

National Survey of Health, Diet, Physical Activity and Supplements among Adults in Saudi Arabia

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Abstract

Background

Diet, health, physical activity, tobacco use, and mental health are risk factors that contribute to an increased incidence of NCDs. This report aims to determine overall health status, nutritional perceptions, knowledge, behaviors, and shopping practices among the Saudi population.

Methods

A nationwide cross-sectional survey was conducted among Saudi residents aged ≥ 18 years. This study used a stratified quota sampling technique to get an equal distribution of participants across the 13 regions of Saudi Arabia.

Results

A total of 3,699 people across all 13 regions in Saudi Arabia were interviewed. Of those, 15.2% reported that they had at least one chronic disease, 12.5% were at risk of depression, and 16.4% were regular smokers. Overall, 25.9% of participants were obese (29% of men and 26.5% of women).

Less than two thirds (60.5%) of participants were physically active, with an average of 53 minutes of physical activity per day. A lack of willpower was the most-reported reason for not being active. A very small portion of participants ate fruit (5.8%) and vegetables (7.3%). During the last seven days, 19.9 % had taken supplements, and 54.65% of those reported that they used supplements for medical reasons.

Conclusion

Further research is needed to develop evidence-based nutrition guidelines to address food consumption and Saudi dietary habits.

Introduction

Non-communicable diseases (NCDs) are increasing and reaching epidemic levels worldwide (1). In Saudi Arabia, 73% of all deaths were attributable to NCDs in 2015 (2). According to the Saudi Ministry of Health, the main risk factors contributing to mortality were hypertension, type 2 diabetes, and obesity (3). The WHO estimated that by 2020, NCDs will account for 80% of global disease and cause 70% of deaths in developing countries (1).

Very few national studies in Saudi Arabia have attempted to address the overall health status, physical activity, and food intake among the Saudi population (4). The last study, conducted in 2013 among 10,734 participants, found that 28.7% of them were obese. Obesity in men was associated with marital status, diet, physical activity, diabetes, hypercholesterolemia, and hypertension. In women, obesity was associated with marital status, education, history of chronic conditions, and hypertension.

The previous study is more than five years old and assessed only nutrition behavior and diet; no study has investigated the population's nutritional knowledge or perception and behavior

associated with obesity. In this study, we aimed to determine overall health status, nutritional perceptions, knowledge, behaviors, and shopping practice among the Saudi population.

Methods

Study design

This is a nationwide cross-sectional study conducted in Saudi Arabia between March and August, 2018. The study was conducted via web-based computer-assisted phone interviews lasting approximately 10 minutes. This study used the QPlatform® data collection system, which has integrated eligibility and sampling modules to control the distribution of the sample (5). The eligibility module included three questions used to determine the completeness of the sampling quota, including age, gender, and region. Eligible participants proceeded with the interview to complete the study. All questions must have been answered to submit the answers into the database successfully. All data were coded and stored on the QPlatform database (5). The Saudi Food and Drug Authority Ethics Committee (SFDA18-0004) approved the research protocol.

Sampling and sample size

This study used the quota sampling technique to get an equal distribution of participants across the 13 regions of Saudi Arabia stratified by age and gender. We used two age groups based on the Saudi Arabia median age of 37. This led to 52 quotas for this study.

The sample size was calculated based on the depth of the sub-analysis we wanted to reach, comparing the age and gender groups between regions with a medium effect size around 0.3. Thus, each quota required 70 participants for a total sample of 3,640 participants. Once the quota sample was reached, the participants with similar characteristics were not eligible to participate in the study.

Participants and recruitment

We recruited Arabic-speaking Saudi residents aged ≥ 18 years. A random phone number list was generated from a national database and the Sharik database, which is a database of individuals who are interested in participating in health research (6). Participants were contacted by phone on up to three occasions. Where quotas could not be filled by telephone (e.g., remote community, cultural factors) participants were recruited for face-to-face interviews in public places such as shopping malls. The proportion of sample size generated by face-to-face interviews was approximately 25% of the total sample.

Questionnaire design

After providing verbal consent, participants were asked about their socio-demographic characteristics, such as age, height, weight, marital status, monthly income, nationality, education level, and employment status. The presence of chronic conditions, any medication use related to the conditions, gastrointestinal disorders, presence of food allergies, and smoking status was also assessed.

Nutrition knowledge was assessed by asking participants four basic questions about food groups, including sources of protein and carbohydrates, sources of energy, and what food group is most likely to cause weight gain. Attitude and behavior related to food consumption were assessed to determine food and beverage intake among participants. The participants were asked about the frequency of food consumption, drinks, soda, and energy drinks. In addition, participants were asked to recall the number of meals they had eaten that were not prepared at home within the past seven days. Finally, shopping practices were assessed by asking participants if they ever checked any nutrition information on food packaging, and if so, what kind of information they looked at. This will help us understand what type of information

participants usually look for and how this information could be used to correct or direct the next approach to Saudi nutrition behaviors.

The questionnaires were modified from The National Health Interview Survey (NHAES) and the Health and Food Survey 2015 by the International Food Information Council Foundation (7)(8).

Data analysis

Mental health was assessed using the Patient Health Questionnaire-2 (PHQ2), which inquires about the frequency of depressed mood and anhedonia for the past two weeks (9). The scores ranged from 0-6 and a cut point score of 3 was used as the optimal cut point for screening purposes (9)

Participants were asked to provide their height in cm and weight in kg. We calculated their body mass index (BMI), a measure of body fat based on height and weight that applies to adults of both genders (10). BMI was calculated using the following formula:

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2} \quad (10).$$

The BMI results were categorized into four groups: underweight = <18.5 ; normal weight = $18.5-24.9$; overweight = $25-29.9$; and obesity = BMI of 30 or greater (12).

The mean and standard deviation (\pm SD) of the quantitative variables were presented if they had a normal distribution, or the median and range were presented as appropriate. As this study used automated electronic data collection, there were no missing values; the QPlatform also includes a data integrity check to prevent users from entering invalid data (such as a maximum age of 99).

Statistical analysis was performed using the statistical package for SAS. Descriptive statistics such as percentages, frequency distribution, and

cross-tabulations were done to assess the significance of associations between variables. The knowledge score was calculated based on the sum of correct answers to knowledge questions. The recommended food guideline intake were based on the Saudi Healthy Food Palm.

Results

A total of 3,698 participants were interviewed; their mean age was 36.9 years and 51.2% were males. Overall, 66% of participants rated their health as excellent, 15.2% reported having at least one chronic condition, and 15.4% of participants reported that they were allergic to at least one type of food. More details are presented in Table 1.

Overall, 35.27% were overweight and 25.69% were obese. Table 2 describes the prevalence of obesity stratified by age, gender, and education level.

Table 3 provides details on physical activity status, barriers, and motivators.

Participants' nutritional knowledge, attitudes, and behavior are presented in Table 4.

Conflict of interest

The authors have no conflict of interest to declare.

Authors' contribution

Nora A. Althumiri: designing the study, supervising data collection, analyzing data, and drafting the manuscript. Nasser F. BinDhim: designing the study and supervising the study process. Amani S Alqahtani: supervising manuscript writing. All authors have made substantial contributions to editing the manuscript.

Table 1: Demographic Characteristics of the Participants and Health Status (N=3698)

Socio-demographic characteristics		Mean	SD
Age (years)		36.59	± 11.5
		N	Weighted %
Gender	Female	1806	48.82
	Male	1893	51.2
Education	Less than bachelor	1750	45.57
	Bachelor and above	1949	54.42
Employment	Employed at governmental institution	1198	33.79
	Employed at privet institution	779	26.47
	Self-employ	138	4.46
	Seeking employment	328	5.58
	Home worker	604	15.66
	Retired	197	6.43
	Unable to work	15	0.28
	Student	439	7.29
Marital Status	Never married	1078	23.44
	Currently married	2405	71.37
	Widowed	98	2.07
	Separated or divorced	117	3.10
Monthly income	< 5,000 SR	639	16.81
	5,000 SR to <10,000	854	23.49
	10,000 SR to <15,000 SR	776	19.97
	≥15,000 SR	806	24.70

	Refused to answer	623	15.00
Health Status	Excellent/ very good	2457	66.00
	Good	869	24.00
	Fair / poor	373	10.00
Chronic Conditions	At least one disease	581	15.16
	No Chronic disease	3118	84.83
Depression risk*	Not at risk	3236	87.48
	At risk	463	12.5
Abdominal Surgery	No	3319	89.70
	Yes, Abdominoplasty	75	1.96
	Yes, Other conditions	305	8.32
Food Allergies	No	3027	84.64
	Yes, Milk	82	1.31
	Yes, Egg	169	3.63
	Yes, Peanut	38	0.55
	Yes, Nuts	47	0.90
	Yes, Fish	96	2.168
	Yes, Soy	6	0.05
	Yes, Wheat	21	0.44
	Yes, Shrimp	70	1.31
	Yes, Other	325	8.46

*PHQ2 Scale range from 0-6 where cutoff score of 3 as the optimal cut point for screening purpose and stated that a cut point of 2 would enhance selectivity and cut point of 4 would improve specificity.

Table 2: Prevalence of Obesity, and age, gender and education level

Characteristics	Categories	N	Weighted %
Overall	Underweight	144	4.36
	Normal	1142	34.64
	Overweight	1163	35.27
	Obese	847	25.69

Male	Underweight	58	1.74
	Normal	567	30.56
	Overweight	688	38.63
	Obese	430	29.06
Female	Underweight	86	5.55
	Normal	575	32.60
	Overweight	475	35.35
	Obese	417	26.48
Obesity Prevalence by Education level	BMI	Male	Female
		(N) %	(N) %
Less than bachelor	Underweight	(30) 20.42	(38) 23.03
	Normal	(267) 26.39	(245) 15.32
	Overweight	(289) 26.81	(228) 16.19
	Obese	(193) 27.77	(246) 20.59
Above than Bachelor	Underweight	(28) 14.85	(48) 41.68
	Normal	(300) 35.56	(330) 22.72
	Overweight	(399) 38.69	(247) 18.30
	Obese	(237) 37.82	(171) 13.80
Obesity Prevalence by Age (18-36)	Underweight	(44) 3.18	(72) 10.47
	Normal	(365) 41.75	(401) 45.34
	Overweight	(310) 33.95	(202) 28.42
	Obese	(157) 21.10	(141) 15.74
Age (37-90)	Underweight	(14) 0.90	(14) 1.30
	Normal	(202) 24.01	(174) 21.59
	Overweight	(378) 41.36	(273) 41.33
	Obese	(273) 33.71	(276) 35.76

Table 3 : Physical Activity status, barriers and motivations

Characteristics		N	Weighted %
Physically active	Active	2238	60.50
	Not active	1461	39.49
Overall	Active	1254	66.24
	Not active	639	33.75
Physically active Male	Active	984	54.48
	No	822	45.51
Physical activities among active participants (N: 2238)			
Intensive Physical Activity (at least 20 minutes)	Once / week	245	8.02
	Twice / week	204	7.29
	Three / week	240	12.08
	Four to five / week	193	10.46
	Everyday	264	13.89
	Never	1138	48.24
	Moderate Physical Activity (at least 30 minutes)	Once / week	222
Twice / week		259	9.26
3 days / week		312	13.00
4 to 5 days / week		302	14.22
Everyday		627	27.10
Never		562	28.82
	Continuous Activity	1342	77.55

Type of Physical Activity	Aerobic Exercise	318	16.36
	Strength Training	79	3.65
	Flexibility	47	2.42
Average minutes on physical per day		53	1.15
Factors that help to maintain or loss weight	Channing my Food type	682	16.82
	I get enough physical activity	1092	32.5
	Eating a small meals and snacks	727	20.63
	weighting myself regularly	143	2.91
	Tracking my Calories	119	2.50
	personal trainer	61	1.01
	weight lost apps	46	0.96
	Diet program by nutritionist	83	1.98
	Family Support	66	1.39
	Nothing	1535	39.46
	Change my diets	178	4.50
	Other	408	15.06
	Motivators	Improvement in physical activity	749
Increased Physical activity for athletes		234	5.23
Physical mobility and less tired		526	15.25
Improvement in health		1209	37.03
Increased self-stem		583	13.50
Compliment from friend and family		143	3.21
Being a good model		77	1.47
More attention from others		123	3.13
Other		284	7.11

Barriers	Lack of willpower	1130	32.01
	Lack of time	550	15.59
	Not seeing results quickly	111	2.52
	Demanding work or travel schedule	374	11.10
	Laziness	318	7.16
	Can't offer gyms membership because they aren't found	65	1.42
	Can't offer gyms membership because they expensive	58	1.59
	Social habits	256	6.23
	Feel hungry all time	69	1.77
	Don't like the test of healthy food	74	1.92
	Dislike of physical activity	42	1.15
	Lack of supports from family and friends	53	1.41
	Other	767	23.23
	Have you advised by doctors about your weight?	Yes	929
No		2769	71.32
	Mean		SE
Average of hour watching TV, Videos game, use phones app per day	4.35		0.08
Average of hour spend on Office works per day	4.27		0.10

Table 4: Prevalence of Cigarette Smoking:

	Characteristics	N	Weighted %
Cigarette Smoking	Regularly	465	16.4
	Occasional	119	3.00
	Ex-Smoker	179	6.9
	Never	2936	73.6
Shisha Smoking	Regularly	149	4.5
	Occasional	202	6.7
	Ex-Smoker	143	5.1
	Never	3205	83.6
Perception of Smoking Habit	Negative	3371	72.1
	Natural	276	7.5
	Positive	52	1.4

Table 5: Nutritional knowledge, attitude and behavior

Characteristics		N	Weighted %
Given thoughts of healthfulness of consumed food	A lot	1822	52.10
	Sometime	1007	25.01
	Never	737	20.66
	Not sure	132	2.23
Eat breakfast meal/week	Never	525	4.5
	1-3 days	812	18.98
	4-6 days	422	11.53
	Everyday	1930	58.69
	Yes	1525	44.39
	Sometime	1028	25.22
Type of information checked before buying a food product	Expiration date	2251	66.49
	Production date	1314	32.23
	Nutrition Facts	967	30.01
	Ingredients list	709	22.69
	Serving size and amount per container	116	2.62
	Calorie amount per container	733	20.00
	Brand Name	427	11.37
	Cooking Instruction	117	2.92
	Preparation time	72	1.80
	Statement about nutrition benefit	150	4.4.55
	Country of original labelling	356	11.22
	Statement about health benefit	185	5.60

	Statement about absence of certain food ingredients	612	14.63
	Other	660	16.94
Disposed food last month	Milk and its product	1181	28.18
	Bread and bakery products	366	8.70
	Baby Milk and Food	66	1.01
	Canned food	327	9.46
	Meats all type	50	1.29
	Species and dried beans	16	0.26
	Juices and drink	73	1.85
	I have not disposed any food	1230	40.00
	I don't know what been disposed	389	9.22
Source of calories is the most likely to cause weight gain	Carbohydrate	329	7.55
	Portion	1221	32.12
	Fat	1117	33.28
	Fruits and Vegetables	98	1.97
	The same in all source	282	8.8
	Not sure	361	9.66
	I do not know what calories means	1035	26.12
Carbohydrates is source of energy	Yes	771	22.35
	No	2281	63.36
	I don't know	644	14.28
Good source of Carbohydrate	Fat, oil, butter	126	2.20
	Fish, egg, meats and chicken	300	6.80
	Rice, Fruits, Bread	2203	67.00
	Green leaves, seafood, water	231	4.08
	All above	165	4.16

	I don't know	673	15.60
Good source of protein	Lettuce, carrots, and potatoes	119	2.57
	Chicken, chees, egg, and bean	2509	74.07
	Apple, banana, and oranges	272	4.61
	Honey and sugar	36	0.75
	All above	158	4.36
	I don't know	604	13.62

Food consumption	As recommended [§]	214	5.8
Fruits			
Vegetables	Not as recommended [§]	3485	94.2
	As recommended	267	7.2
Red Meat	Not as recommended	3432	92.8
	As recommended	733	18.8
Chicken	Not as recommended	2966	80.1
	As recommended	452	12.2
Seafood	Not as recommended	3247	87.7
	As recommended	403	10.9
Bread and Rice	Not as recommended	3296	89.1
	As recommended	650	17.6
Milk and Milk Products	Not as recommended	3049	89.2
	As recommended	396	10.7
Most Consumed Beverages	Not as recommended	3303	89.2

	Milk	760	19.2
	Juice	801	18.8
	Soda	438	10.3
	Coffee or Tea	2295	65.9
	Water	2325	63.1
	Sport Drinks	50	0.9
	Other	107	2.3
Soft Drinks Consumption/week	Never	1727	46.7
	One to three times	1233	33.3
	Four to six times	335	2.00
	Seven or more	442	10.6
Energy Drinks Consumption/week	Never	3241	92.0125
	One to three times	321	5.8175
	Four to six times	74	1.2112
	Seven or more	63	0.9587

§ It meets the daily-recommended level of food intake according to Saudi Health food palm guideline.

§ It either sufficient or insufficient of food intake.

Table 6: Supplements Use and Intake

Characteristics		N	Weighted %
Taking supplements past 7 days	No	3036	80.09
	Yes	663	19.90
Reasons of taking supplements	Medical Need	361	54.65
	Inadequate diet	242	38.61
	Support immune system	48	5.24
	Provide Energy	68	8.07
	Increase power	56	7.87
	Aid recovery	13	1.84
	Everyone dose	15	2.78
	Recommendation by family	28	2.78
	Other	45	5.51
		Doctor Instruction	414
How do you select you dose of these supplements?	Brochure Instruction	201	29.07
	Family or friend recommendation	49	5.63
	Advertisements	17	2.94
	Change does regularly	33	3.36
From where you obtain these supplements?	Supermarket	55	11.24
	Pharmacy	540	80.85
	Online stores	107	14.88
Do you know what RDA* means?	No	361	53.73
	Yes	373	46.26
Are you aware of toxicity level of vitamins and minerals?	No	274	35.54
	Yes	460	64.45
Using of dietary herbs	No	472	65.01

	Yes	261	34.98
Forms of dietary herb	Seed	108	35.95
	Powder	40	15.85
	Mixed herbs	74	24.69
	Liquid	68	23.49

* Recommended Dietary Allowance of Vitamins and Minerals.

References:

- World Health Organization (WHO). Noncommunicable diseases [Internet]. [cited 2018 Oct 18]. Available from: <http://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
- World Health Organization (WHO). Noncommunicable diseases Saudi Arabia profiles 2018. WHO [Internet]. 2018 [cited 2018 Oct 18]; Available from: http://www.who.int/nmh/countries/sau_en.pdf?ua=1
- Saudi Health Interview Survey finds high rates of chronic diseases in the Kingdom of Saudi Arabia | Institute for Health Metrics and Evaluation [Internet]. [cited 2018 Nov 8]. Available from: <http://www.healthdata.org/news-release/saudi-health-interview-survey-finds-high-rates-chronic-diseases-kingdom-saudi-arabia>
- Memish ZA, Charbel ;, Bcheraoui E, Tuffaha M, Robinson M, Daoud F, et al. Associated Factors- Kingdom of Saudi Arabia. *Prev Chronic Dis* [Internet]. 2013 [cited 2018 Oct 1];11:140236. Available from: <http://dx.doi.org/10.5888/11:140236>
- SmarQPlatform. Smart Health Project. [Internet]. 2012 [cited 2018 Oct 28]. Available from: <https://shproject.net/>
- SharikHealth [Internet]. [cited 2018 Nov 8]. Available from: <https://sharikhealth.com/>
- NHANES Food Questionnaire [Internet]. [cited 2018 Oct 18]. Available from: https://www.cdc.gov/nchs/data/nhanes/nhanes_03_04/tq_fpq_c.pdf
- Food Health Survey 2015 [Internet]. 2015 [cited 2018 Oct 24]. Available from: https://www.foodinsight.org/sites/default/files/2015_Food_and_Health_Survey_-_FINAL.pdf
- The Patient Health Questionnaire-2 (PHQ-2)- Overview [Internet]. [cited 2018 Oct 24]. Available from: http://www.cqaimh.org/pdf/tool_phq2.pdf
- HHS. Calculate Your BMI - Standard BMI Calculator [Internet]. Aim for a healthy weight. 2015 [cited 2018 Oct 24]. Available from: https://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.htm