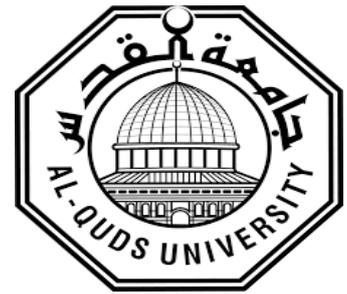


**Deanship of Graduate Studies  
Al-Quds University**



**Dietary habits and associated factors and their  
relationships with body mass index and percent body fat  
among Al-Quds University students**

**Walaa Maher Muneer Idrees**

**M.Sc. Thesis**

**Jerusalem – Palestine**

**1444 – 2023**

**Deanship of Graduate Studies  
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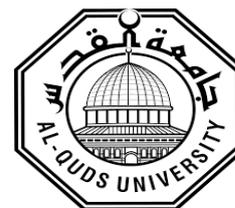
**B.Sc. Public health nutrition /Al Quds University/  
Palestine**

**Supervisor: Dr. Hazem Agha**

**A thesis submitted in partial fulfillment of the  
requirement for the degree of Master of Public Health -  
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**1444 – 2023**

**Deanship of Graduate Studies  
Al-Quds University  
Public Health**



## **Thesis Approval**

# **Dietary habits and associated factors and their relationships with body mass index and percent body fat among Al-Quds University students**

Prepared by: Walaa Maher Muneer Idrees

Registration No: 21911088

Supervisor: Dr. Hazem Agha

Master thesis submitted and accepted, Date: 10/6/2023

The names and signatures of the examining committee members are as follows:

- |                      |                       |           |   |
|----------------------|-----------------------|-----------|---|
| 1. Head of committee | Dr. Hazem Agha        | Signature |  |
| 2. Internal examiner | Dr. Nuha El Sharif    | Signature |  |
| 3. External examiner | Dr. Haleama Al Sabbah | Signature |  |

**Jerusalem – Palestine**

**1444 / 2023**

## **Dedication**

I dedicate my thesis to my family, love and friends. A special feeling of gratitude to my loving parents.

To everyone who believed, encouraged, helped me and prayed for me.

**Walaa Maher Muneer Idrees**

## **Declaration**

I certify that this thesis submitted to the degree of master is the result of my own research, except where otherwise acknowledged, and that this thesis or any of its parts has not been submitted for higher degree to any other university or institution.

Signature:

***Walaa Idrees.***

Walaa Maher Muneer Idrees.

Date : 10/6/2023

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I would like to thank everyone who supported and motivated me while writing this master's thesis.

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**My loving parents**, whose words of encouragement and push for tenacity ring in my ears. Without them, I would not have achieved my goals.

**My life partner Omar**, has been my backbone through this, and my support system. Without your encouragement, I would have never overcome the challenges. I am truly thankful for having you in my life.

“All fears disappear when you are with your true friends”. **To my friends**, they are the reason behind my laughter and who were there for me always and forever. Especially **Alaa Obeyat**, and **Shatha Eideh**.

Finally yet importantly, to all the people close to my heart, I dedicate this work.

## **Abstract**

### **Background:**

In university education, a healthy lifestyle is an important component of the adult population. Several research have demonstrated that there is a growing global demand to closely monitor university students' eating habits. University students in Palestine have a lack of awareness regarding good eating practices. Evidence is scarce on the relationship between eating habits and other characteristics in university students who are overweight or obese.

**Aim:** The aim of this study is to investigate the prevalence of overweight and obesity using BMI and percent body fat measurements in a sample of university students, together with finding the effect of unhealthy eating habits, depression, and food addiction on BMI and percent body fat among Al-Quds University students.

**Methods:** A cross-sectional study was conducted in the Nutrition Assessment Laboratory at Al-Quds University /Abu Dies. The study participants were both male and female students aged over 18 years old from different faculties in the university. A questionnaire was administered to assess the level of eating habits, depression, and food addiction. Body composition especially percent body fat was measured using the body composition analyzer (Inbody120, Biospace, Korea). Weight and height were measured using a weight scale with a stadiometer (Inbody, BSM120, Biospace, Korea). Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS), version 26.0. Data were analyzed by using parametric tests such as frequency and chi-square.

**Results:** The prevalence of overweight and obesity were calculated using students' body mass index (BMI). BMI was higher for male students compared to females (53.7% vs. 46.6%) ( $p<0.05$ ). . Further, the prevalence of overfat, i.e. percent body fat (PBF), was higher among females students compared to males (71% vs 29%, respectively), ( $p<0.05$ ).

There was a negative significant association between the level of depression and eating habits ( $p<0.05$ ). The Binary logistic regression showed that there are statistically significant differences in the BMI according to the gender, food addiction, Ownership status of house, PBF categories (P. values  $<0.05$ ), in the logistic regression study that predicted the percent body fat (PBF). All the variables indicated no statistically significant difference except the "Body Mass Index (BMI).

**Conclusion:** In summary, BMI revealed that male and female students at Al-Quds University had high levels of overweight and obesity. In addition, when PBF% was used to define adiposity instead of BMI, it increased the percentage of people who were obese by twice as much, Findings revealed significant variations ( $p < 0.05$ ) of PBF between males and females, females seem to have more overfat than males by PBF.

University students' assessed depression was quite high, showing that they were depressed because of their new educational setting. University students with depression have fewer healthy eating habits than students with no depression symptoms.

It would be interesting to begin interventions with this population, throughout their undergraduate education, to include motivational aspects and knowledge of healthy habits in terms of reducing overweight and obesity and minimizing depression and food addiction.

**Keywords:** BMI, PBF, eating habits, food addiction, depression, socio-demographic, University students.

## العادات الغذائية والعوامل المؤثرة على نسبة الدهون والوزن لدى طلاب جامعة القدس.

اعداد: ولاء ماهر منير ادريس.

اشراف: د. حازم آغا.

### الملخص

**خلفية الدراسة:** في الحياة الجامعية، يعد اتباع أسلوب حياة صحي عنصراً مهماً للبالغين. أظهرت العديد من الأبحاث أن هناك طلباً عالمياً متزايداً لمراقبة عادات الأكل لدى طلاب الجامعات عن كثب. حيث يعاني طلبة الجامعات في فلسطين من نقص الوعي فيما يتعلق بالعادات الغذائية الجيدة. الأدلة نادرة على العلاقة بين العادات الغذائية والخصائص الأخرى لدى طلاب الجامعات الذين يعانون من زيادة الوزن أو السمنة.

**الأهداف الرئيسية:** الهدف من هذه الدراسة هو معرفة مدى انتشار السمنة لدى عينة من طلبة الجامعة باستخدام قياسات مؤشر كتلة الجسم ونسبة الدهون في الجسم لدى عينة من طلاب الجامعة، إلى جانب إيجاد تأثير العادات الغذائية غير الصحية والاكنتاب وإدمان الطعام على مؤشر كتلة الجسم ونسبة الدهون في الجسم لدى طلبة جامعة القدس.

**منهجية الدراسة:** دراسة مقطعية أجريت في مختبر التقييم التغذوي في جامعة القدس / أبو ديس، وكان المشاركون في الدراسة من الذكور والإناث الذين تزيد أعمارهم عن 18 عاماً من مختلف الكليات في الجامعة. تم استخدام استبيان لتقييم مستوى عادات الأكل والاكنتاب وإدمان الطعام. تم تحليل مكونات الجسم باستخدام محلل تكوين الجسم ( Inbody120 ، Biospace ، كوريا ) ، وتم ايضاً قياس الوزن والطول

باستخدام مقياس الوزن مع مقياس ستاديوميتر ( Inbody ، BSM120 ، Biospace ، كوريا)، تم إجراء التحليل الإحصائي باستخدام الحزمة الإحصائية للعلوم الاجتماعية (SPSS)، الإصدار 26.0. وقد تم تحليل البيانات باستخدام الاختبارات البارامترية مثل التكرار ومربع كاي.

**النتائج:** اشارت نتائج الدراسة الى انتشار زيادة الوزن والسمنة باستخدام مؤشر كتلة الجسم للطلاب. كان مؤشر كتلة الجسم أكثر شيوعاً بين الطلاب الذكور مقارنة بالإناث (53.7% مقابل 46.6%)، وأظهرت النتائج وجود فروق ذات دلالة إحصائية ( $p < 0.05$ ) بين الذكور والإناث في فئات مؤشر كتلة الجسم باستخدام اختبار مربع كاي. علاوة على ذلك، كان انتشار نسبة الدهون الزائدة أكثر شيوعاً بين الطالبات مقارنة بالذكور (71% مقابل 29%)، وكشفت النتائج عن اختلافات ذات دلالة إحصائية ( $P < 0.05$ ) بين الذكور والإناث.

يبدو أن الإناث لديها نسبة دهون أكثر من الذكور. ومع ذلك، لم يتم العثور على علاقات ذات دلالة إحصائية بين نسبة الدهون ومؤشر كتلة الجسم والخصائص الاجتماعية والديموغرافية المختلفة والإدمان على الطعام والاكنتاب. وكانت هناك علاقة عكسية بين مستوى الاكنتاب والعادات الغذائية ذات دلالة إحصائية ( $P < 0.05$ ).

وكانت هناك علاقة سلبية معنوية بين مستوى الاكنتاب والعادات الغذائية ( $P < 0.05$ ). أظهر الانحدار اللوجستي الثنائي وجود فروق ذات دلالة إحصائية في مؤشر كتلة الجسم BMI باختلاف الجنس، الإدمان على الغذاء، ملكية المنزل، فئات PBF ( $P < 0.05$ )، في دراسة الانحدار اللوجستي التي تنبأت بنسبة

الدهون في الجسم (PBF) أشارت جميع المتغيرات إلى عدم وجود فروق ذات دلالة إحصائية باستثناء مؤشر كتلة الجسم (BMI).

الخلاصة: وتلخص الدراسة بان نسبة الدهون في الجسم مرتفعة بين العديد من الطلاب، مما أدى إلى زيادة انتشار السمنة بأكثر من مرتين عند استخدامه لتحديد السمنة بدلاً من مؤشر كتلة الجسم، وكشفت النتائج عن اختلافات كبيرة ( $P < 0.05$ ) في نسبة الدهون بين الذكور والإناث، ويبدو أن الإناث لديهم نسبة أكبر من الدهون. ايضاً، فان نسبة الطلاب المصابين بالاكتئاب كانت سلوكياتهم الغذائية أقل صحية مقارنة بالطلاب الذين يعانون من اكتئاب منخفض. وبالتالي، يجب التعامل مع اكتئاب طلاب الجامعات بشكل صحيح لمنع السلوكيات الغذائية غير الصحية المرتبطة بالاكتئاب.

سيكون من المثير للاهتمام أن يتم التعامل مع هؤلاء الطلاب طوال فترة تعليمهم الجامعي، لتشمل الجوانب التحفيزية ومعرفة العادات الصحية من حيث الحد من زيادة الوزن والسمنة، والتقليل من الاكتئاب والإدمان على الغذاء.

الكلمات المفتاحية: مؤشر كتلة الجسم، نسبة دهون الجسم، عادات الأكل، الإدمان على الطعام، الاكتئاب، الديموغرافية الاجتماعية، طلاب الجامعة.

## Table of Contents

<b>DECLARATION</b> .....	<b>1</b>
<b>ACKNOWLEDGEMENT</b> .....	<b>II</b>
<b>CHAPTER ONE: INTRODUCTION</b> .....	<b>1</b>
<b>1.1 BACKGROUND</b> .....	<b>1</b>
<b>1.2 JUSTIFICATION</b> .....	<b>2</b>
<b>1.4 AIM</b> .....	<b>4</b>
<b>1.6 EXPECTED OUTCOME</b> .....	<b>4</b>
<b>CHAPTER TWO: LITERATURE REVIEW</b> .....	<b>5</b>
<b>2.1 INTRODUCTION</b> .....	<b>5</b>
<b>2.2 OBESITY &amp; EATING HABITS AMONG UNIVERSITY STUDENTS</b> .....	<b>6</b>
<b>2.3 OBESITY IN ARAB WORLD</b> .....	<b>8</b>
<b>2.4 OBESITY IN PALESTINE</b> .....	<b>9</b>
<b>2.5 OBESITY BY SOCIODEMOGRAPHIC FACTORS</b> .....	<b>11</b>
<b>2.5.1 OBESITY BY AGE AND GENDER</b> .....	<b>11</b>
<b>2.5.2 OBESITY BY LIVING ARRANGEMENT</b> .....	<b>12</b>
<b>2.6 OBESITY BY FOOD ADDICTION</b> .....	<b>12</b>
<b>2.7 OBESITY BY DEPRESSION</b> .....	<b>14</b>
<b>2.8 CONCEPTUAL FRAMEWORK</b> .....	<b>15</b>
<b>CHAPTER THREE: METHODOLOGY</b> .....	<b>18</b>
<b>3.1 INTRODUCTION</b> .....	<b>18</b>
<b>3.2 STUDY DESIGN</b> .....	<b>18</b>
<b>3.3 STUDY POPULATION/SETTING</b> .....	<b>18</b>
<b>3.4 SAMPLING METHODS AND TECHNIQUE</b> .....	<b>18</b>
<b>3.5 SAMPLE SIZE CALCULATION</b> .....	<b>19</b>
<b>3.6 RESEARCH INSTRUMENTS</b> .....	<b>19</b>
<b>3.7 ETHICAL CONSIDERATION/APPROVAL:</b> .....	<b>21</b>

<b>3.8 VALIDITY AND RELIABILITY.....</b>	<b>21</b>
<b>3.9 QUESTIONNAIRE PILOTING .....</b>	<b>21</b>
<b>3.10 DATA COLLECTION PROCEDURE.....</b>	<b>22</b>
<b>3.11 STATISTICAL ANALYSIS.....</b>	<b>23</b>
<b>CHAPTER FOUR : RESULTS .....</b>	<b>24</b>
<b>4.1 INTRODUCTION .....</b>	<b>24</b>
<b>4.2 DESCRIPTIVE ANALYSIS.....</b>	<b>24</b>
<b>4.3 UNIVARIATE ANALYSIS .....</b>	<b>30</b>
<b>4.5 MULTIVARIATE ANALYSIS .....</b>	<b>43</b>
<b>CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>47</b>
<b>REFERENCES: .....</b>	<b>55</b>
<b>APPENDICES 1.....</b>	<b>63</b>

## **List of tables**

<b>TABLE (4.2-1): SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS.....</b>	<b>24</b>
<b>TABLE (4.2-2): BMI AND PBF MEAN AND STANDARD DEVIATION OF UNIVERSITY STUDENTS BY GENDER. (INDEPENDENT T TEST) .....</b>	<b>27</b>
<b>TABLE (4.3-1): PREVALENCE OF OBESITY AMONG STUDENTS BASED ON BMI BY GENDER.....</b>	<b>30</b>
<b>TABLE (4.3-2): PREVALENCE OF OBESITY AMONG STUDENTS BASED ON BMI BY GENDER.....</b>	<b>31</b>
<b>TABLE (4.3-3): PREVALENCE OF OBESITY AMONG STUDENTS BASED ON PBF BY GENDER.....</b>	<b>31</b>
<b>TABLE (4.3-4): PREVALENCE OF OBESITY AMONG STUDENTS BASED ON PBF BY GENDER.....</b>	<b>32</b>
<b>TABLE (4.3-5): PREVALENCE OF OBESITY AMONG STUDENTS BASED ON BMI BY SOCIO-DEMOGRAPHIC CHARACTERISTICS.....</b>	<b>33</b>
<b>TABLE (4.3-6): PREVALENCE OF OBESITY AMONG STUDENTS BASED ON PBF BY SOCIO-DEMOGRAPHIC CHARACTERISTICS.....</b>	<b>35</b>
<b>TABLE (4.3-7): RELATIONSHIP BETWEEN BMI AND PBF.....</b>	<b>37</b>
<b>TABLE (4.3-8): RELATIONSHIP BETWEEN BMI AND THEIR EATING HABITS LEVELS.....</b>	<b>37</b>
<b>(TABLE 4.3-9): RELATIONSHIP BETWEEN PERCENT BODY FAT AND THEIR EATING HABITS LEVELS.....</b>	<b>38</b>
<b>TABLE (4.3-10): RELATIONSHIP BETWEEN BMI AND THEIR LEVELS OF DEPRESSION.....</b>	<b>39</b>
<b>(TABLE 4.3-11): RELATIONSHIP BETWEEN PERCENT BODY FAT AND THEIR LEVELS OF DEPRESSION.....</b>	<b>39</b>

<b>TABLE (4.3-12): THE RELATIONSHIP BETWEEN LEVELS OF EATING HABITS AND LEVELS OF DEPRESSION.....</b>	<b>40</b>
<b>TABLE (4.3-13): RELATIONSHIP BETWEEN BMI AND THEIR LEVELS OF FOOD ADDICTION.....</b>	<b>41</b>
<b>(TABLE 4.3-14): RELATIONSHIP BETWEEN PERCENT BODY FAT AND THEIR LEVELS OF FOOD ADDICTION.....</b>	<b>42</b>
<b>TABLE (4.4-1): THE RELATIONSHIP OF FOOD ADDICTION, DEPRESSION, BMI, PBF AND EATING HABITS. (PEARSON CORRELATION).....</b>	<b>43</b>
<b>TABLE (4.5-1): MULTIVARIATE FORWARD LOGISTIC MODEL ANALYSIS OF THE ASSOCIATED VARIABLES WITH BMI.....</b>	<b>44</b>
<b>TABLE (4.5-2): MULTIVARIATE MODEL ANALYSIS OF THE ASSOCIATED VARIABLES WITH PBF.....</b>	<b>45</b>

**List of figures**

**FIGURE 2.8.1: CONCEPTUAL FRAMEWORK ..... 17**

**FIGURE 4.2-1: DISTRIBUTION OF STUDY PARTICIPANTS ACCORDING TO BMI. 26**

**FIGURE 4.2-2: DISTRIBUTION OF STUDY PARTICIPANTS ACCORDING TO PBF. 27**

**FIGURE 4.2-3: DISTRIBUTION OF STUDY PARTICIPANTS ACCORDING TO THEIR EATING HABITS LEVELS..... 28**

**FIGURE 4.2-4: DISTRIBUTION OF STUDY PARTICIPANTS ACCORDING TO THEIR LEVELS OF DEPRESSION..... 29**

**FIGURE 4.2-5: DISTRIBUTION OF STUDY PARTICIPANTS ACCORDING TO THEIR LEVELS OF FOOD ADDICTION..... 29**

## List of abbreviations

<b>BMI</b>	<b>Body mass index</b>
<b>PBF</b>	<b>Percent body fat</b>
<b>WHO</b>	<b>World Health Organization</b>
<b>SPSS</b>	<b>Statistical package for social sciences</b>
<b>FA</b>	<b>Food addiction</b>

## **Chapter One: Introduction**

---

### **1.1 Background**

Public concern and attention have been drawn to this alarming rise in obesity due to its association with numerous non-communicable conditions (NCDs), such as Type 2 diabetes, coronary artery disease, hypertension, and stroke, as well as problems with reproduction and certain cancers (Tok at el, 2018).

Lifestyle factors, in particular unhealthy eating habits have been identified as major risk factors for various non-communicable diseases such as cardiovascular disease and diabetes. In addition, unhealthy diet is associated with overweight and obesity, which are both associated with increased total mortality and increased risk of diseases (Waweru, & Marete, 2016).

Overweight and obesity are both defined by the World Health Organization (WHO) as excess or abnormal accumulation of fat which can result in negative health effects. According to estimates from the WHO, 39% of adults (those above the age of 18) worldwide are overweight, and 13% of adults worldwide are obese. (WHO, 2016).

In addition, it is the fifth leading cause of death for adults worldwide, causing 2.8 million deaths per year and it's a major consequence of unhealthy eating habits (WHO, 2013), in addition to a considerable economic burden associated with addressing these obesity-related pathologies (Blanco at el, 2021).

One of the factors that is considered crucial to cause obesity is diet. Eating habits and several mediators that include factors such as food addiction, depression, tobacco and alcohol use, nutrition knowledge, and eating environments affect the physical and mental health of the individuals. Several studies have shown that eating habits and mediators of eating behaviors affect physical and mental performance, weight status, and overall health (Cole et al, 2021).

Obesity, as an epidemic disease, is distributed among all age groups, including children, adolescents, adults, and the elderly. University students undergo a critical period where their habits are conducive to change, which can result in weight gain (Tok CY et al, 2018), since they have at this point in time a begin of a new educational phase of their lives and are given the freedom

to select their own eating choices (Qamar et al,2021). Therefore, it is very common for university students to encounter many challenges due to the new responsibilities that accompany university life and the environment itself. These challenges may result in unhealthy eating habits, altered dietary patterns, and sedentary lifestyles (Cecil, 2021)

According to a study published in the British Journal of Nutrition, the prevalence of overweight/obesity among university students is approximately 14.4% (Telleria N & Arroyo M, 2022).

The study published in the British Journal of Nutrition also found that certain unhealthy lifestyle behaviors coexist, interact with one another, and increase the risk of overweight/obesity in university students. These behaviors include a high preference for high-fat and high-sugar food, a lack of physical activity and exercise, shorter sleep duration, and tobacco use (Telleria N & Arroyo M, 2022).

According to the American University Health Association National University Health Assessment, only 6.4% of University students consume the recommended five or more fruits and vegetables per day. In addition, approximately 34.3% of University students are termed overweight or obese (American University Health Association, 2012).

According to Zust (2016), university students spend up to 72% of their day sedentary. A study by Pengpid and Peltzer (2014), which analysed the correlation between physical inactivity and associated factors among university students, found that 33% of students engage in low physical activity (Cecil, 2021).

A healthy lifestyle is a crucial element of the adult population in university education, and several studies have shown that there is an increased global desire to pay close attention to the eating habits of university students (Silva et al., 2021).

## **1.2 Justification**

The prevalence of excessive weight is increasing among all age groups in Palestine, regardless of gender. There has been a nutritional transition from the typical Mediterranean diet to western fast food over the past few years. Therefore, obesity contributes significantly to the burden of many diseases, including heart disease, diabetes, and cancer (WHO, 2009).

The World Health Organization estimates that over 1.9 billion individuals who are 18 years of age or older are overweight, and over 650 million of those persons are obese (Haththotuwa at el, 2020).

Multi-factorial factors are implicated in obesity according to several international and regional studies (WHO, 2007).

There is evidence that obesity and overweight are prevalent among men and women in the occupied Palestinian territory (based on one study conducted in a rural community in Ramallah, which was not necessarily representative of national trends). The prevalence was 58.7% for men and 71.3% for women (Husseini at el, 2009).

In Palestine West Bank, a study at Al-Najah National University have been conducted by Bassam Ali Abdel Raheem Abu Shanab (2019) to assess the prevalence of overweight and obesity among university students and their association with dietary habits. The prevalence rates of overweight and obesity among students from An-Najah national University were 20.1% and 4.6%, respectively, ( $P < 0.05$ ). Overweight and obesity were more common among males compared to females (27.0% and 5.9% vs. 13.2% and 3.3%, respectively), 5.3% of males were underweight compared to 4.6% of female, ( $P < 0.05$ ). 68.4% of students reported that they take meals irregularly and a significant difference was found between males and females in meal patterns (Shanab & Al-Sabbah, 2019).

In Gaza, an analytical descriptive survey of University students were selected randomly from the University University of Sciences and Technology – Khan Yunis between October 2018 to January 2019, the prevalence of obesity was more common among male students compared to females (10.0% vs. 5.0%), the percentage of students who eat vegetables and fruits once or twice weekly was 42.5%, and those who drink Carbonated beverages per week were 78.0%. Moreover, BMI had significant direct correlations with intake of lunch meal regularly ( $r=0.171$ ,  $P = 0.015$ ) (Altaher at el, 2022).

### **1.3 Problem statement**

In Palestine, there is a lack of knowledge about healthy eating habits among university students, data exists is very old and there is a lack of data referring to the association between eating habits and other factors among overweight and obesity among university students.

There is no previous study among Al-Quds university student in Jerusalem about eating habits and this study will be the first one. Therefore, these data are needed in order to design interventions to improve an effective nutrition and weight counseling among university students.

### **1.4 Aim**

This study has two aims:

- 1- To determine the prevalence of overweight and obesity using BMI and percent body fat measurements among Al-Quds University students.
- 2- To investigate the associations between unhealthy eating habits, depression, and food addiction on BMI and percent body fat among Al-Quds University students.

### **1.5 Objectives**

1. To assess the BMI & percent body fat status among Al-Quds University students.
2. To determine the relationship between sociodemographic factor and BMI & percent body fat status at Al-Quds University students.
3. To determine the relationship between unhealthy eating habits and BMI & percent body fat status at Al-Quds University students.
4. To determine the relationship between depression and BMI & percent body fat status at Al-Quds University students.
5. To determine the relationship between food addiction and BMI & percent body fat status at Al-Quds University students.

### **1.6 Expected outcome**

This study will look into whether there is a relationship between eating habits and depression, food addiction, and PBF/BMI in university students. Following that, implementing an intervention program will raise understanding about healthy eating habits and be beneficial in reducing the prevalence of overweight or obesity among university students.

## Chapter Two: Literature review

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### 2.1 Introduction

This chapter summarizes the existing literature on overweight and obesity and influences factors amongst university students. This review will focus Globally, Regionally, Arab Countries and Palestine, and more specifically on university students.

The World Health Organization estimates that over 1.9 billion individuals who are 18 years of age or older are overweight, and over 650 million of those persons are obese (Haththotuwa at el, 2020). The last forty years have seen a sharp rise in the frequency of obesity worldwide; if current trends continue, most adults will be overweight or obese by 2030. The issue of obesity has significant social and psychological implications that impact people of almost all ages and socioeconomic groups, and it is a major contribution to the worldwide burden of chronic illness and disability (Haththotuwa at el, 2020). The prevalence of overweight and obesity has grown, according to earlier research done among university students in many emerging nations: Nigeria: 10%; Egypt: 25.3%–59.4%, Saudi females: 47.9%, Oman: 28.2%, Kuwait: 42% (Badrasawi at el, 2023).

Many variables might contribute to a university students' obesity. Unhealthy eating habits, food addiction, and depression, as well as sociodemographic characteristics, are examples of these issues (Neumark-Sztainer et al, 2006). It is a medical condition that has a detrimental impact on quality of life and can lead to psychological, social, and physical problems. It is one of the most serious health problems in both developed and developing countries (WHO 2016).

According to several studies, university years are full of important changes. Students are making one's own dietary choices is one of the most noticeable shifts that university students experience. Additionally, students must choose their own eating habits and patterns whether they live on campus or off (Yahia N, 2016). This is reflected on their usual diet which low in fruits, vegetables, and dairy products and rich in things that are considered addictive, such as fat, salt, and sugar. Recently, academics have become interested in the possibility that food addiction causes obesity, making this an attractive subject of research (Hebebrand et al. 2014).

University students encounter significant alterations related to their physical and social environments, which lead to more independence and responsibility. These modifications might explain why university students experience anxiety and depression at greater rates than the general population. (Keck MM, 2020)

This can lead to poor-quality meals deficient in critical nutrients and undesired weight gain (high BMI/high percent body fat). University students' unhealthy eating habits may have long-term effects on their health, including an increased chance of developing obesity, diabetes, hypertension, and cardiovascular disease.

## **2.2 Obesity & Eating habits among university students**

Students' lifestyles at university are very formative. During these years, habits can develop that last a lifetime. It appears to presume that if a student knows about dietary habits in university and knows how to enjoy a healthy diet, their food intake would improve. If their eating habits improve throughout this formative time of childhood, it is probable that these habits will continue throughout their maturity. A balanced diet can act as a preventative measure against a variety of life-threatening medical conditions (Majors and Matthew R, 2015).

Unhealthy eating habits are common among university students, which can contribute to weight gain. The "Freshman 15" is the term given to this phenomenon. Excessive energy consumption, in general, may contribute to an unhealthy weight increase, which, if not regulated, can progress to obesity. Obesity is prevalent in the United States and is a substantial risk factor for numerous potentially fatal disorders (Ingham V, 2019).

Many research investigations have revealed that University students frequently do not consume a healthy diet. Based to small-scale research that supported this, university students are not eating enough fruits and vegetables (Tam et al, 2017).

The Centers for Disease Control (CDC) discovered that a percentage of 30 of adults aged between the ages of 18 and 24 in the US ate vegetables less than once a day in a sample of 20,264 individuals (CDC, 2018). Additionally, they discovered that 40.2% of them ate fruit fewer than once each day.

The USDA recommends individuals between the ages of 19 and 30 to eat between two and three cups of fruit and vegetables each day (USDA Vegetable, 2018).

According to the Centers for Disease Control and Prevention, men and women who are between the ages of 20 and 39 in the US had a mean BMI of 28.7 in 2015-2016. Overweight is defined as a BMI of 28.7 (CDC, 2018). This is significant since undergrad students are often in this age range.

In one study of obesity at a university found that 33% of its students were obese with a BMI of 30kg/m<sup>2</sup>. They also found that these students made poor choices when it came to their diet as they ate 1 serving of fruit every three days. In addition to that the authors found that there was no difference amongst all students when it came to eating junk food. (Bray et al, 2018)

According to a 2007 Phillip B. Sparling essay for the CDC, the government is more concerned about obesity on university campuses than drug and alcohol usage. Although the CDC strongly discourages the use of drugs and alcohol, they have discovered that universities place a larger priority on teaching students about drugs and alcohol than on a healthy diet and regular exercise. The CDC suggested that schools teach students on healthy food and activity. The CDC's mission is to "decrease the global incidence of obesity through healthy weight loss and weight loss maintenance among the overweight, as well as to avoid excess weight gain among the non-overweight." (Sparling, 2007).

A university student survey found that 1 in 3 students scored a BMI of over 30 kgm/2, which is obesity. The research revealed that choices about diet varied greatly with BMI, for example in the consumption of vegetables and meats. In fact, surprisingly consumption of junk food remained about the same in all BMI's. (Kenllopoulou et al, 2021)

University students have unhealthy eating habits and do not follow nutritional instructions. This is plausible given that moving from school to university is filled with considerable changes and obstacles for students. The unhealthy decisions that University students frequently make have an influence on their health and frequently lead to diets that are deficient in important nutrients and cause unwanted weight gain. Young people who engage in certain behaviors have long-term health risks, one of which is the emergence of obesity. Obesity not only raises the risk of developing diabetes, cardiovascular disease, hypertension, and stroke, but it is also the main predictor of obesity later in life. (NCHA, 2019).

### **2.3 Obesity in Arab world**

Obesity has been recognized as an international health issue by the World Health Organization (WHO), with about 1.5 billion individuals being overweight in the year 2008, and more than hundred million men and three hundred million women being obese (WHO, 2008).

Over 1.9 billion persons were expected to be overweight in 2016, while over 650 million were estimated to be obese. (Syed NK et al, 2020)

The Arabian Gulf area is now experiencing an increase in the global epidemic of obesity, both children and adults in Arab nations are reaching epidemic levels of obesity, the local health authorities in the majority of Arab nations have been extremely concerned over the past ten years about the unhealthy lifestyle and unhealthy dietary practices. This is mostly due to the fact that these issues are among the primary causes of chronic noncommunicable illnesses and obesity, according to several surveys conducted in the Arab world, locals' eating patterns are becoming more westernized. (Musaiger AO. 2013).

In the past few decades, obesity has become much more common in the nations of the Arabian Gulf, particularly among women. Obesity prevalence is increasing related to alterations in lifestyle and diet, which are related to changing financial, social, and medical issues (Kerkadi, A. 2017). A shift in food intake is one of the most important elements impacting obesity rates, since dietary patterns have changed significantly over the past 40 years due to the greater supply of calories; this has been researched in several nations around the area. (FAO, 2009).

Consuming high-fat Westernized fast food or local fast food given that many factors are contributing to obesity, it is impossible to blame the Western diet alone for the rise in obesity in the Arab world. Eating foods produced outside the house is a significant contributor. (N. Alzaman and A. Ali, 2016).

A study conducted at a university in Saudi Arabia found that 8% of students were overweight, 7% were obese, and 55% of participants had body fat levels above normal. Additionally, there was a link between family meal times and BMI as the researchers found students who ate home-cooked meals with their families had lower BMIs, and people who ate more snacks during the day had higher BMI (Al Rethaiaa, Fahmy and Al Shwaiyat, 2010).

Healthy eating habits have a significant role in reducing diabetes and obesity. Consuming fiber, fruits, and vegetables lowers the risk of obesity, as is widely known. It has been found that information alone is insufficient to motivate people to eat healthily. In a survey that was conducted among Egyptian university students, students favored fast food over healthy meals since they made it easier for them to consume on the go, an individual's diet decisions are greatly influenced by their way of living. In another study that was conducted among university students in Kuwait, eating fruits and vegetables regularly might help prevent obesity (El-Ghazali et al, 2010). Another thing that reduces the likelihood of being overweight or obese is eating breakfast (Szajewska et al, 2010). University students generally do not schedule the time to make a healthy lunch because of their busy schedules. They also observed that, while a better grasp of nutrition may not always be the best incentive for health professionals to eat nutritious food, time is an important factor that might affect one's mindset and, as a result, one's nutrition (EL-Ahmady and El-Wakeel, 2016).

Another factor contributing to the rise in obesity is urbanization. Compared to rural communities, which engage in greater physical exercise, urban residents are more likely to lead a sedentary lifestyle and are therefore at a higher risk of becoming obese (Abdul-Rahim et al, 2003). In addition, almost all households in Kuwait and Saudi Arabia frequently employ cooks and house cleaners, which contributes to the sedentary lifestyle of native women (Al-Kandari et al, 2006). Additionally, clothing has played a role in obesity; Arab women usually wear classic, long, and broad clothes, which may hinder their desire to lose weight (Musaiger A and Qashqari K, 2005).

## **2.4 Obesity in Palestine**

Several research on this issue have been conducted in numerous places throughout the world. These investigations, however, have revealed equivocal or inconsistent findings, owing to differences in food intake and nutritional habits from nation to country. In recent years, Palestinian University students have been undergoing a dietary shift from a traditional dietary pattern to a fast-food dietary pattern. As a result, more University students are becoming overweight or obese (Altaher, 2022).

Information from the occupied Palestinian territory (depending on a single investigation conducted in a rural area in Ramallah, are for older individuals ages 30-65 years, and are not always indicative of national data) showed that the frequency of obesity and overweight was 58.7 percent in men and 71.3 percent in women (Shanab, & Al-Sabbah, H, 2019).

There is a shortage of data in Palestine on obesogenic variables (factors that tend to produce obesity), which are crucial in defining and comprehending high-risk variables that might be addressed for future changes in public health initiatives (Shanab, & Al-Sabbah, H, 2019).

At this point, there have been two previous studies related to this issue in Palestine, the first was at the University young students in Gaza Strip (Khanyunis) and the second one at the Faculty of Arts and the Faculty of Science at a AL-Najah university.

In research that studied the Effects of Dietary Habits on Body Mass Index in Young University Adults from Southern Governorates (Gaza), Male University students were found to have a higher frequency of overweight and obesity than female University students. The most common unhealthy eating habits among the research group were irregular dinner meal intake, excessive snacking, and fatty food consumption, as well as a lack of consumption of vegetables and fruits (Altaher, 2022).

BMI was directly associated to the quantity of both fatty food consumption and regular lunch meal consumption. Despite the fact that the individuals had a low prevalence of obesity (Altaher, 2022).

The rapid urbanization of nations that are developing, including Palestine, has caused rapid alterations to lifestyle and dietary behaviors (specifically, the typical Mediterranean diet) among University students toward fast food intake, high caloric diet patterns, and an inactive lifestyle. These modifications have a significant influence on the emergence of chronic illnesses associated with urbanization (Shihada, M. I. 2020).

Another study conducted in rural and urban areas of the West Bank found that obesity rates were higher in urban areas than in rural areas Furthermore, there was a difference in BMI between women and men in urban areas (Thapa, Dahl, Aubg, 2021).

In Palestine, there is a growing incidence of obesity in every age category and sexes (Shihada, M. I. 2020). Furthermore, this is really the first-time students in East Jerusalem have taken part in this

sort of research. University students' nutritional understanding may act as a barrier to unhealthy eating habits, which are closely connected to a number of disorders (Altaher, 2022).

Dietary knowledge among Palestinian University students can serve as a preventative mechanism against the fast-food habit among them, contributing to lower morbidity among the students (Shihada, M. I. 2020).

## **2.5 Obesity by sociodemographic factors**

Numerous investigations have found that the underlying reasons of obesity are multifaceted. Genetics, age, sex, employment, socioeconomic status, lack of exercise, food habits, and physiological characteristics are some of these determinants (Shanab, 2011).

### **2.5.1 Obesity by age and gender**

Nowadays, In Palestine, there is a growing incidence of obesity in every age category and sexes (Shihada, M. I. 2020).

It is vital to highlight that in recent years, there has been a nutritional movement in eating habits from the normal Mediterranean-style diet to the western fast-food eating pattern. As a result, obesity contributes significantly to the overall cost of illnesses such as cardiovascular disease, type 2 diabetes, and malignancy (Shanab, 2011).

Obesity in childhood is a predictor for future obesity, and University students who are overweight or obese in childhood are more probable to be fat, as they become older (Yahia at el, 2016).

Few researches have recently been done to investigate the links between overweight and Palestinian youths (Al Sabbah, 2009). While three investigations were carried out to investigate the frequency of overweight and obesity and how they are linked with eating habits within University students, the findings of each investigation showed that the frequency of overweight and obesity raised within every age category and sexes (Shihada, M. I. 2020).

A research was done at a prominent Midwestern institution to compare the variations in trends in nutrition and eating patterns among males and females (Majors, 2015). This study used an instrument to collect data on the intake particular diets, sources of nutrition information, people for whom the participant typically eats meals, and university students' opinions, men were substantially taller, heavier, and had greater body mass index ( $P < 0.0001$ ) than women. Women

were more likely than males to say they learned about nutrition through relatives and magazines/newspapers (Majors, 2015).

These investigations, together with others from wealthy nations, provide an alarming indication of widespread obesity among people of every stage of life, which may be a signal of a rise in the frequency of other long-term illnesses in the surrounding area.

### **2.5.2 Obesity by living arrangement.**

A number of investigations have been undertaken by experts that have discovered changes in food patterns based on living conditions.

According to a research conducted at Sam Houston State University, information regarding nutrition-related habits of the subjects while residing within their homes as well as following the first year of residing away from home revealed that the average weight increase recorded within those students was 10.78 pounds, with females accounting for 69.7% of the total (Sealey et al, 2006).

It also showed that twenty-three percent of participants stated an average loss of weight of 12.1 pounds and fewer people kept weight following living away from their homes (Sealey et al, 2006).

When investigating practices prior to and following getting out residence, the present investigation discovered an important shift in drinking alcohol, exercising, and particular food intake such as fruits and vegetables (Sealey et al, 2006).

This proved to be true for the individuals who lost weight and those who didn't lose weight. This study revealed that University students nutrition-related behavior changes significantly once they leaving homes for university (Sealey et al, 2006).

### **2.6 Obesity by food addiction**

Food addiction is a behavioral addiction defined by obsessive intake of appetizing (e.g., fatty and lots of sugary) meals that significantly stimulate the appetite suppression mechanism in humans as well as other living things despite negative consequences (Olsen, 2011).

People tend to get cravings some types of food when the brain starts calling for certain foods such as sugar, the mind knows they are not healthy, some other parts of the brain do not seem to agree (Gordon et al, 2018).

Some people do not experience this and can easily control the type of foods they eat, while others do not, it is a complex situation. The fact that processed food stimulates the receptors in the brain in the same way as addictive drugs, such as cocaine (Gordon et al, 2018).

During the past fifty years, the global incidence of overweightness and obesity has grown significantly, with changes in eating habits such as addiction to food and a lack of activity, as well as stress, being identified as some of the primary underlying reasons of this epidemic (Romero et al, 2021).

Several other medical conditions, such as binge eating disorder, bulimia, and compulsive binge eating, are comparable to food addiction (Olsen CM, 2011).

Yet there is still controversy over the status of food addiction as distinct phenomena from eating disorders. A few findings suggest that food addiction and binge eating disorders overlap symptoms, while other research suggests that these are two separate problems. However, the incidence of food addiction is much greater among those with an eating disorder diagnosis and/or people who are overweight or obese compared to their not clinical counterparts (Gonçalves S et al, 2022).

A broad demographic research in Lebanon. The overall sample contained (17.8%) persons with food addiction, with a substantially greater proportion of food addiction reported among individuals with overweight and obesity in comparison to those with a normal weight (25.4% vs 12.7%;  $p < 0.001$ ) (Hallit, S et al, (2022).

The investigation that carried out in Alexandria (Egypt 2019) throughout the peak of the summer season visitor inflow. Participants comprised Egyptians and non-Egyptian Arabs (Gulf citizens, Syrians, Palestinians, Jordanians, Sudanese, and Tunisians). The incidence of food addiction among medical students was 17.6%, which is greater than the previously established Egyptian level (11.0%) (Egypt, 2017) (Mobarak et al, 2019).

Students who attend University (24%) tend to be more susceptible to food addiction than other people (20%) (Pursey, K.M et al, 2014). A research at the University of North Florida in the United States intended to analyze sex differences and food addiction (FA). Individuals varied in age from 18 to 25 years old. Female University students showed a considerably higher percentage of FA (12.3% vs. 4.6%,  $p = 0.0001$ , OR = 3.04) than those of men (Pursey, K.M et al, 2014).

University students are a known population at risk for eating disorders. Prior study indicates that transitioning to University typically results in alterations to eating habits. Adults tend to transition

from family-based eating patterns to more independent dietary decisions and, as a result, new eating habits. Particularly, these periods are characterized by a lack of dietary diversity, missing meals, consuming high calorie and high-fat foods between meals, and making food decisions based primarily on flavor and enjoyment of eating (Sogari, G et al, 2018).

Additionally, a study found a clear association between food addiction and obesity in both men and women, with rates higher in women. They found that among the participants 67 women and 30 men suffered from food addiction. These overeaters weighed more than 117 kg, and had high BMI, and high body fat. (Pape et al, 2021).

In a new study at the University of Minho (Portugal), (6.7%) of the University students included in the research group had a diagnostic of food addiction, while other (15.5%) had an indication of food addiction despite not demonstrating the requisite clinically substantial impairment or distress. Furthermore, a link was discovered between the prevalence of food addiction and unhealthier eating behaviors, as well as the intake of meals high in sugar/high in fat/fast food. When compared to the group without food addiction difficulties, the group with food addiction problems indicated less healthy eating behaviors (Gonçalves, et al, 2022).

## **2.7 Obesity by depression**

Depression is defined by the Oxford English Dictionary as "a psychological disorder that presents with intense feelings of hopelessness and unworthiness, usually accompanied by an absence of energy and interest in life" (Oxford English Dictionary,2008)

Depressive illnesses can range in severity. This group of diseases is classified as mild, moderate, or severe by the World Health Organization's International Classification of Diseases (ICD-10). The IHME adopts similar categories by categorizing depression as moderate, chronic (dysthymia), or severe (major depressive illness) (WHO, 2012)

There has been found a correlation between those with obesity seeking treatment and depression, as their risk of being depressed becomes less since they are taking care of their diet, their physical activity and their life. (Gruszka et al, 2020)

Another study found a clear link between chronic depression and high body mass index, with gray areas in the brain increasing in people with a high BMI. The study concluded that there is a

clear link between obesity and depression, so they should be treated simultaneously (Badillo et al, 2022)

Depression is becoming more prevalent among younger people in Latin America. University students have a significant prevalence of depressive symptoms, ranging from 11.8% to 30%, which can reach to 50% during difficult circumstances (Lazarevich, 2018)

A research was conducted at a public university in Mexico City, and the incidence of depressive symptoms was 18.2% in males and 27.5% in women ( $p < 0.001$ ). A significant number of University students indicated unhealthy eating habits. (Lazarevich, 2018).

A study done in Australian children looked into the relationship between percent body fat and depression; they found that boys and girls with depressive symptoms had higher levels of PBF with 11% for boys and 20% for girls. This leads us to realize that attention to children mental state is very important in order to reduce the risks of obesity and its related health conditions (Olive at el, 2017).

## **2.8 Conceptual Framework**

Based on centers of disease control and prevention the factors that contribute to excess weight gain including eating patterns, physical activity levels, and sleep routines. Social determinants of health, genetics, and taking certain medications also play a role (CDC, 2011).

Overweight and obesity can develop over time when you consume more calories than you use. Also, this is described as an energy imbalance: when energy in (calories) does not equal energy out (calories that body uses for things such as breathing, digesting food, and being physically active). (*National Heart Lung and Blood Institute, 2022*)

**Dependent variable:** obesity

Dependent variable is the variable that changes as a result of the independent variable manipulation. It's the outcome that interested in measuring, and it "depends" on the independent variable (Bhandari, 2023).

Obesity measured by:

1. **BMI:** Body mass index is a prevalent and frequently utilized anthropometric statistic to determine health status, high risk of diseases with being with high BMI(Platikanova at el, 2022)
2. **PBF:** Accumulation in the fat cells and used as fuel by the human body. It is located immediately beneath the layer of skin and surrounding the internal organs. High fat storage might be hazardous to one's wellbeing. Carrying too much accumulated fat may lead to long-term illnesses and disorders. (Inbody120, Biospace,Korea)

**Independent variables:** Socio demographic factors, depression, food addiction, unhealthy eating habits.

1. Socio-demographic factors as age, gender, number of years of parental education, financial status of the family, place of residence, and social position are all factors to consider.
2. Lifestyle factors include:

### **2.1 Unhealthy eating habits**

Some unhealthy eating behaviors can increase the risk for overweight and obesity.

- Eating more calories than you use: The number of calories you need will vary based on your sex, age, and physical activity level.
- Eating too much saturated fat: According to the Dietary Guidelines for Americans, the amount of saturated fat in your daily diet should be no more than 10% of your total calories. For a 2,000-calorie diet, that's about 200 calories or about 22 grams of saturated fat.
- Eating foods high in added sugar: On a daily basis, try to limit the amount of added sugar in your diet to no more than 10% of your calories. (Etherton & Krauss, 2020).

### **2.2 Depression**

Long-term and even short-term depression can affect the brain and trigger the body to make hormones, such as cortisol, that control energy balances and hunger urges. These hormone changes can make you eat more and store more fat (Islam, at el, 2018).

### **2.3 Food addiction**

One of the interesting new hypotheses for epidemic obesity is food addiction, which is associated with both substance-related disorder and eating disorder. Accumulating evidences have shown that there are many shared neural and hormonal pathways as well as distinct differences that may

help researchers find why certain individuals overeat and become obese (Gonçalves, et al. (2022)).

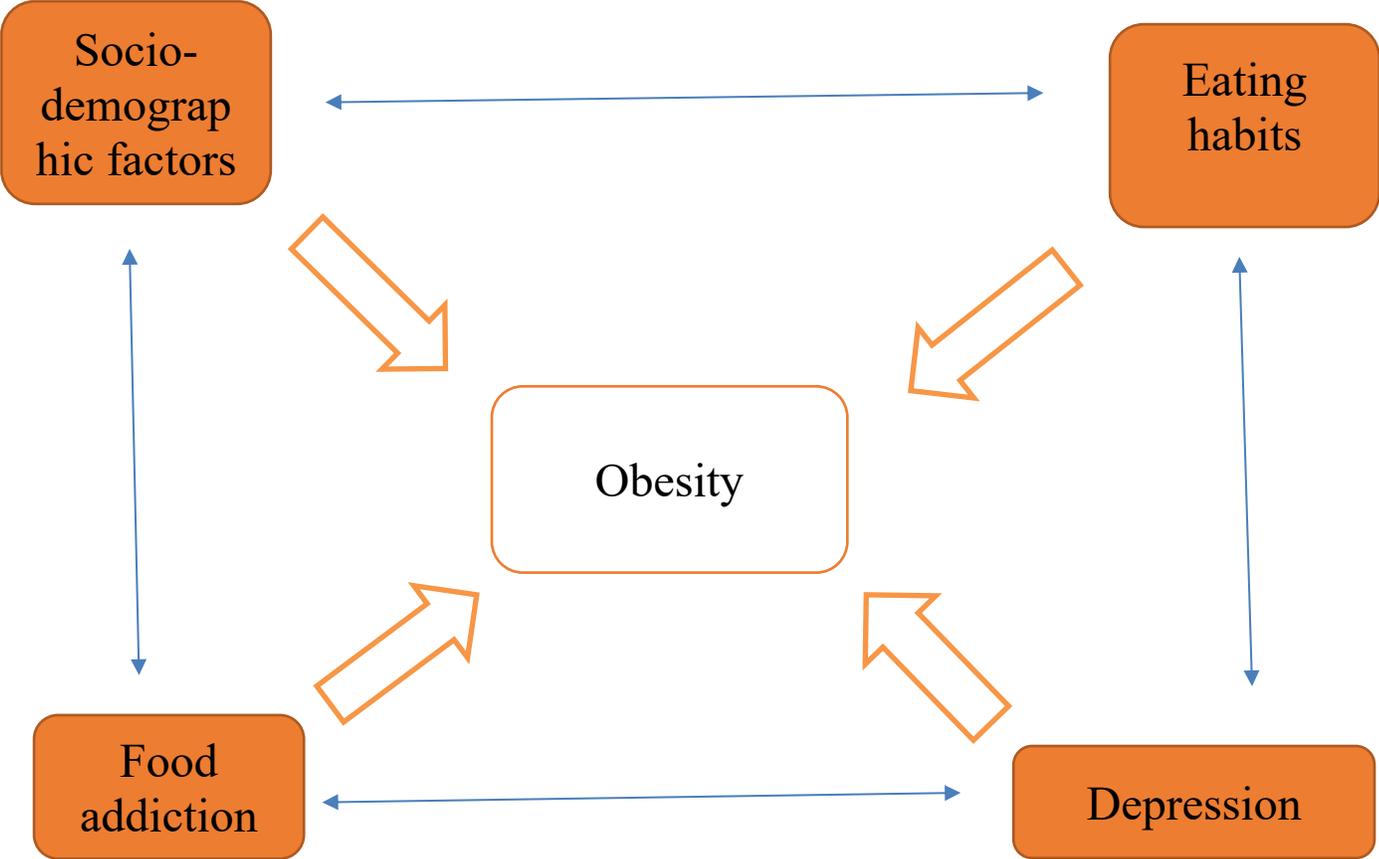


Figure 2.8.1: Conceptual Framework

## Chapter Three: Methodology

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### 3.1 Introduction

The purpose of this study is to investigate the prevalence of overweight and obesity using BMI and percent body fat measurements in a sample of university students, together with finding the effect of unhealthy eating habits, depression, and food addiction on BMI and percent body fat among Al-Quds University students.

Study design, study population, setting, study sample, instrument of the study, ethical consideration, and statistical analysis of the study are discussed in this chapter.

### 3.2 Study design

Cross-Sectional Study.

The cross-section design used because it is useful for descriptive purposes, to capture information based on the data collected, and it is useful because it shows the factors that affect the weight status (Kesmodel, U. S. (2018).

### 3.3 Study population/setting

This research carried out in the Nutritional Assessment Laboratory at Al-Quds University /Abu Dies, Campus. In addition, the study population is males and females students over 18 years old from different faculties in the university including Master students.

### 3.4 Sampling methods and technique

Recruitment advertisements distributed in different sites at the university, and the participants asked to visit the nutritional assessment laboratory for filling out the questionnaire and body composition analysis.

A cross -sectional study carried among a number of Al-Quds University students, a non-probability convenience sampling procedure followed from different faculties, using self-administrated questionnaires.

– **Exclusion criteria:**

- (1) Participants with major complications including ischemic heart disease, renal function impairment, diabetic neuropathy and hypertension.
- (2) Participants taking drugs such as mood stabilizer drugs.

- (3) Pregnant females.
- (4) Participants with pacemaker.
- (5) Students aged under 18 from several faculties at al-Quds University.

Subjects fulfilling the inclusion criteria were informed regarding the research's objective and sign the consent form of participation (Appendices 1).

### **3.5 Sample size calculation**

Al-Quds University is a Palestinian university with its main campus in Abu Dis and additional campuses in Al-Bireh, Hebron and Jerusalem (Wikipedia, 2023).

Al-Quds University (AQU) is a research university that currently offers more than one hundred undergraduate and postgraduate programs, taught through its fifteen degree-granting faculties, covering the main scientific disciplines, which include medicine, life and natural sciences, arts and humanities, business and management, law and jurisprudence, engineering, and social sciences. Established in 1977 in fulfillment of a 1931 resolution to found an Arab university in Jerusalem. AQU currently enrolls around 12,000 full time students, taught by more than 700 faculty members (Wikipedia, 2023).

I used Epitools (*Ausvet*, <https://epitools.ausvet.com.au>) to calculate the number of samples needed to fulfill the statistical limitations that suggested enrolling 289 students out of 12,712 students. Inputs are the assumed or estimated value for the proportion which is 0.25, the desired level of confidence which is 0.95, the desired precision of the estimate, which is 0.05, and the size of the population for limited population sizes which is 12.712 (Sergeant, ESG, 2018).

### **3.6 Research instruments**

A questionnaire contains a set of questions relevant to each factor of the conceptual framework (Socio-demographic, unhealthy eating habits, depression, food addiction) (Appendix 1).

- **Socio demographic information**

A self-administered questionnaire utilized for gathering demographic data such as sex, number of years of education of parents, earnings of the family, place of residence, and status in society (Appendix 1).

- **Eating habit assessment**

A self-administrated questionnaire containing a 15 questions, questions was about many times of eating fruits, vegetables, fried foods, chocolate and so on (appendix 1). The answer was (ALWAYS) or (MOST OF THE TIME) or (RARELY) or (NEVER). Based on these answers, they were categorized into 3 categories based on scores:

1. **37-48 POINTS = healthy eating habits** means that person have a healthy eating habits such as eating vegetables with each meal, at least eating two serving of fruits daily, less consumption of starchy foods, using the grill to cook instead of frying, low consuming of salt and soft drinks.
2. **13-36 POINTS=moderate eating habits**, A person have a few healthy eating habits, yet not sufficient for good long-term wellness and helping own stay healthy
3. **0-12 POINTS = unhealthy eating habits** means that person have unhealthy eating habits such as skipping breakfast many times at weeks, eating when not hungry, eating fried fast foods, eating chocolate and cakes many times of day, eating less than on serving of vegetables and fruits (British Heart Foundation, 2012).

- **Yale food addiction scale**

The English version of mYFAS 2.0 (mYFAS 2.0-EN) includes 13 self-report questions. Eleven questions represent each of DSM-5's 11 criteria for substance use disorder (and two assess the clinical importance (distress/ impairment) of these signs and symptoms. The 13 items were assessed on a Likert scale of 0-7, with "Never" being the lowest and "Daily" being the highest (Mobarak et al.)

- **Depression assessment**

Beck's Depression Inventory, questions showed in (appendix 1).

The score for each of the twenty-one questions has four options by counting the number to the right of each option (option 1= zero, option 2=1 option 3= 2, option 4=3). The highest possible total for the whole test would be 63. This would mean you circled number three on all twenty-one questions. Since the lowest possible score for each question is zero, the lowest possible score for the test would be zero. This would mean you circles zero on each question. You can evaluate your depression according to the Table below.

Total Score	Levels of Depression
1-10	These ups and downs are considered normal

11-16	Mild mood disturbance
17-20	Borderline clinical depression
21-30	Moderate depression
31-40	Severe depression over
>40	Extreme depression

(Beck, 1961).

### **3.7 Ethical consideration/Approval:**

The project was given to the study ethics committee at Al Quds University-School of Public Health for consideration and approval.

- **Informed consent:**

Full clarifications were presented to the students, and formal informed permission was acquired from all participants, all participants were informed about respect, privacy, confidentiality measures and the study aim and objectives. In addition, all participants were asked to sign a consent form before participating; a special form was prepared before data collection. Participants have the right to refuse or to withdraw from the study at any time without any restrictions (Appendix 1)

### **3.8 Validity and reliability**

A pilot study was applied on 20 students at the Nutritional Assessment Laboratory at Al-Quds University /Abu Dies, Campus in order to examine the reliability of the test, internal reliability measured using Cronbach's alpha was (0.80). In addition,  $p < 0.05$  was used as the criterion of significant for all analysis.

Content validity was assessed and research experts of public health from Al Quds University reviewed the questionnaire.

Four experts and the supervisor (Appendix 2) evaluated the study instrument. They were asked to perform content validity in order to evaluate how well the items in each section can measure what needs to be measured and to improve instrument relevance. All feedback and suggestions for instrument modifications were evidenced.

### **3.9 Questionnaire Piloting**

The piloting phase took place on 20 students to identify difficulties and challenges that the participants might face in the instrument content and structure so that the researcher can amend

the tools prior to the data collection process. As a result of the pilot study some changes were made to the format of the questionnaire to avoid any difficulties with students.

Their information was not incorporated in the research.

### 3.10 Data collection procedure

- A self-administrated questionnaire that consists of socio-demographic such as (age, sex,...), unhealthy eating habits, depression and food addiction to get the information from participants after asking them questions that included in the exclusion criteria. (Appendix 1)
- After the participants answered the questionnaires completely, The BSM 370 measures Height, Weight, BMI. For height it has a range 90 ~ 200cm with error range of  $\pm 1$ mm and for weight it has a range 10 ~ 200kg. Measurement modes are Weight and Height / Weight only / Height only. Height measurement A (Measure height after weight measurement), It offers quick measurements, measurement duration for weight, height measurement : 7 sec just weight 2 sec and just height 5 sec, standby time 2 sec, the measure was done one time for each student (Biospace Co, Seoul, Korea).

Individuals was categorized as underweight ( $>18.5$  kg/m<sup>2</sup>), normal weight (18.5-24.9 kg/m<sup>2</sup>), overweight (25.0-29.9 kg/m<sup>2</sup>), or obese ( $>30$ kg/m<sup>2</sup>) based on these statistics (CDC, 2011).

- Then the participants' body composition was analyzed using **body composition analyzer (inbody 120)**.

It calculates weight, skeletal muscle mass (SMM), percent body fat, total body water (TBW), fat-free mass (FFM), and body mass index (BMI). In addition, the fat meter, calculates visceral fat (scale), basal metabolic rate (BMR), percent body fat (PBF).

Females was categorized as normal range of PBF (18%-28%),  $<18\%$  under range of PBF,  $>28\%$  over range of PBF.

Males was categorized as normal range of PBF (10%-20%),  $<10\%$  under range of PBF,  $>20\%$  over range of PBF.

Obesity Diagnosis that reveals hidden obesity, InBody120 offers widely used item for obesity diagnosis, which PBF is the actual value to diagnose the obesity considering the proportion of fat amount overall body (Inbody 120, Seoul, Korea).

### **3.11 Statistical analysis**

The statistical package for social sciences (SPSS) version 25 had been used to examine the results. SPSS utilized for data input and management, as well as descriptive and analytical analysis.

The continuous variable represented as mean SD, while categorical variables presented as frequency. The association between socio-demographic factors, food addiction, depression, and eating habits investigated using parametric tests such as frequency, chi square test, t-test, and Pearson correlation coefficient. The statistical significance level chosen at  $P < 0.05$ .

## Chapter Four: Results

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### 4.1 Introduction

In this chapter, the descriptive analysis, univariate analysis and multivariate analysis will be presented.

### 4.2 Descriptive analysis

#### Characteristics of the participants

A total of 300 University were participated in the study, 182 (60.7%) were females higher than males 118 (39.3%). Most of the students 211 (70.3%) were at the age 18-20yr. 272 (90.7%) of students were single. About 147 (49%) of the participants lived in cities, 137 (45.7%) lived in Village, and 16 (5.3%) lived in camps.

As for ownership of the house, about 257 (85.7%) have owned house, and only 26(8.7%) lived in students' dorms. About 126 (42%) of the University reported that their family monthly income was over 5000 NIS, and only 28 (9.3%) reported monthly income was less than 1500 NIS. As for University, the participation of health-related University 263 (87.7%) was higher than that of non-health-related University, which was the participation 37 (12.3%).

By father's educational level, the highest proportion was high school is highest percentage 114 (38%). By mother's educational level, the highest proportion was high school is highest proportion 108 (36%).

**Table (4.2-1): Socio-demographic characteristics of the participants.**

	N (n=300)	%
<b>Gender</b>		
Male	118	39.3%
Female	182	60.7%
<b>Age (years)</b>		
18-20	211	70.3%
21-24	79	26.3%
>24	10	3.3%
<b>Marital status</b>		

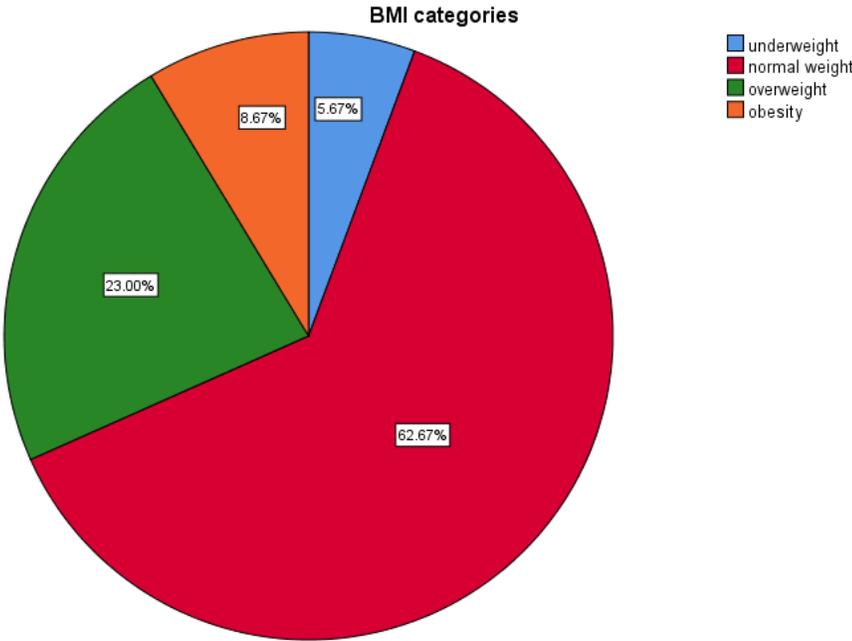
Married	22	7.3%
Single	272	90.7%
Widow	4	1.3%
divorced	2	0.7%
<b>Place of residence</b>		
Village	137	45.7%
City	147	49%
Camp	16	5.3%
<b>Ownership status of your house</b>		
Owned	257	85.7%
Rented	17	5.7%
student hostels	26	8.7%
<b>Monthly Income</b>		
Less than 1500 NIS	28	9.3%
>1500 NIS	50	16.7%
>3000 NIS	96	32%
>5000 NIS	126	42%
<b>Faculty</b>		
Health related	263	87.7%
Non health related	37	12.3%
<b>Father's education level</b>		
Less than High School	68	22.7%
High School	114	38%
Diploma	8	2.7%
Bachelor degree	68	22.7%
Master degree	18	6%
Ph.D.	24	8%

Mother's education level		
Less than High School	60	20%
High School	108	36%
Diploma	20	6.7%
Bachelor degree	78	26%
Master degree	19	6.3%
Ph.D.	15	5%

**BMI and PBF of the University**

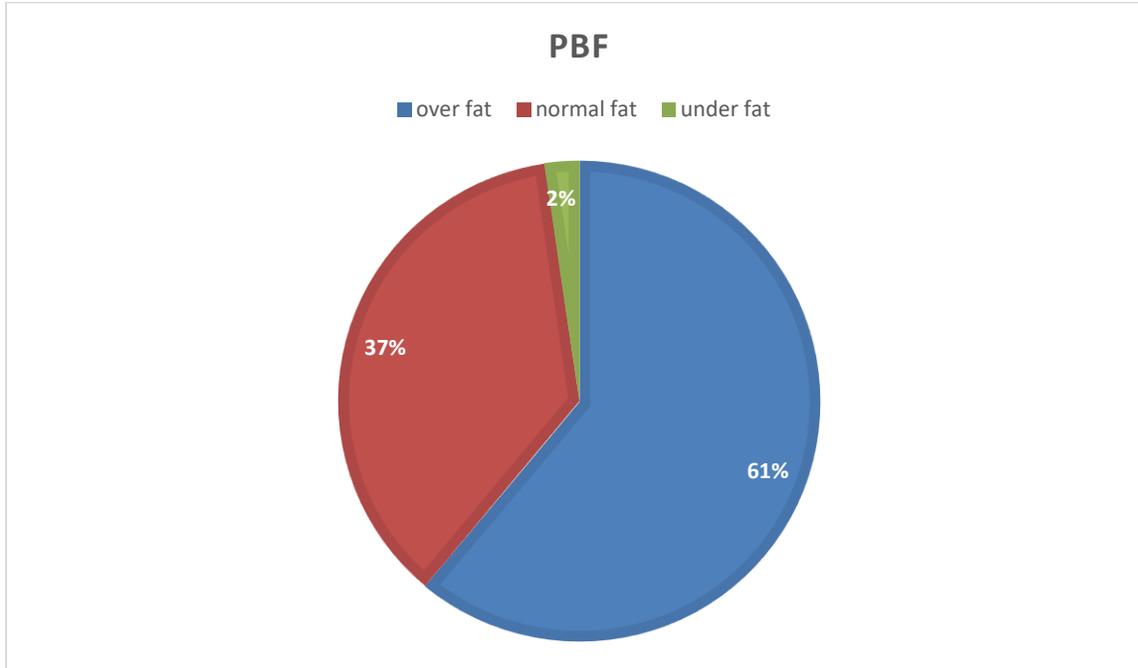
Based on BMI classification, (Figure 4.2-1) shows that majority of the students (62.7%) were of normal weight. In addition (23%) were overweight, (8.6%) were obese (5.6%) were under weight.

**Figure 4.2-1: Distribution of study participants according to BMI.**



Based on Percent body fat classification, **(Figure 4.2-2)** shows that majority of the students (61%) were of over fat. In addition (36.6%) were normal fat, (2.3%) were under fat.

**Figure 4.2-2: Distribution of study participants according to PBF.**



**(Table 4.2-2)** shows the mean and standard deviation of the BMI and PBF of the University by gender. However, the BMI mean was 24.9 (kg/m<sup>2</sup>) for male students and 23.1 (kg/m<sup>2</sup>) for females. The PBF mean for male students was (20.4%) compared to (32.6%) for females, Findings revealed significant variations ( $p < 0.05$ ) in the mean of PBF between males and females which means that females has more PBF than males.

**Table (4.2-2): BMI and PBF Mean and standard deviation of university students by gender. (Independent t test)**

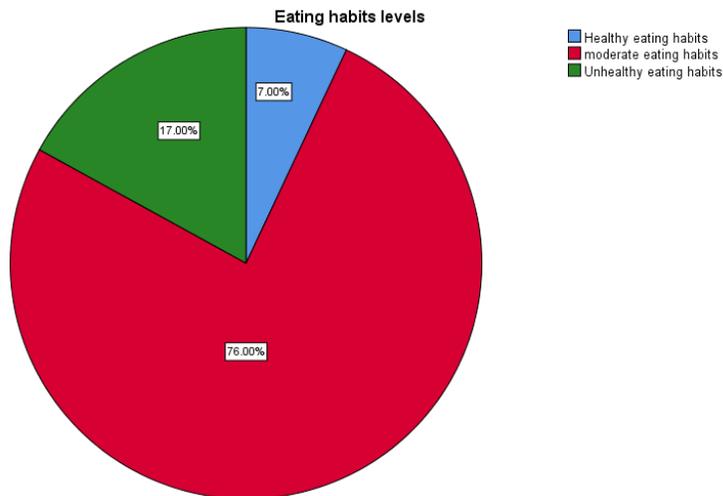
Variable	Mean $\pm$ SD		P- Value
	Male	Female	
BMI in kg/m <sup>2</sup>	24.9 $\pm$ 4.4	23.1 $\pm$ 4.1	0.403
PBF (%)	20.4 $\pm$ 8.3	32.6 $\pm$ 6.8	<b>0.013*</b>

### **Eating habits levels among university students**

**(Figure 4.2-3)** explain that the percentage of students who followed moderate eating habits was the largest percent (76%), unfortunately, the percentage of students followed unhealthy eating

habits accounted (17%), and the lowest percentage was for students who followed healthy eating habits (7 %).

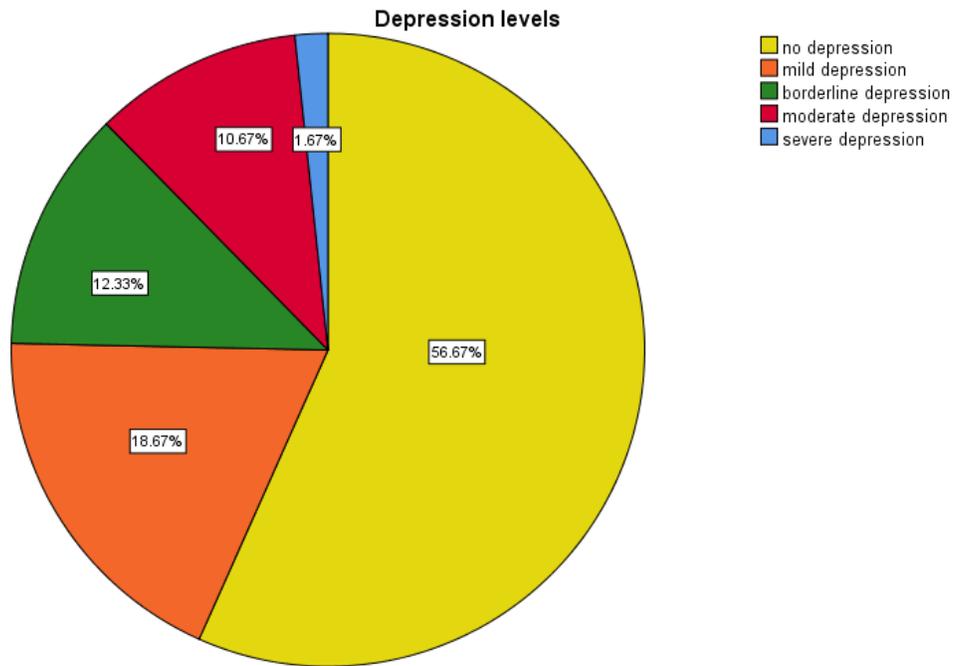
**Figure 4.2-3: Distribution of study participants according to their eating habits levels.**



#### **Depression levels among university students**

Study results showed that the percentages of students who had no depression symptoms is the highest percent (56.7%), while (18.7%) of participants had mild depression, (12.3%) had borderline depression, (10.7%) had moderate depression, (1.7%) had severe depression. **(Figure 4.2-4)**

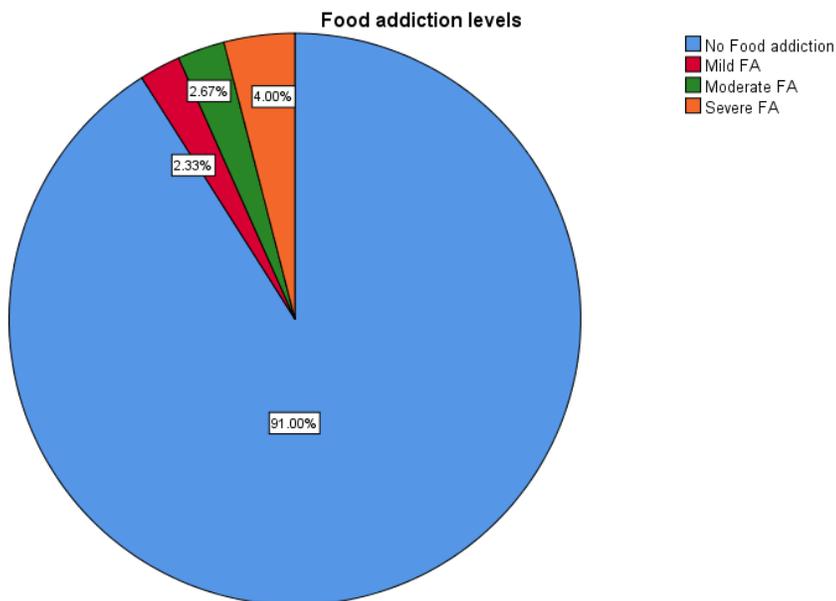
**Figure 4.2-4: Distribution of study participants according to their levels of depression.**



**Food addiction levels among university students.**

Results showed that the percentages of students who had no food addiction symptoms is the highest percent (91%), while (2.7%) of participants had moderate food addiction symptoms, (2.3%) had mild food addiction symptoms, and (4%) had severe food addiction symptoms. (Figure 4.2-5)

**Figure 4.2-5: Distribution of study participants according to their levels of food addiction.**



### 4.3 Univariate analysis

(Table 4.3-1) shows the majority of the students (62.7%) were of normal weight (54.2% of the male students compared to 68.1% of the female students). In addition (23%) were overweight ((30.5%) of the male students compared to (18.1%) of the female students). Based on BMI classification, the prevalence of obesity was more common among male students compared to females (12.7% vs. 6%). In contrast, (7.7%) of female students were underweight as compared to (12.5%) males. Findings showed significant differences ( $p < 0.05$ ) between males and females in the BMI categories.

**Table (4.3-1): Prevalence of obesity among students based on BMI by gender.**

Variables	Gender		Total N	p-value
	Male N (%)	Female N (%)		
<b>BMI in kg/m<sup>2</sup></b>				
BMI categories				<b>0.003*</b>
Under Weight	3 (2.5%)	14 (7.7%)	17 (5.7%)	
Normal	64 (54.2%)	124 (68.1%)	188 (62.7%)	
Overweight	36 (30.5%)	33 (18.1%)	69 (23%)	
Obese	15 (12.7%)	11 (6%)	26 (8.7%)	
Total	118	182	300 (100%)	

**In table (4.3-2), I combined the BMI categories because of the small numbers of the students in each category in order to take an overlook of the data.**

(Table 4.3-2) shows that the majority of BMI of the students (68.3%) were of Under Weight & Normal weight (23.7% of the male students compared to 67.3% of the female students). Based on BMI classification, the prevalence of obesity and overweight were (31.7%), of them ((53.7%) of the male students compared to (46.3%) of the female students). Findings showed significant differences ( $p < 0.05$ ) between males and females in the BMI categories, males seem to have more overweight and obesity than females by BMI.

**Table (4.3-2): Prevalence of obesity among students based on BMI by gender.**

Variables	Gender		Total N (%)	p-value
	Male N (%)	Female N (%)		
BMI categories				
kg/m <sup>2</sup>				
Under Weight & Normal weight	67 (23.7%)	138 (67.3%)	205 (68.3%)	<b>0.001*</b>
Overweight & Obesity	51 (53.7%)	44 (46.3%)	95 (31.7%)	
Total	118 (39.3%)	182 (60.7%)	300 (100%)	

(Table 4.3-3) shows the percent body fat categories among males and females student, (61%) of students were over fat which is high proportion, (around (71.4%) of females students compared to (44.9%) of the male students). In addition (36.6%) were normal fat ((49.1%) of the male students compared to (28.5%) of the female students). The prevalence of under fat was more common among male students compared to females (5.9%), no one of female students were under fat.

**Table (4.3-3): Prevalence of obesity among students based on PBF by gender.**

Variables	Gender		Total N
	Male N (%)	Female N (%)	
Percent body fat			
PBF categories			
Under fat	7 (5.9%)	0(0%)	7 (2.3%)
Normal fat	58 (49.1%)	52(28.5%)	110 (36.6%)
Over fat	53 (44.9%)	130 (71.4%)	183 (61%)
Total	118	182	300 (100%)

**In table (4.3-4), I combined the PBF categories because of the small numbers of the students in each category in order to take an overlook of the data.**

(Table 4.3-4), shows that the percent body fat categories among males and females student, (61%) of students were over fat which is high proportion, around (71%) of females students compared to (29%) of the male students). In addition (39%) were under fat & normal fat

((55.6%) of the male students compared to (44.4%) of the female students). Findings revealed significant variations ( $p < 0.05$ ) of PBF between males and females, females seems to have more overfat than males by PBF.

**Table (4.3-4): Prevalence of obesity among students based on PBF by gender.**

Variables	Gender		Total N (%)	P-value
	Male N (%)	Female N (%)		<b>0.001*</b>
Percent body fat				
Under fat & Normal fat	65 (55.6%)	52(44.4%)	118 (39%)	
Over fat	53 (29%)	130 (71%)	183 (61%)	
Total	118	182	300 (100%)	

Table (4.3-5): shows that most of the students with under and normal weight (74.1%) were at the age 18-20yr. (24.4%) at the age 21-24, (1.5%) at the age >24. About (62.1%) with overweight and obesity at the ages 18-20, (30.5%) at the ages 21-24, (7.4%) at the age >24. Findings showed significant differences ( $p < 0.05$ ) between the ages in the BMI categories, ages 18-20 seems to have more overweight and obesity than other ages by BMI, results show that there is no significant differences between BMI and the other socio demographic characteristic ( $P > 0.05$ ).

**Table (4.3-5): Prevalence of obesity among students based on BMI by Socio-demographic characteristics**

Variables	BMI		Total N	P-value
	Underweight & normal weight N (%)	Overweigh & obesity N (%)		
<b>Age (years)</b>				<b>0.011*</b>
18-20	152 (74.1%)	59 (62.1%)	211 (70.3%)	
21-24	50 (24.4%)	29 (30.5%)	79 (26.3)	
>24	3 (1.5%)	7 (7.4%)	10 (3.3%)	
<b>Marital status</b>				0.812
Married	15 (7.3%)	7 (7.4%)	22 (7.3%)	
Single	187 (91.2%)	85 (89.5%)	272 (90.7%)	
Widow	2 (1%)	2 (2.1%)	4 (1.3%)	
divorced	1 (0.5%)	1 (1.1%)	2 (0.7%)	
<b>Place of residence</b>				0.269
Village	95 (46.3%)	42 (44.2%)	137 (45.7%)	
City	102 (49.8%)	45 (47.4%)	147 (49%)	
Camp	8 (3.9%)	8 (8.4%)	16 (5.3%)	
<b>Ownership status of your house</b>				0.058
Owned	178 (86.8%)	79 (83.2%)	257 (85.7%)	
Rented	14 (6.8%)	3 (3.2%)	17 (5.7%)	
student hostels	13 (6.3%)	13 (13.7%)	26 (8.7%)	
<b>Monthly Income</b>				0.958
Less than 1500 NIS	18 (8.8%)	10 (10.5%)	28 (9.3%)	
>1500 NIS	34 (16.6%)	16 (16.8%)	50 (16.7%)	
>3000 NIS	67 (32.7%)	29 (30.5%)	96 (32%)	
>5000 NIS	86 (42%)	40 (42.1%)	126 (42%)	
<b>Faculty</b>				0.451

Health related	182 (88.8%)	81 (85.3%)	263 (87.7%)	
Non health related	23 (11.2%)	14 (14.7%)	37 (12.3%)	
<b>Father's education level</b>				0.800
Less than High School	43 (21%)	25 (26.3%)	68 (22.7%)	
High School	78 (38%)	36 (37.9%)	114 (38%)	
Diploma	5 (2.4%)	3 (3.2%)	8 (2.7%)	
Bachelor degree	50 (24.4%)	18 (18.9%)	68 (22.7%)	
Master degree	14 (6.8%)	4 (4.2%)	18 (6%)	
Ph.D.	15 (7.3%)	9 (9.5%)	24 (8%)	
<b>Mother's education level</b>				0.057
Less than High School	32 (15.6%)	28 (29.5%)	60 (20%)	
High School	83 (40.5%)	25 (26.3%)	108 (36%)	
Diploma	14 (6.8%)	6 (6.3%)	20 (6.7%)	
Bachelor degree	52 (25.4%)	26 (27.4%)	78 (26%)	
Master degree	15 (7.3%)	4 (4.2%)	19 (6.3%)	
Ph.D.	9 (4.4%)	6 (6.3%)	15 (5%)	

As seen in Table (4.3-6), there is no significant differences between PBF and the other socio demographic characteristic ( $P > 0.05$ ).

**Table (4.3-6): Prevalence of obesity among students based on PBF by Socio-demographic characteristics**

Variables	PBF		Total N	P-value
	Under and normal fat N (%)	Over fat N (%)		
<b>Age (years)</b>				0.150
18-20	83 (70.9%)	128 (69.9%)	211 (70.3%)	
21-24	33 (28.2%)	46 (25.1%)	79 (26.3%)	
>24	1 (0.9%)	9 (4.9%)	10 (3.3%)	
<b>Marital status</b>				0.267
Married	7(6%)	15 (8.2%)	22 (7.3%)	
Single	107 (91.5%)	165 (90.2%)	272 (90.7%)	
Widow	1 (0.9%)	3 (1.6%)	4 (1.3%)	
divorced	2 (1.7%)	0	2 (0.7%)	
<b>Place of residence</b>				0.786
Village	55 (47%)	82 (44.8%)	137 (45.7%)	
City	57 (48.7%)	90 (49.2%)	147 (49%)	
Camp	5 (4.3%)	11 (6%)	16 (5.3%)	
<b>Ownership status of your house</b>				0.981
Owned	100 (85.5%)	157 (85.8%)	257 (85.7%)	
Rented	7 (6%)	10 (5.5%)	17 (5.7%)	
student hostels	10 (8.5%)	16 (8.7%)	26 (8.7%)	
<b>Monthly Income</b>				0.724
Less than 1500 NIS	12 (10.3%)	16 (8.7%)	28 (9.3%)	
>1500 NIS	19 (16.2%)	31 (16.9%)	50 (16.7%)	
>3000 NIS	41 (35%)	55 (30.1%)	96 (32%)	
>5000 NIS	45 (38.5%)	81 (44.3%)	126 (42%)	
<b>Faculty</b>				0.858

Health related	102 (87.2%)	161 (88%)	263 (87.7%)	
Non health related	15 (12.8%)	22 (12%)	37 (12.3%)	
<b>Father's education level</b>				0.258
Less than High School	23 (19.7%)	45 (24.6%)	68 (22.7%)	
High School	48 (41%)	66 (36.1%)	114 (38%)	
Diploma	3 (2.6%)	5 (2.7%)	8 (2.7%)	
Bachelor degree	27 (31.1%)	41 (22.4%)	68 (22.7%)	
Master degree	9 (7.7%)	9 (4.9%)	18 (6%)	
Ph.D.	7 (6%)	17 (9.3%)	24 (8%)	
<b>Mother's education level</b>				0.956
Less than High School	25 (21.4%)	35 (19.1%)	60 (20%)	
High School	42 (35.9%)	66 (36.1%)	108 (36%)	
Diploma	8 (6.8%)	12 (6.6%)	20 (6.7%)	
Bachelor degree	30 (25.6%)	48 (26.2%)	78 (26%)	
Master degree	8 (6.8%)	11 (6%)	19 (6.3%)	
Ph.D.	4 (3.4%)	11 (6%)	15 5%)	

### **BMI and PBF**

According to table (4.3-7) students with underweight and normal weight was (76.1%) among those who with under and normal fat, (63.4%) with over fat, Students with overweight and obesity was (23.9%) among those with under and normal fat, and (36.6%) with over fat. There was significant difference between BMI and PBF ( $p < 0.05$ ).

**Table (4.3-7): Relationship between BMI and PBF**

		Underweight & Normal weight	Overweight & Obesity	Total N (%)	P value
<b>Percent body fat</b>	Under and normal fat	89 (76.1%)	28 (23.9%)	117	<b>0.022</b>
	Over fat	116 (63.4%)	67 (36.6%)	183	

**BMI and PBF by their eating habits levels**

According to table (4.3-8) students with underweight and normal weight was 205, the percent was (50.7%) among those who followed moderate eating habits, (12.7%) followed unhealthy eating habits, and the percent was (5%) for students who followed a healthy eating habits.

Students with overweight and obesity were 95, the percent was (25.3%) among those who followed moderate eating habits, and (4.3%) followed unhealthy eating habits, and the percent was (2%) for students who followed a healthy eating habits. There was no significant difference ( $p=0.526$ ).

**Table (4.3-8): Relationship between BMI and their eating habits levels.**

		Underweight & Normal weight	Overweight & Obesity	Total N (%)	P value
<b>Eating habits levels</b>	Healthy EH	15 (5%)	6 (2%)	21	0.526
	Moderate EH	152 (50.7%)	76 (25.3%)	228	
	unhealthy EH	38 (12.7%)	13 (4.3%)	51	
	Total	205 (68.3%)	95 (31.7%)	300 (100%)	

According to table (4.3-9) students with under fat and normal fat was 117, the percent was (29%) among those who followed moderate eating habits, (7.7%) followed unhealthy eating habits, and the percent was (2.3%) for students who followed a healthy eating habits.

Students with over fat were 183, the percent was (47%) among those who followed moderate eating habits, and (9.3%) followed unhealthy eating habits, and the percent was (4.7%) for students who followed a healthy eating habits. There was no significant difference (p=0.563).

**(Table 4.3-9): Relationship between Percent body fat and their eating habits levels.**

		Under fat &Normal fat	Over fat	Total N (%)	P value
<b>Eating habits levels</b>	healthy EH	7 (2.3%)	14 (4.7%)	21	0.563
	Moderate EH	87 (29%)	141 (47%)	228	
	unhealthy EH	23 (7.7%)	28 (9.3%)	51	
	Total	117 (39%)	183 (61%)	300	

**BMI and PBF by their level of depression**

According to table (4.3-10) the percent of students with underweight and normal weight was (40%) among those with No depression symptoms, (20%) among those with Mild to borderline depression, and (8%) for students with moderate to severe depression.

The percent of students with overweight and obesity was (16.7%) among those with No depression symptoms, (10.7%) among those with Mild to borderline depression, and (4.3%) for students with moderate to severe depression. There was no significant difference (p=0.629).

**Table (4.3-10): Relationship between BMI and their levels of depression.**

		Underweight & Normal weight	Overweight & Obesity	Total N (%)	P value
<b>Depression levels</b>	No depression	120 (40%)	50 (16.7%)	170	0.629
	Mild to borderline depression	61 (20.3%)	32 (10.7%)	93	
	Moderate to severe depression	24 (8%)	13 (4.3%)	37	
	Total	205 (68.3%)	95 (31.7%)	300 (100%)	

According to table (4.3-11) the percent of students with under fat and normal fat was (39.4%) among those with No depression symptoms, (41.9%) among those with Mild to borderline depression, and (29.7%) for students with moderate to severe depression.

The percent of students with overfat was (34.3%) among those with No depression symptoms, (18%) among those with Mild to borderline depression, and (8.7%) for students with moderate to severe depression. There was no significant difference ( $p=0.431$ ).

**(Table 4.3-11): Relationship between Percent body fat and their levels of depression.**

<b>Depression levels</b>	Under fat & Normal fat	Over fat	Total N (%)	P value
No depression	67 (22.3%)	103 (34.3%)	170	0.431
Mild to borderline depression	39 (13%)	54 (18%)	93	
Moderate to severe depression	11 (3.7%)	26 (8.7%)	37	
Total	117 (39%)	183 (61%)	300	

**Eating habits by their level of depression**

Table (4.3-12) explain the distribution of students in terms of level of depression with levels of eating habits, the number of students who do not have depression were 170 students, and the majority of them were following a moderate eating habits with (40%) the following percentage was (13%) for students with a unhealthy eating habits and the lowest percentage was (3.7%) for students with a healthy eating habits.

The number of all student were have symptoms of Mild to Borderline depression was 93 students, the majority of whom had a moderate eating habits about (26.3%), and (2.7%) Of students followed an unhealthy eating habits, and the lowest proportion was (2%) for students who followed a healthy eating habits.

The average number of students with Moderate to Severe depression were 37 and the majority of them had a moderate eating habits (9.7%) , (1.3%) of them had a unhealthy eating habits and a (1.3% ) followed a healthy eating habits. With a significant difference (p=0.0.029) which means that there is decreasing level of depression among who categorized within the healthy eating habits than others, as (3.7%) of students who didn't have depression categorized within healthy eating habits

**Table (4.3-12): The relationship between levels of eating habits and levels of depression.**

Levels of depression	Levels of eating habits				
	healthy EH	Moderate EH	unhealthy EH	Total	P-value
<b>No depression</b>	11 (3.7%)	120 (40%)	39 (13%)	170 (56.7%)	<b>0.029*</b>
<b>Mild to Borderline depression</b>	6 (2%)	79 (26.3%)	8 (2.7%)	93 (31%)	
<b>Moderate to Severe depression</b>	4 (1.3%)	29 (9.7%)	4 (1.3%)	37 (12.3%)	

### **BMI and PBF by their levels of food addiction**

According to table (4.3-13) the percent of students with underweight and normal weight was (63.7%) among those with No food addiction, (2%) among those with moderate food addiction, and (1.3%) for students with mild and severe food addiction.

The percent of students with overweight and obesity was (27.3%) among those with No food addiction, (2.7%) among those with severe food addiction, and (1%) for students with mild food addiction, (0.7%) with Moderate food addiction. There was no significant difference ( $p=0.053$ ).

**Table (4.3-13): Relationship between BMI and their levels of food addiction.**

<b>Food addiction levels</b>	<b>Underweight &amp; Normal weight</b>	<b>Overweight &amp; Obesity</b>	<b>Total N (%)</b>	<b>P value</b>
No food addiction	191 (63.7%)	82 (27.3%)	273	0.053
Mild food addiction	4 (1.3%)	3 (1%)	7	
Moderate food addiction	6 (2%)	2 (0.7%)	8	
Severe food addiction	4 (1.3%)	8 (2.7%)	12	
<b>Total</b>	<b>205 (68.3%)</b>	<b>95 (31.7%)</b>	<b>300 (100%)</b>	

According to table (4.3-14) the percent of students with under fat and normal fat was (35.7%) among those with No food addiction, (1.3%) among those with severe food addiction, and (1%) for students with mild and moderate food addiction.

The percent of students with over fat was (55.3%) among those with No food addiction, (2.7%) among those with severe food addiction, and (1.7%) for students with moderate food addiction, (1.3%) with mild food addiction. There was no significant difference ( $p=0.975$ ).

**(Table 4.3-14): Relationship between Percent body fat and their levels of food addiction.**

		Under fat &Normal fat	Over fat	Total N (%)	P value
<b>Food addiction levels</b>	No food addiction	107 (35.7%)	166 (55.3%)	273	0.975
	Mild food addiction	3 (1%)	4 (1.3%)	7	
	Moderate food addiction	3 (1%)	5 (1.7%)	8	
	Severe food addiction	4 (1.3%)	8 (2.7%)	12	
	<b>Total</b>	<b>117 (39%)</b>	<b>183 (61%)</b>	<b>300</b>	

For answering, the research question which stated “What is the relationship between food addiction, depression, BMI, PBF and eating habits” Pearson correlation was run as shown in **table (4.4-1)**. The results showed that there is a statistically significant positive correlation between PBF with BMI ( $R=0.505$ ,  $P\text{-Value}= 0.000$ ) respectively which means that the increase of BMI associated with increasing of PBF.

In regard with the eating habits, there is a statistically significant negative correlation with depression ( $R=-0.192$ ,  $P\text{.value}=0.001$ ,  $R=0.54$ ) which means that the increasing of depression associated with decreasing the eating habits. In addition, there is another statistically significant positive correlation between food addiction and depression ( $R=0.15$ ,  $P\text{.value}=0.009$ ) which means that the increasing of depression associated with the increasing of food addiction.

On the other hand, there is a statistically significant positive correlation between food addiction and BMI ( $R=0.193$ ,  $P\text{.value}=0.001$ ) which indicated that the increasing of food addiction associated with increasing the level of BMI.

**Table (4.4-1): The relationship of food addiction, depression, BMI, PBF and eating habits. (Pearson correlation)**

	BMI	PBF	Food addiction	Depression
Eating habits	-0.095 0.1	-0.08 0.168	-0.078 0.179	<b>-0.192</b> <b>0.001*</b>
BMI	-	<b>0.505</b> <b>0.000*</b>	<b>0.193</b> <b>0.001*</b>	0.014 0.805
PBF	-	-	0.025 0.665	0.44 0.448
Food addiction	-	-	-	<b>0.15</b> <b>0.009*</b>

\* P value <0.05

#### 4.5 Multivariate analysis

The likelihood of falling into a higher BMI group was analyzed in connection to several of predictor variables. The Binary logistic regression showed that there are statistically significant differences in the BMI according to the gender, food addiction, Ownership status of house, PBF categories (P. values <0.05).

According to the "Gender of participant" variable is being used with "Female" as the reference category. Notable associations' were found in the results. First off, males were 2.275 times more likely than females to fall into a higher BMI category, and this difference was statistically significant (P.value = 0.004).

Additionally, the increasing in age associated to 1.742 times higher odds of being in a higher BMI category (OR= 1.742, P.value = 0.034).

Regarding the eating habits categories, there is no statistically significant difference in the BMI based on eating habits as the good eating habits categorized as the reference variable.

For the food addiction, the variable severe food addiction used as a reference. The results indicated that the total impact of the food addiction score on the likelihood of falling into a

higher BMI category is statistically significant with a p-value of 0.032. For students with a severe food addiction, the odds of being in a higher BMI category are 8.055 times than others.

Ownership status of house has a statistically significant overall effect on the likelihood of falling into a higher BMI category (p-value = 0.025). All of the three categories were associated statistically significant difference based on the BMI. As students living in ownership housing have, 0.333 times the odds of being obese compared to those in student hostels. Also, students who living in rented house have 0.11 times of being in a higher BMI in comparison with those who living in student hostels (P.values= 0.0023, 0.0013 respectively). Which means that living rented and ownership housing are lower odds of having higher BMI than students who are living in student hostels.

Also, the increasing of total body fat associated with the increasing risk for obesity (OR=0.548, P.value=0.036).

**Table (4.5-1): Multivariate forward logistic model analysis of the associated variables with BMI.**

		Sig.	Exp(B)	95% C.I.for EXP(B)	
				Lower	Upper
Step 1 <sup>a</sup>	Gender of participant	<b>.004</b>	2.275	1.299	3.984
	age of participant	<b>.034</b>	1.742	1.042	2.913
	Unhealthy eating habits	.838			
	Moderate eating habits	.977	.981	.282	3.419
	Healthy eating habits	.739	1.203	.405	3.571
	No depression	.946			
	Mild to borderline depression	.757	1.100	.603	2.007
	Moderate to severe depression	.841	1.093	.459	2.601
	No food addiction	<b>.032</b>			
	Mild FA	.851	1.202	.176	8.227
	Moderate FA	.768	.767	.131	4.476
	Severe FA	<b>.003</b>	8.055	2.005	32.372
	<b>Faculty</b>	.743	.819	.249	2.694
	<b>Place of residence</b>	.117			
	City	.069	.337	.105	1.086
Camp	.271	.521	.163	1.665	

	<b>Ownership status of your house</b>	<b>.025</b>			
	Rented	<b>.023</b>	.333	.129	.860
	student hostels	<b>.013</b>	.118	.022	.635
	<b>Monthly Income</b>	.973	1.005	.747	1.352
	<b>Father's education level</b>	.133	.840	.670	1.054
	<b>Mother's education level</b>	.861	1.022	.803	1.301
	total PBF cat(1)	<b>.036</b>	.548	.313	.962
	Constant	.670	1.656		

Multiple predictor factors were taken into consideration in the logistic regression study that predicted the percent body fat (PBF). All the variables indicated no statistically significant difference except the “Body Mass Index (BMI)

which showed a statistically significant difference with PBF categories. More specifically, there was a higher probability of increasing percent body fat in those classified under BMI categories that indicated a higher body weight than the reference category (Under and Normal Weight) (OR= 1.81, p = 0.037).

**Table (4.5-2): Multivariate model analysis of the associated variables with PBF.**

		Sig.	Exp(B)	95% C.I.for EXP(B)	
				Lower	Upper
Step 1 <sup>a</sup>	Gender of participant	.480	.828	.490	1.399
	age of participant	.373	1.249	.766	2.035
	Unhealthy eating habits	.632			
	Moderate eating habits	.455	.651	.211	2.007
	Healthy eating habits	.789	.873	.322	2.367
	No depression	.355			
	Mild to borderline depression	.547	.845	.489	1.461
	Moderate to severe depression	.272	1.585	.697	3.606
	No food addiction	.998			
	Mild FA	.966	1.036	.209	5.129
	Moderate FA	.974	1.025	.224	4.696
	Severe FA	.841	1.144	.309	4.240
	Faculty	.213	2.008	.671	6.014

Place of residence	.832			
City	.616	.741	.230	2.392
Camp	.766	.837	.260	2.693
Ownership status of your house	.962			
Rented	.865	.924	.372	2.296
student hostels	.780	.823	.209	3.244
Monthly Income	.474	1.102	.844	1.439
Father's education level	.391	.916	.749	1.120
Mother's education level	.291	1.121	.907	1.387
BMI categories(1)	.037	1.813	1.036	3.175
Constant	.622	.575		

## **Chapter Five: Discussion, conclusions and recommendations**

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Consequently, the significant associations between eating habits, depression as well as food addiction with BMI and percent body fat among Al-Quds University students are disclosed. The effect of these factors on body weight metrics among this population has been studied and it was found to be considerable (Shihada, 2020; Yahia et al., 2016; Al Sabbah, 2009).

There is a distinctive correlation between unhealthy eating habits, which are identified by low consumption of fruits and vegetables and the reliance on processed foods (Shihada, 2020), elevated BMI and increased body fat percentages in most cases among students. Furthermore, the intricate nature of depression and body weight relationships is observed especially since higher depression scores are associated with increased odds of having high BMI or percent body fat.

In addition, the systematic occurrence of food addiction symptoms significantly adds to BMI increment and percent body fat, indicating that, food addiction affect weight status (Gonçalves et al., 2022; Pape et al., 2021). All these findings together highlight the complex role of all such factors in contributing to Al-Quds university students' body weight and fat composition, hence serve as a basis for creating comprehensive intervention strategies that address physical well-being joined with mental health.

### **BMI & percent body fat status among al-Quds university students.**

The data emanating from the research conducted at Al-Quds University provides enlightening information regarding its student category, with high BMI categories dominating among them and many students having to face overweight as a frequent cause of illness. This is also in line with broader worldwide trends that depression the need to address obesity as a transformative health issue, particularly among young people (Shihada 2020; Yahia et al., 2016; Al Sabbah 2009).

One remarkable aspect indicated by the data is, that there exists a noticeable gap between males and females this illustrates, that male students have a more significant likelihood of falling into higher BMI categories than their female counterparts fall.

This observation, however, males more muscled than females, uncovers a gender-based weight distribution within the university study that may be indicative of at least lifestyle-related or physiological contributors to patients' nutritional choices and tendencies towards gaining weight among male and female student populations (Shihada, 2020; Yahia et al., 2016; Al Sabbah, 2009).

Additionally, the research highlights an important relationship where progression in age increases chances of attaining higher BMI categories. This trend means that university-based students who are older would be faced with challenges when it comes to managing their healthy body weight. This dimension related to age can help in providing valuable feedbacks about strategies that aim at curtailing the risks of obesity among various ages' groups of students.

Especially, the correlation of severe food addiction and higher BMI categories is dramatic as it signals the strong relationship between addictive eating behaviors and weight status within student society. This implies that there is a greater interaction between psychological constructs and eating patterns to achieve such elevated BMIs, calling for an even much more comprehensive approach to both nutritional education as well as the elimination of possible addictive components within meals.

An interesting issue, which is underlined in the study as well, concerns the impact of accommodation type on BMI. Data clearly reveals that students who stay in university residence have greater odds of having high BMIs than those on rented or ownership basis. This suggests that there may be lifestyle behaviors or environmental conditions afforded by different kinds of housing situation, and any interventions need to be focused on the bespoke circumstances of students' accommodation.

Moreover, the link suggesting that growing total body fat indicates a great risk of obesity supports the amount of unhealthy weight statuses among students (Shihada 2020; Yahia et al., 2016; Al Sabbah, 2009). This highlights the multidimensional nature of obesity, involving different physiological, behavioral and environmental determinants that together contribute to the weight-related problems diagnosed among Al-Quds university students. With these diverse perspectives, it is clear that for university students to address issues of obesity will require interventions that are more targeted and multi-faceted.

The introduction of educational programs, gender-specific approaches to addressing the problem, implementing lifestyle changes and relevant prevention initiatives as well as psychological support lines could be considered effective components of a comprehensive strategy directed at promoting healthier choices among students.

### **The relationship between sociodemographic factor and BMI & percent body fat status at al-Quds university students.**

In fact, gender was one of the most prominent sociodemographic factors that were associated significantly with BMI among the university students. The data indicated that odds of males falling into higher categories is significantly greater than the case with females. In this context, it is crucial to highlight the gender-specific inequality in health outcomes as an example of how different characteristics should be considered and addressed with relation to health women students displayed healthier results than their male counterparts of something more peculiar to distinct patterns of lifestyle behavior, or dietary preferences or perhaps some physiological differences between middle-aged men's and women's organisms (Shihada, 2020; Yahia et al.,2016; Al Sabbah, 2009).

Another critical sociodemographic determinant, age, the results revealed that the odds with larger crude ORs were increasing as far as advancing in age categories was concerned. This observation highlights the impact of age-related covariates on weight status in university students, which indicates for development and implementation of specific interventions or special health educational programs to be designed for various ages within a student group (Shihada 2020; Yahia et al. 2016).

Furthermore, the type of residence revealed strong correlation with BMI among students. The odds ratio of having a high BMI for those who stayed in the university's living arrangements were tending to be higher as compared to students staying outside the rented or ownership housing. This association is an indicator of the possible influence that living environment has on students' health and lifestyle behavior, suggesting that accommodation type may determine habits regarding nutrition, physical activity as well as availability for resources affecting weight status.

Likewise, the relationship between sociodemographic factors and percent body fat (PBF) status were investigated to identify several patterns. Gender, age and the type of accommodation did not show any substantial correlations with PBF but highlighted BMI as an important factor in relation to PBF. Among university students, there was a positive linear relationship linking the higher BMI categories with an increased likelihood of higher percent body fat. As such, it became clear that from normal to obese range for University Students as the student increases in weight status based on BMI, they may have also been increasing their risk factor in terms of changes in body composition include lean tissue mass and percentage increase fatty-bone tissues mass.

Therefore, having clear knowledge on these complex relationships between the sociodemographic factors and weight-related parameters is critical to come up with personalized interventions. There are several characteristics of the student body in this university that would be helpful to developing a comprehensive health promotion including 10 distinct sociodemographic segments based on their BMI, percent body fat and other characteristic features.

### **The relationship between eating habits and BMI & percent body fat status at al-Quds university students.**

The results therefore pointed out that there wasn't correlation between unhealthy eating practices and BMI status within the student population. The students that show unhealthy dietary patterns, such as higher calorie intake, lower consumption of fruits and vegetables or wish to rely only on processed foods were more likely to be found in high-BMI categories. Suggesting that unhealthy diets contribute considerably to students' chances of higher BMIs. On the one hand, students with low levels of consumption of fruits and vegetables or reliance on processed foods showed a higher likelihood to have elevated PBF. This association between unhealthy food choices and more body fat percentage means that the diet affects not only BMI but also location of adipose tissue in a student study. Supporting further evidence to this study, previous researches have also identified a direct connection between unhealthy eating patterns and the BMI along with the PBF status (Yahia et al., 2016; Al Sabbah, 2009), thereby emphasizing an important role of dietary pattern in deciding weight related parameters among students of Al-Quds University.

In this perspective, the implementation of specific nutritional educational programs that would target these eating habits as well as promotion healthier choices for foods in campuses through provision and retailing should be given more attention to address overall changes towards better believes with healthy food concurrent with people support system because access could not go hand on clothes without initial cognitive bases upon whose decisions are made. Therefore, integrating the full strategies to encourage healthier dietary choices within the university setting has a potential of making a significant contribution towards fostering a healthy student community.

### **The relationship between depression and BMI & percent body fat status at al-Quds university students.**

Those at moderate or severe depressive symptom levels among the students were more likely to fall into higher BMI categories. This correlation denotes a bidirectional relationship where higher depression scores tended to indicate increased chances of having elevated BMI, thus reflecting the intricate interaction between mental state and weight status.

The probability of having elevated PBF increased with increasing levels of depression among students. This linkage implies that since depression is associated with psychological factors, it may affect changes in body composition, which might also affect the distribution of fat within this study of students (Sabbah et al., 2009; Yahia et al., 2016).

The correlation found between depression and both BMI and PBF points to the complicated relationship that can be observed between mental health and weight-related parameters among students from Al-Quds University. The student community may benefit from the comprehensive strategies implemented that integrate mental health support within the university environment in relation to improving their overall mental well-being and physical health outcomes.

### **The relationship between food addiction and BMI & percent body fat status at al-Quds university students**

A study revealed a strong correlation between food addiction scores and BMI status among the students studied. Students labelled as having severe food addiction had significantly higher odds of being in the high BMI categories. This connection implies that food addictiveness might have a significant effect on BMI, which makes obese adults more likely to rapidly gain weight. A

strong likelihood of having a high PBF was observed among students with moderate to severe levels of food addiction symptoms. This relationship may mean that the addictive eating characteristics are likely to not only affect BMI but also body fat distribution within this student population (Meule et al., 2014, Gearhardt et al., 2009).

The relationship established between food addiction and BMI boiling to the fact of its status as PBF takes center stage in highlighting why it is important for Al-Quds University students to understand how addictive eating behavior can influence weight related parameters. Calculating this relationship may be essential in establishing particularly for obese individuals whether were psychological, the interventions could also enable students to cope with food addiction and create better eating habits, which would eventually affect overall weight management and body composition outcomes for the student population .

## **5.2 Conclusions:**

This thesis focused on the prevalence of overweight and obesity by using BMI and percent body fat measurements and the factors effecting. In summary, BMI revealed that male and female students at Al-Quds University had high levels of overweight and obesity. In addition, when PBF% was used to define adiposity instead of BMI, it increased the percentage of people who were obese by twice as much, Findings revealed significant variations ( $p < 0.05$ ) of PBF between males and females, females seems to have more overfat than males by PBF.

The findings indicated that (17%) of students were following unhealthy eating habits, (10.7%) had moderate depression, (1.7%) had severe depression, (4%) had severe food addiction symptoms.

Overweight and obesity by BMI was (4.3%) among those who followed unhealthy eating habits, and (61%) were over fat, (9.3%) of them followed unhealthy eating habits. There was no significant difference.

Overweight and obesity by BMI was (4.3%) for students with moderate to severe depression, (8.7%) for students with moderate to severe depression were over fat. There was no significant difference.

University students' depression was quite high, showing that they were depressed because of their new educational setting, university students are a special group of people that are enduring a critical transitory period in which they are going from adolescence to adulthood and can be one of the most stressful times in a person's life. Trying to fit in, maintain good grades, plan. As a reaction to this stress, some students get depressed.

Overweight and obesity by BMI was (2.7%) among those with severe food addiction, (2.7%) for students with severe food addiction were over fat. There was no significant difference.

**Recommendations:**

It would be interesting to begin interventions with this population, throughout their undergraduate education, to include motivational aspects and knowledge of healthy habits in terms of reducing overweight and obesity, minimizing depression and food addiction.

However, health education could be the first step towards initiating a change of habits.

A comprehensive solution is needed to tackle this thorny problem. Therefore, it is necessary to formulate special measures to address the problem of obesity and unhealthy eating among university students. By incorporating nutritional education programs into general academic curricula, people can become more aware of their diets and make the transition to healthier habits. Campaigns aimed at bringing nutritious food choices to campuses, and counseling services related to nutrition can of course play a role in stemming the tide of weight gain.

University students 'runaway obesity problem definitely needs to be treated as an urgent matter. Examining relationships among dietary behavior patterns and the incidence of obesity makes clear that comprehensive measures are urgently needed. It's time to develop better eating habits, promote nutritional education, and offer comprehensive support networks among this group. What is needed now is to concentrated group effort to build an environment that encourages university students to make the right choices with their diet and thereby combat obesity.

University leadership encouragement, such as nutritional educational interventions, advertising the healthy food item at the university needed to enhance healthy eating habits, allocate an area for physical activities to avoid the frequency of overweight and obesity among undergraduates,

Depression in undergraduates should be carefully addressed in order to avoid unhealthy eating practices associated with depression. Depression management should begin during university, since depression should not interfere with a student's capacity to engage in healthy eating choices.

**Limitations:**

There are some limitations to this study, including the use of a long survey for a short period. In addition to feeling rushed or tired, some students may have answered more inaccurately than they would have if the survey had been smaller, as their next exam was to be given in the following class meeting.

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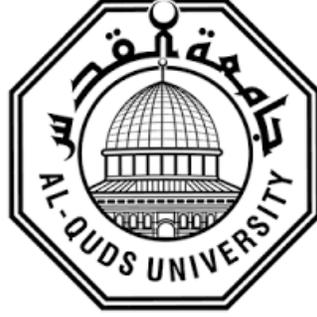
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## Appendices 1



جامعة القدس

عمادة الدراسات العليا

كلية الصحة العامة

عزيزي المشارك/ة

أنا الطالبة ولاء ادريس من كلية الصحة العامة -الدراسات العليا-أقوم بعمل دراسة بحثية "رسالة الماجستير" حول العوامل التي تؤثر على العادات الغذائية عند طلاب جامعة القدس بهدف تحديد الارتباط بين العادات الغذائية والعوامل الأخرى (السمنة, الاكتئاب, ادمان الطعام) وذلك استكمالاً لمتطلبات التخرج من كلية الصحة العامة في جامعة القدس وسوف يتم التعامل مع المعلومات دون ذكر الاسماء، المشاركة طوعية هدفها علمي تماما وبإمكانك المشاركة إذا رغبت في هذا البحث العلمي، يرجى من حضرتكم الإجابة على جميع الأسئلة بدقة.

مع جزيل الشكر والتقدير.

اسم الباحثة: ولاء ماهر ادريس.

الايمل: [walaaloll0522@hotmail.com](mailto:walaaloll0522@hotmail.com)

هل انت موافق للمشاركة: 1-أوافق 2-لا أوافق

وأشكركم على أخذ الوقت لمساعدتي في انهاء واستكمال عمليتي التعليمية.

A1 الرقم التسلسلي للاستبيان (الكود) \_\_\_\_\_.

### القسم الأول: بيانات شخصية:

الاسم: _____ . لن يظهر الاسم في البحث.	A2
رقم الهاتف الشخصي: _____ .	A3

### القسم الثاني: القياسات الانثروبومترية

سيتم تعبئة هذا الجزء من قبل الباحث:

	الوزن (كغم)	B1
	الطول (سم)	B5
	BMI(body mass index)	B6
	PBF(percent body fat)	B7

القسم الثالث: بيانات أساسية:

				الكلية:	c 1
.....					
2. علمي		1. أدبي		التخصص:	C2
2. أنثى		1. ذكر		الجنس:	C3
24<		24-21		العمر: 20-18	C4
4. مطلق	3. ارملة	2. أعزب	1. متزوج	الحالة الاجتماعية:	C5
3. لا		2. مريض	1. حامل	إذا كنت متزوجة هل انت؟	C6
3. مخيم		2. مدينة	1. قرية	مكان اقامة العائلة الحالي:	C7
3. سكن جامعي		2. إيجار	1. ملك	نوع السكن	C8
4. أكثر من 5000	3. أكثر من 3000	2. أكثر من 1500	1. أقل من 1500	دخل الاسرة بالشيكل:	C9
.....				عدد سنوات تعليم الاب بما في ذلك المدرسة:	C10
.....				عدد سنوات تعليم الام بما في ذلك المدرسة:	C11

## القسم الرابع استبيان العادات الغذائية:

السؤال	دائماً	معظم الوقت	نادراً	أبداً
D1 هل تتناول الخضروات أو السلطة مع وجبة أو أكثر من وجبة في اليوم؟				
D2 هل تتناول على الأقل حصتين من الفاكهة يومياً؟				
D3 هل تحاول الابتعاد عن تناول الكربوهيدرات المكررة (النشويات) مثل الخبز الأبيض، الأرز الأبيض، حبوب الصباح المحلاة؟				
D4 هل تحاول نزع دهون اللحوم وجلد الدجاج قبل الطبخ؟				
D5 هل تستخدم طرق طهي لتقليل كمية الدهون مثل الشوي، السلق، التحميص الجاف أو المايكرويف؟				
D6 هل تتناول الأسماك أو المأكولات البحرية (طازجة أو معلبة) مرة أو مرتين في الأسبوع؟				
D7 هل تقوم برش الملح على طعامك؟				
D8 هل تقوم بشراء الأطعمة الخالية من الملح أو قليلة الملح مثل الأجبان، البسكوت، الصلصات، أو غيرها؟				
D9 هل تحاول الحد من المشروبات الغازية المحلاة أو عصائر الفاكهة المركزة؟				
D10 هل تفضل تناول الشوكولاتة، الكعك، الحلويات، بالمناسبات الخاصة؟				
D11 هل تحافظ على تناول الكفايين بشكل معتدل (أقل من كوبين من القهوة أو 2 كوب من مشروب الطاقة أو 4 كوب من الشاي في اليوم)				
D12 هل تختار الوجبات السريعة قليلة الدهون مثل (البيرغر، لفائف الشاورما، السندويشات الخالية أو قليلة بالدهون) مع تناول الكثير من السلطة؟				
D13 هل تتناول الإفطار في الصباح؟				
D14 هل تتناول الطعام عندما تكون جائعاً وتتوقف عندما تكون شبعاً بشكل مريح؟				
D15 هل تتناول أصناف متنوعة من الأطعمة المختلفة خلال اليوم؟				

## القسم الخامس: استبيان ادمان الطعام The Yale Food Addiction Scale

يسأل هذا الاستبيان عن عاداتك الغذائية في العام الماضي. يصعب على الأشخاص في بعض الأحيان التحكم في مقدار ما يتناولونه من أطعمة معينة مثل - :

- الحلويات: مثل الآيس كريم والشوكولاتة والدونات والكوكيز والكيك والحلوى -
  - النشويات: مثل الخبز الأبيض والمخبوزات والمكرونه والأرز
  - الوجبات الخفيفة المالحة: مثل رقائق البطاطس/البطاطا) الشيبس (ورقائق الذرة) الدوريتوس (وغيرها والمقرمشات والبسكويت المالح.
  - الأطعمة الدهنية: مثل شرائح اللحم والهامبرجر والهامبرجر بالجبن والبيتزا والبطاطس المقليه
  - المشروبات السكرية: مثل المشروبات الغازية والمشروبات الرياضية ومشروبات الطاقة
- عند السؤال عن "بعض الأطعمة" في الفقرات التالية يرجى التفكير في أي أطعمة أو مشروبات مماثلة لتلك المذكورة في مجموعات الأطعمة أو المشروبات أعلاه أو أي أطعمة أخرى كنت قد واجهت معها صعوبة في العام الماضي

	مطلقاً	أقل من مرة شهرياً	مرة شهرياً	2-3 شهرياً	مرة اسبوعياً	3-2 مرات اسبوعياً	6-4 مرات اسبوعياً	يوماً
E1								
E2								
E3								
E4								
E5								
E6								

								E7	إفراطي في تناول الطعام أعاقني عن رعاية أسرتي أو القيام بالأعمال المنزلية.
								E8	ظلت أتناول الطعام بنفس الأسلوب رغم أن أسلوبني تسبب لي في مشكلات نفسية
								E9	تناول نفس الكمية من الطعام لم يعطيني نفس القدر السابق من اللذة
								E10	كان لدي رغبة قوية ملححة لتناول أطعمة معينة لدرجة منعنتني من التفكير في أي شيء آخر إلا فيها
								E11	حاولت وفشلت في خفض أو التوقف عن تناول أطعمة معينة
								E12	كنت منهمكا جدا في تناول الطعام في مواقف تحتاج لانتباه مما قد يعرضني للأذى) مثال عند قيادة السيارة، أو عبور الشارع، أو تشغيل الآلات)
								E13	كان أصدقائي/أفراد أسرتي قلقين ويعبرون عن مخاوفهم وانزعاجهم من مدى إفراطي في تناول الطعام.

### القسم السادس: استبيان بيك للاكتئاب Beck's Depression Inventory

ستجد/ي في هذه الاستمارة مجموعة من الجمل، أرجو أن تقرأ كل مجموعة بتمعن ثم اختار الجملة التي نصف حالتك بدقة خلال الأسبوع الماضي بما في ذلك اليوم. ضع دائرة حول رقم الجملة التي تختارها. إذا بدا لك أن أكثر من جملة في المجموعة تنطبق عليك فبإمكانك أن تضع دائرة حول كل جملة تناسب حالتك. تأكد من قراءة كل جملة في كل المجموعات قبل الاختيار.

(F1)

- (0) أنا لا اشعر بالحزن.
- (1) أنا اشعر بالحزن
- (2) أنا حزين طيلة الوقت ولا أستطيع أن أتخلص من هذا الشعور.
- (3) أنا حزين جدا أو غير سعيد إلى حد لا أستطيع تحمله.

(F2)

- (0) أنا تماما متشجعا نحو المستقبل
- (1) اشعر بان المستقبل غير مشجع
- (2) اشعر بأنه لم يعد لدي شيء أتطلع إليه في المستقبل.
- (3) اشعر بان المستقبل لا أمل فيه وان الأمور لا يمكن أن تتحسن.

(F3)

- (0) لا اشعر بأنني شخص فاشل.
- (1) اشعر بانني فشلت أكثر مما يجب.
- (2) عندما انظر إلى الفترة الماضية من حياتي أرى كثير من الفشل.
- (3) اشعر أنني فاشل تماما كإنسان.

(F4)

- (0) استمتع بالأشياء كما تعودت.
- (1) لم اعد استمتع بالأشياء بنفس الطريقة التي كنت متعودا عليها.
- (2) لم اعد احصل على الشعور بالاكتمال الحقيقي من أي شيء.
- (3) أنا غير مكثفي أو اشعر بالملل في كل الأشياء.

(F5)

- (0) ليس لدى شعور بالضرورة بالذنب
- (1) شعوري بالذنب يأخذ جزء جيد من وقتي.
- (2) اشعر بالذنب تقريبا معظم الوقت.
- (3) اشعر بالذنب طيلة الوقت.

(F6)

- (0) لا اشعر بأنني أعاقب.
- (1) اشعر بانني سأعاقب.
- (2) إنني أتوقع أن أعاقب.
- (3) اشعر بانني اعاقب الان.

(F7)

- (0) لا اشعر بخيبة أمل من نفسي.
- (1) اشعر بخيبة أمل من نفسي.
- (2) أنا مشمئز من نفسي.
- (3) أنا أكره نفسي.

(F8)

- (0) أنا لا اشعر إنني بحال أسوء من الآخرين.
- (1) أنا انتقد نفسي على أخطائي وضعفي.
- (2) إنني ألوم نفسي طيلة الوقت على أخطائي.
- (3) إنني ألوم نفسي على أي شيء سيء يحدث.

(F9)

- (0) ليست لدي أفكار لقتل نفسي.
- (1) لدي أفكار لقتل نفسي ولكنني لن انفذها.
- (2) ارغب في قتل نفسي.

(3) سوف اقتل نفسي إذا أتحت لي الفرصة.

(F10)

- (0) لا ابكي أكثر من المعتاد.
- (1) أصبحت ابكي أكثر من المعتاد.
- (2) إنني الآن ابكي طيلة الوقت.
- (3) لقد كان بمقدوري أن ابكي فيما قبل ولكني الآن لا أستطيع أن ابكي رغم أنني أريد ذلك.

(F11)

- (0) أنا لست أكثر منزعا من الأشياء الآن مما كنت عليه دائما.
- (1) أنا أكثر توترا الآن مما كنت.
- (2) اشعر الآن بأنني متوتر ومنزعج بقدر جيد من الوقت.
- (3) اشعر أنني متوتر طوال الوقت الآن.

(F12)

- (0) لم افقد اهتمامي بالناس الآخرين.
- (1) أصبحت اقل اهتماما بالناس الآخرين مما كنت عليه من قبل.
- (2) لقد فقدت معظم اهتمامي في الناس الآخرين.
- (3) لقد فقدت كل اهتمامي في الناس الآخرين.

(F13)

- (0) قدرتي على اتخاذ القرار لم تتغير تقريبا.
- (1) اوجل اتخاذ القرارات أكثر مما كنت معتادا سابقا.
- (2) أعاني من صعوبة أكثر في اتخاذ القرارات من قبل.
- (3) أنا غير قادر على اتخاذ أي قرار في الوقت الحاضر.

(F14)

- (0) لا اشعر بأنني ابدو أسوء من المعتاد.
- (1) أنا قلق لأنني ابدو أكبر من عمري ولم اعد جذابا.
- (2) اشعر أن هناك تغيرات دائمة في مظهري الشخصي مما يجعلني ابدو غير جذاب.
- (3) اعتقد أنني ابدو بشعا.

(F15)

- (0) أنا أقوم بعملتي كما في السابق.
- (1) احتاج إلى جهد إضافي للبدء في عمل شيء ما.
- (2) اضطر لان ادفع بقوة من اجل عمل ما.
- (3) لا أستطيع القيام بأي شيء.

(F16)

- (0) أستطيع أن أنام كالمعتاد.
- (1) نومي لم يعد كالمعتاد.
- (2) استيقظ ساعة أو ساعتين قبل المعتاد واجد صعوبة في الرجوع إلى النوم ثانية.
- (3) استيقظ بعدة ساعات قبل المعتاد ولا أستطيع العودة إلى النوم ثانية.

(F17)

- (0) لا اشعر بالإرهاق أكثر من المعتاد.
- (1) أرهق بسرعة أكبر من ذي قبل.
- (2) اشعر بالإرهاق من أداء أي شيء تقريبا.
- (3) اشعر بالتعب الكثير للقيام بأي عمل كان.

(F18)

- (0) شهيتي للأكل ليست أسوء من المعتاد.
- (1) شهيتي للأكل ليست جيدة كالمعتاد.
- (2) شهيتي للأكل أصبحت أسوء الآن.
- (3) ليس لدى أي شهية للأكل على الإطلاق.

(F19)

- (0) لم افقد شيئا من وزني مؤخرا.
- (1) لقد فقدت أكثر من 2 كيلو من وزني.
- (2) لقد فقدت أكثر من 4.5 كيلو من وزني.
- (3) لقد فقدت أكثر من (6.5 كيلو) من وزني.

(F20)

- (0) لم اعد قلقا بشأن صحتي كالمعتاد.
- (1) اشعر بالقلق بشأن مشكلات جسدية مثل الألام المعدة والصداع.
- (2) إنني قلق جدا بشأن مشكلات جسدية وانه لمن الصعب أن اكفر في أمر أخرى.
- (3) إنني قلق للغاية بشأن مشكلاتي الجسدية إلى درجة أنني لا أكاد أفكر في شيء آخر.

(F21)

- (0) لم ألاحظ أي تغيير حاليا في رغبتني الجنسية.
- (1) لدي رغبة في الجنس أقل مما كانت عليه.
- (2) لدي رغبة قليلة بالجنس الآن.
- (3) فقدت رغبتني في الجنس كليا.