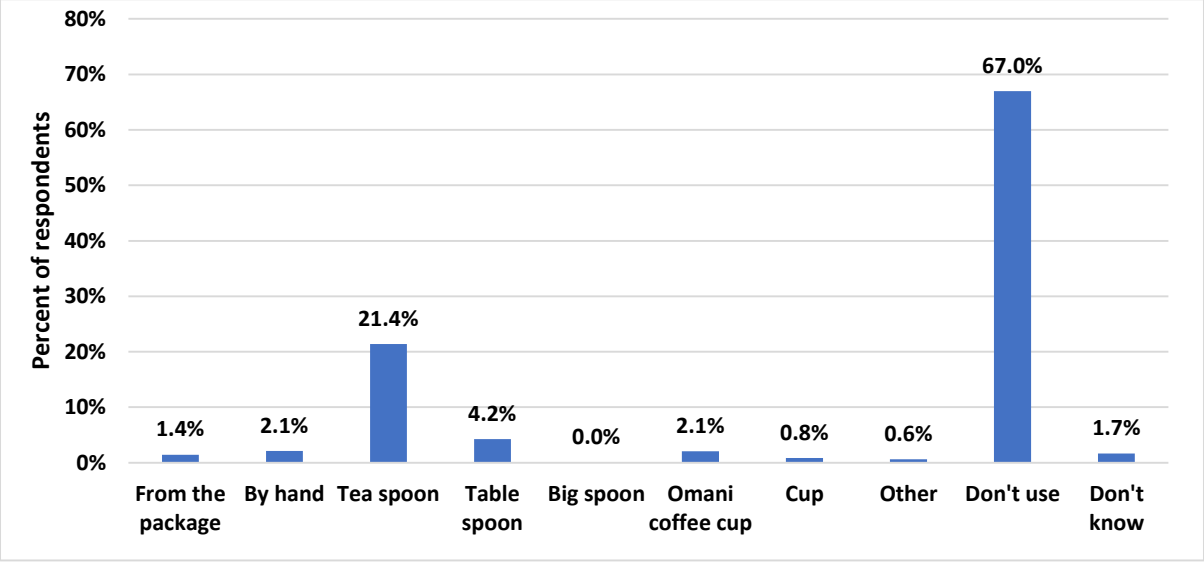

Figure 157 What scale is used when adding sugar when eating, adults 19-60 years of age

The most common use of sugar reported by adult respondents was adding it to tea (Figure 158). Other uses, reported much less frequently, were adding to sweets, baked goods, and juices.

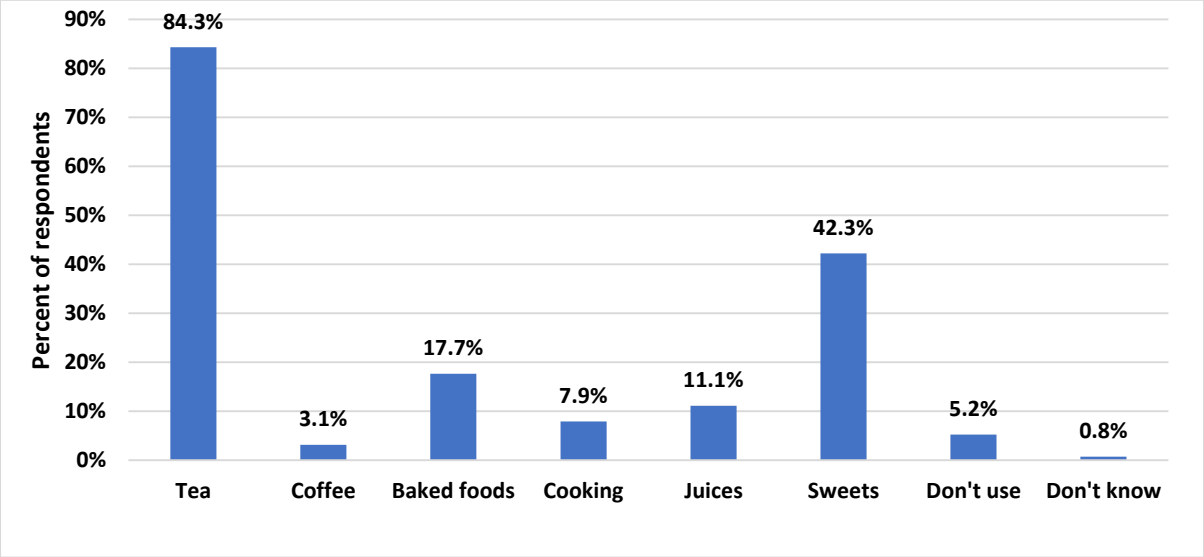

Figure 158 What do you use sugar for most often, adults 19-60 years of age

The number of spoons of sugar added to drinks varies by governorate (**Table 65**). Adult respondents in Dhofar add subtantially more sugar than in other governorates, and the p value of <0.001 demonstrates that the differences among governorates are statistically significant.

Table 65. Mean number of spoons of sugar added to a cup of drinks by adults 19-60 years of age, by governorate

Governorate	N	Mean spoons of sugar added to drinks
Muscat	96	1.1
Dhofar	65	1.7
Ad Dakhliyah	74	0.9
Ash Sharqiyah North	88	1.0
Ash Sharqiyah South	106	1.1
Al Batinah North	108	1.1
Al Batinah South	91	1.0
Adh Dhahirah	104	0.8
Al Buraymi	84	1.3
Musandam	86	1.3
Al Wusta	88	1.4

The amount of sugar added to drinks differed with statistical significance (p <0.001) by the self-assessed appropriateness of adult respondents' sugar intake (Table 66). Those respondents who thought their sugar intake was more than appropriate added more sugar to their drinks, and those who thought their sugar intake was appropriate or less than appropriate added less sugar. Respondents who could not assess the appropriateness of their sugar intake had the lowest sugar usage.

Table 66. Mean number of spoons of sugar added to a cup of drinks by adults 19-60 years of age, by self-reported appropriateness of current sugar intake

Appropriateness	N	Mean spoons of sugar added to drinks
Yes	598	1.0
No (more than appropriate	294	1.3
No (less than appropriate)	102	1.1
Don't know	24	0.6

A large proportion (84.3%) of the 1084 responding adults reported trying to limit their sugar intake; 157 (14.8%) reported that they were not trying to limit their sugar intake, and fewer than 1% said they did not know.

Of the 913 adults who reported trying to limit sugar intake, the two most commonly cited reasons were for health and weight control (Figure 159).

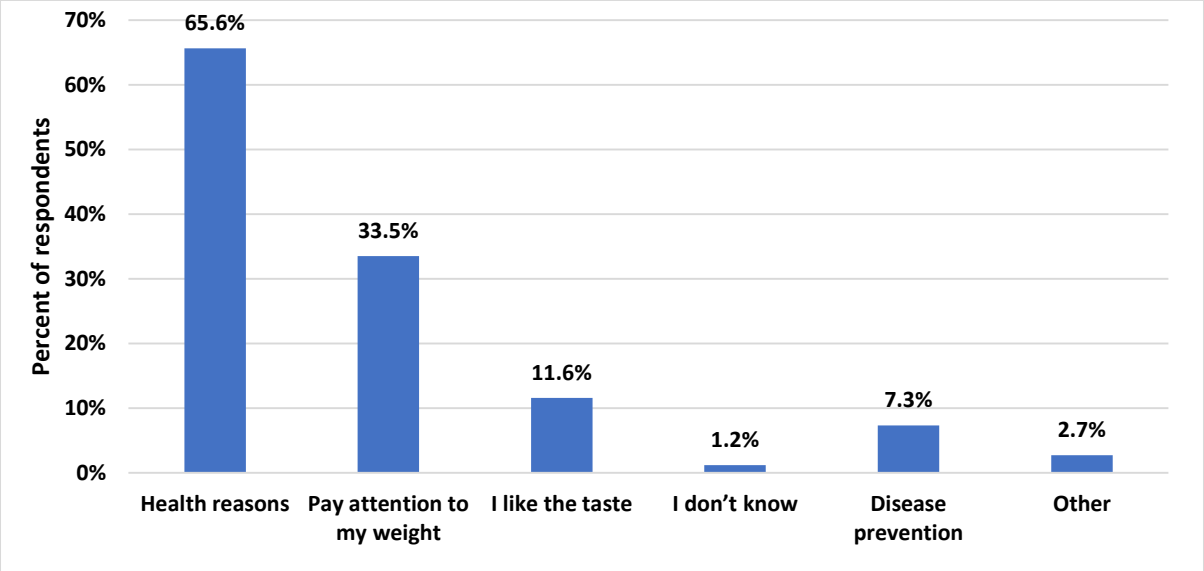

Figure 159 Reason for limiting sugar in diet, adults 19-60 years of age

Of the 157 adults who reported not trying to limit their sugar intake, more than two-thirds said it was because of habit (Figure 160). Other reasons were reported by only a few percent of respondents, although a relatively large proportion could not report a reason.

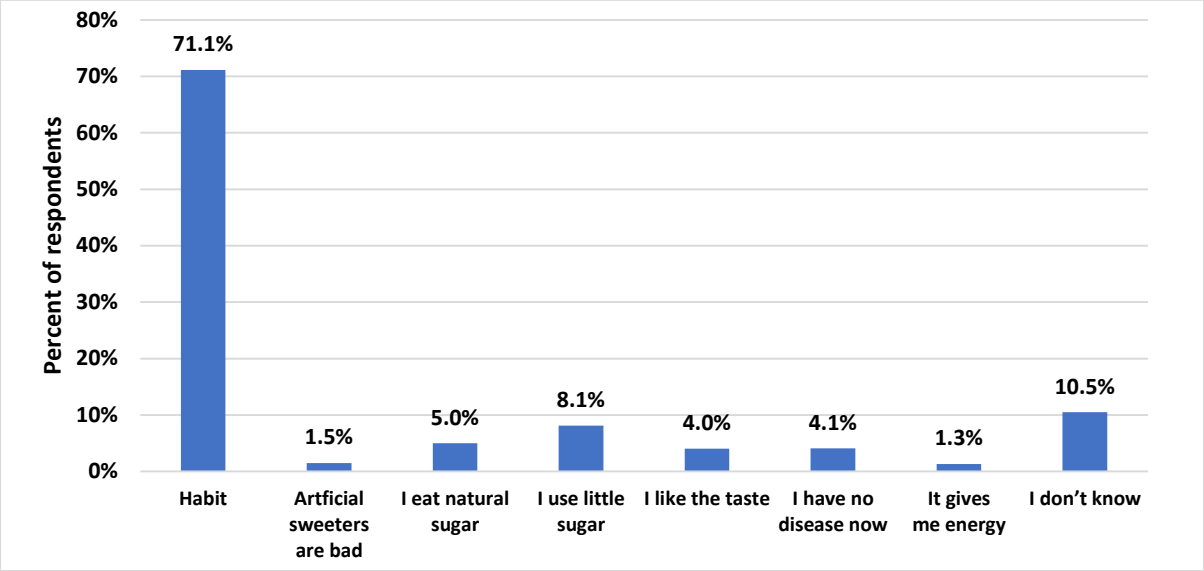

Figure 160 Reason for not limiting amount of sugar in diet, adults 19-60 years of age

Use of artificial substitutes for sugar was reported by only 176 (18.7%) of the 1084 responding adults. The majority of adults (70.6%) reported that they did not use artificial sugar substitutes, and 10.7% responded they did not know. Of those who reported using artificial substitutes for sugar, 123 (73.2%) of the 176 respondents reported using Stevia and 40 (18.4%) reported using Steviana.

Of the 1084 adult respondents, 551 (52.1%), reported using natural sugar substitutes; 471 (44.3%) reported not using natural sugar substitutes, and 3.6% reported "I don't know". As shown in Figure 161 below, the natural substitutes reported by adults consisted largely of alternate forms of sugar, including honey, pomegranate syrup, date syrup, and sugarcane molasses.

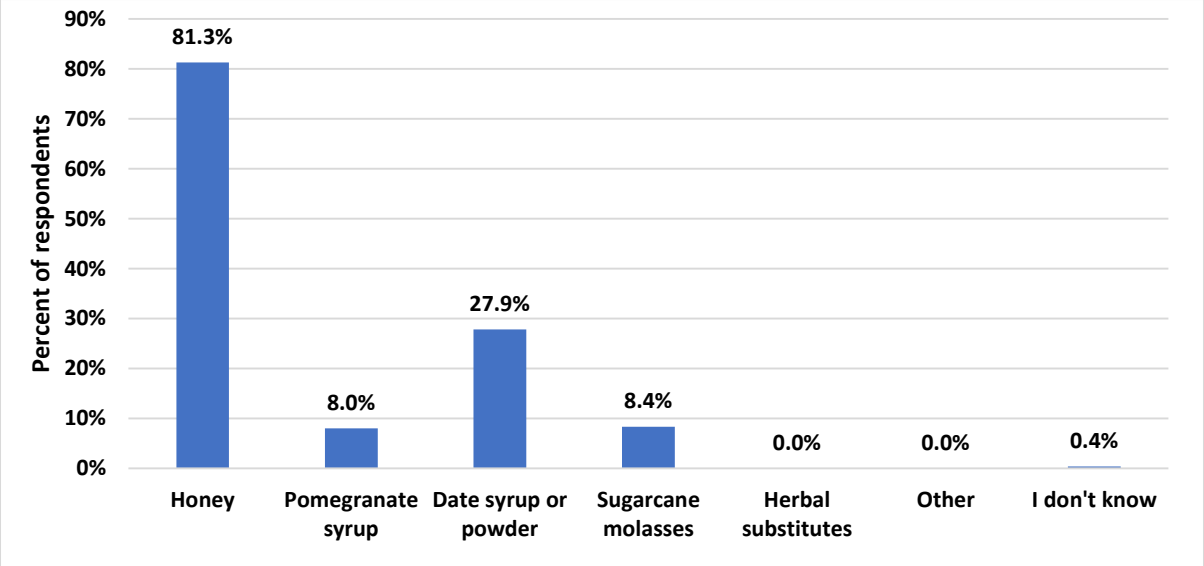

Figure 161 Of those reporting using natural substitutes for sugar, percent using specific substitutes, adults 19-60 years of age

Only about one-third of adult respondents said that the imposition of a tax on soft drinks and sweetened beverages reduced their consumption, but a large proportion of adults reported not consuming such drinks (Figure 162). Another one-third said no, that such a tax did not reduce their consumption.

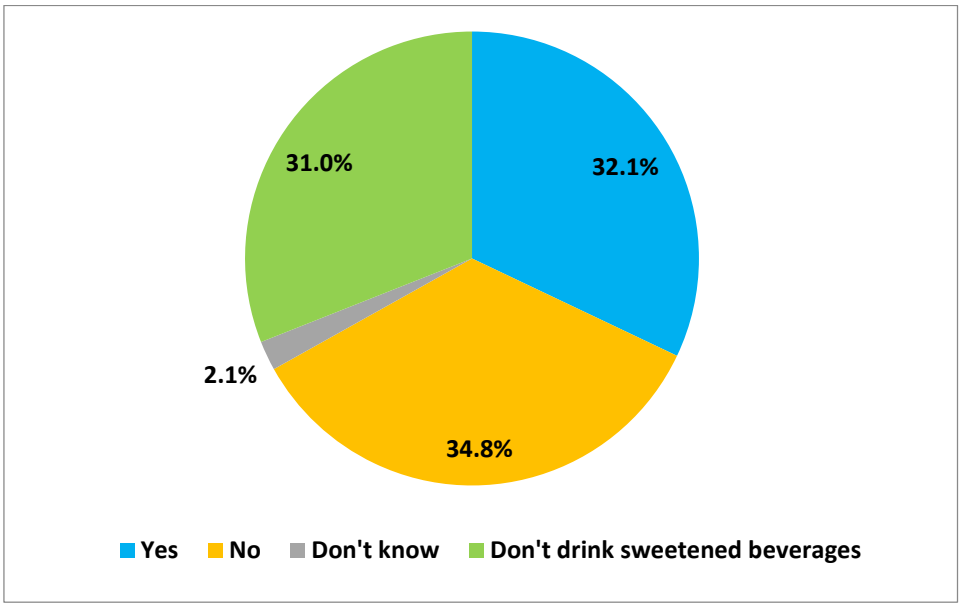

Figure 162 Would imposing a tax on soft drinks and sweetened beverages reduce your consumption, adults 19-60 years of age

Many adults reported consuming several high-sugar foods only monthly or rarely; these foods include Arab sweets; Omani halwa; jelly, cream, or custard; breakfast cereal; canned fruit or jam; sweet milk; and red sugar drink (Table 67). On the other hand, several high-sugar foods were consumed much more often, including chocolate; honey; canned sweet drinks; natural canned juice with sugar; carbonated drinks; regular chewing gum; coffee or tea with sugar; and sauces. The median number of times per month each food is consumed is shown for each governorate in **Table S82**.

Table 67. Reported frequency* of consuming various foods, by adults 19-60 years of age

Food	Daily	Weekly	Monthly	Rarely
Arab sweets	0.6%	13.3%	29.2%	56.9%
Omani halwah	1.3%	10.9%	27.9%	60.0%
Biscuits, cakes, donuts	8.8%	36.7%	21.9%	32.7%
Date molasses	7.1%	21.1%	16.7%	55.1%
Jelly, cream, custard	0.6%	5.3%	8.5%	85.6%
Ice cream	4.5%	24.8%	18.8%	51.9%
Chocolate	16.4%	30.4%	11.9%	41.3%
Breakfast cereal	5.2%	12.0%	6.8%	76.1%
Rusk	2.0%	8.4%	8.8%	80.8%
Honey	21.0%	43.9%	16.9%	18.3%
Canned fruit, jam	2.2%	7.1%	7.1%	83.6%
Canned sweet drinks	14.0%	20.7%	11.5%	53.7%
Natural canned juice with sugar	13.6%	25.9%	12.6%	47.9%
Natural juice with no sugar	8.9%	25.5%	11.0%	54.6%
Carbonated drinks	13.8%	19.0%	12.9%	54.2%
Carbonated drinks with no sugar	1.4%	7.2%	6.0%	85.4%
Energy drinks	0.7%	3.7%	6.0%	89.5%
Regular chewing gum	14.0%	15.8%	10.3%	59.9%
Sweet milk	3.0%	15.4%	19.6%	62.0%
Coffee or tea with sugar	59.0%	12.5%	3.4%	25.1%
Sauces	17.1%	27.6%	8.0%	47.3%
Red sugar drink	0.4%	2.5%	2.8%	94.3%

* Monthly frequency calculated as continuous variable, then categorized as:

Daily	16 times per month or more
Weekly	3 – 15 times per month
Monthly	1 – 2 times per month
Rarely	0 times per month

6.3. Discussion

The composite index scores for knowledge of dietary sugar were substantially higher in both adolescents and adults than the knowledge scores for general health eating, oil and fat, or salt. In addition, these scores were high in almost every demographic subgroup. As with other composite scores in adolescents, scores did not differ with statistical significance by most demographic variables; however, scores were significantly different by governorate. In contrast to other questionnaires, the knowledge index score differed by fewer demographic variables in adults, although the knowledge score did increase with educational level and was greater in those who had tried to lose weight.

A large proportion of both adolescents and adults thought their sugar intake was appropriate, even though more than one-half did not know the World Health Organization recommended maximum daily sugar intake. As with oil and fat and salt, a large majority of respondents knew that excess sugar intake was bad for health; a majority also knew that sugar consumption leads to accumulation of fat and resultant weight gain, obesity, and diabetes. In addition, a large proportion of adolescent and adult respondents could correctly identify several foods containing high levels of sugar but failed to identify other important sugar-containing foods.

Despite generally high knowledge of sugar, the composite scores for attitudes regarding dietary sugar were generally low nationally and in most demographic subgroups. The attitudes scores were, however, higher in adults than in adolescents, and among adults, scores were higher with increasing age, in married people, and in those who were responsible for household food purchases. In addition, adults who had tried to lose weight and those who had diabetes, heart disease, or were overweight or obese had higher scores than those without these conditions. While most respondents agreed that reducing consumption of sugar is important and most expressed an intention to do so, a majority of adolescents and about one-third of adults believe that reducing sugar intake is difficult and disagreed with the statement that there is no need to use sugar. Differences in the attitudes of adults, but not adolescents, also differed with statistical significance based on the perceived risk of diabetes.

Overall, composite index scores for dietary sugar practices in adolescents were quite poor, but these scores were somewhat better among adults. This demonstrates one of the larger differences discovered in this survey between adolescents and adults. In adults, the practices score was higher for those with more education, those who were responsible for household food purchasing, those who had talked to a professional about diet, those who had tried to lose weight, and those with diabetes.

Many adolescents and adults reported eating various high-sugar foods and snacks either daily or weekly, and adolescents ate many of these sweet foods more frequently than adults.

Few adolescent and adult respondents reported purchasing foods labeled as low sugar. Positive purchasing practices, such as reading nutrition labels and basing purchases on this information effects or checking the sugar content of foods when food shopping, were also infrequently practiced. Adolescents and adults who thought their sugar use was more than appropriate reported adding more sugar to their drinks than those who thought their sugar intake was appropriate or less than appropriate. This demonstrates that although survey subjects knew they were using more sugar than they should, they continued with this unhealthy behaviour. Lastly, few adolescent or adult respondents reported using artificial substitutes for sugar, and those who reported using "natural" substitutes for table sugar merely reported using other forms of sugar such as honey, date syrup, or molasses. These findings indicate that consumption of sugar is near universal, and that even among those respondents who stated that they used substitutes, the large majority were actually consuming sugar.

These findings indicate a situation where a sizeable share of the Omani population has high knowledge of dietary sugar and its harmful effects but is unwilling to change their consumption patterns and continue to consume large amounts of sugar. This could indicate that behavior change interventions designed to modify sugar consumption may not be entirely effective in the Sultanate of Oman. Rather, policies designed to restrict access to and/or decrease demand for sugar and sugary foods, such as increased taxes on high-sugar products, may be more practical. Although one-half of adolescents and one-third of adults reported that imposition of a tax on sugary drinks would not lead to a decrease in their consumption, these results are self-reported answers to a hypothetical situation. In fact, other countries have demonstrated that a tax on sugar-sweetened beverages leads to a substantial decline in overall sales [38].

In addition to taxes, other policies have also led to a reduction in sugar purchases and consumption. For example, government food benefit programs (e.g., cash transfers to purchase food) that prohibit the purchase of sugar-sweetened beverages have resulted in a reduced consumption of these drinks [39]. In addition, interventions that deliver bottled water and diet beverages to homes have been shown to reduce the consumption of sugar-sweetened beverages by increasing access to an acceptable substitute beverage [39].

The Sultanate of Oman has proposed policies to reduce the consumption of sugar by implementing a national plan to gradually shift subsidization from sugars and unhealthy fats to healthy foods by 2025 [40]. This initiative should be continued because economic incentives to reduce sugar consumption may be the most practical and sustainable approach to decreasing sugar intake in the population. In addition to reducing subsidies of sugar, taxes on high-sugar products should also be considered in the Sultanate of Oman. The Sultanate of Oman recently updated its national food composition database [40], and thus, high-sugar foods could be easily identified and targeted for such taxes.

7. Comparison of composite index scores Adolescents 14-18 years of age

7.1.1. Knowledge

Knowledge of dietary oil and salt is poor in all subgroups of adolescents (Figure 163). In addition, there is little difference by sex or educational level. On the other hand, knowledge of general healthy eating is poorer in Muscat, Dhofar, and Al Wusta. Knowledge of dietary oil and salt is quite variable between subgroups, while knowledge of dietary sugar is substantially higher and more similar between subgroups.

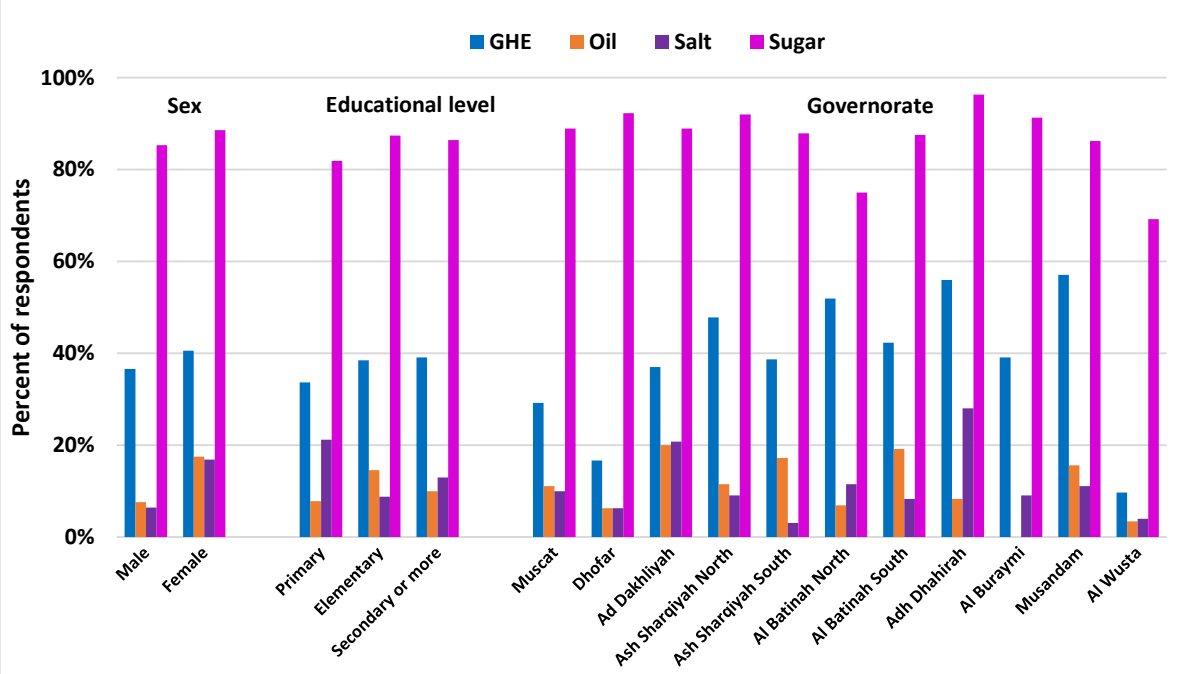

Figure 163 Weighted percent of respondents scoring moderate or high on knowledge of general healthy eating, oil and fat, salt, and sugar, by various demographic factors, adolescents 14-18 years of age

7.1.2. Attitudes

In contrast to knowledge, the scores for attitudes are much higher in all subgroups (Figure 164). In addition, there is much less difference between attitudes scores for general healthy eating, oil, salt, and sugar. In most subgroups, the attitudes score for sugar is lower than the other scores.

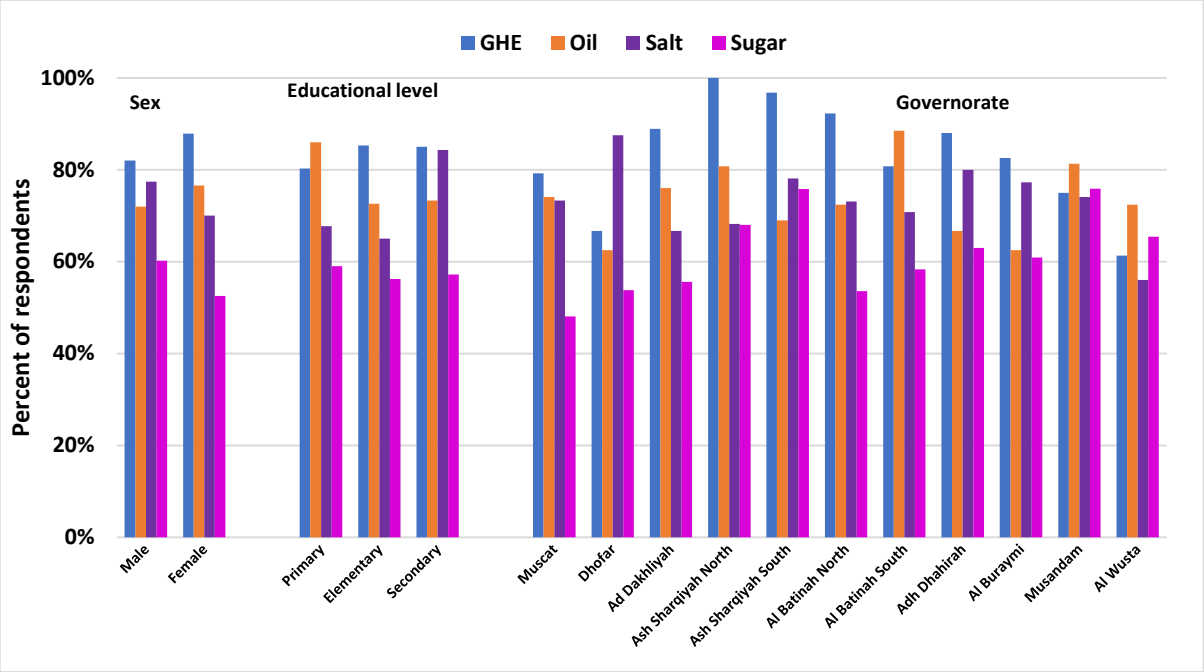

Figure 164 Weighted percent of respondents scoring moderate or high on attitudes of general healthy eating, oil and fat, salt, and sugar, by various demographic factors, adolescents 14-18 years of age

7.1.3. Practices

In all subgroups, the practices score for generally healthy eating is much higher than the other scores. The salt practices score seems to increase with increasing education. In contrast, sugar practice score does not differ substantially by sex or educational level. There is substantial variability in all scores by governorate.

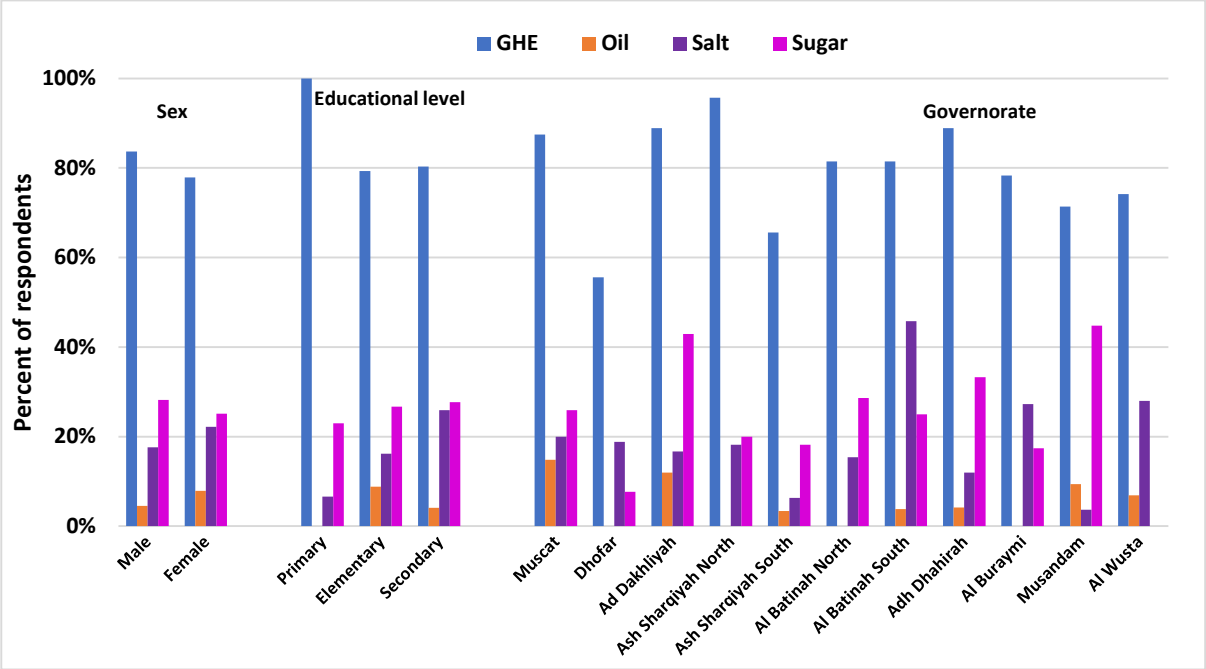

Figure 165 Weighted percent of respondents scoring moderate or high on practices of general healthy eating, oil and fat, salt, and sugar, by various demographic factors, adolescents 14-18 years of age

7.2. Adults 18-60 years of age

7.2.1. Knowledge

Overall, knowledge of dietary oil and salt is quite variable between subgroups, but less poor in adults with higher educational level (Figure 166). Knowledge of dietary sugar is substantially higher and more similar between subgroups. Knowledge of general healthy eating is poorer in Muscat, Dhofar, and Al Wusta.

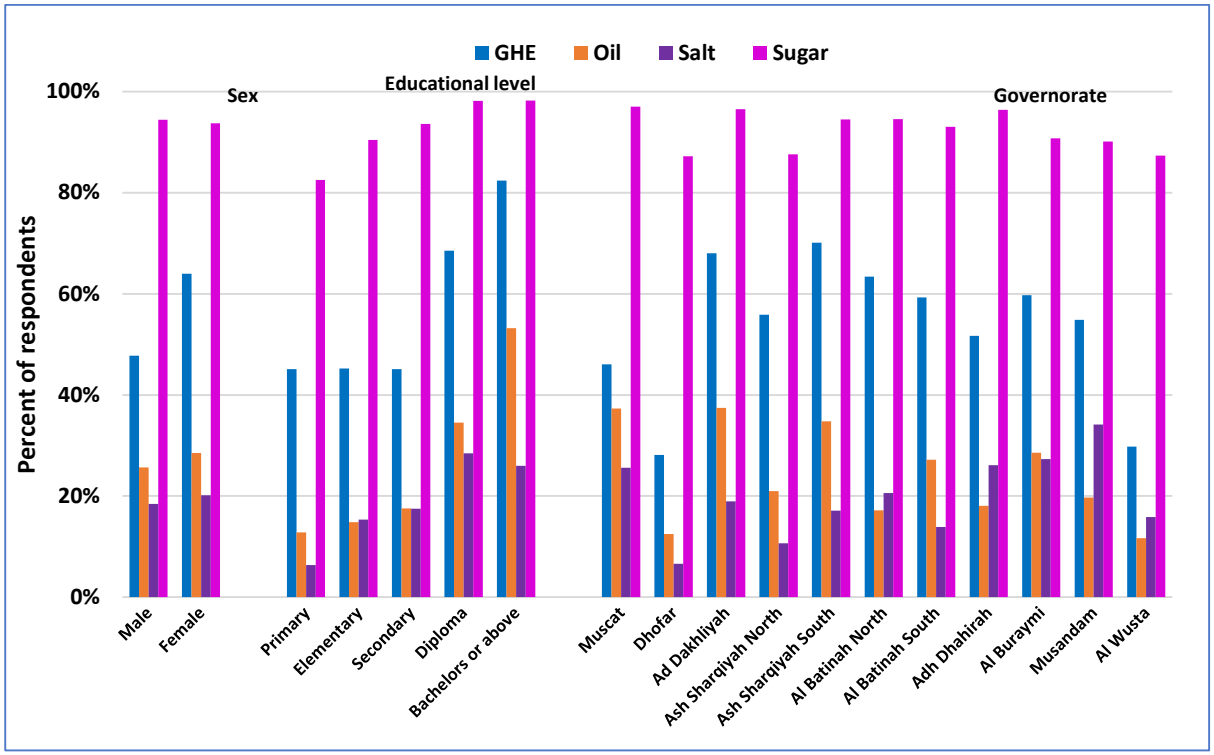

Figure 166 Weighted percent of respondents scoring moderate or high on knowledge of general healthy eating, oil and fat, salt, and sugar, by various demographic factors, adults 19-60 years of age

7.2.2. Attitudes

In contrast to knowledge, the scores for attitudes are much higher in all subgroups of adults (Figure 167). In addition, there is much less difference between attitudes scores for general healthy eating, oil, salt, and sugar.

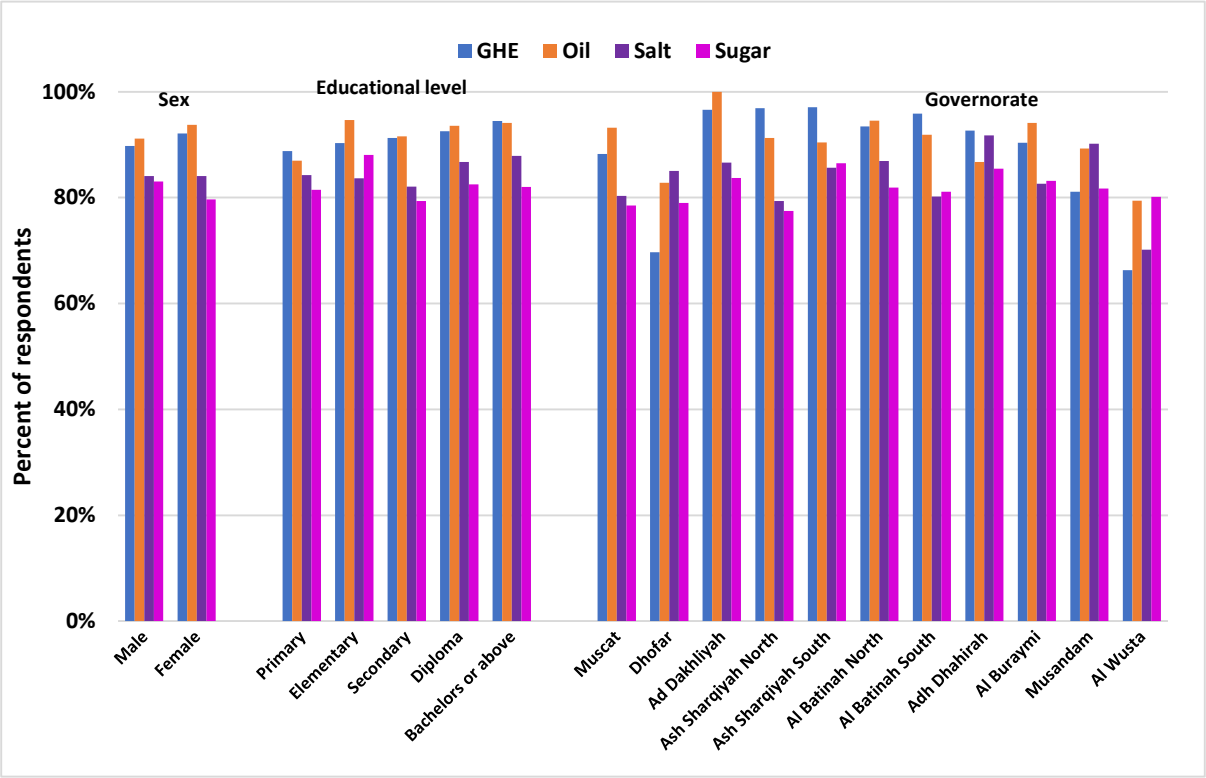

Figure 167 Weighted percent of respondents scoring moderate or high on attitudes of general healthy eating, oil and fat, salt, and sugar, by various demographic factors, adults 19-60 years of age

7.2.3. Practices

In all subgroups of adults, the practices score for general healthy eating is much higher than the other scores (Figure 168). The oil and sugar practices score seems to increase with increasing education. In contrast, salt practice score does not differ substantially by sex or educational level. There is substantial variability in all scores except the general healthy eating score by governorate.

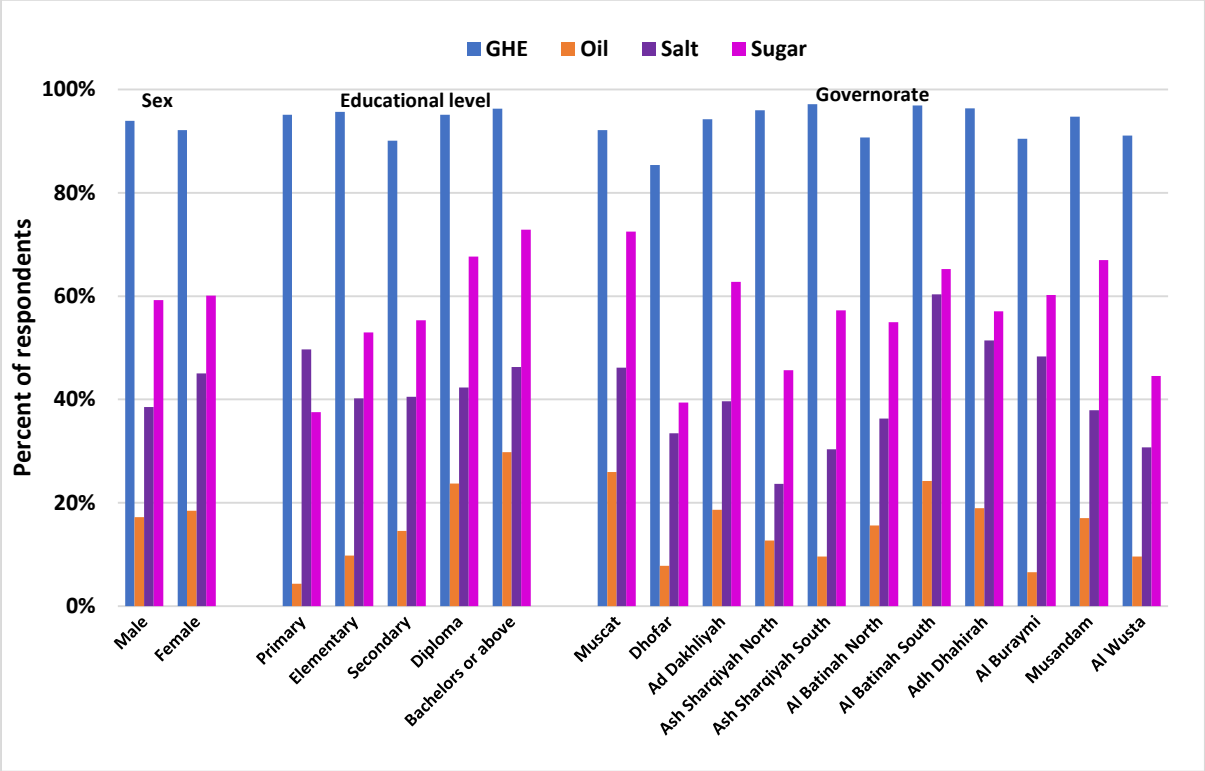

Figure 168 Weighted percent of respondents scoring moderate or high on practices of general healthy eating, oil and fat, salt, and sugar, by various demographic factors, adults

8. Overall conclusions

With relatively rare exceptions, the level of diet and nutrition knowledge, correct attitudes, and favourable practices were quite similar between adolescents and adults in the Sultanate of Oman. This is true of both the composite index scores for knowledge, attitudes, and practices for each of the four questionnaires as well as for specific questions in each of the questionnaires. This implies that the nutrition and diet education messages targeted to adolescents and adults can be similar. However, because these target groups have somewhat different patterns of media access and exposure, the medium for these messages may differ for adolescents and adults. In addition, there are some differences in the perceived risk for specific poor health outcomes resulting from excess consumption. This should also be taken into account when designing health education messages.

There seems to be no particular communication medium which reaches a large proportion of the Omani population. A minority of adolescents and adults watch local Omani television, and even fewer listen to local Omani radio. As a result, these media could not be used, on their own, to deliver nutrition education messages to a large proportion of the Omani population. Unfortunately, because of the structure of the survey questions about watching television and listening to the radio, it is not possible to develop a precise estimate of the number of Omani adolescents and adults who could be reached on each medium, station, or program. Almost two-thirds of adolescents and adults usually get information about healthy food from the internet; however, respondents cited several different websites and social media sites as sources. In addition, respondents recommend many different ways of educating the general population and children. However, this survey cannot provide sufficiently detailed information regarding which media to use to transmit what nutrition messages to which target populations. Such questions should be answered with additional marketing-style investigations, including perhaps focus groups and key informant interviews.

The composite index scores of knowledge in all questionnaires are quite poor in both adolescents and adults. A notable exception is the high level of knowledge of some specific points related to the overconsumption of fat and oil, salt, and sugar, such as the generally poor effect on health and various disease outcomes. On the other hand, other specific knowledge components were quite poor, such as the relative amount of oil and fat, salt, and sugar in selected specific foods and the type of salt and sugar substitutes which can be used to reduce dietary intake of these food components. With the exception of recommendations regarding increasing or decreasing consumption of specific types of foods, there is also a relatively poor level of knowledge of specific expert dietary recommendations, such as the recommended daily number of servings of fruits and vegetables, the recommended type of dairy products, and the recommended maximum intake of salt and sugar. Raising the level of knowledge could help individuals avoid the purchase and consumption of unhealthy foods.

The composite index scores for attitudes were quite high for all questionnaires, especially in adults. However, high attitudes scores do not translate directly into beneficial practices. This high attitude score partially resulted from the majority of adolescents and adults expressing the intention to reduce dietary intake of oil and fat, salt, and sugar. However, given the poor level of knowledge shown on all four questionnaires, it is not immediately apparent how these positive attitudes were developed initially. In addition, excessive consumption of specific foods high in oil and fat, salt, and sugar is still quite common. As a result, there is a contrast between overall attitudes and expressed intentions and actual practice. In addition, a large portion of respondents felt it was difficult to reduce intake of oil and fat, salt, and sugar and disagreed with the statement that there is no need to use oil and fat, salt, or sugar. Interventions should address these obstacles to reducing consumption. Such interventions could include taxing foods with unhealthy amounts of oil, salt, or sugar and reformulating the content of unhealthy food to decrease the concentration of these unhealthy ingredients.

Attitudes were generally more positive among respondents who had tried to lose weight in the past, and this was especially true among adults. These results highlight that there is a subgroup of the Omani population that seems to be more concerned about overweight and possibly other negative outcomes of overconsumption of oil and fat, salt, and sugar. Although, as discussed above, developing or having positive attitudes does not necessarily translate into positive behaviors, such individuals may be more amenable to health education and other interventions to change their behavior.

The lack of association between self-assessed risk for disease and the practices index scores for oil and fat, salt, and sugar among adolescents demonstrates the disconnection between self-assessed risk and behaviour. Although there was a similar lack of association between self-assessed risk of disease and the oil and fat practices index score in adults, adults reporting higher self-assessed disease risk had better composite index scores for salt and sugar practices. Adolescents may know intellectually that they may theoretically be at risk of future poor health outcomes from excess consumption, but they have not yet internalized the knowledge sufficiently to change behavior.

For both adolescents and adults, the most cited factor which would lead to a decrease in oil and fat, sugar, and salt was a change in health condition. This attitude neglects the preventive benefits of changes in dietary practice. Once long-term excess consumption results in symptomatic health conditions, primary prevention (the prevention of the initial stage of a disease process) is no longer possible. For example, primary prevention would prevent the development of fatty plaque in arteries which, years later, may produce the signs and symptoms of coronary and vascular disease. In the face of already developed disease, secondary prevention (the prevention of the progression of signs and symptoms once the disease process is established) becomes important, but it is much less effective

than primary prevention in maintaining or restoring health. Omanis need to be educated about the greater benefit of earlier changes in dietary habits before diseases associated with overconsumption appear.

Relatively few adolescents and adults reported reading food labels; looking for indications of fat, salt, or sugar content of foods; or allowing information from food labels to influence their purchasing. This indicates either a lack of awareness of the information contained on food labels or a general lack of interest in obtaining and acting upon such nutrition information. It may be beneficial to teach Omanis what nutrition information is available on food labels and what are the benefits of reading and acting upon such information. Simplified nutrition labels may be required to enhance rapid consumer comprehension.

The ability of both adolescents and adults to identify which foods were rich in some dietary components was quite variable. Most could identify foods high in added sugar, but knowledge of fiber content of specific foods was much lower, with a large proportion reporting that they did not know. Assessment of the protein content of various foods was better, although not universal. Similarly, assessment of the starch content of various foods was also variable, with one-quarter to one-third of both adolescents and adults reporting that they did not know. In addition, identification of the type of fat in various foods was quite poor, with one-half reporting that they did not know. Although such knowledge may seem too detailed for the general population, it is important for individuals to know the general categories of less desirable foods and understand why overconsumption poses risks to health.

School-based nutrition education could address some of the overall lack of knowledge, as indicated by the four composite index scores for knowledge. A recent review of worldwide data demonstrated that such education had a positive effect on fruit and vegetable consumption in adolescents [41]. In addition, an evaluation of Omani efforts at health promotion in schools demonstrated positive impact, including a positive effect on several nutrition-related outcomes [42]. However, given that this evaluation is more than 10 years old and did not focus specifically on nutrition education or behaviors, a more careful evaluation of nutrition-related activities in schools may be warranted to be sure they are as effective as they can be. Future monitoring with KAP surveys like this one can be used to revise these education programs.

The frequency with which Omanis eat in fast food restaurants is excessive, especially for adolescents. Although eating in restaurants is not necessarily unhealthy, portions in restaurants are often larger than would be consumed at home, thus encouraging overconsumption of food in general. In addition, fast food often has excess oil and fat and salt. Educational efforts should stress that most fast food is not healthy food and should only be eaten rarely.

A high proportion of both adolescents and adults reported concern about the health effects of artificial flavors and artificial colors in the food they eat, and a greater proportion of survey subjects cited this concern than cited concern about salt, calories, saturated fat, and trans fats. The exaggerated importance placed on artificial flavors and colors relative to concern about the real dangers of excess consumption of salt and fat represents a fundamental distortion of the true sources of dietary risks to health. With certain exceptions, such as nitrites and nitrates [43], there is little evidence that food additives have negative health effects; therefore, this level of relative concern is not justified by the true health risk posed by these food ingredients. Omanis would be better served by being more concerned about excess consumption of oil and fat, salt, and sugar.

One half or more of adolescent and adult respondents reported that there were no barriers to reducing consumption of oil in fact, salt, and sugar. However, one-quarter or more of adolescent and adult respondents reported eating more than is appropriate oil and fat, salt, and sugar. In addition, responses to questions about the frequency of eating specific foods high in these three food components indicate that their consumption is still greater than desired. Unfortunately, this survey cannot provide much information on why Omanis, in spite of reporting no barriers, continue to consume excess oil and fat, salt, and sugar. Further research should probe more carefully to uncover additional barriers not addressed in this survey. These barriers could then be addressed with appropriate interventions.

Many adolescent and adult respondents could not identify true substitutes for dietary salt and sugar. In addition, many incorrectly identified as salt substitutes different forms of table salt which contain sodium and different forms of sugar, all of which have the same detrimental impact on health. Educational intervention should teach that just because the form of salt and sugar used in the household is not white granules, this does not mean that these other forms are harmless. Many of them contain the same harmful components, specifically sodium and sucrose. Education should also stress practical recommendations for substituting non-sodium containing salt substitutes, and non-sugar containing substitutes which do not have the same health impact.

There are several limitations to this KAP survey which may prevent the formulation of certain conclusions:

a) Because the four different questionnaires were administered to different samples of adolescents and adults, we cannot measure cross-correlation between variables measured in different populations. As a result, we cannot look at the association between various facets of the consumption of oil and fat, salt, and sugar.

b) The four different questionnaires did not contain entirely comparable or standardized questions, so the composite scores were based on quite different criteria for different questionnaires. For example, the oil and fat knowledge index was made up of seven

questions, the salt knowledge index was six questions, and the sugar knowledge index was four questions. As a result, comparison of the differences between index scores must be done with caution. Nor can similar concepts explored with individual questions be readily compared across questionnaires. As an example, when asking respondents about expert recommendations related to sugar, the sole question about recommendations was true/false, making it relatively easy to get the correct answer. On the other hand, the general healthy eating questionnaire contained three questions about recommendations which were open-ended or required a selection from among several choices, making it much more difficult to get a perfect score on this topic.

c) All data self-reported, and there was no external or objective validation of responses. Although there is no evidence of respondents distorting answers, survey respondents often wish to give answers they think will result in approval by the interviewer. This may be responsible for some of the discrepancy between attitude questions, which are more hypothetical and theoretical and thus more amenable to distortion, and practice questions, which are more concrete.

d) Some questions are vague or open to different interpretations by different respondents. For example, the salt questionnaire contained the question which, translated into English, was “Please specify the percentage of salt in your daily menu (high, medium or low/no salt) of salt or sodium.” followed by a list of selected foods. Does this question ask respondents to categorize each of these foods according to what proportion of their total daily salt intake is contributed by that food? If so, then responding accurately to this question requires three complicated calculations on the part of each respondent: a) assessing the salt concentration in each selected food relative to all other foods consumed, b) calculating the average amount of each selected food consumed, and c) comparing this average amount to the average amount of all other foods consumed daily. Many respondents may not fully consider all three calculations. Many may only think about how salty the food is and rank it high even though the total amount of that food consumed daily may be very small. Such foods may include pickles or Maggi cubes. As a result, their contributions to total salt intake may be grossly overestimated because such foods taste very salty.

e) The survey samples were taken from persons attending health centers. Such individuals may not be representative of the general population, as they are more likely to be ill and/or be more interested in their own health and nutrition. They may also differ demographically from the general population; they may live in larger communities which have a health centre and live closer to the health centre. These factors may have an effect on almost all the outcomes measured in this survey.

9. Recommendations

Use various mass media platforms in the Sultanate of Oman to communicate nutrition information

The survey found that Omanis use multiple media sources, including television, radio, and the internet, but no one media source is dominant. As such, multiple media platforms are required to increase the nutrition knowledge of Omanis via mass media. As nutrition knowledge is generally low for all population groups, the same messages can be disseminated on multiple platforms. For example, messaging on radio and TV would be viewed mostly by Omani adults, and messages on various internet platforms would reach both adolescents and adults. Regardless, mass media messages must focus on a few key messages and cannot provide detailed information. One potential nutrition message could be related to fruits and vegetables consumption and could encourage Omani adolescents and adults to consume 2-4 servings of fruit and 3-5 servings of vegetables per day.

In addition to messages that are relevant to all population groups, individualized messages that target specific population groups should be disseminated. For example, messages targeted to adolescents on various internet platforms could provide information about the quality of fast food and could encourage adolescents to eat at fast food restaurants only occasionally. In contrast, messages targeted to older Omanis — who reported eating at traditional restaurants — could identify traditional Omani and middle eastern dishes that are low in sodium, fat, and sugar.

Add nutrition and health education to school curriculum

As adolescents in the Sultanate of Oman have generally low knowledge about healthy eating, the health and nutrition information provided to school-age children should be enhanced. Currently, the Sultanate of Oman has multiple initiatives that aim to increase health and nutrition knowledge and practices in schools [42]. To understand which programs are the most effective, these programs should be thoroughly evaluated. The most effective programs should subsequently be expanded throughout the Sultanate of Oman and should be seen as key long-term approach to improving the diets of Omani's and reducing the incidence of diet-related non-communicable diseases.

Adopt a simplified method of communicating the health content of foods

As the survey found that few Omanis examine the nutritional labels of foods, the use of a simplified nutritional label for the front of food packages, should be considered. Front of the package labels, such as France's Nutri-Score [44] has been adopted by several countries throughout Europe and could be considered for use in the Sultanate of Oman. The Nutri-Score label is a based on a nutrition quality score that is based on the sugar, fat, sodium, protein, fiber, and energy content of every food and beverage. This score is then categorized

into a color-coded (green to red) and alphabetic (A to E) label schematic that is easily understood by consumers. Prior to using the Nutri-Score or a similar front of the package nutrition quality label, the algorithm underpinning the Nutri-Score should be extensively studied by nutrition specialists in the Sultanate of Oman, and market research related to the Nutri-Score label should be conducted. It is likely that the Nutri-Score label would need to be modified to the Omani context and would need to use Arabic letters rather than Latin letters.

Conduct research on post-partum dietary patterns

Although this study did not collect data on women's overweight/obesity nor parity status, other studies have found that Omani women typically gain weight after childbirth [45]. This association may be due to post-partum weight retention, changes in dietary patterns, and changes in physical activity. As studies in other countries have found that maternal diet is a significant predictor of the diet of other members of the household [46], improvements to mothers' diets could lead to improved diets for other members of the household. To fully understand the food consumption attitudes and behaviors of postpartum Omani women, further research is required.

Explore the implications of excise taxes on high-sugar foods and drinks

The study found that the consumption of sugar is nearly universal. To reduce the consumption of sugar and high-sugar foods, the government of the Sultanate of Oman should explore the use of a tax on foods and drinks that are high in sugar. Regarding the taxation of drinks high in sugar, data from other countries has shown a substantial decline in overall sales of sugar-sweetened beverages after imposition of such a tax [38].

10. References

1. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: A systematic analysis for the Global Burden of Disease Study 2013. The Lancet. 2014. doi:10.1016/S0140-6736(14)60460-8

2. Ministry of Health [Oman], UNICEF, GroundWork. Oman National Nutrition Survey (ONNS) 2017. Muscat, Oman; 2018. Available: https://groundworkhealth.org/wp-content/uploads/2021/01/ONNS-Report-Final_180820_low-res.pdf

3. Al-Mawali A, Jayapal SK, Morsi M, Al-Shekaili W, Pinto AD, Al-Kharusi H, et al. Prevalence of risk factors of non-communicable diseases in the Sultanate of Oman: STEPS survey 2017. PLoS One. 2021;16: e0259239. doi:10.1371/journal.pone.0259239

4. Al Riyami A, Elaty MAA, Morsi M, Al Kharusi H, Al Shukaily W, Jaju S. Oman world health survey: part 1 - methodology, sociodemographic profile and epidemiology of non-communicable diseases in oman. Oman Med J. 2012;27: 425–43.

5. Ministry of Health - Oman, United Nations Development Programme, Gulf Health Council, World Health Organization, Secretariat of the UN Inter-Agency Task Force on NCDs. The case for investment in prevention and control of non-communicable diseases in Oman. Muscat, Oman; 2023.

6. Boutayeb A, Boutayeb S, Boutayeb W. Multi-morbidity of non communicable diseases and equity in WHO Eastern Mediterranean countries. Int J Equity Health. 2013;12: 60. doi:10.1186/1475-9276-12-60

7. Al Ani MF, Al Subhi LK, Bose S. Consumption of fruits and vegetables among adolescents: a multi-national comparison of eleven countries in the Eastern Mediterranean Region. Br J Nutr. 2016;115: 1092–9. doi:10.1017/S0007114515005371

8. Kilani H, Al-Hazzaa H, Waly MI, Musaiger A. Lifestyle Habits: Diet, physical activity and sleep duration among Omani adolescents. Sultan Qaboos Univ Med J. 2013;13: 510–9. doi:10.12816/0003309

9. FAO. Food Balance Sheets. Rome, Italy: FAOSTAT; 2021. Available: http://www.fao.org/faostat/en/#data/FBS

10. Scientific Advisory Committee on Nutrition. Carbohydrates and health. London, UK; 2015. Available: https://assets.publishing.service.gov.uk/media/5a7f7cc3ed915d74e622ac2a/SACN_Carbohydrates_and_Health.pdf

11. Powles J, Fahimi S, Micha R, Khatibzadeh S, Shi P, Ezzati M, et al. Global, regional and national sodium intakes in 1990 and 2010: a systematic analysis of 24 h urinary sodium excretion and dietary surveys worldwide. BMJ Open. 2013;3: e003733. doi:10.1136/bmjopen-2013-003733

12. WHO. Guideline: Sodium intake for adults and children. World Health Organization; 2012. Available: https://iris.who.int/bitstream/handle/10665/77985/9789241504836_eng.pdf?sequence=1

13. Micha R, Khatibzadeh S, Shi P, Fahimi S, Lim S, Andrews KG, et al. Global, regional, and national consumption levels of dietary fats and oils in 1990 and 2010: a systematic analysis including 266 country-specific nutrition surveys. BMJ. 2014;348: g2272–g2272. doi:10.1136/bmj.g2272

14. WHO. Saturated fatty acid and trans-fatty acid intake for adults and children: WHO guideline. Saturated fatty acid and trans-fatty acid intake for adults and children: WHO guideline. 2023. Available: https://iris.who.int/bitstream/handle/10665/370419/9789240073630-eng.pdf?sequence=1

15. Al-Riyami H, Al-Abdulsalam Q, Al-Khayari A, Al-Mushrafi H, Al-Alawi Z, Al-Hashmi K, et al. Awareness of the Dangers of High Salt Intake among the Urban Omani Population. Sultan Qaboos University Medical Journal [SQUMJ]. 2020;20: 352. doi:10.18295/squmj.2020.20.03.016

16. Dietary Guidelines Advisory Committee. Scientific report of the 2015 Dietary Guidelines Advisory Committee: advisory report to the Secretary of Health and Human Services and the Secretary of Agriculture. Agricultural Research Service. 2015; 2019. Available: https://health.gov/sites/default/files/2019-09/Scientific-Report-of-the-2015-Dietary-Guidelines-Advisory-Committee.pdf

17. Marías YF, Glasauer P. Guidelines for assessing nutrition-related knowledge, attitudes and practices. Food and Agriculture Organization of the United Nations (FAO); 2014.

18. Kliemann N, Wardle J, Johnson F, Croker H. Reliability and validity of a revised version of the General Nutrition Knowledge Questionnaire. Eur J Clin Nutr. 2016;70: 1174–1180. doi:10.1038/ejcn.2016.87

19. Aung PP, Foung CS, Azman KB, Ain N, Zulkifeli B. Knowledge, attitude, and practice of healthy eating among the 1st and 2nd year students of universiti Malaysia sarawak (UNIMAS). 2012 International Conference on Nutrition and Food Sciences IPCBEE. 2012. pp. 188–194.

20. Saeidlou SN, Babaei F, Ayremlou P. Nutritional knowledge, attitude and practice of north west households in Iran: is knowledge likely to become practice? Maedica (Bucur). 2016;11: 286.

21. Parmenter K, Wardle J. Development of a general nutrition knowledge questionnaire for adults. Eur J Clin Nutr. 1999;53: 298–308.

22. Nasser R, Cook S, Bashutski M, Hill K, Norton D, Coleman J, et al. Consumer perceptions of trans fats in 2009 show awareness of negative effects but limited concern regarding use in snack foods. Applied Physiology, Nutrition, and Metabolism. 2011;36: 526–532.

23. Dobson AJ, Blijlevens R, Alexander HM, Croce N, Heller RF, Higginbotham N, et al. Short fat questionnaire: a self-administered measure of fat-intake behaviour. Aust N Z J Public Health. 1993;17: 144–149.

24. Kinlay S, Heller RF, Halliday JA. A simple score and questionnaire to measure group changes in dietary fat intake. Prev Med (Baltim). 1991;20: 378–388.

25. Ellis S, Glanville NT. Trans fat information on food labels: consumer use and interpretation. Canadian Journal of Dietetic Practice and Research. 2010;71: 6–10.

26. Eckel RH, Kris-Etherton P, Lichtenstein AH, Wylie-Rosett J, Groom A, Stitzel KF, et al. Americans' awareness, knowledge, and behaviors regarding fats: 2006-2007. J Am Diet Assoc. 2009;109: 288–296.

27. Jasti S, Kovacs S. Use of trans fat information on food labels and its determinants in a multiethnic college student population. J Nutr Educ Behav. 2010;42: 307–314.

28. Papadakis S, Pipe AL, Moroz IA, Reid RD, Blanchard CM, Cote DF, et al. Knowledge, attitudes and behaviours related to dietary sodium among 35-to 50-year-old Ontario residents. Canadian Journal of Cardiology. 2010;26: e164–e169.

29. Grimes CA, Riddell LJ, Nowson CA. Consumer knowledge and attitudes to salt intake and labelled salt information. Appetite. 2009;53: 189–194.

30. Webster JL, Li N, Dunford EK, Nowson CA, Neal BC. Consumer awareness and self-reported behaviours related to salt consumption in Australia. Asia Pac J Clin Nutr. 2010;19: 550–4.

31. Sarmugam R, Worsley A, Flood V. Development and validation of a salt knowledge questionnaire. Public Health Nutr. 2014;17: 1061–1068. doi:10.1017/S1368980013000517

32. Action on salt. Salt Survey Questionnaire for Adults 2003. London, UK; 2003. Available: https://www.actiononsalt.org.uk/less/what/adults/index.html

33. Nasreddine L, Akl C, Al-Shaar L, Almedawar MM, Isma'eel H. Consumer knowledge, attitudes and salt-related behavior in the Middle-East: the case of Lebanon. Nutrients. 2014;6: 5079–5102.

34. Quadri FA, Hendriyani H, Pramono A, Jafer M. Knowledge, attitudes and practices of sweet food and beverage consumption and its association with dental caries among schoolchildren in Jazan, Saudi Arabia. EMHJ-Eastern Mediterranean Health Journal. 2015;21: 403–411.

35. Pielak M, Czarniecka-Skubina E, Trafiałek J, Głuchowski A. Contemporary trends and habits in the consumption of sugar and sweeteners—A questionnaire survey among poles. Int J Environ Res Public Health. 2019;16: 1164.

36. Joo N, Kim S-K, Yoon J. High school students' sugar intake behaviors and consumption of sugary processed food based on the level of sugar-related nutrition knowledge in Seoul area. Korean Journal of Community Nutrition. 2017;22: 1–12.

37. Ministry of Health. Oman Annual Health Report 2020. Muscat, Oman; 2020. Available: https://www.moh.gov.om/documents/274609/6240456/%D8%A7%D9%84%D8%AA%D9%82%D8%B1%D9%8A%D8%B1+%D8%A7%D9%84%D8%B5%D8%AD%D9%8A+%D8%A7%D9%84%D8%B3%D9%86%D9%88%D9%8A+2020/f9cbebed-00da-ce8d-2cec-e202ee743a09

38. Andreyeva T, Marple K, Marinello S, Moore TE, Powell LM. Outcomes Following Taxation of Sugar-Sweetened Beverages. JAMA Netw Open. 2022;5: e2215276. doi:10.1001/jamanetworkopen.2022.15276

39. von Philipsborn P, Stratil JM, Burns J, Busert LK, Pfadenhauer LM, Polus S, et al. Environmental interventions to reduce the consumption of sugar-sweetened beverages and their effects on health. Cochrane Database of Systematic Reviews. 2019;2019. doi:10.1002/14651858.CD012292.pub2

40. Al-Jawaldeh A, Taktouk M, Naalbandian S, Aguenaou H, Al Hamad N, Almamary S, et al. Sugar Reduction Initiatives in the Eastern Mediterranean Region: A Systematic Review. Nutrients. 2022;15: 55. doi:10.3390/nu15010055

41. Medeiros GCBS de, Azevedo KPM de, Garcia D, Oliveira Segundo VH, Mata ÁN de S, Fernandes AKP, et al. Effect of School-Based Food and Nutrition Education Interventions on the Food Consumption of Adolescents: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2022;19: 10522. doi:10.3390/ijerph191710522

42. WHO. Health-promoting schools initiative in Oman: A WHO case study in intersectoral action. Muscat, Oman; 2013. Available: https://iris.who.int/bitstream/handle/10665/120000/EMROPUB_2013_EN_1587.pdf;jsessionid=039E8762ABDB712B716F39BB32DEC7B4?sequence=1

43. Said Abasse K, Essien EE, Abbas M, Yu X, Xie W, Sun J, et al. Association between Dietary Nitrate, Nitrite Intake, and Site-Specific Cancer Risk: A Systematic Review and Meta-Analysis. Nutrients. 2022;14: 666. doi:10.3390/nu14030666

44. WHO. The Nutri-Score: A Science-Based Front-of-Pack Nutrition Label - Helping consumers make healthier food choices. 2021. Available: https://www.iarc.who.int/wp-content/uploads/2021/09/IARC_Evidence_Summary_Brief_2.pdf

45. Onyango AW, Nommsen-Rivers L, Siyam A, Borghi E, de Onis M, Garza C, et al. Post-partum weight change patterns in the WHO Multicentre Growth Reference Study. Matern Child Nutr. 2011;7: 228–40. doi:10.1111/j.1740-8709.2010.00295.x

46. Howard AJ, Mallan KM, Byrne R, Magarey A, Daniels LA. Toddlers' food preferences. The impact of novel food exposure, maternal preferences and food neophobia. Appetite. 2012;59: 818–25. doi:10.1016/j.appet.2012.08.022

11. Supplementary tables

11.1. General health eating

a) Adolescents

Table S1. Which household member purchases food, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Housewife	Household head	Servant	Other
Sex					
Male	138	44.6%	58.4%	0.1%	7.9%
Female	149	49.3%	61.4%	0.3%	12.2%
Governorate					
Muscat	24	58.3%	50.0%	0%	8.3%
Dhofar	18	44.4%	61.1%	0%	11.1%
Ad Dakhliyah	27	51.9%	48.1%	0%	7.4%
Ash Sharqiyah North	23	39.1%	65.2%	0%	0%
Ash Sharqiyah South	32	43.8%	62.5%	0%	18.8%
Al Batinah North	27	37.0%	74.1%	0%	3.7%
Al Batinah South	27	48.1%	51.9%	0%	22.2%
Adh Dhahirah	27	40.7%	85.2%	0%	14.8%
Al Buraymi	23	43.5%	78.3%	0%	8.7%
Musandam	28	53.6%	46.4%	0%	0%
Al Wusta	31	58.1%	9.7%	19.4%	16.1%

Table S2. Which household member cooks food, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Respondent	Housewife	Household head	Servant	Other
Sex						
Male	138	0%	78.9%	3.3%	18.8%	11.6%
Female	149	14.4%	77.8%	2.6%	13.4%	11.0%
Governorate						
Muscat	24	8.3%	83.3%	0%	12.5%	8.3%
Dhofar	18	0%	50.0%	0%	55.6%	11.1%
Ad Dakhliyah	27	11.1%	77.8%	7.4%	11.1%	18.5%
Ash Sharqiyah North	23	0%	87.0%	0%	4.3%	8.7%
Ash Sharqiyah South	32	6.3%	75.0%	6.3%	18.8%	15.6%
Al Batinah North	27	3.7%	85.2%	3.7%	7.4%	7.4%
Al Batinah South	27	14.8%	85.2%	3.7%	11.1%	7.4%
Adh Dhahirah	27	14.8%	70.4%	3.7%	18.5%	22.2%
Al Buraymi	23	0%	91.3%	0%	8.7%	8.7%
Musandam	28	0%	100.0%	0%	3.6%	0%
Al Wusta	31	0%	22.6%	0%	58.1%	19.4%

Table S3. How often respondent reads nutrition information on packaging of food purchases, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	P-value
Sex					
Male	136	66.3%	21.7%	12.0%	<0.05
Female	146	49.5%	38.3%	12.2%	
Governorate					
Muscat	23	73.9%	17.4%	8.7%	0.216
Dhofar	18	61.1%	27.8%	11.1%	
Ad Dakhliyah	27	51.9%	33.3%	14.8%	
Ash Sharqiyah North	23	69.6%	26.1%	4.3%	
Ash Sharqiyah South	32	62.5%	31.3%	6.3%	
Al Batinah North	27	37.0%	48.1%	14.8%	
Al Batinah South	25	60.0%	20.0%	20.0%	
Adh Dhahirah	27	59.3%	29.6%	11.1%	
Al Buraymi	23	69.6%	17.4%	13.0%	
Musandam	26	57.7%	34.6%	7.7%	
Al Wusta	31	51.6%	45.2%	3.2%	

Table S4. Among those who read nutrition information, how often this reading affects purchases, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	P-value
Sex					
Male	63	43.7%	38.9%	17.3%	0.455
Female	89	53.7%	28.1%	18.2%	
Governorate					
Muscat	10	50.0%	50.0%		<0.05
Dhofar	7	28.6%	42.9%	28.6%	
Ad Dakhliyah	20	60.0%	25.0%	15.0%	
Ash Sharqiyah North	8	25.0%	62.5%	12.5%	
Ash Sharqiyah South	18	72.2%	22.2%	5.6%	
Al Batinah North	22	50.0%	27.3%	22.7%	
Al Batinah South	13	38.5%	30.8%	30.8%	
Adh Dhahirah	11	36.4%	18.2%	45.5%	
Al Buraymi	12	58.3%	33.3%	8.3%	
Musandam	13	7.7%	69.2%	23.1%	
Al Wusta	18	33.3%	44.4%	22.2%	

Table S5. How often respondent counts the calories in food consumed, by sex and governorate, by governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	P-value
Sex					
Male	131	76.2%	15.2%	8.6%	0.255
Female	146	64.5%	25.0%	10.4%	
Governorate					
Muscat	23	78.3%	17.4%	4.3%	0.283
Dhofar	18	83.3%	11.1%	5.6%	
Ad Dakhliyah	27	77.8%	18.5%	3.7%	
Ash Sharqiyah North	23	82.6%	13.0%	4.3%	
Ash Sharqiyah South	29	75.9%	17.2%	6.9%	
Al Batinah North	27	44.4%	33.3%	22.2%	
Al Batinah South	25	68.0%	20.0%	12.0%	
Adh Dhahirah	27	66.7%	22.2%	11.1%	
Al Buraymi	23	78.3%	13.0%	8.7%	
Musandam	25	80.0%	8.0%	12.0%	
Al Wusta	30	80.0%	16.7%	3.3%	

b) Adults

Table S6. Which household member purchases food, by sex, job, and governorate – Adults 19-60 years of age

Characteristic	N	Housewife	Household head	Servant	Other
Sex					
Male	544	37.9%	62.8%	0.3%	15.2%
Female	540	45.9%	63.5%	0.2%	9.3%
Job					
Government	267	42.9%	69.5%	0%	5.9%
Private	182	34.0%	64.1%	0%	16.2%
Military	82	45.4%	65.8%	0%	14.9%
Retired	39	47.1%	67.1%	0%	4.8%
Student	76	36.5%	48.3%	0%	23.0%
Looking	155	39.2%	57.1%	0.9%	20.1%
Not working	283	48.6%	64.7%	0.3%	6.4%
Governorate					
Muscat	1.2	45.1%	63.7%	0%	8.8%
Dhofar	58	42.1%	44.7%	1.6%	20.6%
Ad Dakhliyah	88	37.4%	62.6%	0%	10.2%
Ash Sharqiyah North	100	48.4%	59.6%	0%	7.0%
Ash Sharqiyah South	108	47.0%	71.4%	0%	16.7%
Al Batinah North	109	33.3%	67.0%	0%	12.6%
Al Batinah South	99	57.8%	62.6%	0%	13.9%
Adh Dhahirah	112	29.5%	71.3%	0%	12.5%
Al Buraymi	91	28.3%	73.7%	0%	14.7%
Musandam	116	39.3%	58.9%	0%	4.2%
Al Wusta	101	40.8%	30.7%	10.5%	18.9%

Table S7. Which household member cooks food, by sex, job, and governorate – Adults 19-60 years of age

Characteristic	N	Respondent	Housewife	Household head	Servant	Other
Sex						
Male	544	7.8%	76.2%	1.3%	12.3%	10.5%
Female	540	68.3%	20.8%	0.5%	16.8%	9.2%
Job						
Government	267	22.9%	57.0%	1.5%	25.9%	5.0%
Private	182	19.0%	62.2%	1.6%	12.4%	16.1%
Military	82	4.9%	81.6%	0%	7.7%	10.7%
Retired	39	24.6%	71.7%	0.2%	10.0%	3.0%
Student	76	9.2%	70.9%	0%	21.5%	13.7%
Looking	155	46.1%	41.7%	2.0%	9.5%	12.6%
Not working	283	81.9%	12.8%	0%	11.2%	6.6%
Governorate						
Muscat	102	44.0%	44.2%	2.0%	9.8%	8.8%
Dhofar	58	20.2%	38.6%	1.9%	44.7%	5.1%
Ad Dakhliyah	88	42.7%	56.1%	1.1%	7.9%	4.6%
Ash Sharqiyah North	100	44.3%	47.7%	0%	10.1%	4.9%
Ash Sharqiyah South	108	39.3%	43.0%	1.9%	21.3%	12.1%
Al Batinah North	109	34.0%	54.1%	0%	10.2%	13.8%
Al Batinah South	99	39.0%	47.9%	0%	11.4%	16.4%
Adh Dhahirah	112	39.6%	48.6%	0%	13.4%	12.5%
Al Buraymi	91	21.5%	66.0%	0%	16.7%	7.4%
Musandam	116	47.1%	50.2%	2.8%	10.0%	3.1%
Al Wusta	101	11.4%	18.4%	1.0%	72.0%	6.0%

Table S8. How often respondent reads nutrition information on packaging of food purchases, by sex and governorate – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	P-value
Sex					
Male	538	42.0%	27.4%	30.5%	0.329
Female	532	35.9%	31.8%	32.3%	
Governorate					
Muscat	102	39.2%	21.6%	39.2%	<0.001
Dhofar	57	60.9%	18.6%	20.5%	
Ad Dakhliyah	87	31.0%	42.5%	26.5%	
Ash Sharqiyah North	98	52.0%	32.7%	15.3%	
Ash Sharqiyah South	108	45.4%	29.6%	25.1%	
Al Batinah North	107	25.0%	33.7%	41.2%	
Al Batinah South	98	31.7%	31.3%	37.0%	
Adh Dhahirah	112	56.4%	23.1%	20.5%	
Al Buraymi	87	50.5%	28.1%	21.4%	
Musandam	115	33.3%	39.6%	27.1%	
Al Wusta	99	56.1%	27.9%	16.0%	

Table S9. Among those who read nutrition information, how often this reading affects purchases, by sex and governorate – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	P-value
Sex					
Male	343	22.5%	23.6%	54.0%	0.220
Female	370	17.4%	28.3%	54.3%	
Governorate					
Muscat	69	23.2%	15.9%	60.9%	<0.001
Dhofar	27	30.3%	26.2%	43.5%	
Ad Dakhliyah	68	13.2%	32.3%	54.4%	
Ash Sharqiyah North	52	11.4%	67.3%	21.3%	
Ash Sharqiyah South	76	25.0%	27.5%	47.5%	
Al Batinah North	91	21.8%	20.8%	57.5%	
Al Batinah South	72	13.7%	25.2%	61.1%	
Adh Dhahirah	56	17.9%	26.7%	55.4%	
Al Buraymi	57	28.5%	30.5%	41.1%	
Musandam	83	2.8%	46.5%	50.7%	
Al Wusta	62	39.0%	25.6%	35.5%	

Table S10. How often respondent counts the calories in food consumed, by sex and governorate, by sex and governorate – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	P value
Sex					
Male	528	63.4%	15.4%	21.3%	0.340
Female	524	58.0%	18.8%	23.2%	
Governorate					
Muscat	102	58.8%	15.7%	25.5%	<0.001
Dhofar	56	83.5%	8.8%	7.6%	
Ad Dakhliyah	85	48.2%	25.8%	26.0%	
Ash Sharqiyah North	91	78.3%	13.0%	8.7%	
Ash Sharqiyah South	105	64.8%	20.9%	14.3%	
Al Batinah North	107	59.6%	14.0%	26.4%	
Al Batinah South	98	48.5%	23.8%	27.7%	
Adh Dhahirah	112	68.1%	8.8%	23.1%	
Al Buraymi	85	59.8%	16.9%	23.3%	
Musandam	114	51.4%	24.1%	24.5%	
Al Wusta	97	71.5%	15.3%	13.2%	

11.2. Oil

a) Adolescents

Table S11. Knows that there are cooking methods to reduce the amount of fat in food, by governorate, by governorate – Adolescents 14-18 years of age

Governorate	N	Yes	No	Does not know	P-value
Muscat	27	81.5%	3.7%	14.8%	<0.01
Dhofar	16	50.0%	6.3%	43.8%	
Ad Dakhliyah	25	72.0%	28.0%	0%	
Ash Sharqiyah North	26	61.5%	15.4%	23.1%	
Ash Sharqiyah South	29	65.5%	20.7%	13.8%	
Al Batinah North	30	50.0%	33.3%	16.7%	
Al Batinah South	26	57.7%	19.2%	23.1%	
Adh Dhahirah	24	50.0%	25.0%	25.0%	
Al Buraymi	24	25.0%	20.8%	54.2%	
Musandam	32	65.6%	12.5%	21.9%	
Al Wusta	29	62.1%	13.8%	24.1%	

Table S12. What is effect of too much dietary fat on health, by governorate, by governorate – Adolescents 14-18 years of age

Governorate	N	Good for health	No effect on health	Bad for health	Don`t know	P-value
Muscat	27	3.7%	7.4%	88.9%	0%	0.938
Dhofar	16	0%	6.3%	93.8%	0%	
Ad Dakhliyah	25	0%	0%	100.0%	0%	
Ash Sharqiyah North	26	0%	0%	100.0%	0%	
Ash Sharqiyah South	29	3.4%	0%	93.1%	3.4%	
Al Batinah North	30	6.7%	3.3%	90.0%	0%	
Al Batinah South	26	0%	0%	96.2%	3.8%	
Adh Dhahirah	24	0%	0%	100.0%	0%	
Al Buraymi	24	0%	0%	95.8%	4.2%	
Musandam	32	0%	9.4%	87.5%	3.1%	
Al Wusta	29	0%	3.4%	96.6%	0%	

Table S13. Saturated fat raises the cholesterol level in the blood, among respondents who had heard of saturated fat, by governorate – Adolescents 14-18 years of age

Governorate	N	Right	Wrong	Don`t know	P-value
Muscat	12	83.3%	8.3%	8.3%	0.818
Dhofar	2	100.0%	0%	0%	
Ad Dakhliyah	14	85.7%	7.1%	7.1%	
Ash Sharqiyah North	10	80.0%	0%	20.0%	
Ash Sharqiyah South	16	68.8%	6.3%	25.0%	
Al Batinah North	9	77.8%	11.1%	11.1%	
Al Batinah South	17	76.5%	5.9%	17.6%	
Adh Dhahirah	6	100.0%	0%	0%	
Al Buraymi	2	100.0%	0%	0%	
Musandam	12	75.0%	0%	25.0%	
Al Wusta	10	60.0%	20.0%	20.0%	

Table S14. Saturated fat increase the risk of cardiovascular disease, among respondents who had heard of saturated fat, by governorate – Adolescents 14-18 years of age

Governorate	N	Right	Wrong	Don`t know	P-value
Muscat	12	91.7%	8.3%	0%	0.890
Dhofar	2	100.0%	0%	0%	
Ad Dakhliyah	14	85.7%	0%	14.3%	
Ash Sharqiyah North	10	80.0%	0%	20.0%	
Ash Sharqiyah South	16	75.0%	6.3%	18.8%	
Al Batinah North	9	100.0%	0%	0%	
Al Batinah South	17	94.1%	5.9%	0%	
Adh Dhahirah	6	100.0%	0%	0%	
Al Buraymi	2	100.0%	0%	0%	
Musandam	12	75.0%	0%	25.0%	
Al Wusta	10	80.0%	0%	20.0%	

Table S15. Saturated fats are naturally present in milk, among respondents who had heard of saturated fat, by governorate – Adolescents 14-18 years of age

Governorate	N	Right	Wrong	Don`t know	P-value
Muscat	12	33.3%	41.7%	25.0%	0.204
Dhofar	2	0%	50.0%	50.0%	
Ad Dakhliyah	14	42.9%	35.7%	21.4%	
Ash Sharqiyah North	10	60.0%	30.0%	10.0%	
Ash Sharqiyah South	16	25.0%	50.0%	25.0%	
Al Batinah North	9	11.1%	66.7%	22.2%	
Al Batinah South	17	23.5%	23.5%	52.9%	
Adh Dhahirah	6	50.0%	16.7%	33.3%	
Al Buraymi	2	0%	50.0%	50.0%	
Musandam	12	33.3%	16.7%	50.0%	
Al Wusta	10	30.0%	50.0%	20.0%	

Table S16. Saturated fats are found in animal fats, among respondents who had heard of saturated fat, by governorate – Adolescents 14-18 years of age

Governorate	N	Right	Wrong	Don`t know	P-value
Muscat	12	50.0%	41.7%	8.3%	0.444
Dhofar	2	50.0%	50.0%	0%	
Ad Dakhliyah	14	78.6%	0%	21.4%	
Ash Sharqiyah North	10	100%	0%	0%	
Ash Sharqiyah South	16	50.0%	31.3%	18.8%	
Al Batinah North	9	44.4%	22.2%	33.3%	
Al Batinah South	17	64.7%	11.8%	23.5%	
Adh Dhahirah	6	33.3%	33.3%	33.3%	
Al Buraymi	2	50.0%	0%	50.0%	
Musandam	12	58.3%	0%	41.7%	
Al Wusta	10	80.0%	0%	20.0%	

Table S17 Saturated fats are found in a high percentage in vegetable oils such as sunflower and corn oil, among respondents who had heard of saturated fat, by governorate – Adolescents 14-18 years of age

Governorate	N	Right	Wrong	Don`t know	P-value
Muscat	12	25.0%	66.7%	8.3%	0.105
Dhofar	2	50.0%	0%	50.0%	
Ad Dakhliyah	14	57.1%	28.6%	14.3%	
Ash Sharqiyah North	10	60.0%	20.0%	20.0%	
Ash Sharqiyah South	16	37.5%	18.8%	43.8%	
Al Batinah North	9	55.6%	33.3%	11.1%	
Al Batinah South	17	52.9%	17.6%	29.4%	
Adh Dhahirah	6	66.7%	16.7%	16.7%	
Al Buraymi	2	0%	50.0%	50.0%	
Musandam	12	33.3%	33.3%	33.3%	
Al Wusta	10	40.0%	40.0%	20.0%	

Table S18. Saturated fats are found in in tropical oils such as palm oil and coconut oil, among respondents who had heard of saturated fat, by governorate – Adolescents 14-18 years of age

Governorate	N	Right	Wrong	Don`t know	P-value
Muscat	12	66.7%	25.0%	8.3%	0.110
Dhofar	2	50.0%	50.0%	0%	
Ad Dakhliyah	14	35.7%	50.0%	14.3%	
Ash Sharqiyah North	10	60.0%	20.0%	20.0%	
Ash Sharqiyah South	16	56.3%	12.5%	31.3%	
Al Batinah North	9	55.6%	22.2%	22.2%	
Al Batinah South	17	29.4%	29.4%	41.2%	
Adh Dhahirah	6	0%	50.0%	50.0%	
Al Buraymi	2	0%	0%	100.0%	
Musandam	12	41.7%	25.0%	33.3%	
Al Wusta	10	70.0%	20.0%	10.0%	

Table S19. Saturated fat does not affect health in any negative way, among respondents who had heard of saturated fat, by governorate – Adolescents 14-18 years of age

Governorate	N	Right	Wrong	Don`t know	P-value
Muscat	12	8.3%	91.7%	0%	0.496
Dhofar	2	0%	100.0%	0%	
Ad Dakhliyah	14	7.1%	85.7%	7.1%	
Ash Sharqiyah North	10	30.0%	70.0%	0%	
Ash Sharqiyah South	16	6.3%	81.3%	12.5%	
Al Batinah North	9	0%	100.0%	0%	
Al Batinah South	17	5.9%	94.1%	0%	
Adh Dhahirah	6	16.7%	83.3%	0%	
Al Buraymi	2	0%	100.0%	0%	
Musandam	12	0%	66.7%	33.3%	
Al Wusta	10	20.0%	70.0%	10.0%	

Table S20. Respondents' assessment of truth of statements regarding trans fat, among respondents who had heard of trans fats - Adolescents 14-18 years of age

Statement (trans fat…)	N	Right	Wrong	Don`t know
Raises cholesterol	51	74.5%	6.5%	19.1%
Increases the risk of cardiovascular disease	51	80.7%	19.3%	100.0%
Are found naturally in milk	51	22.2%	41.4%	36.4%
Are found in non-hydrogenated vegetable ghee	51	8.7%	57.8%	33.5%
Do not affect health in any negative way	51	5.8%	83.7%	10.5%

Table S21. Do you care about artificial flavors in the foods you eat?, by governorate – Adolescents 14-18 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	27	29.6%	70.4%	0.090
Dhofar	16	43.8%	56.3%	
Ad Dakhliyah	25	36.0%	64.0%	
Ash Sharqiyah North	26	19.2%	80.8%	
Ash Sharqiyah South	29	41.4%	58.6%	
Al Batinah North	30	13.3%	86.7%	
Al Batinah South	26	38.5%	61.5%	
Adh Dhahirah	24	41.7%	58.3%	
Al Buraymi	24	37.5%	62.5%	
Musandam	32	28.1%	71.9%	
Al Wusta	29	10.3%	89.7%	

Table S22. Do you care about artificial colors in the foods you eat?, by governorate – Adolescents 14-18 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	27	22.2%	77.8%	0.072
Dhofar	16	50.0%	50.0%	
Ad Dakhliyah	25	16.0%	84.0%	
Ash Sharqiyah North	26	26.9%	73.1%	
Ash Sharqiyah South	29	48.3%	51.7%	
Al Batinah North	30	20.0%	80.0%	
Al Batinah South	26	50.0%	50.0%	
Adh Dhahirah	24	37.5%	62.5%	
Al Buraymi	24	29.2%	70.8%	
Musandam	32	25.0%	75.0%	
Al Wusta	29	17.2%	82.8%	

Table S23. Do you care about salt in the foods you eat?, by governorate – Adolescents 14-18 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	27	18.5%	81.5%	<0.05
Dhofar	16	6.3%	93.8%	
Ad Dakhliyah	25	24.0%	76.0%	
Ash Sharqiyah North	26	7.7%	92.3%	
Ash Sharqiyah South	29	34.5%	65.5%	
Al Batinah North	30	23.3%	76.7%	
Al Batinah South	26	3.8%	96.2%	
Adh Dhahirah	24	16.7%	83.3%	
Al Buraymi	24	12.5%	87.5%	
Musandam	32	9.4%	90.6%	
Al Wusta	29	24.1%	75.9%	

Table S24. Do you care about sugar in the foods you eat?, by governorate – Adolescents 14-18 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	27	44.4%	55.6%	<0.05
Dhofar	16	37.5%	62.5%	
Ad Dakhliyah	25	52.0%	48.0%	
Ash Sharqiyah North	26	34.6%	65.4%	
Ash Sharqiyah South	29	51.7%	48.3%	
Al Batinah North	30	33.3%	66.7%	
Al Batinah South	26	26.9%	73.1%	
Adh Dhahirah	24	33.3%	66.7%	
Al Buraymi	24	8.3%	91.7%	
Musandam	32	34.4%	65.6%	
Al Wusta	29	44.8%	55.2%	

Table S25. Do you care about calories in the foods you eat?, by governorate – Adolescents 14-18 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	27	29.6%	70.4%	0.445
Dhofar	16	18.8%	81.3%	
Ad Dakhliyah	25	24.0%	76.0%	
Ash Sharqiyah North	26	15.4%	84.6%	
Ash Sharqiyah South	29	20.7%	79.3%	
Al Batinah North	30	26.7%	73.3%	
Al Batinah South	26	38.5%	61.5%	
Adh Dhahirah	24	33.3%	66.7%	
Al Buraymi	24	8.3%	91.7%	
Musandam	32	18.8%	81.3%	
Al Wusta	29	20.7%	79.3%	

Table S26. Do you care about saturated fat in the foods you eat?, by governorate – Adolescents 14-18 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	27	7.4%	92.6%	<0.05
Dhofar	16	25.0%	75.0%	
Ad Dakhliyah	25	32.0%	68.0%	
Ash Sharqiyah North	26	23.1%	76.9%	
Ash Sharqiyah South	29	20.7%	79.3%	
Al Batinah North	30	30.0%	70.0%	
Al Batinah South	26	34.6%	65.4%	
Adh Dhahirah	24	45.8%	54.2%	
Al Buraymi	24	8.3%	91.7%	
Musandam	32	12.5%	87.5%	
Al Wusta	29	10.3%	89.7%	

Table S27. Do you care about trans fat in the foods you eat?, by governorate – Adolescents 14-18 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	27	0%	100.0%	<0.05
Dhofar	16	31.3%	68.8%	
Ad Dakhliyah	25	20.0%	80.0%	
Ash Sharqiyah North	26	7.7%	92.3%	
Ash Sharqiyah South	29	17.2%	82.8%	
Al Batinah North	30	20.0%	80.0%	
Al Batinah South	26	38.5%	61.5%	
Adh Dhahirah	24	20.8%	79.2%	
Al Buraymi	24	12.5%	87.5%	
Musandam	32	12.5%	87.5%	
Al Wusta	29	10.3%	89.7%	

Table S28. When asked "Do you care about certain ingredients in the foods you eat?", replied 'Do not know', by governorate – Adolescents 14-18 years of age

Governorate	N	Does not know	Other	P-value
Muscat	27	7.4%	92.6%	0.077
Dhofar	16	6.3%	93.8%	
Ad Dakhliyah	25	4.0%	96.0%	
Ash Sharqiyah North	26	3.8%	96.2%	
Ash Sharqiyah South	29	0%	100.0%	
Al Batinah North	30	6.7%	93.3%	
Al Batinah South	26	3.8%	96.2%	
Adh Dhahirah	24	8.3%	91.7%	
Al Buraymi	24	4.2%	95.8%	
Musandam	32	25.0%	75.0%	
Al Wusta	29	6.9%	93.1%	

Table S29. Not worried about anything in the foods you eat, by governorate – Adolescents 14-18 years of age

Governorate	N	Not worried	Worried	P-value
Muscat	27	14.8%	85.2%	<0.05
Dhofar	16	12.5%	87.5%	
Ad Dakhliyah	25	4.0%	96.0%	
Ash Sharqiyah North	26	11.5%	88.5%	
Ash Sharqiyah South	29	6.9%	93.1%	
Al Batinah North	30	6.7%	93.3%	
Al Batinah South	26	0	100.0%	
Adh Dhahirah	24	12.5%	87.5%	
Al Buraymi	24	41.7%	58.3%	
Musandam	32	6.3%	93.8%	
Al Wusta	29	13.8%	86.2%	

Table S30. When eating meals do you reduce fat while eating?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	161	43.4%	30.1%	22.1%	4.4%	0.193
Female	127	34.5%	37.9%	26.8%	0.9%	
Governorate						
Muscat	27	55.6%	25.9%	14.8%	3.7%	0.579
Dhofar	16	50.0%	37.5%	12.5%	0%	
Ad Dakhliyah	25	36.0%	40.0%	24.0%	0%	
Ash Sharqiyah North	26	53.8%	26.9%	19.2%	0%	
Ash Sharqiyah South	29	34.5%	44.8%	20.7%	0%	
Al Batinah North	30	36.7%	30.0%	26.7%	6.7%	
Al Batinah South	26	15.4%	38.5%	46.2%	0%	
Adh Dhahirah	24	16.7%	37.5%	41.7%	4.2%	
Al Buraymi	24	41.7%	33.3%	12.5%	12.5%	
Musandam	32	34.4%	25.0%	37.5%	3.1%	
Al Wusta	29	34.5%	48.3%	17.2%	0%	

Table S31. Do you check food ingredient labels when you shop?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	161	66.1%	15.1%	11.5%	7.3%	0.641
Female	127	58.5%	16.9%	16.8%	7.8%	
Governorate						
Muscat	27	63.0%	14.8%	18.5%	3.7%	0.252
Dhofar	16	68.8%	18.8%	6.3%	6.3%	
Ad Dakhliyah	25	44.0%	20.0%	20.0%	16.0%	
Ash Sharqiyah North	26	53.8%	15.4%	0%	30.8%	
Ash Sharqiyah South	29	62.1%	31.0%	6.9%	0%	
Al Batinah North	30	76.7%	10.0%	13.3%	0%	
Al Batinah South	26	65.4%	11.5%	19.2%	3.8%	
Adh Dhahirah	24	45.8%	20.8%	12.5%	20.8%	
Al Buraymi	24	79.2%	8.3%	0%	12.5%	
Musandam	32	59.4%	9.4%	25.0%	6.3%	
Al Wusta	29	41.4%	34.5%	13.8%	10.3%	

Table S32. Have you ever changed your purchasing habits to reduce your total fat intake?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	161	54.5%	15.5%	7.3%	22.7%	0.348
Female	127	41.3%	18.6%	10.4%	29.7%	
Governorate						
Muscat	27	55.6%	18.5%	11.1%	14.8%	0.093
Dhofar	16	62.5%	25.0%	6.3%	6.3%	
Ad Dakhliyah	25	48.0%	28.0%	0%	24.0%	
Ash Sharqiyah North	26	30.8%	7.7%	0%	61.5%	
Ash Sharqiyah South	29	17.2%	27.6%	6.9%	48.3%	
Al Batinah North	30	43.3%	10.0%	13.3%	33.3%	
Al Batinah South	26	57.7%	11.5%	15.4%	15.4%	
Adh Dhahirah	24	50.0%	12.5%	8.3%	29.2%	
Al Buraymi	24	62.5%	4.2%	-	33.3%	
Musandam	32	50.0%	9.4%	18.0%%	21.9%	
Al Wusta	29	75.9%	10.3%	6.9%	6.9%	

Table S33. Have you ever changed your purchasing habits to reduce your intake of trans fats?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	161	55.6%	6.4%	4.5%	33.5%	0.613
Female	127	46.8%	9.2%	5.9%	38.2%	
Governorate						
Muscat	27	48.1%	3.7%	11.1%	37.0%	0.342
Dhofar	16	81.3%	0%	6.3%	12.5%	
Ad Dakhliyah	25	48.0%	12.0%	4.0%	36.0%	
Ash Sharqiyah North	26	26.9%	3.8%	0%	69.2%	
Ash Sharqiyah South	29	24.1%	3.4%	10.3%	62.1%	
Al Batinah North	30	56.7%	13.3%	0%	30.0%	
Al Batinah South	26	57.7%	7.7%	3.8%	30.8%	
Adh Dhahirah	24	50.0%	12.5%	4.2%	33.3%	
Al Buraymi	24	70.8%	4.2%	0%	25.0%	
Musandam	32	59.4%	15.6%	6.3%	18.8%	
Al Wusta	29	48.3%	17.2%	10.3%	24.1%	

Table S34. Do you check food ingredient labels for amount of total fat when you shop?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	161	45.0%	10.6%	4.0%	40.4%	0.575
Female	127	44.3%	7.7%	7.9%	40.1%	
Governorate						
Muscat	27	51.9%	3.7%	7.4%	37.0%	<0.05
Dhofar	16	25.0%	6.3%	6.3%	62.5%	
Ad Dakhliyah	25	44.0%	20.0%	16.0%	20.0%	
Ash Sharqiyah North	26	7.7%	3.8%	7.7%	80.8%	
Ash Sharqiyah South	29	72.4%	20.7%	6.9%	0%	
Al Batinah North	30	33.3%	6.7%	0%	60.0%	
Al Batinah South	26	57.7%	15.4%	0%	26.9%	
Adh Dhahirah	24	41.7%	0%	4.2%	54.2%	
Al Buraymi	24	75.0%	4.2%	0%	20.8%	
Musandam	32	56.3%	9.4%	9.4%	25.0%	
Al Wusta	29	69.0%	6.9%	6.9%	17.2%	

Table S35. Do you check food ingredient labels for amount of trans fat when you shop?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	161	47.5%	3.9%	2.1%	46.5%	0.448
Female	127	46.5%	6.6%	5.3%	41.6%	
Governorate						
Muscat	27	55.6%	3.7%	3.7%	37.0%	0.114
Dhofar	16	37.5%	0%	0%	62.5%	
Ad Dakhliyah	25	48.0%	12.0%	12.0%	28.0%	
Ash Sharqiyah North	26	3.8%	3.8%	0%	92.3%	
Ash Sharqiyah South	29	75.9%	6.9%	3.4%	13.8%	
Al Batinah North	30	33.3%	3.3%	0%	63.3%	
Al Batinah South	26	57.7%	7.7%	3.8%	30.8%	
Adh Dhahirah	24	41.7%	0%	4.2%	54.2%	
Al Buraymi	24	75.0%	4.2%	0%	20.8%	
Musandam	32	56.3%	6.3%	9.4%	28.1%	
Al Wusta	29	62.1%	10.3%	3.4%	24.1%	

Table S36. Do you check food ingredient labels for amount of saturated fat when you shop?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	161	49.0%	6.3%	5.7%	39.0%	0.820
Female	127	45.3%	9.4%	6.1%	39.2%	
Governorate						
Muscat	27	59.3%	3.7%	7.4%	29.6%	<0.05
Dhofar	16	31.3%	6.3%	0%	62.5%	
Ad Dakhliyah	25	56.0%	12.0%	8.0%	24.0%	
Ash Sharqiyah North	26	3.8%	3.8%	7.7%	84.6%	
Ash Sharqiyah South	29	75.9%	10.3%	10.3%	3.4%	
Al Batinah North	30	30.0%	10.0%	3.3%	56.7%	
Al Batinah South	26	53.8%	11.5%	7.7%	26.9%	
Adh Dhahirah	24	41.7%	0%	4.2%	54.2%	
Al Buraymi	24	75.0%	4.2%	0%	20.8%	
Musandam	32	56.3%	6.3%	9.4%	28.1%	
Al Wusta	29	62.1%	10.3%	3.4%	24.1%	

Table S37. Do you check food ingredient labels for amount of tropical oils when you shop?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	161	48.0%	5.3%	3.0%	43.7%	0.515
Female	127	46.7%	10.1%	4.2%	39.1%	
Governorate						
Muscat	27	59.3%	3.7%	3.7%	33.3%	0.075
Dhofar	16	18.8%	18.8%	0%	62.5%	
Ad Dakhliyah	25	60.0%	12.0%	8.0%	20.0%	
Ash Sharqiyah North	26	3.8%	7.7%	0%	88.5%	
Ash Sharqiyah South	29	72.4%	10.3%	10.3%	6.9%	
Al Batinah North	30	36.7%	0%	0%	63.3%	
Al Batinah South	26	50.0%	15.4%	3.8%	30.8%	
Adh Dhahirah	24	41.7%	0%	4.2%	54.2%	
Al Buraymi	24	75.0%	4.2%	0%	20.8%	
Musandam	32	53.1%	12.5%	9.4%	25.0%	
Al Wusta	29	58.6%	10.3%	6.9%	24.1%	

b) Adults

Table S38. Knows that there are cooking methods to reduce the amount of fat in food, by governorate – Adults 19-60 years of age

Governorate	N	Yes	No	Don`t know	P-value
Muscat	102	81.5%	4.9%	13.6%	<0.001
Dhofar	64	70.3%	12.5%	17.2%	
Ad Dakhliyah	91	72.0%	11.8%	16.2%	
Ash Sharqiyah North	88	79.8%	8.8%	11.4%	
Ash Sharqiyah South	115	81.8%	11.3%	7.0%	
Al Batinah North	110	78.1%	11.9%	10.0%	
Al Batinah South	99	70.8%	6.1%	23.1%	
Adh Dhahirah	115	78.0%	16.6%	5.4%	
Al Buraymi	90	56.3%	10.4%	33.3%	
Musandam	113	72.3%	8.5%	19.2%	
Al Wusta	106	66.4%	20.3%	13.4%	

Table S39. What is effect of too much dietary fat on health, by governorate – Adults 19-60 years of age

Governorate	N	Good for health	No effect on health	Bad for health	Don`t know	P-value
Muscat	102	1.0%	2.0%	97.1%	0%	0.914
Dhofar	64	1.6%	0%	98.4%	98.4%	
Ad Dakhliyah	91	2.2%	0%	97.8%	97.8%	
Ash Sharqiyah North	88	2.3%	1.1%	95.4%	1.2%	
Ash Sharqiyah South	115	0.9%	0%	95.6%	3.5%	
Al Batinah North	110	0%	0.9%	98.2%	0.9%	
Al Batinah South	99	0%	2.1%	93.9%	4.1%	
Adh Dhahirah	115	4.4%	0.8%	92.9%	1.9%	
Al Buraymi	90	0.7%	0%	96.3%	3.0%	
Musandam	113	1.3%	0.6%	90.3%	7.8%	
Al Wusta	106	0.9%	1.8%	95.4%	1.9%	

Table S40. Saturated fat raises the cholesterol level in the blood – Adults 19-60 years of age

Characteristic	N	Right	Wrong	Don`t know	P-value
Education level					
Primary	14	100.0%	0%	0%	0.309
Elementary	24	95.5%	0%	4.5%	
Secondary or more	175	91.3%	1.6%	7.1%	
Diploma	73	99.9%	0%	0.1%	
Bachelors or more	129	88.7%	4.3%	6.9%	
Governorate					
Muscat	50	89.8%	4.1%	6.1%	0.949
Dhofar	11	100.0%	0%	0%	
Ad Dakhliyah	41	94.8%	0%	5.2%	
Ash Sharqiyah North	35	97.0%	3.0%	0%	
Ash Sharqiyah South	56	89.3%	3.6%	7.1%	
Al Batinah North	38	92.2%	0%	7.8%	
Al Batinah South	42	92.8%	0%	7.2%	
Adh Dhahirah	42	92.9%	2.6%	4.5%	
Al Buraymi	34	89.7%	8.3%	2.0%	
Musandam	40	90.5%	0%	9.5%	
Al Wusta	31	90.3%	0%	9.7%	

Table S41. Saturated fat increase the risk of cardiovascular disease – Adults 19-60 years of age

Characteristic	N	Right	Wrong	Don`t know	P-value
Education level					
Primary	14	100.0%	0%	0%	0.676
Elementary	24	92.9%	2.5%	4.5%	
Secondary or more	175	94.0%	1.0%	5.0%	
Diploma	73	99.2%	0%	0.8%	
Bachelors or more	129	95.5%	2.3%	2.2%	
Governorate					
Muscat	50	93.9%	2.1%	4.0%	0.599
Dhofar	11	100.0%	0%	0%	
Ad Dakhliyah	41	97.4%	0%	2.6%	
Ash Sharqiyah North	35	94.0%	6.0%	0%	
Ash Sharqiyah South	56	96.4%	1.8%	1.8%	
Al Batinah North	38	94.7%	0%	5.3%	
Al Batinah South	42	97.6%	0%	2.4%	
Adh Dhahirah	42	95.5%	0%	4.5%	
Al Buraymi	34	87.7%	4.1%	8.1%	
Musandam	40	80.6%	3.2%	16.2%	
Al Wusta	31	83.6%	16.4%	0%	

Table S42. Saturated fats are naturally present in milk – Adults 19-60 years of age

Characteristic	N	Right	Wrong	Don`t know	P-value
Education level					
Primary	14	32.0%	37.5%	30.4%	0.847
Elementary	24	43.4%	20.0%	36.6%	
Secondary or more	175	41.5%	20.4%	38.0%	
Diploma	73	39.2%	23.4%	37.3%	
Bachelors or more	129	47.3%	17.3%	35.4%	
Governorate					
Muscat	50	43.9%	19.8%	36.3%	<0.01
Dhofar	11	45.5%	27.3%	27.3%	
Ad Dakhliyah	41	56.5%	14.7%	28.9%	
Ash Sharqiyah North	35	52.9%	26.4%	20.7%	
Ash Sharqiyah South	56	46.4%	19.6%	33.9%	
Al Batinah North	38	28.9%	23.8%	47.3%	
Al Batinah South	42	38.0%	19.0%	43.1%	
Adh Dhahirah	42	40.4%	9.3%	50.3%	
Al Buraymi	34	42.7%	41.1%	16.3%	
Musandam	40	46.1%	4.9%	48.9%	
Al Wusta	31	41.8%	32.4%	25.8%	

Table S43. Saturated fats are found in animal fats – Adults 19-60 years of age

Characteristic	N	Right	Wrong	Don`t know	P-value
Education level					
Primary	14	66.3%	0%	33.7%	0.515
Elementary	24	66.0%	17.3%	16.7%	
Secondary or more	175	59.7%	22.0%	18.3%	
Diploma	73	70.1%	13.2%	16.7%	
Bachelors or more	129	69.5%	17.7%	12.8%	
Governorate					
Muscat	50	58.3%	25.8%	15.9%	0.058
Dhofar	11	72.7%	27.3%	0%	
Ad Dakhliyah	41	72.9%	14.4%	12.6%	
Ash Sharqiyah North	35	68.6%	19.7%	11.7%	
Ash Sharqiyah South	56	67.9%	17.8%	14.3%	
Al Batinah North	38	58.0%	15.8%	26.2%	
Al Batinah South	42	78.5%	4.7%	16.8%	
Adh Dhahirah	42	73.7%	14.7%	11.6%	
Al Buraymi	34	63.2%	14.4%	22.4%	
Musandam	40	55.6%	1.8%	42.6%	
Al Wusta	31	58.8%	19.1%	22.1%	

Table S44. Saturated fats are found in a high percentage in vegetable oils such as sunflower and corn oil – Adults 19-60 years of age

Characteristic	N	Right	Wrong	Don`t know	P-value
Education level					
Primary	14	41.6%	39.7%	18.7%	0.683
Elementary	24	39.5%	34.4%	26.0%	
Secondary or more	175	56.2%	24.8%	19.0%	
Diploma	73	62.3%	23.2%	14.5%	
Bachelors or more	129	47.8%	29.2%	23.0%	
Governorate					
Muscat	50	44.1%	31.8%	24.1%	0.136
Dhofar	11	63.6%	36.4%	0%	
Ad Dakhliyah	41	65.2%	29.9%	4.9%	
Ash Sharqiyah North	35	50.8%	32.1%	17.1%	
Ash Sharqiyah South	56	66.1%	14.3%	19.6%	
Al Batinah North	38	47.1%	21.3%	31.6%	
Al Batinah South	42	54.6%	23.7%	21.6%	
Adh Dhahirah	42	59.3%	29.1%	11.6%	
Al Buraymi	34	57.3%	22.3%	20.4%	
Musandam	40	36.3%	23.2%	40.5%	
Al Wusta	31	58.8%	31.8%	9.4%	

Table S45. Saturated fats are found in in most tropical oils such, as palm oil and coconut oil – Adults 19-60 years of age

Characteristic	N	Right	Wrong	Don`t know	P-value
Education level					
Primary	14	38.0%	50.4%	11.6%	0.372
Elementary	24	37.5%	26.5%	36.0%	
Secondary or more	175	48.8%	18.6%	32.7%	
Diploma	73	36.1%	23.6%	40.3%	
Bachelors or more	129	50.3%	21.2%	28.4%	
Governorate					
Muscat	50	48.1%	19.7%	32.2%	0.057
Dhofar	11	72.7%	18.2%	9.1%	
Ad Dakhliyah	41	48.7%	22.2%	29.1%	
Ash Sharqiyah North	35	42.8%	26.1%	31.1%	
Ash Sharqiyah South	56	50.0%	16.1%	34.0%	
Al Batinah North	38	28.9%	28.9%	42.2%	
Al Batinah South	42	47.5%	21.4%	31.1%	
Adh Dhahirah	42	50.6%	21.5%	27.9%	
Al Buraymi	34	50.9%	22.5%	26.5%	
Musandam	40	20.1%	34.5%	45.4%	
Al Wusta	31	55.5%	25.8%	18.8%	

Table S46. Saturated fat does not affect health in any negative way – Adults 19-60 years of age

Characteristic	N	Right	Wrong	Don`t know	P-value
Education level					
Primary	14	0%	98.2%	1.8%	0.401
Elementary	24	14.1%	81.4%	4.5%	
Secondary or more	175	5.3%	88.7%	6.0%	
Diploma	73	10.4%	89.5%	0.1%	
Bachelors or more	129	7.5%	84.8%	7.7%	
Governorate					
Muscat	50	6.1%	83.7%	10.3%	0.653
Dhofar	11	18.2%	81.8%	0%	
Ad Dakhliyah	41	2.3%	95.1%	2.6%	
Ash Sharqiyah North	35	14.4%	85.6%	0%	
Ash Sharqiyah South	56	7.1%	92.9%	0%	
Al Batinah North	38	8.0%	86.7%	5.3%	
Al Batinah South	42	4.7%	90.5%	4.8%	
Adh Dhahirah	42	14.1%	81.4%	4.5%	
Al Buraymi	34	8.3%	87.7%	4.0%	
Musandam	40	12.0%	78.2%	9.9%	
Al Wusta	31	13.4%	80.3%	6.4%	

Table S47. Respondents' assessment of truth of statements regarding trans fat, among respondents who had heard of trans fats – Adults 19-60 years of age

Statement (Trans fat…)	N	Right	Wrong	Don`t know
Raises cholesterol	362	95.4%	0.2%	4.4%
Increases the risk of cardiovascular disease	362	94.1%	0.4%	5.5%
Are found naturally in milk	362	17.3%	55.9%	26.8%
Are found in non-hydrogenated vegetable ghee	362	27.2%	46.2%	26.6%
Do not affect health in any negative way	362	6.4%	90.2%	3.4%

Table S48. Do you care about artificial flavors in the foods you eat? – Adults 19-60 years of age

Characteristic	N	Does care	Does not care	P-value
Governorate				
Muscat	102	51.8%	48.2%	<0.01
Dhofar	64	37.5%	62.5%	
Ad Dakhliyah	91	36.6%	63.4%	
Ash Sharqiyah North	88	26.9%	73.1%	
Ash Sharqiyah South	115	53.9%	46.1%	
Al Batinah North	110	30.8%	69.2%	
Al Batinah South	99	43.3%	56.7%	
Adh Dhahirah	115	63.0%	37.0%	
Al Buraymi	90	33.1%	66.9%	
Musandam	113	29.2%	70.8%	
Al Wusta	106	21.9%	78.1%	

Table S49. Do you care about artificial colors in the foods you eat? – Adults 19-60 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	102	48.9%	51.1%	<0.001
Dhofar	64	57.8%	42.2%	
Ad Dakhliyah	91	36.6%	63.4%	
Ash Sharqiyah North	88	37.4%	62.6%	
Ash Sharqiyah South	115	66.1%	33.9%	
Al Batinah North	110	32.5%	67.5%	
Al Batinah South	99	41.4%	58.6%	
Adh Dhahirah	115	66.5%	33.5%	
Al Buraymi	90	37.5%	62.5%	
Musandam	113	34.5%	65.5%	
Al Wusta	106	20.7%	79.3%	

Table S50. Do you care about salt in the foods you eat? – Adults 19-60 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	102	29.3%	70.7%	<0.05
Dhofar	64	45.3%	54.7%	
Ad Dakhliyah	91	32.7%	67.3%	
Ash Sharqiyah North	88	30.0%	70.0%	
Ash Sharqiyah South	115	48.7%	51.3%	
Al Batinah North	110	24.7%	75.3%	
Al Batinah South	99	21.1%	78.9%	
Adh Dhahirah	115	28.8%	71.2%	
Al Buraymi	90	33.1%	66.9%	
Musandam	113	28.9%	71.1%	
Al Wusta	106	25.4%	74.6%	

Table S51. Do you care about sugar in the foods you eat? – Adults 19-60 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	102	54.9%	45.1%	0.135
Dhofar	64	59.4%	40.6%	
Ad Dakhliyah	91	63.5%	36.5%	
Ash Sharqiyah North	88	45.8%	54.2%	
Ash Sharqiyah South	115	56.5%	43.5%	
Al Batinah North	110	48.0%	52.0%	
Al Batinah South	99	37.2%	62.8%	
Adh Dhahirah	115	39.9%	60.1%	
Al Buraymi	90	44.1%	55.9%	
Musandam	113	56.1%	43.9%	
Al Wusta	106	41.7%	58.3%	

Table S52. Do you care about calories in the foods you eat? – Adults 19-60 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	102	31.4%	68.6%	<0.05
Dhofar	64	23.4%	76.6%	
Ad Dakhliyah	91	24.5%	75.5%	
Ash Sharqiyah North	88	14.0%	86.0%	
Ash Sharqiyah South	115	27.0%	73.0%	
Al Batinah North	110	25.5%	74.5%	
Al Batinah South	99	22.1%	77.9%	
Adh Dhahirah	115	29.0%	71.0%	
Al Buraymi	90	17.6%	82.4%	
Musandam	113	11.5%	88.5%	
Al Wusta	106	15.0%	85.0%	

Table S53. Do you care about saturated fat in the foods you eat? – Adults 19-60 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	102	14.8%	85.2%	<0.001
Dhofar	64	20.3%	79.7%	
Ad Dakhliyah	91	45.9%	54.1%	
Ash Sharqiyah North	88	23.8%	76.2%	
Ash Sharqiyah South	115	20.9%	79.1%	
Al Batinah North	110	43.1%	56.9%	
Al Batinah South	99	46.4%	53.6%	
Adh Dhahirah	115	19.1%	80.9%	
Al Buraymi	90	36.0%	64.0%	
Musandam	113	29.1%	70.9%	
Al Wusta	106	18.9%	81.1%	

Table S54. Do you care about trans fat in the foods you eat? – Adults 19-60 years of age

Governorate	N	Does care	Does not care	P-value
Muscat	102	12.9%	87.1%	<0.001
Dhofar	64	31.3%	68.7%	
Ad Dakhliyah	91	37.7%	62.3%	
Ash Sharqiyah North	88	13.9%	86.1%	
Ash Sharqiyah South	115	15.6%	84.4%	
Al Batinah North	110	33.6%	66.4%	
Al Batinah South	99	31.3%	68.7%	
Adh Dhahirah	115	14.8%	85.2%	
Al Buraymi	90	26.4%	73.6%	
Musandam	113	27.3%	72.7%	
Al Wusta	106	10.3%	89.7%	

Table S55. When asked "Do you care about certain ingredients in the foods you eat?", replied 'Do not know' – Adults 19-60 years of age

Governorate	N	Do not know	Other	P-value
Muscat	102	4.9%	95.1%	0.067
Dhofar	64	7.8%	92.2%	
Ad Dakhliyah	91	3.2%	96.8%	
Ash Sharqiyah North	88	0%	100.0%	
Ash Sharqiyah South	115	4.4%	95.6%	
Al Batinah North	110	0.9%	99.1%	
Al Batinah South	99	4.1%	95.9%	
Adh Dhahirah	115	2.5%	97.5%	
Al Buraymi	90	8.8%	91.2%	
Musandam	113	7.2%	92.8%	
Al Wusta	106	16.8%	83.2%	

Table S56. When asked "Do you care about certain ingredients in the foods you eat?", replied 'Not worried' – Adults 19-60 years of age

Characteristic	N	Not worried	Other	P-value
Governorate				
Muscat	102	11.8%	88.2%	<0.05
Dhofar	64	1.6%	98.4%	
Ad Dakhliyah	91	3.5%	96.5%	
Ash Sharqiyah North	88	10.2%	89.8%	
Ash Sharqiyah South	115	5.2%	94.8%	
Al Batinah North	110	1.9%	98.1%	
Al Batinah South	99	2.0%	98.0%	
Adh Dhahirah	115	8.8%	91.2%	
Al Buraymi	90	11.1%	88.9%	
Musandam	113	7.4%	92.6%	
Al Wusta	106	9.3%	90.7%	

Table S57. When eating meals do you reduce fat while eating? – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	556	24.1%	27.3%	46.3%	2.3%	<0.01
Female	537	14.1%	25.9%	56.3%	3.7%	
Education level						
Primary	56	19.2%	30.0%	45.8%	5.0%	<0.01
Elementary	112	17.4%	18.9%	60.7%	3.1%	
Secondary or more	519	23.3%	27.3%	47.9%	1.4%	
Diploma	137	12.4%	35.6%	51.6%	0.4%	
Bachelors or more	219	14.5%	23.0%	55.4%	7.2%	
Governorate						
Muscat	102	19.4%	23.5%	52.3%	4.9%	0.627
Dhofar	64	18.8%	37.5%	43.7%	0%	
Ad Dakhliyah	91	11.8%	21.9%	61.8%	4.5%	
Ash Sharqiyah North	88	13.4%	29.7%	55.7%	1.2%	
Ash Sharqiyah South	115	19.1%	38.3%	42.6%	0%	
Al Batinah North	110	22.8%	24.4%	50.1%	2.7%	
Al Batinah South	99	19.2%	24.3%	51.4%	5.1%	
Adh Dhahirah	115	25.7%	19.5%	53.9%	0.8%	
Al Buraymi	90	25.8%	31.6%	42.6%	0%	
Musandam	113	12.0%	28.0%	53.8%	6.2%	
Al Wusta	106	18.6%	48.3%	33.1%	0%	

Table S58. Do you check food ingredient labels when you shop? – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	556	49.6%	16.8%	31.6%	1.9%	<0.05
Female	537	46.7%	21.5%	26.1%	5.6%	
Education level						
Primary	56	58.6%	23.2%	13.0%	5.2%	<0.001
Elementary	112	58.8%	13.0%	21.4%	6.8%	
Secondary or more	519	54.6%	17.1%	26.2%	2.1%	
Diploma	137	45.4%	18.5%	34.7%	1.5%	
Bachelors or more	219	31.6%	27.2%	39.3%	2.0%	
Governorate						
Muscat	102	48.0%	16.7%	34.3%	1.0%	<0.001
Dhofar	64	79.7%	6.3%	14.1%	0%	
Ad Dakhliyah	91	46.0%	19.0%	28.5%	6.5%	
Ash Sharqiyah North	88	54.8%	17.4%	15.0%	12.8%	
Ash Sharqiyah South	115	53.9%	16.5%	22.6%	7.0%	
Al Batinah North	110	38.1%	24.4%	34.9%	2.6%	
Al Batinah South	99	36.5%	27.3%	33.2%	3.1%	
Adh Dhahirah	115	48.5%	18.9%	30.9%	1.7%	
Al Buraymi	90	55.4%	18.3%	18.3%	8.1%	
Musandam	113	41.7%	16.9%	26.6%	14.7%	
Al Wusta	106	50.6%	21.7%	24.7%	3.0%	

Table S59. Have you ever changed your purchasing habits to reduce your total fat intake? – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	556	38.5%	16.3%	29.9%	15.2%	0.345
Female	537	36.4%	21.0%	26.3%	16.4%	
Education level						
Primary	56	40.4%	15.4%	18.4%	25.8%	<0.01
Elementary	112	44.8%	13.1%	18.9%	23.2%	
Secondary or more	519	42.2%	18.0%	24.3%	15.5%	
Diploma	137	33.2%	23.4%	31.8%	11.6%	
Bachelors or more	219	28.2%	20.8%	42.2%	8.8%	
Governorate						
Muscat	102	43.2%	16.7%	34.3%	5.8%	<0.001
Dhofar	64	54.7%	9.4%	18.7%	17.2%	
Ad Dakhliyah	91	33.9%	19.0%	32.9%	14.1%	
Ash Sharqiyah North	88	26.1%	18.6%	9.2%	46.1%	
Ash Sharqiyah South	115	20.9%	17.4%	16.5%	45.2%	
Al Batinah North	110	33.5%	19.7%	31.2%	15.5%	
Al Batinah South	99	34.3%	25.2%	30.2%	10.2%	
Adh Dhahirah	115	42.2%	17.5%	34.2%	6.1%	
Al Buraymi	90	48.0%	25.5%	17.6%	8.8%	
Musandam	113	41.0%	16.9%	25.4%	16.8%	
Al Wusta	106	55.3%	26.4%	16.3%	2.0%	

Table S60. Have you ever changed your purchasing habits to reduce your intake of trans – Adults 19-60 years of age fats?

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	556	42.5%	9.4%	23.7%	24.5%	0.565
Female	537	41.9%	11.2%	20.1%	26.8%	
Education level						
Primary	56	35.0%	9.3%	2.4%	53.3%	<0.001
Elementary	112	51.1%	6.3%	11.9%	30.7%	
Secondary or more	519	47.8%	7.3%	17.9%	27.1%	
Diploma	137	42.9%	14.3%	21.8%	21.0%	
Bachelors or more	219	29.4%	16.0%	41.1%	13.5%	
Governorate						
Muscat	102	41.1%	8.8%	33.4%	16.6%	<0.001
Dhofar	64	59.4%	6.3%	9.4%	25.0%	
Ad Dakhliyah	91	45.4%	14.3%	19.6%	20.7%	
Ash Sharqiyah North	88	22.5%	10.6%	10.4%	56.5%	
Ash Sharqiyah South	115	19.1%	7.8%	10.4%	62.6%	
Al Batinah North	110	46.2%	9.0%	20.3%	24.5%	
Al Batinah South	99	36.3%	13.2%	30.2%	20.3%	
Adh Dhahirah	115	49.0%	10.4%	23.2%	17.5%	
Al Buraymi	90	64.9%	11.6%	11.7%	11.7%	
Musandam	113	41.0%	12.7%	21.0%	25.4%	
Al Wusta	106	48.6%	17.2%	20.1%	14.2%	

Table S61. Do you check food ingredient labels for amount of total fat when you shop? – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	556	48.3%	10.6%	15.9%	25.2%	0.123
Female	537	42.1%	14.2%	13.5%	30.3%	
Education level						
Primary	56	27.8%	12.5%	6.8%	52.8%	<0.001
Elementary	112	45.8%	11.6%	5.5%	37.1%	
Secondary or more	519	48.3%	11.2%	12.4%	28.0%	
Diploma	137	38.2%	12.0%	21.6%	28.3%	
Bachelors or more	219	47.4%	16.8%	23.0%	12.8%	
Governorate						
Muscat	102	56.7%	13.7%	17.7%	11.8%	<0.001
Dhofar	64	23.4%	10.9%	4.7%	60.9%	
Ad Dakhliyah	91	49.6%	14.4%	15.4%	20.6%	
Ash Sharqiyah North	88	11.6%	11.8%	19.5%	57.0%	
Ash Sharqiyah South	115	61.7%	19.1%	11.3%	7.9%	
Al Batinah North	110	36.5%	8.9%	14.7%	39.9%	
Al Batinah South	99	44.4%	9.2%	21.1%	25.4%	
Adh Dhahirah	115	52.2%	14.8%	10.5%	22.6%	
Al Buraymi	90	63.2%	13.3%	8.1%	15.4%	
Musandam	113	49.4%	12.8%	9.7%	28.0%	
Al Wusta	106	61.1%	10.3%	9.5%	19.2%	

Table S62. Do you check food ingredient labels for amount of trans fat when you shop? – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	556	46.0%	5.4%	15.9%	32.7%	0.129
Female	537	42.0%	9.7%	12.8%	35.5%	
Education level						
Primary	56	26.9%	6.3%	2.9%	63.9%	<0.001
Elementary	112	45.0%	7.0%	4.3%	43.7%	
Secondary or more	519	47.2%	5.9%	10.8%	36.1%	
Diploma	137	41.8%	9.0%	21.0%	28.1%	
Bachelors or more	219	43.4%	11.5%	26.3%	18.8%	
Governorate						
Muscat	102	57.6%	8.9%	19.7%	13.7%	<0.001
Dhofar	64	20.3%	0%	4.7%	75.0%	
Ad Dakhliyah	91	54.4%	6.6%	16.2%	22.8%	
Ash Sharqiyah North	88	16.3%	5.9%	12.7%	65.1%	
Ash Sharqiyah South	115	54.8%	8.7%	7.0%	29.6%	
Al Batinah North	110	32.8%	7.2%	13.8%	46.3%	
Al Batinah South	99	42.3%	9.2%	20.1%	28.4%	
Adh Dhahirah	115	48.3%	10.4%	11.5%	29.8%	
Al Buraymi	90	58.1%	12.5%	8.1%	21.3%	
Musandam	113	49.3%	8.5%	11.4%	30.9%	
Al Wusta	106	54.6%	10.4%	9.4%	25.6%	

Table S63. Do you check food ingredient labels for amount of saturated fat when you shop? – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	556	47.7%	6.8%	13.7%	31.8%	0.072
Female	537	39.3%	11.7%	12.9%	36.1%	
Education level						
Primary	56	26.9%	7.7%	2.9%	62.5%	<0.001
Elementary	112	47.0%	8.3%	2.8%	41.8%	
Secondary or more	519	47.5%	8.1%	8.7%	35.7%	
Diploma	137	44.7%	7.3%	19.7%	28.3%	
Bachelors or more	219	39.1%	13.9%	27.3%	19.7%	
Governorate						
Muscat	102	58.5%	10.9%	15.9%	14.8%	<0.001
Dhofar	64	18.8%	3.1%	6.2%	71.9%	
Ad Dakhliyah	91	51.0%	7.6%	16.3%	25.0%	
Ash Sharqiyah North	88	17.5%	7.1%	12.6%	62.8%	
Ash Sharqiyah South	115	53.9%	11.3%	8.7%	26.1%	
Al Batinah North	110	32.8%	8.1%	12.8%	46.3%	
Al Batinah South	99	41.2%	13.3%	18.0%	27.5%	
Adh Dhahirah	115	46.7%	10.4%	12.2%	30.7%	
Al Buraymi	90	61.1%	11.0%	6.6%	21.3%	
Musandam	113	48.6%	7.9%	11.4%	32.0%	
Al Wusta	106	56.3%	9.4%	7.7%	26.6%	

Table S64. Do you check food ingredient labels for amount of tropical oils when you shop? – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	556	49.6%	6.7%	12.9%	30.8%	0.229
Female	537	42.9%	10.5%	12.8%	33.8%	
Education level						
Primary	56	28.7%	10.1%	2.9%	58.3%	<0.001
Elementary	112	44.7%	7.1%	8.5%	39.7%	
Secondary or more	519	48.2%	7.7%	9.6%	34.5%	
Diploma	137	45.2%	6.8%	18.1%	29.9%	
Bachelors or more	219	49.3%	12.2%	22.2%	16.3%	
Governorate						
Muscat	102	57.6%	6.9%	20.7%	14.8%	<0.001
Dhofar	64	17.2%	4.7%	6.2%	71.9%	
Ad Dakhliyah	91	54.2%	12.2%	13.1%	20.5%	
Ash Sharqiyah North	88	12.8%	13.0%	9.2%	64.9%	
Ash Sharqiyah South	115	66.0%	11.3%	9.6%	13.1%	
Al Batinah North	110	40.1%	4.4%	9.2%	46.3%	
Al Batinah South	99	45.3%	9.1%	16.1%	29.5%	
Adh Dhahirah	115	47.6%	15.7%	10.5%	26.2%	
Al Buraymi	90	62.6%	10.3%	8.1%	19.1%	
Musandam	113	49.3%	9.2%	8.5%	33.0%	
Al Wusta	106	60.1%	11.4%	5.7%	22.8%	

11.3. Salt

a) Adolescents

Table S65. Type of information on package labels reported as identifying salt content of food, by sex and governorate - Adolescents 14-18 years of age

Characteristic	N	Sodium level	Ingredients	Claim of low salt content	Does not know
Sex					
Male	147	18.8%	9.7%	9.3%	24.9%
Female	126	22.5%	8.6%	5.3%	34.6%
Governorate					
Muscat	30	10.0%	13.3%	6.7%	46.7%
Dhofar	16	6.3%	0%	0%	68.8%
Ad Dakhliyah	24	29.2%	20.8%	4.2%	25.0%
Ash Sharqiyah North	22	9.1%	9.1%	4.5%	0%
Ash Sharqiyah South	32	18.8%	6.3%	3.1%	6.3%
Al Batinah North	26	38.5%	3.8%	15.4%	23.1%
Al Batinah South	24	8.3%	4.2%	0%	16.7%
Adh Dhahirah	25	44.0%	8.0%	24.0%	16.0%
Al Buraymi	22	31.8%	9.1%	13.6%	45.5%
Musandam	27	11.1%	3.7%	0%	0%
Al Wusta	25	16.0%	16.0%	8.0%	20.0%

Table S66. How often respondent checks the salt or sodium content of foods when shopping, by sex and governorate - Adolescents 14-18 years of age

Characteristic	N	Never/rarely	Sometimes	Often/always	Unknown	P value
Sex						
Male	147	66.5%	12.8%	12.5%	8.2%	0.517
Female	126	71.2%	14.7%	6.4%	7.7%	
Governorate						
Muscat	30	70.0%	13.3%	6.7%	10.0%	0.374
Dhofar	16	62.5%	18.8%	12.5%	6.3%	
Ad Dakhliyah	24	70.8%	16.7%	4.2%	8.3%	
Ash Sharqiyah North	22	59.1%	9.1%	0%	31.8%	
Ash Sharqiyah South	32	84.4%	6.3%	9.4%	0%	
Al Batinah North	26	65.4%	11.5%	23.1%	0%	
Al Batinah South	24	70.8%	16.7%	4.2%	8.3%	
Adh Dhahirah	25	56.0%	20.0%	12.0%	12.0%	
Al Buraymi	22	81.8%	13.6%	0%	4.5%	
Musandam	27	63.0%	3.7%	7.4%	25.9%	
Al Wusta	25	68.0%	12.0%	4.0%	16.0%	

Table S67. How often among respondent reads food labels affect your purchase of a food product, by sex and governorate - Adolescents 14-18 years of age

Characteristic	N	Never/rarely	Sometimes	Often/always	Unknown	P value
Sex						
Male	147	42.1%	5.6%	10.4%	41.9%	0.474
Female	126	35.5%	11.4%	10.2%	42.9%	
Governorate						
Muscat	30	50.0%	6.7%	3.3%	40.0%	<0.05
Dhofar	16	18.8%	12.5%	25.0%	43.8%	
Ad Dakhliyah	24	37.5%	4.2%	12.5%	45.8%	
Ash Sharqiyah North	22	27.3%	4.5%	4.5%	63.6%	
Ash Sharqiyah South	32	12.5%	3.1%	9.4%	75.0%	
Al Batinah North	26	30.8%	15.4%	15.4%	38.5%	
Al Batinah South	24	54.2%	8.3%	12.5%	25.0%	
Adh Dhahirah	25	64.0%	12.0%	4.0%	20.0%	
Al Buraymi	22	40.9%	4.5%	0%	54.5%	
Musandam	27	59.3%	7.4%	3.7%	29.6%	
Al Wusta	25	64.0%	8.0%	16.0%	12.0%	

Table S68. How often respondents purchases foods labeled as low salt or low sodium, by sex and governorate - Adolescents 14-18 years of age

Characteristic	N	Never/rarely	Sometimes	Often/always	Unknown	P value
Sex						
Male	147	52.2%	11.7%	4.9%	31.2%	0.389
Female	126	53.9%	15.0%	8.3%	22.8%	
Governorate						
Muscat	30	60.0%	10.0%	0%	30.0%	<0.001
Dhofar	16	31.3%	31.3%	12.5%	25.0%	
Ad Dakhliyah	24	70.8%	8.3%	0%	20.8%	
Ash Sharqiyah North	22	27.3%	4.5%	4.5%	63.6%	
Ash Sharqiyah South	32	9.4%	6.3%	9.4%	75.0%	
Al Batinah North	26	65.4%	11.5%	15.4%	7.7%	
Al Batinah South	24	50.0%	20.8%	8.3%	20.8%	
Adh Dhahirah	25	56.0%	20.0%	8.0%	16.0%	
Al Buraymi	22	63.6%	22.7%	4.5%	9.1%	
Musandam	27	59.3%	11.1%	7.4%	22.2%	
Al Wusta	25	80.0%	0%	12.0%	8.0%	

Table S69. Median number of times per month selected salty foods or drinks consumed, by governorate - Adolescents 14-18 years of age

Food or drink item	Muscat	Dhofar	Ad Dakhliyah	Ash Sharqiyah North	Ash Sharqiyah South	Al Batinah North	Al Batinah South	Adh Dhahirah	Al Buraymi	Musan-dam	Al Wusta	P value
Canned food	2.5	0.5	3.5	4.3	4.3	4.3	1.5	8.7	2.5	2.0	3.0	0.231
Dairy	30.4	15.2	23.9	30.4	23.9	30.4	30.4	30.4	30.4	30.4	8.7	<0.05
Sauces	4.3	30.4	2.0	5.3	10.9	6.5	6.5	3.0	8.7	21.7	4.3	<0.01
Pickles	0.0	0.0	1.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	<0.01
Processed meat	4.3	6.5	1.5	1.0	0.5	4.3	4.3	2.0	3.7	4.0	1.0	<0.01
Crisps	23.9	30.4	19.5	30.4	26.1	21.7	17.4	8.7	13.0	30.4	13.0	0.104
Salted nuts	1.5	0.5	0.0	0.0	3.2	2.7	1.0	4.3	1.5	4.3	4.3	<0.01
Salted butter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	<0.01
Pastries	8.7	3.2	4.3	4.3	4.3	8.7	6.5	4.3	8.7	8.7	8.7	0.782
Maggi cubes	1.5	0.0	0.0	0.0	0.5	4.8	1.5	4.3	8.7	1.0	0.0	<0.05
Fast food	3.7	8.7	2.0	3.7	4.3	8.7	3.2	3.0	4.3	8.7	8.7	0.092
Maleh	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	1.0	1.0	<0.001
Ouwaal-Qashaa	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	<0.01
Local achar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.577
Local cheese	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	2.5	0.0	0.0	<0.001
Indomie	2.0	2.7	1.0	0.0	0.0	4.3	3.7	1.0	4.3	2.0	0.0	0.058

b) Adults

Table S70. Type of information on package labels reported as identifying salt content of food, by sex, educational level, and governorate – Adults 19-60 years of age

Characteristic	N	Sodium level	Ingredients	Claim of low salt content	Does not know
Sex					
Male	550	24.7%	19.2%	14.1%	29.0%
Female	534	28.1%	16.6%	12.2%	26.1%
Education level					
Primary	49	4.7%	8.5%	20.5%	37.4%
Elementary	126	8.9%	20.4%	14.4%	36.4%
Secondary	516	24.6%	18.6%	15.0%	28.8%
Diploma	125	34.5%	17.6%	15.9%	23.4%
Secondary or more	212	43.6%	19.9%	6.6%	18.4
Governorate					
Muscat	102	22.5%	26.6%	18.7%	23.4%
Dhofar	61	16.5%	1.8%	0%	62.0%
Ad Dakhliyah	89	27.2%	28.8%	5.4%	27.3%
Ash Sharqiyah North	93	8.6%	10.7%	17.2%	5.5%
Ash Sharqiyah South	111	23.4%	12.5%	19.6%	2.7%
Al Batinah North	110	36.3%	13.6%	20.0%	28.2%
Al Batinah South	101	23.8%	15.8%	4.0%	29.7%
Adh Dhahirah	110	38.7%	16.3%	9.2%	36.5%
Al Buraymi	85	36.0%	22.7%	14.0%	35.9%
Musandam	115	40.1%	20.5%	18.5%	23.3%
Al Wusta	107	25.1%	12.1%	12.1%	33.7%

Table S71. How often the respondent checks the salt or sodium content of foods when shopping, by sex, educational level, and governorate - Adults 19-60 years of age

Characteristic	N	Never/rarely	Sometimes	Often/always	Do not know	P value
Sex						
Male	550	64.4%	13.4%	15.5%	6.7%	0.264
Female	534	57.2%	15.8%	20.4%	6.6%	
Education level						
Primary	49	70.9%	12.7%	11.6%	4.9%	0.251
Elementary	126	60.4%	8.9%	26.4%	4.3%	
Secondary	516	61.6%	14.2%	17.1%	7.1%	
Diploma	125	60.4%	19.3%	17.1%	3.1%	
Bachelors or more	212	63.0%	17.8%	17.3%	2.0%	
Governorate						
Muscat	102	57.6%	15.8%	21.7%	4.8%	<0.01
Dhofar	61	71.3%	9.9%	15.5%	3.3%	
Ad Dakhliyah	89	51.5%	22.7%	8.0%	17.9%	
Ash Sharqiyah North	93	60.0%	15.2%	8.4%	16.4%	
Ash Sharqiyah South	111	71.2%	15.4%	8.8%	4.6%	
Al Batinah North	110	63.7%	8.2%	25.4%	2.7%	
Al Batinah South	101	61.4%	11.9%	23.7%	3.0%	
Adh Dhahirah	110	63.4%	17.4%	14.4%	4.8%	
Al Buraymi	85	54.8%	25.8%	10.0%	9.4%	
Musandam	115	43.2%	23.3%	27.0%	6.6%	
Al Wusta	107	60.9%	18.6%	10.3%	10.2%	

Table S72. Among those who check the salt or sodium content of foods, how often this affects purchases, by sex, educational level, and governorate - Adults 19-60 years of age

Characteristic	N	Never/rarely	Sometimes	Often/always	Unknown	P value
Sex						
Male	272	28.2%	19.7%	36.3%	15.8%	0.749
Female	295	24.0%	24.2%	35.3%	16.5%	
Education level						
Primary	19	10.4%	43.6%	33.5%	12.4%	0.082
Elementary	63	30.2%	3.6%	59.2%	7.0%	
Secondary	255	26.2%	23.6%	32.8%	17.4%	
Diploma	75	29.5%	25.9%	38.1%	6.5%	
Bachelors or more	116	28.0%	25.5%	36.4%	10.1%	
Governorate						
Muscat	55	29.0%	20.2%	36.4%	14.4%	<0.05
Dhofar	27	31.6%	10.7%	50.3%	7.4%	
Ad Dakhliyah	48	16.7%	18.9%	27.0%	37.5%	
Ash Sharqiyah North	43	11.8%	32.1%	20.9%	35.2%	
Ash Sharqiyah South	45	31.0%	37.6%	22.2%	9.2%	
Al Batinah North	50	26.0%	22.0%	44.0%	8.0%	
Al Batinah South	52	28.9%	21.2%	40.3%	9.6%	
Adh Dhahirah	51	31.3%	25.6%	31.0%	12.1%	
Al Buraymi	52	29.9%	24.7%	28.6%	16.9%	
Musandam	74	12.7%	26.5%	47.8%	12.9%	
Al Wusta	70	47.2%	21.4%	17.2%	14.2%	

Table S73. How often respondent purchases foods labeled as low salt or low sodium, by sex, educational level, and governorate - Adults 19-60 years of age

Characteristic	N	Never/rarely	Sometimes	Often/always	Unknown	P value
Sex						
Male	550	54.3%	14.8%	14.6%	16.3%	<0.01
Female	534	39.7%	21.1%	18.4%	20.8%	
Education level						
Primary	49	35.3%	23.5%	13.5%	27.6%	<0.05
Elementary	126	55.2%	10.8%	17.7%	16.3%	
Secondary	516	51.6%	14.5%	17.0%	16.9%	
Diploma	125	39.0%	20.3%	22.6%	18.0%	
Bachelors or more	212	44.8%	28.0%	13.9%	13.3%	
Governorate						
Muscat	102	49.7%	22.6%	16.7%	11.0%	<0.001
Dhofar	61	45.3%	20.9%	15.8%	18.0%	
Ad Dakhliyah	89	56.2%	16.0%	8.8%	19.0%	
Ash Sharqiyah North	93	28.1%	14.0%	6.5%	51.5%	
Ash Sharqiyah South	111	12.5%	11.7%	12.5%	63.3%	
Al Batinah North	110	53.7%	20.9%	18.1%	7.3%	
Al Batinah South	101	48.5%	10.9%	28.7%	11.9%	
Adh Dhahirah	110	56.8%	16.1%	15.2%	11.9%	
Al Buraymi	85	51.6%	18.0%	14.8%	15.6%	
Musandam	115	39.8%	20.3%	31.0%	8.9%	
Al Wusta	107	54.3%	22.4%	5.6%	17.7%	

Table S74. Median number of times per month selected salty foods or drinks consumed, by governorate – Adults 19-60 years of age

Food or drink item	Muscat	Dhofar	Ad Dakhliyah	Ash Sharqiyah North	Ash Sharqiyah South	Al Batinah North	Al Batinah South	Adh Dhahirah	Al Buraymi	Musan-dam	Al Wusta	P value
Canned food	2.0	1.0	2.0	2.0	4.3	4.3	4.3	4.3	2.0	2.0	1.0	<0.001
Dairy	17.4	13.0	30.4	13.0	17.4	17.4	17.4	21.7	30.4	30.4	8.7	<0.001
Sauces	4.3	4.3	2.0	0.0	4.3	2.5	4.3	0.0	4.3	4.3	2.0	<0.001
Pickles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	<0.001
Processed meat	2.5	0.0	1.0	0.0	0.0	2.0	1.0	0.0	1.0	0.0	0.0	<0.001
Crisps	4.3	4.3	4.3	8.7	8.7	8.7	8.7	4.3	8.7	4.3	4.3	0.856
Salted nuts	2.0	1.0	1.0	1.0	1.0	1.0	0.0	1.0	2.0	2.0	4.3	<0.001
Salted butter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.001
Pastries	4.3	3.0	4.3	2.0	2.0	4.3	3.0	4.0	8.7	8.7	4.3	<0.001
Maggi cubes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	4.3	0.0	0.0	<0.001
Fast food	3.0	4.3	1.0	0.0	1.0	4.3	1.0	1.0	2.0	2.0	1.0	<0.001
Maleh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	<0.001
Ouwaal-Qashaa	0.0	0.0	2.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	1.0	<0.001
Local achar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.001
Local cheese	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	3.0	0.0	0.0	<0.001
Indomie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.05

11.4. Sugar

a) Adolescents

Table S75. Do you check the sugar content or statements like 'low sugar' or 'no added sugar' on the product when you shop, by sex and governorate - Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	171	67.9%	14.3%	14.6%	3.2%	0.630
Female	112	66.9%	16.3%	10.2%	6.6%	
Governorate						
Muscat	27	66.7%	3.7%	18.5%	11.1%	0.236
Dhofar	13	84.6%	7.7%	0%	7.7%	
Ad Dakhliyah	28	60.7%	28.6%	10.7%	0%	
Ash Sharqiyah North	25	68.0%	16.0%	4.0%	12.0%	
Ash Sharqiyah South	33	75.8%	15.2%	6.1%	3.0%	
Al Batinah North	28	60.7%	21.4%	17.9%	0%	
Al Batinah South	24	70.8%	16.7%	12.5%	0%	
Adh Dhahirah	27	70.4%	3.7%	18.5%	7.4%	
Al Buraymi	23	82.6%	13.0%	0%	4.3%	
Musandam	29	44.8%	17.2%	34.5%	3.4%	
Al Wusta	27	57.7%	38.5%	3.8%	0%	

Table S76. Does your reading of nutritional facts, labels, or nutritional claims about sugar affect your purchase of the food product?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	171	39.0%	9.1%	14.2%	37.7%	0.363
Female	112	44.1%	14.6%	6.6%	34.7%	
Governorate						
Muscat	27	37.0%	18.5%	7.4%	37.0%	<0.01
Dhofar	13	61.5%	0%	0%	38.5%	
Ad Dakhliyah	28	50.0%	10.7%	10.7%	28.6%	
Ash Sharqiyah North	25	36.0%	8.0%	4.0%	52.0%	
Ash Sharqiyah South	33	12.1%	12.1%	6.1%	69.7%	
Al Batinah North	28	32.1%	10.7%	21.4%	35.7%	
Al Batinah South	24	58.3%	8.3%	12.5%	20.8%	
Adh Dhahirah	27	51.9%	7.4%	14.8%	25.9%	
Al Buraymi	23	52.2%	8.7%	8.7%	30.4%	
Musandam	29	6.9%	20.7%	31.0%	41.4%	
Al Wusta	27	73.1%	19.2%	7.7%	0%	

Table S77. Do you buy foods that say 'low sugar' or 'no added sugar'?, by sex and governorate – Adolescents 14-18 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Sex						
Male	171	55.1%	10.4%	19.5%	14.9%	<0.05
Female	112	43.4%	23.7%	10.8%	22.1%	
Governorate						
Muscat	27	51.9%	14.8%	11.1%	22.2%	<0.001
Dhofar	13	61.5%	23.1%	7.7%	7.7%	
Ad Dakhliyah	28	53.6%	17.9%	25.0%	3.6%	
Ash Sharqiyah North	25	28.0%	16.0%	4.0%	52.0%	
Ash Sharqiyah South	33	18.2%	9.1%	6.1%	66.7%	
Al Batinah North	28	57.1%	17.9%	25.0%	0%	
Al Batinah South	24	54.2%	12.5%	20.8%	12.5%	
Adh Dhahirah	27	59.3%	11.1%	11.1%	18.5%	
Al Buraymi	23	56.5%	17.4%	8.7%	17.4%	
Musandam	29	48.3%	20.7%	24.1%	6.9%	
Al Wusta	26	57.7%	30.8%	7.7%	3.8%	

Table S78. Median number of times per month selected sweet and sugary foods or drinks consumed, by governorate – Adolescents 14-18 years of age

Food or drink item	Muscat	Dhofar	Ad Dakhliyah	Ash Sharqiyah North	Ash Sharqiyah South	Al Batinah North	Al Batinah South	Adh Dhahirah	Al Buraymi	Musan-dam	Al Wusta
Arab sweets	2.0	1.0	1.0	0.0	2.0	1.0	1.0	1.0	4.3	1.0	2.0
Omani halwa	0.0	0.0	0.0	0.0	1.0	1.0	0.5	0.0	2.0	1.0	2.0
Biscuits, cakes	8.7	8.7	8.7	8.7	8.7	13.0	6.5	4.3	4.3	1.0	8.7
Date molasses	0.0	0.0	0.0	1.0	1.0	0.5	0.0	0.0	0.0	1.0	0.0
Jelly, crème caramel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	1.0
Ice cream	8.7	8.7	4.0	1.0	4.3	4.3	4.3	4.3	8.7	4.3	4.3
Chocolate	13.0	17.4	4.3	4.3	30.4	10.9	15.2	4.3	13.0	30.4	6.5
Breakfast cereal	1.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.0	1.0	0.0
Rusk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Honey	4.3	1.0	8.7	8.7	4.3	8.7	6.5	4.3	8.7	2.0	4.3
Canned fruit, jam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweetened canned drinks	8.7	8.7	4.3	4.3	8.7	13.0	13.0	4.3	8.7	0.0	6.5
Fruit juice with added sugar	8.7	6.0	3.0	4.3	8.7	8.7	4.3	8.7	8.7	8.7	4.3
Fruit juice without added sugar	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carbonated drinks	8.7	8.7	1.5	8.7	8.7	6.5	0.0	2.0	8.7	4.3	8.7
Carbonated drinks without sugar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy drinks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chewing gum	8.7	13.0	0.0	0.0	4.0	4.2	3.0	4.3	8.7	8.7	8.7
Sweetened milk	1.0	2.0	0.0	0.0	1.0	2.0	0.5	1.0	2.0	0.0	1.0
Coffee or tea with sugar	30.4	13.0	30.4	30.4	13.0	30.4	30.4	30.4	30.4	13.0	30.4
Sauces	8.7	1.0	4.3	0.0	1.0	8.7	6.5	1.0	8.7	3.0	4.3
Red sugar drink	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

b) Adults

Table S79. Do you check the sugar content or statements like 'low sugar' or 'no added sugar' on the product when you shop – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Governorate						
Muscat	102	38.2%	17.6%	43.3%	1.0%	0.102
Dhofar	64	61.8%	22.7%	14.1%	1.4%	
Ad Dakhliyah	86	39.5%	24.4%	32.6%	3.5%	
Ash Sharqiyah North	88	50.0%	26.1%	13.7%	10.2%	
Ash Sharqiyah South	110	54.6%	27.2%	12.8%	5.4%	
Al Batinah North	111	45.9%	19.0%	31.5%	3.6%	
Al Batinah South	101	46.4%	17.8%	31.8%	4.0%	
Adh Dhahirah	112	53.6%	16.9%	19.6%	9.8%	
Al Buraymi	87	54.8%	16.0%	26.9%	2.3%	
Musandam	114	28.9%	29.8%	41.4%	0%	
Al Wusta	109	46.8%	37.6%	12.9%	2.6%	

Table S80. Does your reading of nutritional facts, labels, or nutritional claims about sugar affect your purchase of the food product? – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Governorate						
Muscat	102	32.4%	19.6%	38.2%	9.8%	<0.001
Dhofar	64	42.5%	27.3%	15.8%	14.4%	
Ad Dakhliyah	86	26.7%	18.6%	31.4%	23.3%	
Ash Sharqiyah North	88	28.5%	26.2%	9.0%	36.4%	
Ash Sharqiyah South	110	14.6%	24.4%	19.1%	41.9%	
Al Batinah North	111	25.2%	17.2%	26.2%	31.4%	
Al Batinah South	101	33.6%	16.8%	35.5%	14.0%	
Adh Dhahirah	112	37.5%	14.3%	25.9%	22.3%	
Al Buraymi	87	24.7%	16.9%	28.3%	30.1%	
Musandam	114	12.5%	22.9%	42.7%	21.8%	
Al Wusta	109	40.4%	39.3%	14.9%	5.4%	

Table S81. Do you buy foods that say 'low sugar' or 'no added sugar'? – Adults 19-60 years of age

Characteristic	N	Never or rarely	Sometimes	Often or always	Don`t know or not applicable	P-value
Governorate						
Muscat	102	30.3%	22.5%	43.2%	3.9%	<0.05
Dhofar	64	48.5%	27.3%	14.4%	9.8%	
Ad Dakhliyah	86	34.9%	27.9%	33.7%	3.5%	
Ash Sharqiyah North	88	34.2%	27.6%	7.8%	30.4%	
Ash Sharqiyah South	110	16.3%	24.5%	17.3%	41.9%	
Al Batinah North	111	46.8%	15.4%	32.5%	5.4%	
Al Batinah South	101	35.8%	15.7%	41.4%	7.1%	
Adh Dhahirah	112	37.5%	27.7%	26.8%	8.0%	
Al Buraymi	87	34.3%	35.9%	22.2%	7.6%	
Musandam	114	30.9%	26.2%	43.0%	0%	
Al Wusta	109	28.2%	52.6%	11.9%	7.3%	

Table S82. Median number of times per month selected sweet foods or drinks consumed, by governorate – Adults 19-60 years of age

Food or drink item	Muscat	Dhofar	Ad Dakhliyah	Ash Sharqiyah North	Ash Sharqiyah South	Al Batinah North	Al Batinah South	Adh Dhahirah	Al Buraymi	Musan-dam	Al Wusta	P value
Arab sweets	1.5	1.2	0.7	1.2	1.1	1.9	1.2	1.2	2.3	1.5	2.9	<0.001
Omani halwa	1.5	1.3	2.5	1.0	1.0	0.8	2.0	0.7	1.1	0.7	3.3	<0.001
Biscuits, cakes	5.7	8.1	5.2	5.0	4.6	7.2	5.9	6.5	5.6	3.8	6.8	<0.05
Date molasses	1.3	3.2	3.5	4.8	7.2	6.2	5.2	2.7	2.9	8.0	5.8	<0.001
Jelly, crème caramel	0.3	0.4	0.2	0.6	0.2	1.2	0.8	0.3	0.5	1.4	0.7	<0.001
Ice cream	3.5	2.4	4.6	3.8	1.4	5.8	4.0	3.2	3.3	3.3	3.4	0.05
Chocolate	10.0	13.4	7.5	5.3	8.3	11.8	9.1	6.2	7.1	12.1	3.9	<0.01
Breakfast cereal	3.2	2.6	1.7	0.5	1.3	4.0	2.3	1.9	1.6	3.0	0.7	<0.001
Rusk	1.5	0.3	0.6	0.1	1.2	3.4	0.5	1.0	2.0	3.2	1.0	<0.001
Honey	12.8	8.6	8.3	8.9	10.3	10.1	16.2	11.0	14.8	8.3	8.9	<0.001
Canned fruit, jam	1.5	2.8	0.4	0.6	1.7	1.5	0.7	1.8	1.1	1.5	2.6	<0.001
Sweetened canned drinks	5.1	11.2	4.2	4.7	6.0	13.4	6.5	5.5	7.4	3.2	7.1	<0.001
Fruit juice with added sugar	6.7	13.8	3.7	4.9	8.6	11.8	6.1	5.5	7.1	7.5	5.5	<0.001
Fruit juice with-out added sugar	5.4	5.9	4.2	1.0	5.9	5.1	5.0	6.6	3.4	3.0	3.7	<0.001
Carbonated drinks	6.7	15.6	2.3	9.5	11.9	10.2	5.9	4.5	7.7	8.5	5.7	<0.01
Carbonated drinks without sugar	1.3	0.2	0.5	0.1	0.4	0.8	2.1	0.7	0.6	0.6	1.3	<0.001
Energy drinks	0.6	0.0	0.5	0.0	0.4	2.0	0.4	0.3	1.1	0.3	1.4	<0.001
Chewing gum	6.4	5.0	6.0	3.6	7.6	11.8	7.9	6.3	9.1	10.8	2.7	<0.001
Sweetened milk	1.8	6.1	1.3	0.7	2.4	2.4	1.3	2.3	2.7	3.1	2.9	<0.001
Coffee or tea with sugar	28.2	53.3	25.1	27.0	23.4	33.2	37.3	29.1	27.7	21.2	44.6	<0.001
Sauces	10.8	9.1	6.5	7.0	6.3	7.9	12.0	4.6	9.7	7.7	4.4	<0.001
Red sugar drink	0.3	0.1	0.8	0.0	0.0	0.1	0.2	0.2	0.3	0.0	0.4	<0.001

Table S83. List of KAP survey team personnel

Principal investigator & Co investigator	**Supervisors of Al Jisr Foundation, WHO, MOH & SQU Team**
1. Dr. Salima Ali Al Mamary 2. Prof. Lara Nasreddine 3. Dr. Halima Shtaiyat AL Ghannami 4. Mrs. Ibtesam Khalfan Al Ghammari 5. Mr. Saleh Masoud Al-Shammakhi 6. Mrs. Fatma Ali Al Mamari	1. Prof. Lara Nasreddine 2. Mrs. Dina Al khalili 3. Mrs. Asila Saud Saif Al Yarubi 4. Mrs. Jamana Said Ali Al Zadjali 5. Dr. Salah Al Awaidy 6. Prof. Ronald Wesonga
GroundWork Team	**Team B Nutrition Department**
1. Dr. Bradley A. Woodruff 2. Dr. James P Wirth 3. Dr. Nicolay Petry 4. Mr. Mohamed Turay	1. Mr. Nabil Yousuf Al Zajali 2. Ms. Khulood Saif Al Raqadi 3. Mr. Majid Said Al Kulaibi
Supervisor Training Team	**Field Work Team 1 Muscat Governorate**
1. Prof. Lara Nasreddine 2. Mrs. Ibtesam Khalfan Al Ghammari 3. Mr. Saleh Masoud Al-Shammakhi 4. Mrs. Fatma Ali Al Mamari 5. Dr. Halima Shetait Al Ghannami	1. Mrs. Nawal Talib Saleh AL Haddabi 2. Mrs. Mrs. Ashwaq Mohamed Said Al Harthi 3. Mrs. Aisah Othman Murad AL Balushi 4. Mrs. Anwar Zaher Suleiman Al Abri
Field Work Team 2 Dhofar Governorate	**Field Work Team 3 Al Dhakhlya Governorate**
1. Mrs. Salim Ahmed Mohamed Hardan 2. Mrs. Abdullah Mohamed Ba lahaf 3. Mrs. Shiama Said Khalfan Bait Faraj 4. Mrs. Shahnaz Mana Biyat Al Noubi	1. Mrs. Hanan Saif Suleiman Al Syiabi 2. Mrs. Fayza Saqr Suleiman Al Syiabi 3. Mrs. Huda Juma Khamis Al Sabahi 4. Mrs. Jamila Khalfan Saif Al Julandani
Field Work Team 4 Al-Sharqyah North Governorate	**Field Work Team 5 Al-Sharqyah South Governorate**
1. Dr. Maiya Khalfan ALJahdhami 2. Mrs. Obaida Khalifa ALHashmi 3. Mrs. Waniya Said Saleh Al Musalhi 4. Mrs. Aida Hamid Ghashim ALMusallami	1. Mrs. Iman Rashid Sultan Al Qalhati 2. Mrs. Mrs. Bashara Mohammed Al Rasbi 3. Mrs. Khaloud Nasser Said Al Rasbi 4. Mrs. Salma Juma Khamis Al Hikmani
Field Work Team 6 Al Batinah North Governorate	**Field Work Team 7 Al Batinah South Governorate**
1. Mrs. Khadeeja Salim Said AlZeedi 2. Mrs. Mariam Ali Ibrahim Albelushi 3. Mrs. ALYA Humaid Ali AlNukaili 4. Mrs. Ataiya Ghanim Saleem Alduree	1. Mrs. Manal Samh Said Al Shaqsi 2. Mrs. Zayana Ali Said Al Buraiki 3. Mr. Tariq Rashid Mohammed Al Sulaimani 4. Mr. Saif Said Humaid Al Harmali
Field Work Team 8 Al-Dhahairah Governorate	**Field Work Team 9 Al-Buraimy Governorate**
1. Dr. Laila Ali Saleh Alkalbani 2. Mrs. Badriya Humaid Khalfan Almuharmi 3. Mrs. Fatema mohammed saif Al Sudairi 4. Mrs. Summaiya Hamed Saif Al-Alwai	1. Dr. Summaiya Hamad Zahran Al Hatmi 2. Mrs. Khoula Yahya Said Al Shabaibi 3. Mrs. Shaima Hamad Nasser Al Araimi 4. Mrs. Hajar said salim alnasseri
Field Work Team 10 Al wusta Governorate	**Field Work Team 11 Musandam Governorate**
1. Dr. Aymen salem el euchi 2. Mrs. Safaa mosaad ahmed ibraheem 3. Mrs. Maryam ali muslem al junaibi 4. Mr. Eslam salem gharib elbably	1. Mrs. Asma Mohammed Alshehhi 2. Mrs. Aisha Fadhil Almuaini 3. Mrs. Khadijha khamas Alshehhi 4. Dr. Muhanad Abdulrahman

Supervisor Data Management	**Quality Control Team**
1. Mrs. Ibtesam Khalfan Al Ghammari 2. Mr. Saleh Masoud Al-Shammakhi 3. Mrs. Fatma Ali Al Mamari	1. Mrs. Ibtesam Khalfan Al Ghammari 2. Mrs. Fatma Ali Al Mamari 3. Mr. Saleh Masoud Al-Shammakhi 4. Mrs.Hiyam Mohammed alshidhani 5. Mrs Abeer Saif Al Rashdi 6. Mrs Sarah Nasser Saif Al Salmi
Data Entry Team	**Data Cleaning Team**
1. Mrs. Sada Abdullah Al_yahyai 2. Mrs. Arwa Ahmed Alhinai. 3. Mrs. Malak Abdullah AlObaidani 4. Mrs. Sarah Mustafa Alajmi 5. Mrs. Amal Mohammed Al-mujaini 6. Mr. Mohammed Abdullah Alhennai 7. Mr. Mrs. Yousuf Mohsen Al-Hashmi 8. Mr. Haitham Hamood Ali ALowamri	1. Mr. Saleh Masoud Al-Shammakhi 2. Mrs.Fatma Mohsin Alazri 3. Mrs.Ashraqat Sulaiman Al Mamari
Calculating indicators & indices Team	**Writing & reviewing report & policy briefs Team**
1. Dr. Bradley A. Woodruff 2. Dr. James P Wirth 3. Dr. Nicolay Petry 4. Dr. Salima Ali Al Mamary 5. Dr. Halima Shetait Al Ghannami 6. Mrs. Ibtesam Khalfan Al Ghammari 7. Mr. Saleh Masoud Al-Shammakhi 8. Mrs. Fatma Ali Al Mamari	1. Dr. Bradley A. Woodruff 2. Dr. James P Wirth 3. Dr. Nicolay Petry 4. Dr. Salima Ali Al Mamary 5. Dr. Halima Shetait Al Ghannami 6. Mrs. Ibtesam Khalfan Al Ghammari 7. Mr. Saleh Masoud Al-Shammakhi 8. Mrs. Fatma Ali Al Mamari 9. Mrs. Wijdan juma Al-Jahwari

الحملة الوطنية للتغذية

#غايته_تقلل

GroundWork

FOR NUTRITION & HEALTH