

## Evaluation of COVID-19 awareness and its relation to nutritional behaviors in Western Saudi Arabia

By

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### Abstract

#### *Introduction*

Coronavirus disease (COVID-19) has remarkably increased mortality and morbidity rates around the world. The present study was achieved to evaluate of COVID-19 awareness and its relation to nutritional behaviours in Western Saudi Arabia.

#### *Method*

Saudi and non-Saudi participants (n=110, age  $\geq 18$  years old, Men and Women) enrolled in this study from 25 September to 25 November 2022. All data were collected using an online self-reported questionnaire, using Google forms. IBM SPSS Statistics 23 Version was used for data analysis.

#### *Results*

Our result shows that (61) of total participants (110) were Women which indicates that Women are more aware of COVID-19 of the nutritional behaviours than Men (49). In addition, the Saudi population (74) were more aware of COVID-19 of nutritional behaviours than non-Saudis (36). This study shows that there aren't differences among the degrees of the sample individuals in awareness of COVID-19 and its relation to nutritional behaviors according to the Marital status variable. The most aware population according to Education were who have Masters / PhD than those who have Bachelor and High School or Diploma at about (41.44, 40.82 and 27.13) respectively. Therefore, the sample individuals aged From (41) years old or more come in the first place, where they were more aware of COVID-19 disease and more aware of nutritional behaviours than other samples. In addition, Employed were more aware of COVID-19 disease and more aware of the nutritional behaviors than Unemployed . This study shows that, the sample individuals whose income is Over 10000 were more aware of COVID-19 disease and more aware of nutritional behaviors than other individuals.

#### *Conclusion*

The findings of the current results indicate that the population aged  $\geq 18$  years old in western Saudi Arabia among the Saudi and non-Saudi in overall were aware of COVID-19 of the nutritional behaviours. Additional researches is needed to be done so people are sufficiently aware of the nutritional behaviours to keep themselves healthier particularly in lockdown situations.

**Keywords:** COVID-19, awareness, nutritional behaviors, Saudi Arabia.

### Introduction

Coronavirus disease 2019 (COVID-19) is an emerging respiratory disease caused by a novel coronavirus, which was first detected in December 2019 in Wuhan, China (Zhong et al., 2020). and subsequently, spread rapidly throughout the world, affecting approximately 213

countries within 2-3 months (Gao et al., 2020). On January 30, 2020, the World Health Organization (WHO) declared that the outbreak of SARS-2 a public health emergency of international concern, with more than 80,000 confirmed cases reported worldwide. On February 28, 2020, WHO declares COVID-19 a pandemic. The WHO has reported that 2.3 million cases of COVID-19 worldwide, with around 7,400 deaths reported as of November 19, 2022. The first case of COVID-19 in the Kingdom of Saudi Arabia (KSA) was confirmed and announced by Saudi Ministry of Health (MOH) on March 1, 2020 (Alotiby, 2021). The Saudi government enforced lockdown and created curfews for all its residents by the end of March 2020 for about three months (Algaissi et al., 2020). By November 19, 2022, the total confirmed cases in KSA reported by MOH were 825.029.

The main symptoms of COVID-19 have been identified as dry cough, muscle pain, fever, fatigue, shortness of breath, shortness of breath, and kidney failure (MOH, 2020) and (Al-Hanawi et al., 2020). The COVID-19 virus affects people of all ages. However, the evidence so far suggests that two groups of people are more likely to develop severe COVID-19 disease. These are the elderly. And for those with underlying medical conditions, the risk of developing serious illnesses gradually increases with age starting at around 40 years old (Ali et al., 2021) and (Urso, 2020).

COVID-19 is transmitted through direct contact with droplets scattered when a patient coughs or sneezes, or through indirect contact by touching surfaces or objects contaminated with the virus and then touching the nose, eyes, or mouth (MOH, 2020).

MOH advises citizens and visitors to adhere to the following health instructions to control influenza and respiratory infections in general by washing hands well and regularly with soap and water or hand sanitisers, especially after coughing, sneezing, or using the bathroom as well before and after handling or preparing food. They also advise covering your mouth and nose when sneezing or coughing and immediately disposing of these tissues in the trash. Try to avoid touching your eyes, nose, and mouth with your hands as much as possible (MOH, 2020).

The global pandemic COVID-19 has had a noticeable impact on human health and people's eating habits and dietary patterns across the world, especially in the region affected by this pandemic through social distancing and isolation at home. Accordingly, it is necessary to define and change people's perceptions and knowledge about healthy eating habits to maintain their health during the global pandemic (Alhousseini and Alqahtani, 2020). After the COVID-19 pandemic was announced, a lot of information about transmission, prevention and personal hygiene poured into social media, but there was not enough information about healthy eating habits during the pandemic. Whereas nutrition is considered a public health priority in lockdown situations to build strong immunity to prevent the body from viruses and having a healthy diet routine can help boost the human body's immune system, which is essential in fighting viruses (Muscogiuri et al., 2020) and (Wu et al., 2019).

Depression and stress during the pandemic have led to overeating, especially rich in sugar (Yılmaz and Gökmen, 2020) and (Rodríguez-Martín and Meule, 2015). These foods rich in simple carbohydrates can reduce stress as they encourage serotonin production with a positive effect on mood. However, this food is associated with an increased risk of obesity and cardiovascular disease (Eastin and Eastin, 2020) and (Muscogiuri et al., 2020). Social life has been affected by the epidemic which has resulted in the inability to maintain healthy eating habits, as well as regular physical activity.

Furthermore, psychological and emotional responses to the COVID-19 outbreak may increase the risk of developing dysfunctional eating behaviors (Wang et al., 2020) and (Montemurro, 2020). It is well known how experiencing negative emotions can lead to overeating, as defined as “emotional eating” (van Strien, 2018), and (Evers et al., 2018).

In addition, feelings of boredom from staying home for a long time during the outbreak have led to overeating to escape monotony (Havermans et al., 2015) and (Crockett et al., 2015).

## Methods and survey tool

This study aimed to assess awareness of COVID-19 and its relationship to nutritional behaviours in western Saudi Arabia among the Saudi and non-Saudi population aged  $\geq 18$  years. The study comprised a structured questionnaire packet that inquired demographic information (gender, nationality, marital status, education, age, employment, monthly income (Saudi Arabian riyals) and COVID-19 knowledge.

Healthy behaviors and knowledge regarding COVID-19 include consumption of various foods: (cooked meals outside, homemade meals, fresh vegetables/cooked, fresh fruits, fruit juices and fruit drinks, milk and dairy products, soft drinks/cola drinks, coffee and tea, fast foods, bakery items (cake, biscuit, and cookies), snacks and desserts (Arabic dessert, potato chips), sugar and fats, vitamin C from fruits/vegetables supplement, immunity-boosting supplement. The survey was conducted from 25 of September to 25 of November 2022.

All data were collected using an online self-reported questionnaire, using Google forms. Given the high internet usage among people in the KSA, the link of the online questionnaire was distributed to the target population, various media platforms, including Email, Google drive and WhatsApp groups, and their responses were collected.

## Sample size and statistical analysis

The collected data (n=110) Saudi and non-Saudi participants were analyzed by using IBM SPSS Statistics 23 Version.

## Results and discussion

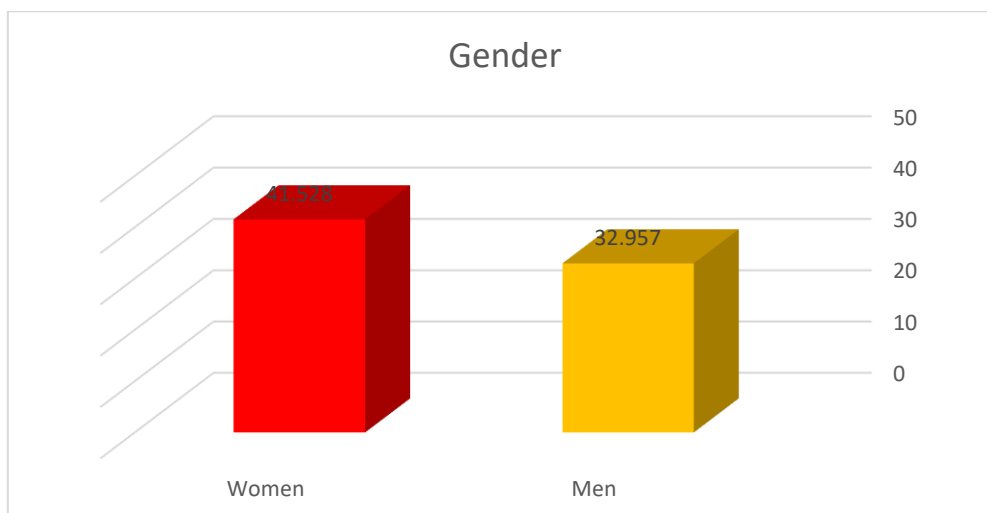
### *The first hypothesis*

There are statistically significant differences between the mean degrees of the research sample individuals in Awareness of COVID-19 and its relation to nutritional behaviors, according to the variables of the study.

To verify this hypothesis, the (T-test) test was applied, and (ANOVA) was calculated for the degrees of the sample individuals in Awareness of COVID-19 and its relation to nutritional behaviors, and the following tables show that:

**Table (1)** *the differences in the mean degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Gender variable*

Gender	Mean	Std. Deviation	N	df	t	Sig
Men	32.957	3.128	49	108	13.661	0.01
Women	41.528	4.269	61			

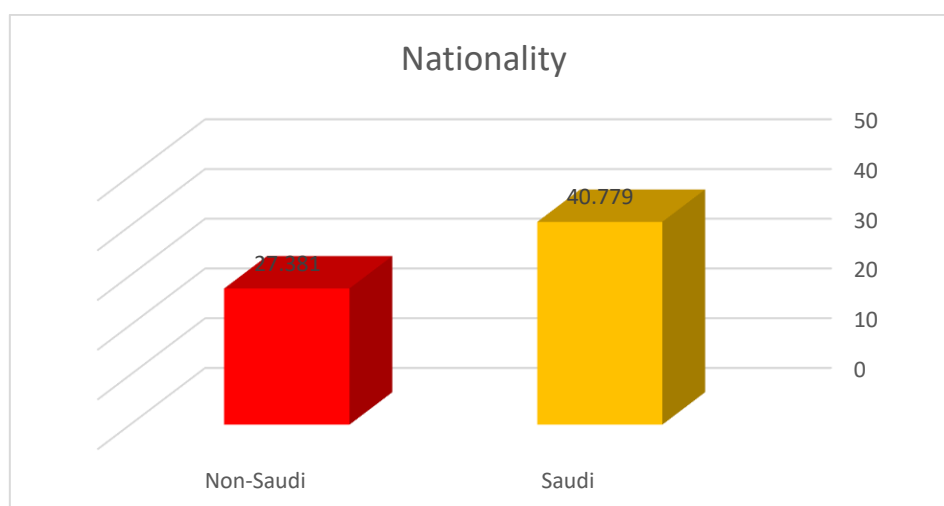


**Graph (1)** the differences in the mean degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Gender variable

From table (1) and graph (1), it is clear that the value of (T) was (13.661), and it is a statistically significant value at the significance level of (0.01) in favor of Women, where the mean degree of Women reached (41.528), while the mean degree of Men reached (32.957), which indicates that Women were more aware of COVID-19 of the nutritional behaviors than Men.

**Table (2)** the differences in the mean degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Nationality variable

Nationality	Mean	Std. Deviation	N	df	t	Sig
Saudi	40.779	4.175	74	108	16.530	0.01
Non-Saudi	27.381	2.660	36			



**Graph (2)** the differences in the mean degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Nationality variable

From table (2) and graph (2), it is clear that the value of (T) was (16.530), and it is a statistically significant value at the significance level of (0.01) in favor of Saudi, where the mean degree of Saudi reached (40.779), while the mean degree of Non-Saudi reached (27.381).

(27.381), which indicates that Saudi were more aware of COVID-19 and more aware of the nutritional behaviors than Non-Saudi .

**Table (3)** analysis of variance for the degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Marital status variable

Marital status	Sum of Squares	Mean Square	df	F	Sig
Between Groups	5.356	1.785	3	0.448	0.719 Not Sig.
Within Groups	421.944	3.981	106		
Total	427.300		109		

Table (3): shows that the value of (F) was (0.448), and it is not a statistically significant, which indicates there aren't differences among the degrees of the sample individuals in Awareness of COVID-19 and its relation to nutritional behaviors according to the Marital status variable.

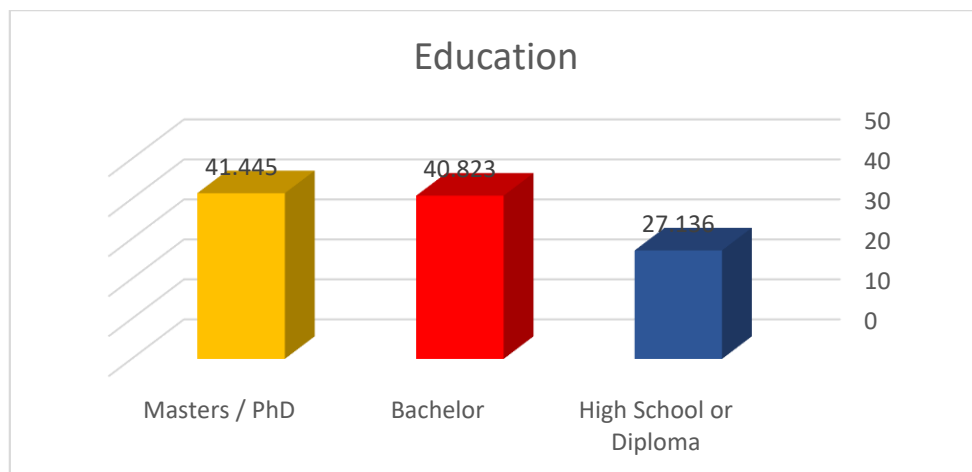
**Table (4)** analysis of variance for the degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Education variable

Education	Sum of Squares	Mean Square	df	F	Sig
Between Groups	5575.092	2787.546	2	23.577	0.01
Within Groups	12650.868	118.232	107		
Total	18225.960		109		

Table (4 ): shows that the value of (F) was (23.577), and it is a statistically significant at the level (0.01), which indicates the existence of differences among the degrees of the sample individuals in Awareness of COVID-19 and its relation to nutritional behaviors according to the Education variable, and to know the direction of the significance, a Scheffe's test for the multiple comparisons was applied, and the following table shows this:

**Table (5)** Scheffe's test for the multiple comparisons

Education	High School or Diploma M = 27.136	Bachelor M = 40.823	Masters / PhD M = 41.445
High School or Diploma	-		
Bachelor	13.687**	-	
Masters / PhD	14.309**	0.622	-



**Graph (3)** the differences of the sample's degrees in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Education variable

From table (4 ) and graph (3), it is clear that there aren't differences in Awareness of COVID-19 and its relation to nutritional behaviors among the sample individuals who have Masters / PhD and the sample individuals who have Bachelor, while there are differences among the sample individuals who have Masters / PhD and the sample individuals who have High School or Diploma in favor of the sample individuals who have Masters / PhD at the significance level of (0.01). Also, there are differences among the sample individuals who have Bachelor and the sample individuals who have High School or Diploma in favor of the sample individuals who have Bachelor at the significance level of (0.01), where the mean degree for both of the sample individuals who have Masters / PhD and the sample individuals who have Bachelor reached (41.445) and (40.823) respectively, followed by the sample individuals who have High School or Diploma by mean of (27.136), so both of the sample individuals who have Masters / PhD and the sample individuals who have Bachelor come in the first place, where they were more aware of COVID-19 disease and more aware of nutritional behaviors, then the sample individuals who have High School or Diploma in the second place.

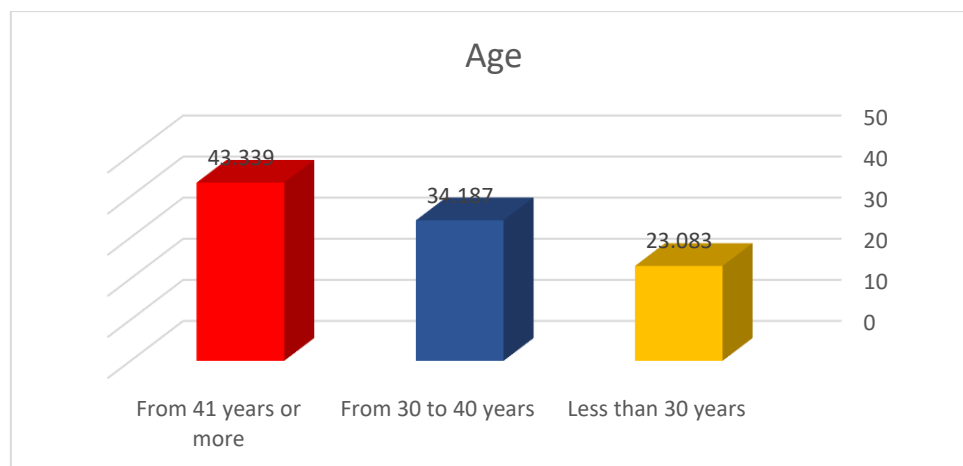
**Table (6)** analysis of variance for the degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Age variable

Age	Sum of Squares	Mean Square	df	F	Sig
Between Groups	6110.845	3055.422	2	50.961	0.01
Within Groups	6415.262	59.956	107		
Total	12526.107		109		

Table (6): shows that the value of (F) was (50.961), and it is a statistically significant at the level (0.01), which indicates the existence of differences among the degrees of the sample individuals in Awareness of COVID-19 and its relation to nutritional behaviors according to the Age variable, and to know the direction of the significance, a Scheffe's test for the multiple comparisons was applied, and the following table shows this:

**Table (7)** Scheffe's test for the multiple comparisons

Age	Less than 30 years M = 23.083	From 30 to 40 years M = 34.187	From 41 years or more M = 43.339
Less than 30 years	-		
From 30 to 40 years	11.104**	-	
From 41 years or more	20.256**	9.152**	-



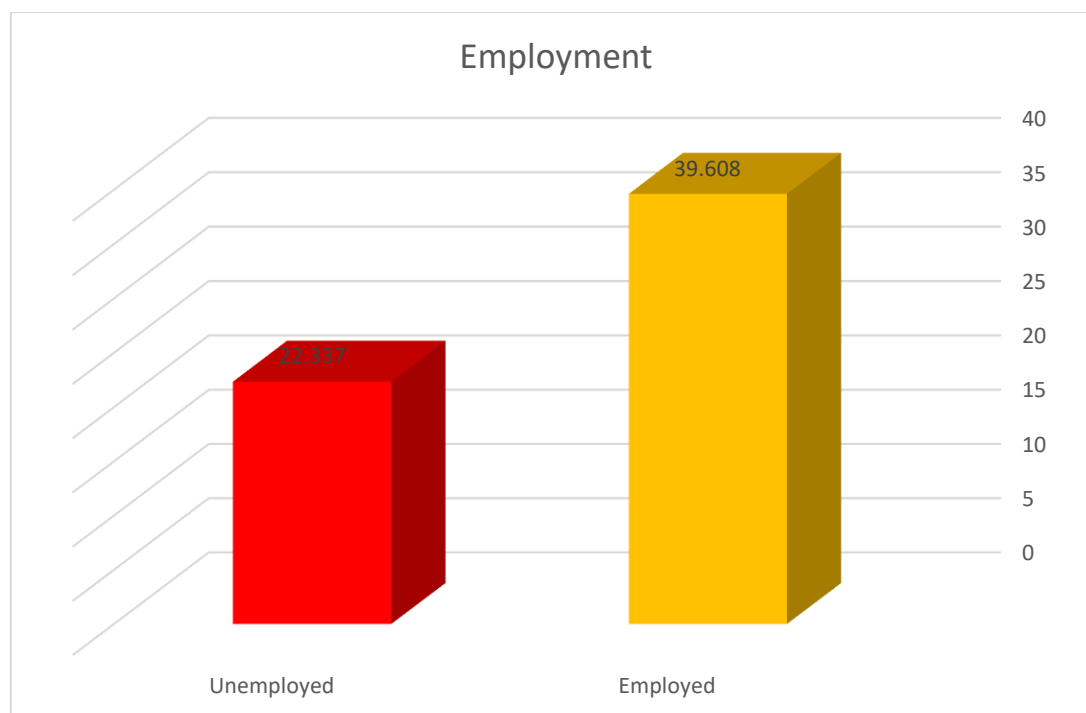
**Graph (4)** the differences of the sample's degrees in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Age variable



From table (6 ) and graph ( 4 ), it is clear that there are differences in Awareness of COVID-19 and its relation to nutritional behaviors among the sample individuals who their ages are From 41 years or more and both the sample individuals who their ages are (From 30 to 40 years ‘ Less than 30 years) in favor of the sample individuals who their ages From 41 years or more at the significance level of (0.01). Also, there are differences among the sample individuals who their ages are From 30 to 40 years and the sample individuals who their ages are Less than 30 years in favor of the sample individuals who their ages are From 30 to 40 years at the significance level of (0.01), where the mean degree of the sample individuals who their ages are From 41 years or more reached (43.339), followed by the sample individuals who their ages are From 30 to 40 years by mean of (34.187), followed by the sample individuals who their ages are Less than 30 years by mean of (23.083), Thus, the sample individuals who their ages are From 41 years or more come in the first place, where they were more aware of COVID-19 disease and more aware of nutritional behaviors, then the sample individuals who their ages are From 30 to 40 years come in the second place, and in the last place the sample individuals who their ages are Less than 30 years.

**Table (8)** the differences in the mean degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Employment variable

Employment	Mean	Std. Deviation	N	df	t	Sig
Employed	39.608	3.718	68	108	19.881	0.01
Unemployed	22.337	2.014	42			



**Graph (5)** the differences in the mean degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Employment variable

From table (8) and graph (5) , it is clear that the value of (T) was (19.881), and it is a statistically significant value at the significance level of (0.01) in favor of Employed , where the mean degree of Employed reached (39.608), while the mean degree of Unemployed reached (22.337), which indicates that Employed were more aware of COVID-19 disease and more aware of the nutritional behaviors than Unemployed .

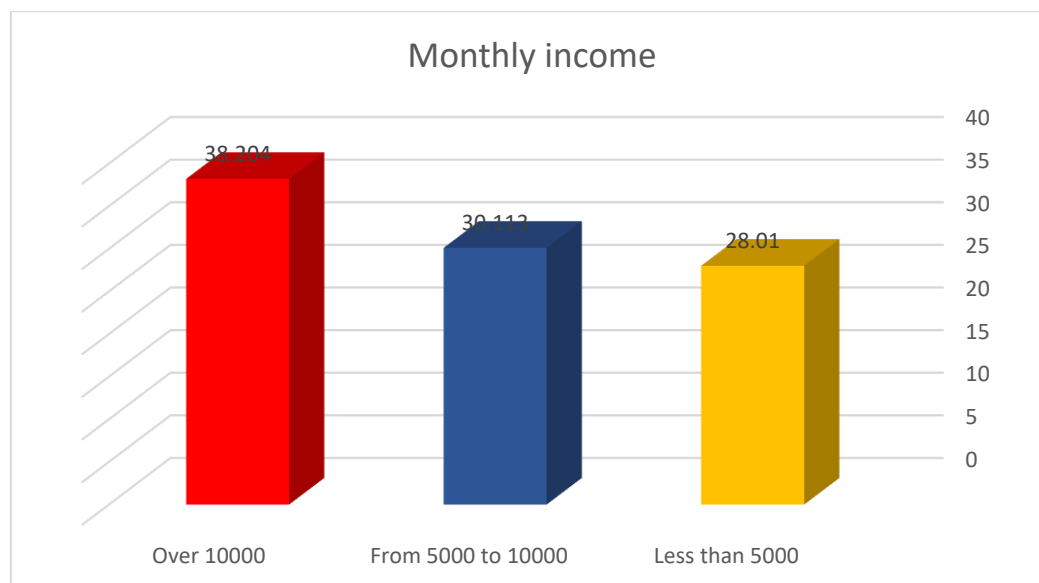
**Table (9)** analysis of variance for the degrees of the sample individuals in the Awareness of COVID-19 and its relation to nutritional behaviors according to the Monthly income variable

Monthly income	Sum of Squares	Mean Square	df	F	Sig
Between Groups	5767.151	2883.576	2	30.487	0.01
Within Groups	10120.394	94.583	107		
Total	15887.545		109		

Table (9): shows that the value of (F) was (30.487), and it is a statistically significant at the level (0.01), which indicates the existence of differences among the degrees of the sample individuals in Awareness of COVID-19 and its relation to nutritional behaviors according to the Monthly income variable, and to know the direction of the significance, a Scheffe's test for the multiple comparisons was applied, and the following table shows this:

**Table (10)** Scheffe's test for the multiple comparisons

Monthly income	Less than 5000 M = 28.010	From 5000 to 10000 M = 30.113	Over 10000 M = 38.204
Less than 5000	-		
From 5000 to 10000	2.103*	-	
Over 10000	10.194**	8.091**	-



**Graph (6)** the differences of the sample's degrees in Awareness of COVID-19 and its relation to nutritional behaviors according to the Monthly income variable

From table ( 9) and graph ( 6 ), it is clear that there are differences in Awareness of COVID-19 and its relation to nutritional behaviors among the sample individuals who their income is Over 10000 and both the sample individuals who their income is (From 5000 to 10000 «Less than 5000) in favor of the sample individuals who their income is Over 10000 at the significance level of (0.01), while there are differences among the sample individuals who their income is From 5000 to 10000 and the sample individuals who their income is Less than 5000 in favor of the sample individuals who their income is From 5000 to 10000 at the significance level of (0.05), where the mean degree of the sample individuals who their income is Over 10000 reached (38.204), followed by the sample individuals who their income is From 5000 to 10000 by mean of (30.113), and finally the sample individuals who their income is Less than 5000 by



mean of (28.010), Thus, the sample individuals who income is Over 10000 come in the first place, where they were more aware of COVID-19 disease and more aware of nutritional behaviors, then the sample individuals who their income is From 5000 to 10000 come in the second place, and in the last place the sample individuals who their income is Less than 5000. This study shows that, the sample individuals whose income is Over 10000 were more aware of COVID-19 disease and more aware of nutritional behaviors than other individuals.

## The second hypothesis

*There is a correlation relation between Awareness of COVID-19 and its relation to nutritional behaviors, according to the variables of the study.*

To verify the validity of this hypothesis, a correlation matrix was created between Awareness of COVID-19 and its relation to nutritional behaviors, according to the variables of the study, and the following table shows the values of the correlation coefficients:

**Table (11)** *the correlation matrix between Awareness of COVID-19 and its relation to nutritional behaviors, according to the variables of the study*

	<b>Awareness of COVID-19 and its relation to nutritional behaviors</b>
Gender	0.156
Nationality	0.108
Marital status	0.239
Education	0.821**
Age	0.875**
Employment	0.601*
Monthly income	0.773**

\*\* significant at 0.01                      \* significant at 0.05                      without stars not significant

From the table (11) it is clear that there is a direct correlation relation between Awareness of COVID-19 and its relation to nutritional behaviors and some of the study variables at the significance level of 0.01, 0.05. So, if the education gets higher, the Awareness of Covid-19 disease gets increased, and awareness of nutritional behaviors gets higher. As well as, if the age gets higher, the Awareness of Covid-19 disease gets increased, and awareness of nutritional behaviors gets higher. As well as if the Employment gets higher, the Awareness of Covid-19 disease gets increased, and awareness of nutritional behaviors gets higher. Also, if the Monthly income gets higher, the Awareness of Covid-19 disease gets increased, and awareness of nutritional behaviors gets higher. While there is no correlation between Gender and Awareness of Covid-19 disease, and the awareness of nutritional behaviors got higher. Also, there is no correlation between Nationality and Awareness of Covid-19 disease, and the awareness of nutritional behaviors got higher. As well as there is no correlation between the Marital Status and Awareness of Covid-19 disease, and the awareness of nutritional behaviors got higher.

## The third hypothesis

*The participation percentage of the factors affecting the Awareness of COVID-19 and its relation to nutritional behaviors varies.*

To verify this hypothesis, the relative importance was calculated using the regression coefficient (the graded step to forward) for the factors affecting the Awareness of COVID-19 and its relation to nutritional behaviors, and the following table shows that:

**Table (12)** the relative importance using the regression coefficient (Regression Stepwise) of the factors affecting the Awareness of COVID-19 and its relation to nutritional behaviors

Dependent variable Awareness of COVID-19 and its relation to	Independent variable	R	R Square	F	Sig	Beta	t	Sig
	Education	0.927	0.859	170.635	0.01	0.754	13.063	0.01
	Age	0.898	0.806	116.103	0.01	0.681	10.775	0.01
	Employment	0.837	0.701	65.758	0.01	0.552	8.109	0.01
	Nationality	0.788	0.621	45.894	0.01	0.460	6.775	0.01

From the previous table it is clear that the Education was one of the most influential factors on the Awareness of COVID-19 and its relation to nutritional behaviors by 85.9%, followed by the Age by 80.6%, and followed by the Employment by 70.1%, and in the last place the Nationality by 67.6%.

In this research, which aims to assess awareness of COVID-19 and its relationship to nutritional behaviours in western Saudi Arabia ,data related to Healthy behaviors and knowledge regarding COVID-19 include consumption of various foods: (cooked meals outside, homemade meals, fresh vegetables/cooked, fresh fruits, fruit juices and fruit drinks, milk and dairy products, soft drinks/cola drinks, coffee and tea, fast foods, bakery items (cake, biscuit, and cookies), snacks and desserts (Arabic dessert, potato chips), sugar and fats, vitamin C from fruits/vegetables supplement, immunity-boosting supplement. the data were collected and evaluated, in addition to the socio-demographic characteristics of the participants such as gender, nationality, marital status, education, age, employment, monthly income (Saudi Arabian riyals) In this study, in which 110 individuals (61women 55.5%, and 49 men 44.5%) **Table 1.** Our results supported the results of a study conducted by Funda Elmacioğlu et al, in 2020 about the evaluation of nutritional behaviour related to COVID-19 with a total of 1036 participants, 827 of them about 79.80 % were female and 209 at about 20.20% were male and it indicated that female was more aware of COVID-19 of the nutritional behaviours than male. In contrast, in the finding in Evaluation of COVID-19 Disease Awareness and Its Relation to Mental Health, Dietary Habits, and Physical Activity: A Cross-Sectional Study from Pakistan by Ahmad Ali in 2021 males were more aware of COVID-19 of nutritional behaviours than females.

Current research confirms that Saudi individuals 74 are more aware of COVID-19 of nutritional behaviours than non- Saudi 36 individuals **Table 2.** In the Awareness of COVID-19 and its relation to nutritional behaviors according to the Age variable 45 of 110 participants were at age From 41 years old or more, 36 were From 30 to 40 years old and 29 were Less than 30 years old, this finding proves that populations in western of KSA at the age From 41 years old more aware of COVID-19 of nutritional behaviours than other ages **Graph 4.** This finding is confirmed the finding by Ahmad Ali in 2021. In this study, the Employed 68 were more aware of COVID-19 of nutritional behaviours than Unemployed 42 **Table 8** which emphasises the result of previous research(Ali, 2021).

## Conclusion

Dietary habits have changed significantly during the COVID-19 pandemic worldwide. Even though some good habits improved, for instance consuming home-cooked meals, eating citrus fruits as a source of Vitamin C while the quality of some dietary habits changed, and it became worse during the COVID-19 pandemic than before the pandemic such as, consumption snacks, coffee, and other sugary foods. Accordingly, public health administrators must improve

nutrition awareness for the population by presenting healthy dietary habits choices, particularly during pandemics. The findings of the current study indicate that the population aged  $\geq 18$  years old in western Saudi Arabia among the Saudi and non-Saudis overall were aware of COVID-19 of nutritional behaviours. It also shows that there aren't differences among the degrees of the sample individuals in awareness of COVID-19 and its relation to nutritional behaviours according to the Marital status variable. The most aware population according to Education were who have Master's / PhD than those who have Bachelor's and High School or Diploma and Employed were more aware of COVID-19 disease and more aware of the nutritional behaviours than the Unemployed. Additional researches is needed to be done so people are sufficiently aware of the nutritional behaviours to keep themselves healthier, specifically in lockdown situations. The limitation of the current research is the questionnaire lacks information about physical activity, which could have added a lot of important information to the research. Also, there is no peer-review data about the evaluation of COVID-19 awareness and its relation to nutritional behaviours in Saudi Arabia, especially in the Western region. This study is novel, and it will add new information to the evaluation of COVID-19 awareness and its relation to nutritional behaviours in KSA.

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