Acta Scientific NUTRITIONAL HEALTH (ISSN:2582-1423)

Volume 8 Issue 11 November 2024

Research Article

Association between Dietary Habits and Prevalence of Non-Communicable Disease (NCD) Among Saudi Adults in Al Ahsa city Saudi Arabia

Bi Bi Mariam[1,3,4]*, Suchithra Koipurathu Rajappan[2,3,4], Abeer Yousef Alwabari[1,3,4], Shahad Yousef Abdulrhman[1,3,4], Roqaya Habib Alhrashi[1,3,4], Dina Abdullah Alkubaisi[1,3,4], Fatimah Hussein Alsuwaykit[1,3,4] and Sara Audah Alshahrani[1,3,4]

[1]*Clinical Nutrition Department, College of Applied Medical Sciences, King Saud Bin Abdulaziz University for Health Sciences, Saudi Arabia*

[2]*Basic Science Department, College of Science and Health Professions, King Saud Bin Abdulaziz University for Health Sciences, Saudi Arabia*

[3]*King Abdullah International Medical Research Center, Saudi Arabia*

[4]*Ministry of National Guard - Health Affairs, Saudi Arabia*

***Corresponding Author:** Bi Bi Mariam, Clinical Nutrition Department, College of Applied Medical Sciences, King Saud Bin Abdulaziz University for Health Sciences, Saudi Arabia.

DOI: 10.31080/ASNH.2024.08.1451

Received: September 19, 2024

Published: October 14, 2024

Abstract

Non-Communicable Diseases (NCDs) and metabolic syndrome have emerged as significant public health concerns globally, particularly in regions experiencing rapid urbanization and lifestyle changes. In Saudi Arabia, the adoption of Western dietary patterns and sedentary lifestyles has contributed to a rise in NCDs, such as diabetes, hypertension, and cardiovascular diseases. Al Ahsa city, like many other regions in the Kingdom, has witnessed an alarming increase in the prevalence of these conditions, highlighting the need for targeted public health interventions to address the underlying risk factors and promote healthier lifestyles among the population.

Aim: This study aims to find Association between dietary habits and prevalence of Non-Communicable Disease (NCD) among Saudi adults in Al Ahsa city Saudi Arabia.

Method: A descriptive, cross-sectional survey was conducted using a pre-structured, validated questionnaire to collect quantitative data. The survey targeted adults aged 18-65 years in the Al-Ahsa region from September to November 2021. Study approval was obtained from KAIMRC and IRB before data collection and ethical Clarence. The questionnaire included sections on demographic variables, physical activity, anthropometric data, obesity, diabetes, hypertension, and cardiovascular diseases. Out of 710 respondents, 625 met the inclusion criteria and were included in the analysis.

Results: The majority of participants were aged 18 to 30 years and were female, undergraduates, with a predominantly sedentary lifestyle, and their mean height and weight were 160.96 cm and 64.19 kg, respectively. The BMI distribution shows that a significant portion of the population is overweight (20.2%) or obese (17.7%). Significant associations were found between age, gender, with hypertension ($p = 0.000, 0.016$); age, gender, education level, and current status with diabetes ($p = 0.000, 0.003, 0.001$); and gender with obesity ($p = 0.037$), prevalence rates of 4% for hypertension, 4.5% for diabetes, 0.5% for cardiovascular diseases, and 13% for obesity.

Conclusion: The study data indicates significant associations between sociodemographic factors such as age, gender, education level, and current status with the prevalence of hypertension, diabetes, and obesity among Saudi adults in Al Ahsa. Highlights a significant public health concern, necessitating targeted interventions to address lifestyle factors and improve overall health outcomes in this population.

Keywords: NCD; Obesity; Physical Activity; Saudi Arabia; Dietary Habits

Introduction

The increasing prevalence of Non-Communicable Diseases (NCDs) and metabolic syndrome poses a significant public health challenge globally, and Saudi Arabia is no exception. NCDs, including diabetes, cardiovascular diseases, and hypertension, are responsible for a substantial burden of morbidity and mortality in the country. The rapid urbanization, coupled with the shift towards Western dietary habits and a more sedentary lifestyle, has exacerbated these health concerns, particularly in urban areas such as Al Ahsa city [1].

Unhealthy dietary patterns are associated with metabolic changes and increased risk of Non-Communicable Disease (NCD). Non-Communicable Diseases are a group of medical conditions in which disease is non-infectious and non-transmissible among people [2]. Cardiovascular Disease, Obesity, Hypertension and Diabetes type-2 are examples of Non-Communicable Disease (NCD) [2]. According to World Health Organization (WHO), 90% of obese or overweight people are diabetics [3]. Obese people who specifically have lots of visceral fat and abdominal adiposity are more likely to develop Non-Communicable Diseases (NCD) like Cardiovascular Disorders [3]. The Eastern Region has shown a remarkable change over time from a Mediterranean style to a western style which is high in salt, sugar, saturated fat and trans-fat but low in fibers. [4]. The rapid urbanization and the adoption of Western dietary patterns, characterized by high-calorie intake and decreased physical activity, have contributed to the growing burden of these diseases, especially in urban centers like Al Ahsa city [5].

Traditional diets in Saudi Arabia have transitioned over the past few decades. The traditional diet, rich in whole grains, dates, and fresh vegetables, has been replaced by a more Westernized diet characterized by high consumption of fast food, sugar-sweetened beverages, and processed foods. This shift has been linked to increased body mass index (BMI) and obesity, key risk factors for NCDs [6].

Al-Hazzaa., *et al*. [6] conducted a nationwide study that included data from various Saudi cities, including Al Ahsa, and found that dietary habits, particularly high intake of saturated fats and sugary foods, were correlated with the increased prevalence of obesity and diabetes. The study pointed out that dietary education and awareness were crucial in preventing NCDs.

Several studies have investigated the prevalence of NCDs in different regions of Saudi Arabia, including Al Ahsa. A cross-sectional study by Al-Quwaidhi., *et al*. (2013) [7] focused on obesity trends in Saudi Arabia, noting that Al Ahsa showed a rising trend of obesity, especially among middle-aged adults. Obesity, in turn, is one of the most significant risk factors for developing NCDs like Type 2 diabetes and hypertension.

Another study by Al Dawish., *et al*. (2016) [8] examined the rising rates of diabetes in Saudi Arabia, with Al Ahsa being one of the regions with the highest prevalence. The study attributed these rates to both genetic factors and unhealthy dietary practices, including high consumption of fast foods and low intake of fruits and vegetables.

Similarly, a review by Badran and Laher (2017) [9] highlighted the role of high-fat diets in increasing the risk of cardiovascular diseases among Saudis. Their research emphasized that the consumption of fried foods, which has become common in Saudi households, significantly elevates cholesterol levels and increases the likelihood of coronary artery disease.

Given the serious implications for public health, there is an urgent need for comprehensive epidemiological studies to assess the prevalence and risk factors of NCDs and metabolic syndrome in regions like Al Ahsa. Such studies are crucial for informing targeted interventions and policies aimed at reducing the burden of these chronic conditions and improving the health outcomes of the Saudi population.

Materials and Methods

Study design and setting

This cross-sectional study assessed assess the prevalence and risk factors of NCDs and metabolic syndrome among adults in Al-Ahsa City in Saudi Arabia. Data was collected via an online survey distributed through social media platforms, including Google Forms, Twitter, WhatsApp, Snapchat, and Facebook.

Study subjects

The study population included adult men and women aged 18-65 years residing in the Al-Ahsa region of Saudi Arabia. Convenience sampling was used to recruit participants. The inclusion criteria were: 1) adults aged 18-65 years, 2) residing in the Al-Ahsa region, and 3) willing to participate in the study. Those aged below 18 or over 65, living outside Al-Ahsa, or unwilling to participate were excluded.

Sample size

The required sample size was calculated using the Roasoft calculator [13]. According to Worldometer website, the estimated number of Al-Ahsa population is 583981 [14]. The estimated sample size of Raosoft calculator was approximately 600 participants, the margin of error was equal to 4% and the confidence interval (CI) was equal to 95%. This was increased by 10% to account for non-responses, giving a target sample size of 660.

Data collection

Data was collected using a pre-structured, close-ended questionnaire administered through the online survey. The question-

naire collected information on demographic variables such as demographic variables, physical activity, anthropometric data, obesity, diabetes, hypertension, and cardiovascular diseases.

Expert review and pilot testing on 10% of the sample before full administration validated the questionnaire. Reliability was assessed using Cronbach's alpha. Any issues identified during piloting were addressed before the full deployment of the survey.

Data analysis

Completed surveys were checked for completeness and accuracy. Data analysis was conducted using statistical SPSS software. Descriptive statistics such as frequencies, percentages, means, standard deviations, and medians were calculated as appropriate based on the type and distribution of variables. Associations were tested using appropriate statistical tests. P-values <0.05 were considered statistically significant.

Ethical considerations

Ethical approval was obtained from the King Abdullah international medical research center -view board before the study commenced. The approval code is SP21A/372/07. Every participant's informed consent was diligently acquired before his or her involvement in the study. Throughout the research, we preserved the confidentiality and anonymity of all participants' data.

Results

After data were extracted from the online survey, it was revised, coded, and fed to statistical software IBM SPSS version 22(SPSS, Inc. Chicago, IL). Based on inclusion and exclusion criteria for the study data of 625 respondents was included for statistical analysis. Majority of the participants were in the age group of 18 to 30 years (68.2%) depicted in table 1. The gender distribution revealed that 513 respondents (82.1%) were female, while 112 (19.9%) were male. Higher number of respondents were undergraduates (75.4%). The majority of the attendees were students (53.6%), with most of them coming from the northern region (40.5%). The detailed information about the demographic characteristics among the study subjects is presented in Table 1.

Table 1: Demographic characteristics of respondents.

Demographic characters		N (%)
Age	18-30	426 (68.2)
	30-40	113 (18.1)
	40-50	61 (9.8)
	50 -65	25 (4.0)
Gender	Female	513 (82.1)
	Male	112(19.9)
Education level	Primary level	6 (1.0)
	Intermediate level	12 (1.9)
	Secondary level	125 (20.0)
	University	471 (75.4)
	High education	11 (1.8)
Residence	Eastern region	127 (20.3)
	Northern region	253 (40.5)
	Central region	245 (39.2)
Employment	Student	335(53.6)
	Employed	124(19.8)
	Unemployed	147(23.5)
	Retired	19(3.0)

The analysis of physical activity levels depicted in Figure 1 indicated that a majority of participants were sedentary (42.1%), followed by those who were moderately active (40.2%), with only a small fraction being extremely active (2.6%). The mean height of study participants was 160.96 cm (±8.57cm) while their mean weight was found to be 64.19 kg; (±18.23kg) is presented in Table 2.

The body mass index (BMI) distribution of Saudi adults residing in Al Ahsa, as presented in Figure 2, reflects a significant public health concern. The data reveals that nearly half of the respondents (49.3%) fall within the "normal" BMI range (18.5-24.9), which is a positive indicator of overall health. However, a large proportion of

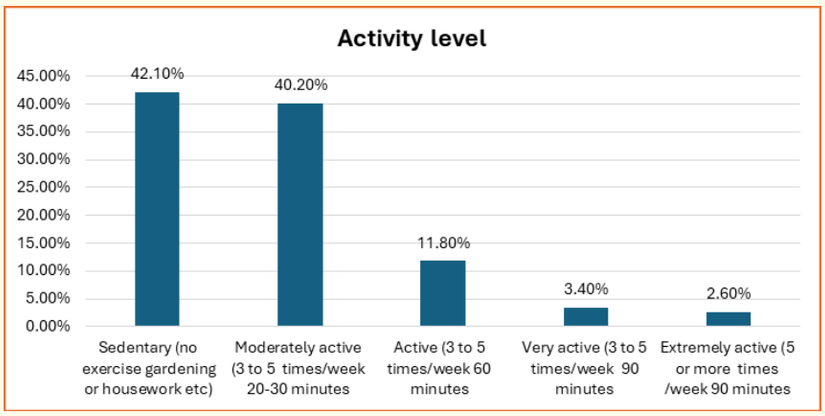

Figure 1: Activity level of study respondents

Table 2: Anthropometric measurements of study respondents (n = 625).

Variable		Mean	SD
Anthropometric measurements	Height in cms	160.96cm	±8.57cm
	Weight in kgs	64.19 kgs	±18.23 kgs

the population shows signs of weight-related issues, with 20.2% classified as overweight (BMI 25.0-29.9), and an alarming 17.7% of respondents falling into the obesity categories (BMI ≥ 30.0).

The data reveals a concerning trend toward overweight and obesity among Saudi adults in Al Ahsa. A combined 37.9% of respondents are either overweight or obese (BMI ≥ 25.0), which is consistent with national trends in Saudi Arabia. The Saudi Health Information Survey (2013) indicated that 28.7% of the adult population is overweight, and 33.5% are classified as obese. The prevalence of overweight and obesity has been linked to an increased risk of non-communicable diseases (NCDs), including cardiovascular diseases, type 2 diabetes, and certain types of cancer (Alqarni, 2016) [3].

Table 3: Association of sociodemographic profile of study participants with chronic diseases.

Association of demographic variables with chronic diseases	F (%)	P- value
Age and hypertension	25(4.0)	0.000
Age and diabetes	28(4.5)	0.000
Gender and obesity	80(12.8)	0.037
Gender and hypertension	25(4.0)	0.016
Gender and diabetes	28(4.5)	0.003
Education level and obesity	80(12.8)	0.045
Education level and diabetes	28(4.5)	0.001
Current status and hypertension	25(4.0)	0.001
Current status and diabetes	28(4.5)	0.001
Obesity and BMI	80(12.8)	0.001
Food habit and CVD	3(0.5)	0.050
Physical activity and obesity	80(12.8)	0.014

P<.05 * Significant at 5% Level, NS: Non-significant

There was a significance association between age, gender and current status and Hypertension with (p = 0.000, 0.016, 0.001< 0.05). There was a significant statistical association between age, gender, education level and current status and diabetes with (p = 0.000, 0.003, 0.001 < 0.05) and gender and obesity with (p = 0.037). Similarly, obesity and BMI demonstrated a significant association with (p = 0.001).

Table 4: Prevalence of Non-Communicable Diseases among study participants.

Diseases		Number	Frequency (%)
Hypertension	Yes	25	4%
Diabetes	Yes	28	4.5%
Cardiovascular diseases	Yes	3	0.5%
Obesity	Yes	80	12.8%
None of the above	Yes	485	77.6%
Other	Yes	30	4.8%

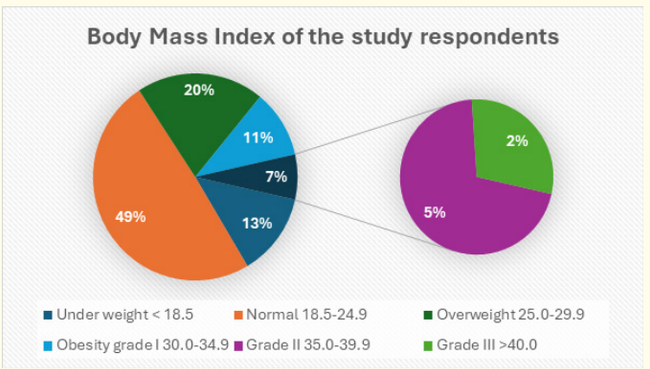

Figure 2: Body Mass Index of the study respondents.

Non-Communicable Diseases for participants were self- reported. The prevalence of NCDs include Hypertension (4%), Diabetes (4.5%), cardiovascular diseases (0.5%), and Obesity (13%). Most of the participants do not suffer from any of these diseases (77.8%) as showed in Table 4.

Discussion

The data presented in Table 3, showing the association between sociodemographic variables and chronic diseases among Saudi adults residing in Al Ahsa, highlights several significant relationships between age, gender, education level, and chronic diseases such as hypertension, diabetes, obesity, and cardiovascular disease (CVD). The findings emphasize how these factors contribute to the prevalence and progression of non-communicable diseases (NCDs) in this population, reflecting broader national trends observed across Saudi Arabia.

Age and chronic diseases

The table shows a significant association between age and both hypertension (4.0%, P = 0.000) and diabetes (4.5%, P = 0.000), suggesting that older individuals are more likely to suffer from these chronic conditions. This is consistent with research indicating that the risk of developing hypertension and diabetes increases with age due to physiological changes, sedentary lifestyles, and prolonged exposure to unhealthy dietary habits (Alqurashi., *et al*. 2020) [10]. In Saudi Arabia, as the population ages, the prevalence of these NCDs is expected to rise, further burdening the healthcare system.

Gender and chronic diseases

Gender also plays a crucial role in the prevalence of chronic diseases in Al Ahsa, as indicated by the significant associations between gender and obesity (12.8%, P = 0.037), hypertension (4.0%, P = 0.016), and diabetes (4.5%, P = 0.003). This finding aligns with previous studies suggesting that women in Saudi Arabia have a higher prevalence of obesity and related conditions compared to men (Alqarni, 2016) [11]. Cultural factors, such as limited opportunities for women to engage in physical activities and traditional gender roles, may contribute to these disparities. Moreover, biological factors such as hormonal differences also play a role in the increased risk of obesity and related NCDs among women (Al-Hazzaa, 2018) [12].

Education level and chronic diseases

The table highlights significant associations between education level and both obesity (12.8%, P = 0.045) and diabetes (4.5%, P = 0.001). Lower educational attainment has been linked to unhealthy lifestyle choices, such as poor dietary habits and reduced physical activity, which contribute to obesity and the development of diabetes (Badran and Laher, 2017) [9]. In Al Ahsa, individuals with lower education levels may have limited awareness of healthy eating practices and the importance of regular physical activity, which exacerbates the risk of NCDs. This underscores the need for public health interventions that prioritize education on nutrition and physical activity, particularly for populations with lower educational attainment.

Socioeconomic status and chronic diseases

The association between current status (which may include occupation or income level) and both hypertension (4.0%, P = 0.001) and diabetes (4.5%, P = 0.001) highlights the influence of socioeconomic factors on the prevalence of these conditions. Socioeconomic status often affects access to healthcare, dietary choices, and engagement in physical activities (Al-Hazzaa., *et al*. 2014) [6]. In Saudi Arabia, individuals with lower socioeconomic status may have limited access to nutritious foods and healthcare resources, leading to a higher likelihood of developing chronic conditions such as hypertension and diabetes.

Obesity and its strong association with BMI and physical activity

Obesity remains a significant health concern in Al Ahsa, with the table showing a strong association between obesity and BMI (12.8%, P = 0.001), as well as obesity and physical activity (12.8%, P = 0.014). These findings are consistent with national data indicating that a high percentage of the Saudi population is classified as overweight or obese, largely due to sedentary lifestyles and poor dietary habits (Alqarni, 2016) [11]. Physical inactivity, as evidenced by the significant association between obesity and physical activity, is a critical factor contributing to the high prevalence of obesity and associated NCDs. Encouraging regular exercise and reducing sedentary behavior are essential components of public health strategies aimed at tackling the obesity epidemic in Saudi Arabia.

Food habits and cardiovascular disease (CVD)

While the association between food habits and CVD is marginally significant (P = 0.050), it suggests that dietary choices still play a role in the development of cardiovascular diseases. The Saudi population has undergone a nutritional transition in recent decades, with a shift from traditional diets to more Westernized diets high in processed foods, sugars, and unhealthy fats (Badran and Laher, 2017) [9]. This shift has been directly linked to the rising incidence of cardiovascular diseases in the country. Public health efforts should focus on promoting healthier food choices, including traditional diets rich in whole grains, fruits, and vegetables, to mitigate the risk of CVD.

Table 4 provides important insights into the prevalence of non-communicable diseases (NCDs) among Saudi adults residing in Al Ahsa. The data reveals several health trends that align with national and regional patterns in Saudi Arabia and underscores the need for targeted public health interventions. The results highlight the presence of conditions such as hypertension, diabetes, cardiovascular diseases (CVD), and obesity in the population.

Hypertension and diabetes

The data shows that 4.0% of participants suffer from hypertension, and 4.5% have diabetes. These findings are in line with broader national surveys which indicate that hypertension and diabetes are among the most prevalent NCDs in Saudi Arabia. The Saudi Health Information Survey (2013) reported that approximately 15.2% of adults aged 15 years and older have hypertension, while around 24% of adults are affected by diabetes (Alqurashi., *et al*. 2020). Although the prevalence figures in the current study are lower, they reflect significant public health concerns for the Al Ahsa population. The development of both hypertension and diabetes in this population can be attributed to several risk factors, including high rates of obesity, sedentary lifestyles, and poor dietary habits, which are common in Saudi Arabia due to rapid urbanization and modernization (Al-Hazzaa., *et al*. 2014) [6]. Given the chronic nature of these conditions and their contribution to other NCDs, early intervention and preventive strategies are essential.

Cardiovascular diseases (CVD)

Only 0.5% of the participants reported having cardiovascular diseases (CVD). This relatively low figure may reflect the younger age of the study participants or underreporting of cardiovascular conditions. However, cardiovascular disease remains one of the leading causes of mortality in Saudi Arabia, accounting for a significant portion of deaths related to NCDs (Badran and Laher, 2017) [9]. Risk factors such as hypertension, diabetes, and obesity—conditions that are already present in this population—greatly increase the likelihood of developing CVD in the future. Given the known progression from these conditions to cardiovascular complications, there is a need for ongoing monitoring and intervention to prevent CVD in this population.

Obesity

The most alarming figure in the table is the prevalence of obesity, affecting 12.8% of the study participants. This aligns with findings from national studies, which indicate that the prevalence of obesity among Saudi adults is rising sharply. The Saudi National Health Survey (2017) indicated that 28.7% of the adult population is obese (Alqarni, 2016) [11]. The lower prevalence in this particular sample could be due to regional differences or variations in the demographic composition of the study participants. Nonetheless, obesity remains a critical public health issue in Saudi Arabia, as it is strongly linked to the development of hypertension, diabetes, and cardiovascular disease. The high rate of obesity can be explained by several lifestyle factors prevalent in Saudi Arabia, including a shift towards sedentary behaviors, an increase in fast food consumption, and limited engagement in physical activity (Al-Hazzaa., *et al*. 2014) [6]. The association between obesity and these other NCDs suggests that tackling obesity should be a top priority in public health efforts aimed at reducing the overall burden of chronic diseases in Al Ahsa and across Saudi Arabia.

Implications for public health

The data from this study reflects the broader public health challenges faced by Saudi Arabia in combating NCDs. Obesity, in par-

ticular, emerges as a central risk factor for the development of diabetes, hypertension, and cardiovascular diseases. Public health interventions should focus on promoting healthier lifestyles, including dietary modifications and increased physical activity, to reduce obesity rates and prevent related NCDs. Educational campaigns should target not only adults but also younger populations to raise awareness about the dangers of unhealthy lifestyles and the long-term consequences of NCDs. In Al Ahsa, healthcare providers and public health authorities must collaborate to design culturally relevant interventions that can address these risk factors and promote sustainable health improvements.

Conclusion

The findings this study indicate that age, gender, education level, socioeconomic status, BMI, physical activity, and food habits—are all significantly associated with chronic diseases among Saudi adults residing in Al Ahsa. The findings emphasize the need for targeted interventions to address the rising burden of NCDs in this population. While the majority of participants do not currently report NCDs, there is a significant proportion of the population at risk due to obesity, hypertension, and diabetes. Addressing these health issues requires a comprehensive approach that includes lifestyle modifications, early screening, and targeted interventions aimed at reducing obesity and managing risk factors for hypertension, diabetes, and cardiovascular diseases.

Bibliography

1. World Health Organization (WHO). "Non communicable diseases country profiles 2018". World Health Organization, (2018).

2. Cross J. MEDLINE, PubMed, PubMed Central, and the NLM. Editors' Bulletin 2.1 (2006): 1-5.

3. M Alqarni S. "A Review of Prevalence of Obesity in Saudi Arabia". *Journal of Obesity and Eating Disorders* 2.2 (2016).

4. Rippe J and Angelopoulos T. "Relationship between Added Sugars Consumption and Chronic Disease Risk Factors: Current Und erstanding". *Nutrients* 8.11 (2016): 697.

5. Al-Nozha MM., *et al*. "Obesity in Saudi Arabia". *Saudi Medical Journal* 26.5 (2005): 824-829.

6. Al-Hazzaa H M., *et al*. "Obesity and physical activity patterns among Saudi adolescents: Urban versus rural settings". *Journal of Nutrition and Metabolism* 3 (2014): 1-8.

7. Al-Quwaidhi A J., *et al*. "Trends and future projections of the prevalence of adult obesity in Saudi Arabia, 1992–2022". *Eastern Mediterranean Health Journal* 20.10 (2015): 589-595.

8. Al Dawish MA. ., *et al*. "Diabetes mellitus in Saudi Arabia: A review of the recent literature". *Current Diabetes Reviews* 12.4 (2016): 359-368.

9. Badran M and Laher I. "Obesity in Arabic-speaking countries". *Journal of Obesity* (2017).

10. Alqurashi AH., *et al*. "Prevalence of diabetes mellitus in a Saudi community". *Annals of Saudi Medicine* 31.1 (2020): 19-23.

11. Alqarni S S. "Prevalence of obesity and associated risk factors among adults in Saudi Arabia: A literature review". *Journal of Obesity and Metabolic Syndrome* 25.1 (2015): 10-15.

12. Al-Hazzaa H M. "Changes in physical activity and sedentary behavior patterns and their relationships with diet and other health habits among Saudi adolescents". *Annals of Saudi Medicine* 38.4 (2018): 247-254.

13. Sample Size Calculator by Raosoft, Inc. Raosoft.com. (2021).

14. Saudi Arabia Population. Worldometer. Worldometers.info. (2021).