

# Health Behavior Changes among Maternity Nurses during the COVID-19 Pandemic: A Cross-Sectional Study

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## Abstract

**Background:** Maternity nurses are frontline health professionals in the COVID-19 pandemic who may confront life-altering challenges. Studies that evaluated the impact of COVID-19 on maternity nurses' daily lifestyles are limited. **Objective:** The aim of this study was to examine the changes in health-enhancing behaviors, such as eating habits and lifestyle behaviors, during the COVID-19 pandemic among nurses working in a maternity hospital. **Methods:** This was a cross-sectional study that surveyed maternity nurses working in a major government maternity hospital in Kuwait. Data were collected between January and February 2021. **Results:** A total of 336 participants completed the questionnaire. Normal weight was perceived by 88 (26.2%) of the participants, while 56 (16.7%) had a Body Mass Index indicating obesity. Weight gain during the pandemic was reported by 128 (38.1%) participants and 91 (27.1%) of the sample gained one to three kilograms. The findings showed low adherence to the Mediterranean diet  $5.3 \pm 2.5$  points. Sleep hours decreased significantly during the crisis, with 113 (33.6%) of participants sleeping 7 to 9 hours during the COVID-19 situation compared to 136 (40.5%) before the pandemic ( $p < 0.001$ ). There was a significant difference in the proportion of participants who practiced sports before the COVID-19 crisis 78 (23.2%) and those who practiced sports 72 (21.4%) during the COVID-19 crisis ( $p < 0.001$ ). A significant association was found between weight gain and participants who have chronic diseases 27 (56.3%) ( $X^2 = 7.621$ ,  $P = 0.006$ ), felt hungry between meals 37 (50.7%) ( $X^2 = 6.505$ ,  $p = 0.011$ ), and who reported changes in their appetite ( $X^2 = 17.129$ ,  $p < 0.001$ ). **Conclusion:** Maternity nurses revealed low adherence with the healthy diet, with almost a third of participants having self-reported weight gain. Further,

the sleeping patterns and the practicing of physical activities were negatively affected by COVID-19 pandemic.

## Keywords

Diet, Lifestyle, Nurses, Covid-19, Kuwait

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## 1. Background

Nurses have a critical role in health promotion and management of life-style-related diseases [1]. Unfortunately, while they are of paramount significance in the warfare against these diseases, they may not be involved in health-enhancing behaviors, such as exercising, eating a healthy diet, and practicing stress reduction activities [2]. Nurses in different parts of the world paradoxically experience prevalence rates of obesity. In the United States, the prevalence of obesity among nurses ranges from 23% to 61.4% [3], while among British nurses, the prevalence is 25.1%, almost similar to that in the general population of England, which is 27% [4]. A review of 13 predominantly large-scale researches revealed that the majority of the US hospital nurses eat diets of poor quality (53% - 61%) and that they have inadequate physical activity levels (60% - 74%) [5]. The quality of patient care may strongly be influenced by the health status of the nurses and their health behavior participation [6].

The World Health Organization (WHO) declared the COVID-19 outbreak “a public health emergency of international concern” [7], as confirmed by its rapid spread worldwide. Public health measures introduced to combat the COVID-19 pandemic have impacted millions of people’s physical activity, health, and well-being [8]. The nurses are the most prominent health professionals at the front line of the health care system’s response to the pandemic [9]. Their physical proximity to patients exposes them directly to the virus and increases their risk of disease transmission [10] [11].

Life-altering challenges confront the universal scenario because of the COVID-19 pandemic [12]. Nonpharmacological interventions (NPI) are recommended to decrease transmission, such as personal restrictions, mass confinement, compulsory home isolation, good ventilation in the workplace and wearing a face mask [13]. Disease-related lifestyle behaviors are targeted to be modified by these NPIs as well. However, unexpected protective or detrimental outcomes for mental health can result from lifestyle changes [14] [15] [16] [17] [18]. The need for significant lifestyle changes was heightened due to the obstacles in daily functioning brought about by COVID-19. A longitudinal study by Czenczek-Lewandowska and colleagues [19] showed that health behaviors of young adults became worse and anxiety increased during the COVID-19 pandemic.

Influential contributors to the “global burden of disease” are unhealthy lifestyle behaviors such as poor diet, lack of physical activity, smoking, and alcohol

[20]. During the COVID-19 outbreak, maintaining a healthy nutritional status and engaging in physical exercise at home have been emphasized as lifestyle guidelines [21] [22]. A survey conducted in Italy as of March 28, 2020, after almost a month of lockdown, showed a sudden and radical change in the habits and lifestyles of the population [23]. The drastic reduction of socialization, self-isolation and physical distancing strongly impacted citizens' lives, particularly their eating habits and daily behaviors. Further, personal circumstances related to work and home life may significantly influence how individuals cope with the ongoing stressor of the probability of contracting COVID-19 [24]. During the lockdown, restrictions and lifestyle changes have reduced psychological well-being. History reveals the links between decreased well-being and feelings of isolation, fear of contracting or spreading viruses, and reduced social exchanges [25] [26] [27].

Several studies have focused on the high prevalence of overweight and obesity in nurses [3]; some have dealt with the quality of nurses' diets; others on their physical activity levels [5]. Since the outbreak of COVID-19, there have been researching gaps on the characteristics of behavior patterns such as dietary intake, physical exercise, and screen time among the general population [28]. Moreover, data about perceived lifestyle changes among nurses are minimal. For example, A Brazilian study examined the impact of the COVID-19 pandemic on the daily eating, physical activities, and sleep habits of health care professionals [29]. The study surveyed a sample of 710 healthcare professionals. The study revealed that two-thirds of participants had sleep-related problems. The use of insomnia medications was reported by 28.7% of the participants, which majority of them were self-medicated. Change in diets habits was reported by the majority of the participants (78.5%), primarily related to an increase in alcohol consumption and carbohydrate intake. Similarly, the majority of the participants reported physical activity practice changes. However, the representation of nurses in this study was low (13.5%) and nursing technician (10.3%) and the specialty of nurses was not reported [29]. Another more recent cross-sectional study investigated the changes in eating habits of 500 hospital nurses in Lebanon [30]. The study found a significant correlation between the reduction of healthy food consumption and stress level. However, the study results were affected by the accompanying economic crisis that impacted the consumption of healthy food. Most participants were bedside nurses (74.8%); however, their specialty unit was not reported [30].

Nurses working in maternity settings are frontline health professionals in the COVID-19 pandemic who are in direct exposure due to the required hands-on care [31]. Therefore, they should have the greatest caution and adequate protection to prevent the transmission of infections to nurses, other healthcare professionals, and patients [31]. This dynamic has changed maternity care nurses' clinical practices and experiences [32]. A qualitative study in the US found that maternity care professionals, including nurses, experienced complex and conflicting challenges in their role with concerns regarding the impact of the

COVID-19 pandemic on their well-being and their families [33]. Another qualitative Korean study used focus groups and in-depth interviews with 24 maternity and newborn care nurses to describe their experiences of caring during the pandemic [34]. The study revealed that the roles of nurses were directed toward preventing COVID-19 transmission and treating patients with or suspected of COVID-19, which affects the levels of work stress and staffing level [34]. A national US cross-sectional study that investigated the practice of labor and delivery nurses during the COVID-19 pandemic showed changes in the roles and responsibilities of nurses, as reported by half of the participants who perceived the effects of quality of patient care [35].

Although the previously mentioned studies showed the changes in maternity nurses' roles, experiences, and work stresses during the COVID-19 pandemic, the studies that evaluated the impact of COVID-19 on changes of maternity nurses' daily lifestyles are lacking. For example, there is a shortage of research describing the maternity nurses' health-enhancing self-care during the COVID-19 pandemic. A deeper understanding of the factors influencing the health-enhancing behaviors of maternity nurses during this period is critically warranted [36] [37].

This study aims to describe the changes in health-enhancing behaviors, like eating habits and lifestyle behaviors, during the COVID-19 pandemic among nurses working in the maternity hospital in Kuwait. From the preventive care perspective, it is hoped that this study can provide valuable information to maintain a healthy lifestyle and good mental health during this pandemic period, particularly among nurses, who are among the vital front liners in health care. During this critical period of high health needs, these nurses who experience distress should be well supported to promote their well-being and retention and facilitate high-quality health care delivery [33]. More specifically, this study is aimed to answer the following research questions:

- Is there a significant change in lifestyle behaviors during the COVID-19 pandemic among nurses working at a maternity hospital in Kuwait compared to the period before the COVID-19 pandemic?
- What is the prevalence of weight gain and the adherence to healthy diet during the COVID-19 pandemic among nurses working at a maternity hospital in Kuwait?
- What factors are associated with the weight gain and adherence to Mediterranean diet during the COVID-19 pandemic among nurses working at a maternity hospital in Kuwait?

## 2. Methods

The study adopted an observational analytical cross-sectional research design using quantitative data collection and analysis methods. The cross-sectional design allows researchers to collect data from the eligible participants at a lower cost and within a reasonable time compared with other research methods. It is

suitable for descriptive analysis and identifying the associated factors of the dependent variables [38].

The study explored how the socio-demographic characteristics of nurses working at a maternity hospital determined their health behaviors (eating and lifestyle) during the initial stage of COVID-19 compared with the period before COVID-19. In addition, the study explored the gain of weight and adherence to a healthy diet (Mediterranean diet) and their associated factors. The health behaviors are the activities that relate to the maintenance of health, including smoking, physical activity, eating and drinking habits, and sleeping patterns [39]. The Mediterranean diet refers to a style of eating that helps prevent heart disease and other health problems [40] [41].

Ethical approval was received from the Ministry of Health (MoH) in the Kuwait Research Ethics Committee (REC). The aims of the study were elucidated, and the participants were given their informed consent and participant information sheets before participating in the study.

### **2.1. Study Setting**

The study was conducted on nurses working in a major governmental maternity hospital in Kuwait with a capacity of 581 beds. The hospital employs around 745 nurses from different nationalities. The hospital comprises of casualty, genetic, radiology, and outpatient departments. In addition to the labor room, antenatal ward, postnatal ward, COVID-19 ward, and several intensive care units. The hospital served around 30,000 patients in the outpatient clinics in 2020 and 49,000 in 2021. The hospital received more than 14,000 in-patient admissions in 2020 and 13,000 in 2021 [42].

### **2.2. Sampling and Participants**

A non-probability convenience sampling technique was considered to distribute the electronic survey. This sampling technique was suitable for use under the restrictions due to COVID-19 pandemic being universal across all health facilities in the country. Participants included nurses working in a Maternity hospital who were willing to participate in the study. Sample size estimation was done by obtaining a list of nurses registered in the Ministry of Health and working in the Maternity Hospital. There is a total of 745 nurses working in the maternity hospital, with an expected 50% response rate, 0.05 margin of error, and 95% confidence level, a minimum recommended sample size is 254 nurses for this study. Raosoft online sample size calculator was used to calculate the sample size [43].

### **2.3. Data Collection**

A structured, self-administered, and online-based questionnaire was used for data collection in this study. The tool which was specifically validated and used by previous studies [23] [44] was adopted from the Eating Habits and Lifestyle Changes in COVID-19 lockdown (EHLCOVID19) and Mediterranean diet

adherence screener (MEDAS) questionnaire [23] [44].

The questionnaire was composed of three main sections. Section I (Personal Data) included questions about demographics such as gender, age, sex, nationality, marital status, educational level, occupational information, as well as the presence of chronic disease and anthropometrics information (weight in kilograms and height in meters). Section II (Health Behaviors) included three main parts. The first part consisted of 14 items about adherence to the Mediterranean diet using the validated version of MEDAS, which score ranges from 0 to 14 points. Based on the MEDAS scores, participants were classified based on their average score to low adherence (score 0 - 5), medium adherence (score 6 - 9), and high (score  $\geq$  10) adherence to the Mediterranean diet [23] [44], the second part consists of 11 items on dietary habits asking about daily/weekly consumption of certain foods; and the third part consists of 12 items on lifestyle habits changes consisting of items about sleeping habits, smoking habits, and specific questions about physical activity habits. Section III (Factors Affecting Health Behaviors during COVID-19) covered the promoting and hindering factors for health-enhancing behaviors that prevent nurses from following lifestyle habits.

Data were collected between January and February 2021. Google forms were adopted to collect responses from participants. Participants were approached with the assistance of an assigned researcher by sending the questionnaire to the potential participants' emails. Follow-up emails were sent as reminders to complete the questionnaire. The questionnaire was in English as nurses in the MoH in Kuwait are competent in reading and writing the English language.

## 2.4. Statistical Analysis

In this study, descriptive statistics were used to characterize the traits, values, and data given by the participants. For categorical data, frequencies and percentages were presented. Using the Chi-square test, all the items were tabulated and compared between the groups regarding demographic factors, educational background, employment background, and medical history. The effect of research variables representing socio-demographic factors, health circumstances, and knowledge of the sampled population on gaining weight during the Covid-19 crisis, as well as MEDAS, were investigated using univariate and multivariate analysis. For all analyses, the significance threshold was fixed at  $p$  0.05. Data cleaning and analysis were performed using SPSS ver. 28.0 (IBM, Chicago, IL, USA).

## 3. Results

### 3.1. Participants and Social Demographic Characteristics

A total of 336 participants completed the questionnaire, with around 45% response rate. Among them, 147 (43.8%) fell in the age category 41 - 50. The majority of participants was married 315 (93.8%) and reported having one or more children. In comparison, 24 (7.1%) reported they had no children. Work expe-

rience ranged from one to over 20 years, with the majority 111 (33%) having worked for a duration between 11 - 15 years. Majority of respondents 143 (42.6%) were working in the neonate department. Only 48 (14.3%) reported a history of chronic illness and 68 (20.2%) had a history of previous surgery. Most participants held a Bachelor of Science in Nursing 193 (57.4%) regarding education level. In terms of body mass index (BMI), 88 (26.2%) of participants showed normal weight, while 56 (16.7%) had a BMI indicating obesity. Only 128 (38.1%) of participants reported that they gained weight during the COVID-19 pandemic and 91 (27.1%) of the sample gained one to three kilograms during the crisis. **Table 1** shows more information about participants' characteristics.

**Table 1.** Participants' general characteristics and anthropometrics.

Variable	n = 336
<b>Age</b>	
31 - 40	145 (43.2%)
41 - 50	147 (43.8%)
51 - 60	44 (13.1%)
<b>Education</b>	
ADN (Associate Degree in Nursing)	73 (21.7%)
BSN (Bachelor of Science in Nursing)	193 (57.4%)
Missing	70 (20.8%)
<b>Marital Status</b>	
Single	21 (6.3%)
Married	315 (93.8%)
<b>Number of children</b>	
None	24 (7.1%)
1 - 2	207 (61.6%)
3 - 4	105 (31.3%)
<b>Working experience</b>	
1 - 5	29 (8.6%)
6 - 10	65 (19.3%)
11 - 15	111 (33%)
16 - 20	47 (14%)
>20	84 (25%)
<b>Department</b>	
Antenatal	51 (15.2%)
Casualty	29 (8.6%)
Labor room	6 (1.8%)
Neonate	143 (42.6%)
OPD	11 (3.3%)
OT	35 (10.4%)
Post-natal	56 (16.7%)



**Continued****Chronic illness**

Yes	48 (14.3%)
No	286 (85.1%)

**Previous surgery**

Yes	68 (20.2%)
No	268 (79.8%)

**BMI category**

Normal weight	88 (26.2%)
Overweight	127 (37.8%)
Obesity	56 (16.7%)
Missing	65 (19.3%)
Mean $\pm$ standard deviation	26.4 $\pm$ 3.8

**Gain weight during the COVID-19**

Yes	128 (38.1%)
No	208 (61.9%)

**Weight gain in KG**

None	208 (61.9%)
<1 kg	18 (5.4%)
>6 kg	19 (5.7%)
1 - 3 kg	91 (27.1%)

**3.2. Mediterranean Diet Adherence Screener**

The average MEDAS questionnaire score was  $5.3 \pm 2.5$  points for all participants. Based on the MEDAS score and with a cutoff of  $\geq 10$  points, 44 (13.3%) of the participants exhibited a high level of adherence to the Mediterranean diet. In particular, in the highest adherence to the Mediterranean diet, the intake of fish, vegetables, rice, and nuts was respectively: 78.6%, 78%, 72.9% and 67.6% (**Table 2**).

By using t-test and ANOVA test to understand the significant difference in MEDAS score among the different classes of participants' characteristics, we found no significant difference among the different participant groups according to their social demographic characteristics. In addition, there was no significant difference among participants based on time of the day, feeling hungry and those who reported changes in sense of hunger during the crisis (**Table 3**). The study also looked at additional aspects of food consumption not covered by MEDAS, such as how many portions of food participants consume on a daily/weekly basis, as well as water consumption. **Figure 1** illustrates the results.

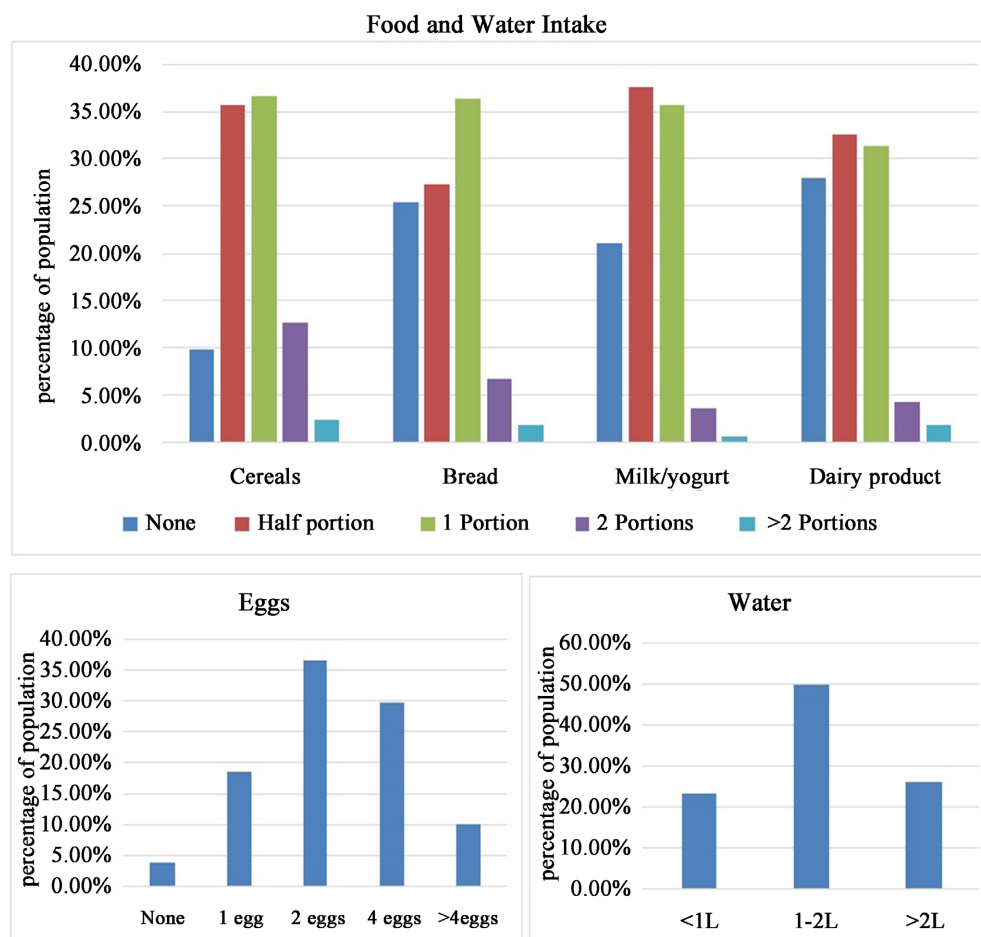
**3.3. Factors Affecting Weight Gain**

The chi-square test was applied to understand the differences among sample characteristics and weight gain classes during the crisis. The results showed no



**Table 2.** MEDAS and adherence to the MD.

Question	Yes (1 point)	No (0 point)
	n = 336 (100%)	n = 336 (100%)
Is olive the main culinary fat used	73 (21.7)	247 (73.5)
Are $\geq 4$ tablespoons of olive oil used each day	67 (19.9)	236 (70.2)
Are $\geq 2$ servings (of 200 g each) of vegetables eaten each day	262 (78)	56 (16.7)
Are $\geq 3$ servings of fruit (of 80 g each) eaten each day	229 (68.2)	91 (27.1)
Is $< 1$ serving (100 - 150 g) of red meat/ hamburgers/ other meat products eaten each day	112 (33.3)	203 (60.4)
Is $< 1$ serving (12 g) of butter, margarine or cream eaten each day	79 (23.5)	241 (71.7)
Is $< 1$ serving (330 ml) of sweet or sugar sweetened carbonated beverages consumed each day	122 (36.3)	197 (58.6)
Are $\geq 3$ glasses (of 125 ml) of wine consumed each week	33 (9.8)	288 (85.7)
Are $\geq 3$ servings (of 150 g) of legumes consumed each week	153 (45.5)	153 (45.5)
Are $\geq 3$ servings of fish (100 - 150 g) or seafood (200 g) eaten each week	264 (78.6)	57 (17)
Is $< 3$ servings of commercial sweets/pastries eaten each week	240 (71.4)	78 (23.2)
Is $\geq 1$ serving (of 30 g) of nuts consumed each week	227 (67.6)	66 (19.6)
Is chicken or turkey routinely eaten instead of veal, hamburger or sausage	143 (42.6)	171 (50.9)
Are pasta, vegetable or rice dishes flavored with garlic, tomato, leek or onion eaten $\geq$ twice a week	245 (72.9)	72 (21.4)

**Figure 1.** Food and water intake during COVID-19 emergency.

**Table 3.** The relationships between participant's characteristics and MEDAS score and gaining weight during COVID-19.

Characteristic	Wt. gain (yes) n = 336 (100%)	Wt. gain (no) n = 336 (100%)	P-value	MEDAS	P- value
<b>Age</b>					
31 - 40	49 (33.8%)	96 (66.2%)	X <sup>2</sup> = 2.607, p = 0.272	7.04 ± 2.79	P = 0.353
41 - 50	63 (42.9%)	84 (57.1%)		6.61 ± 2.24	
51 - 60	16 (36.4%)	28 (63.6%)		6.72 ± 2.53	
<b>Education</b>					
ADN (Associate Degree in Nursing)	29 (39.7%)	44 (60.3%)	X <sup>2</sup> = 2.607, p = 0.272	6.88 ± 2.60	P = 0.878
BSN (Bachelor of Science in Nursing)	75 (38.9%)	118 (61.1%)		6.83 ± 2.65	
Missing	24 (34.3%)	46 (65.7%)			
<b>Marital Status</b>					
Single	7 (33.3%)	14 (66.7%)	X <sup>2</sup> = .215, p = 0.643	7.33 ± 2.49	P = 0.334
Married	121 (38.4%)	194 (61.6%)		6.77 ± 2.53	
<b>Number of children</b>					
None	12 (50%)	12 (50%)	X <sup>2</sup> = 1.787, p = 0.428	7.33 ± 2.27	P = 0.564
1 - 2	75 (36.2%)	132 (63.8%)		6.74 ± 2.55	
3 - 4	41 (39%)	64 (61%)		6.82 ± 2.55	
<b>Working experience</b>					
1 - 5	7 (24.1%)	22 (75.9%)	X <sup>2</sup> = 3.856, p = 0.426	6.86 ± 2.73	P = 0.592
6 - 10	22 (33.8%)	43 (66.2%)		7.00 ± 2.64	
11 - 15	44 (39.6%)	67 (60.4%)		6.96 ± 2.54	
16 - 20	20 (42.6%)	27 (57.4%)		6.89 ± 1.91	
>20	35 (41.7%)	49 (58.3%)		6.41 ± 2.68	
<b>Chronic illness</b>					
yes	27 (56.3%)	21 (43.8%)	X <sup>2</sup> = 7.621, p = 0.006	6.91 ± 1.96	P = 0.769
no	101 (35.3%)	185 (64.7%)		6.80 ± 2.63	
<b>BMI category</b>					
Normal weight	26 (29.5%)	62 (70.5%)	X <sup>2</sup> = 7.468, p = 0.058	6.58 ± 2.44	P = 0.370
Overweight	50 (39.4%)	77 (60.6%)		6.99 ± 2.52	
Obesity	29 (51.8%)	27 (48.2%)		7.10 ± 2.34	
Missing	23 (35.4%)	42 (64.6%)			
<b>Time of the day feeling hungry</b>					
Before main meals	87 (34.3%)	167 (65.7%)	X <sup>2</sup> = 6.505, p = 0.011	6.82 ± 2.60	P = 0.890
Between main meals	37 (50.7%)	36 (49.3%)		6.78 ± 2.24	
<b>Sense of hunger change during crisis</b>					
Yes, more appetite	29 (65.9%)	15 (34.1%)	X <sup>2</sup> = 17.129, p < 0.001	6.88 ± 2.47	P = 0.992
Yes, less appetite	17 (38.6%)	27 (61.4%)		6.81 ± 2.51	
No	78 (32.9%)	159 (67.1%)		6.85 ± 2.55	

significant differences between the different categories of demographics, work background, and BMI category, except for participants who have chronic diseases 27 (56.3%), who were found to be more likely to gain weight than those who do not ( $X^2 = 7.621$ ,  $P = 0.006$ ). The result showed that those who are feeling hungry before mealtime are less likely to gain weight 167 (65.7%), while those who are feeling hungry between meals are more likely to gain weight 37 (50.7%) with a significant difference of ( $X^2 = 6.505$ ,  $p = 0.011$ ). The result showed those who reported no changes in appetite 159 (67.1%) were less likely to gain weight ( $X^2 = 17.129$ ,  $p < 0.001$ ). A statistically significant trend showed that obese nurses are more affected by weight gain ( $X^2 = 7.468$ ,  $p = 0.058$ ) (Table 3).

### 3.4. Lifestyle Habits

Regarding lifestyle changes during the COVID-19 lockdown, concerning smoking habits, most study participants were not smokers, with just two reporting that they began smoking during this time (0.6%). Sleep hours decreased significantly during the crisis, with 113 (33.6%) of participants sleeping 7 to 9 hours during the COVID-19 situation compared to 136 (40.5%) before the pandemic and 223 (66.4%) sleeping less than 7 hours during the emergency compared to 200 (59.5%) of participants before the emergency, as shown in Table 4.

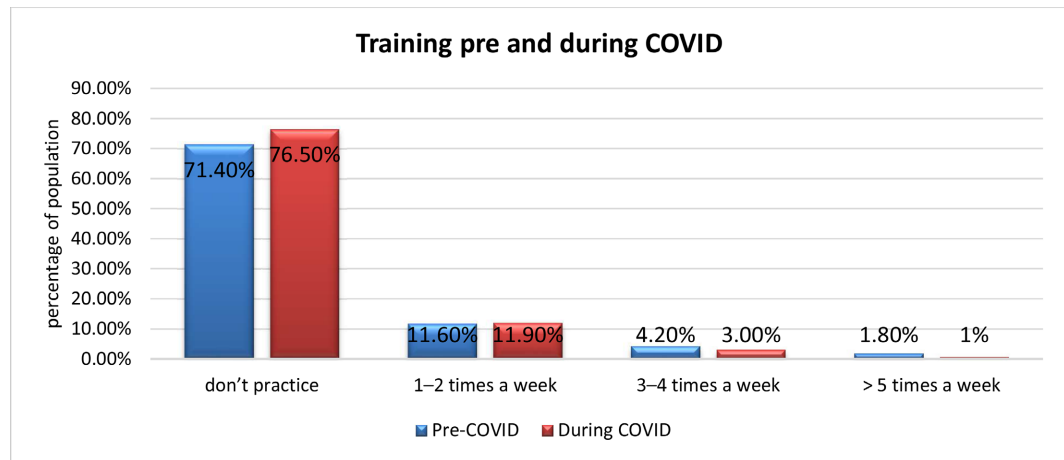
There was a significant difference in the proportion of participants who practiced sports before the COVID-19 crisis 78 (23.2%) and those who practiced sports 72 (21.4%) during the COVID-19 crisis ( $p < 0.001$ ). Data about the frequency of training are reported in Figure 2.

## 4. Discussion

This cross-sectional study provides a snapshot of health behavior changes, focusing on changes in lifestyle habits, adherence to healthy food, and the prevalence of weight gain among maternity nurses during the COVID-19 pandemic in Kuwait. Further, this study investigated the associated factors with weight gain

**Table 4.** Health Habits changes before and during COVID-19 emergency.

	Before n = 336 (100%)	During COVID-19 n = 336 (100%)	
<b>Smoking</b>			
Yes	0	2 (.6%)	
no	336 (100%)	334 (99.4%)	
<b>Sleeping</b>			
<7 h per night	200 (59.5%)	223 (66.4%)	$X^2 = 157.000$ , $p < 0.001$
7 - 9 h per night	136 (40.5%)	113 (33.6%)	
<b>Practicing sport</b>			
Yes	78 (23.2%)	72 (21.4)	$X^2 = 89.441$ , $p < 0.001$
no	255 (75.9%)	264 (78.6)	



**Figure 2.** Physical activities before and during COVID-19 emergency.

and adherence to a healthy diet among this cohort. Our findings revealed low adherence with the Mediterranean diet, with almost third of participants have self-reported weight gain. Chronic illnesses, a sense of hunger (change in appetite), and the time of feeling hungry were associated with weight gain. The weight gain was trending more toward obese nurses. Further, the sleeping patterns and the practicing of physical activities were negatively affected by COVID-19 pandemic.

The fast spread of COVID-19 forced many governments worldwide to impose lockdown, quarantine, and isolation rules. These sorts of procedures contributed to the restriction of public activities and increased stress and anxiety, leading to the consumption of an unhealthy diet and a reduction in physical activities. Our study showed that maternity nurses have low adherence to a healthy diet during the COVID-19 pandemic. The studies investigating the effect of the COVID-19 pandemic on the eating patterns among nurses are limited. Unlike our study, a longitudinal study in Spain examined the changes in the lifestyle of health science University students during the COVID-19 pandemic [45]. The study reported a high increase with the Mediterranean diet and maintaining moderate to intense physical activities among students [45]. The authors reported increased adherence to the Mediterranean diet to the increased consumption of vegetables and nuts [45]. Although our results showed a lower score of adherences to the Mediterranean diet, our cohort's consumption of vegetables and nuts was high. Many studies reported an increase consumption of vegetables during the Pandemic [46] [47]. Similar to the Spain study, a community-based study in Italy observed an increase in consumption of healthy food (37.4%) when compared with the less consumption (35.8%) [23]. More consumption of a healthy diet was observed more in the (18 - 30) years age group when compared to the younger and the elderly population [23]. Although our findings showed less adherence to the healthy food (Mediterranean diet) than these studies, the population of these studies is different from ours. In addition, the Mediterranean diet is more common in these countries than in Kuwait. More studies about maternity nurses are

still needed worldwide. Developing synergistic healthy dietary guidelines or campaigns to support nurses toward shifting to consuming a healthy diet and promoting sustaining healthy diet behaviors is recommended during disrupted environments such as the COVID-19 pandemic [47].

Maternity nurses in this study reported an increase in their weight during the pandemic compared with the period before the pandemic. Weight gain during the pandemic was observed in many studies in different populations. A large retrospective study examined the impact of the COVID-19 pandemic lockdown on weight changes among adults in Massachusetts. The study reported an increase in weight during the pandemic, especially among females [48]. Another cohort observational study in the US reported a monthly weight gain of approximately 0.68 kg [49]. A similar result was found in another US study that showed the COVID-19 pandemic contributed to weight gain (0.6 kg) [50]. A retrospective study from Saudi Arabia that included adults who visited the outpatient clinics before and during the COVID-19 pandemic showed a significant weight gain (0.33 kg) [51]. The study reported that around 10% of the population had shifted to either overweight or obese [51]. A community-based Italian study reported that almost half of the population perceived weight gain during the pandemic [23]. Another Italian research conducted on healthcare workers showed an increase in the body mass index (BMI) among healthcare providers during the COVID-19 pandemic compared with the period before the pandemic [52]. Nurses in this study showed a significant association with increased BMI [52]. Although the studies on maternity nurses on this issue are limited, the observed trends from previous public and health workers studies showed a significant impact of the COVID-19 pandemic on weight gain. Considering and learning from these experiences is essential to promote nurses' healthy behaviors and prepare for any future similar emergent situation.

Obesity and overweight are known to be associated with the consumption of unhealthy food [53] [54] [55]. This association was also reported during the pandemic [56]. However, our findings did not show a statistically significant association between consumption of an unhealthy diet and weight gain. Instead, the weight gain was associated with chronic illnesses, increased appetite, and feeling hungry between main meals. These associations are not surprising findings. Many chronic diseases have a mutual relationship with overweight as many of them are strongly influenced by adiposity (e.g., diabetes mellitus, hypertension, and hypercholesterolemia) [57]. An increase in appetite and eating between meals may influence weight gain if associated with negative lifestyle habits (e.g., low physical activity and consuming unhealthy food) [58] [59]. Our findings were trending toward statistically significant between weight-gaining and obese nurses. These findings go in the same direction as a systematic review finding that showed that weight gain occurred mainly among overweight or obese participants [56].

The results of this study should be interpreted in light of its strengths and limitations. This study is the first that described the changes in health-enhancing

behaviors during the COVID-19 pandemic among nurses working in the maternity hospital in Kuwait. Another strength includes using a relatively reasonable sample size. The main limitation is the cross-sectional nature of this study. Reporting weight, physical activities, lifestyle habits, and eating behavior were subjected and self-documented. In addition, the results of this study may be biased by measured and the unmeasured confounders that may influence the association we sought to examine. Considering the weaknesses of this study in future research is essential to reach better conclusions or to confirm our findings.

## 5. Conclusion

This study is the first study in Kuwait and the region that described the changes in health-enhancing behaviors during the COVID-19 pandemic among maternity nurses. Our findings revealed low adherence with the healthy diet, with almost third of participants have self-reported weight gain. Further, the sleeping patterns and the practicing of physical activities were negatively affected by COVID-19 pandemic. There was a significant association between weight gain and chronic illnesses, a sense of hunger (change in appetite), and the time of feeling hungry. In light of these data, considering support programs, guidelines and policies is important to enhance nurses' healthy behaviors during such emergent or stressful circumstances.

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## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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