

# A Cross-Sectional Study on the Effect of Obesity on Mental Health among Adults in Selangor

Vnesh Malliah Naidu<sup>1</sup>, Lai Xin Wei<sup>2</sup>, Buvanish A/P Arumugam<sup>3</sup>,  
Mohamed Luqman Amal Bin Che AB Azhar<sup>4</sup>, Lavaneya A/P Murugappan<sup>5</sup>,  
Thamilvaani Manaharan<sup>6</sup>

<sup>1,2,3,4,5,6</sup>Faculty of Medicine, University of Cyberjaya, Persiaran Bestari, Cyber 11, 63000 Cyberjaya, Selangor.

Corresponding Author: Thamilvaani Manaharan

DOI: <https://doi.org/10.52403/ijhsr.20240701>

## ABSTRACT

Health is significantly influenced by nutrition, with historical repercussions of malnutrition leading to a notable impact on human well-being. Both undernutrition and overnutrition have contributed to increased illness and mortality rates. Obesity, characterized by excessive fatty tissue, has become increasingly prevalent worldwide. This study aims to ascertain the prevalence of obesity, explore the association between sociodemographic factors and body mass index (BMI) status, investigate the impact of obesity on an individual's mental health status, and examine the relationship between dietary habit and obesity among adults in Selangor, Malaysia. A cross-sectional study spanning two years was conducted in Selangor, Malaysia. Exponential discriminative snowball sampling was utilized for data collection, targeting residents aged 18 to 40 proficient in Bahasa Malaysia and English. Of the 256 respondents obtained, 244 fully met the inclusion criteria. Findings revealed that the prevalence of overweight and obesity among adults in Selangor, Malaysia, stood at 29.92% and 11.06%, respectively. A chi-square test indicated significant associations between body mass index (BMI) status and factors such as age, ethnicity, occupation, marital status, smoking status, and household monthly income ( $p < 0.05$ ). However, no association was found between gender, nationality, education level, and BMI status ( $p > 0.05$ ). Notably, an individual's body weight showed associations with mental health status (depression, anxiety, and stress) ( $p < 0.05$ ), and dietary habits ( $p < 0.05$ ).

**Keywords:** Obesity, sociodemographic factors, mental health, BMI status, food habits

## INTRODUCTION

Nutrition is an essential factor for a good health. In the past, malnutrition had a considerable impact on human health. But both undernutrition and overnutrition lead to a rise in human illness and mortality. Obesity, a condition marked by excessive fatty tissue, is becoming more common everywhere.

A BMI of 25 to 29.9 kg/m<sup>2</sup> is considered overweight, and a body mass index (BMI) of >30 kg/m<sup>2</sup> is considered obese according to World Health Organization (WHO) standards. body mass index (BMI) status does overstate obesity in those who are muscular and underestimates it in those who have lost body mass, like the elderly. It remains the most popular index for obesity,

nonetheless. Obesity is acknowledged as a significant risk factor for noncommunicable diseases like osteoarthritis, gallbladder disease, type 2 diabetes mellitus, respiratory issues, malignancies, cardiovascular disease, and respiratory problems.

Since large-scale demographic data became available in Malaysia during the past three decades, there has been an observed, rapid rise in the prevalence of obesity there. Obesity is on the rise worldwide, not just in Malaysia. In the global setting, obesity has emerged as a major health concern alongside progress and prosperity, particularly in Asia. Numerous people are experiencing weight gain and expressing dissatisfaction with their increased size. Being overweight or obese can profoundly affect one's mental and physical well-being, ranging from facing body shaming to struggling with depression. This contentious issue is subject to various viewpoints: some argue that obesity can contribute to mental health disorders, while others disagree. While obesity isn't inherently a mental illness, it is often associated with several mental health challenges. Additionally, the pressure of living in a society obsessed with thinness can negatively impact the mental health of individuals, even those who are typically psychologically resilient.

The move from diets high in fats, sweets, and processed foods with high energy density to diets with limited availability of calories, mostly in the form of plant products, has been referred to as the nutrition transition. The fast economic growth that Malaysia saw in the final quarter of the 20th century has also contributed to this. In terms of being overweight, Malaysia was recently placed second in East and Southeast Asia.

## **MATERIALS & METHODS**

### **Study Design and Study Population**

A cross-sectional Study design was applied in this study. The study population was adults living in Selangor, Malaysia. The inclusion criteria were residents in Selangor, aged 18 years old until 40 years old, and able to understand Bahasa Malaysia and English

proficiently. The exclusion criteria were not residents in Selangor, aged below 18 years old or above 40 years old, and not able to understand Bahasa Malaysia and English proficiently.

### **Sampling Method**

The exponential discriminative snowball sampling technique was used in this research. It was initiated with a convenience sample of more than one initial participant. In this method, participants provided multiple referrals. However, the researcher assessed these referrals and selected only those who met the inclusion criteria to join the sample. The researcher had minimal control over the sampling process and primarily relied on referrals from already-identified participants. Consequently, the outcome may have been biased. Despite this limitation, snowball sampling offered several advantages, including low cost, ease of recruitment, flexibility, and the ability to access research populations that may otherwise have been difficult to reach.

### **Sample Size**

The sample size was determined by using the following formula:

$$n = \left(\frac{z}{m}\right)^2 \times p(1 - p) + 10\% \text{ non-respondent}$$

where,

n = sample size

Z score, z = 1.96 (95% CI)

m = margin of error

p = prevalence

Based on one example of a non-communicable disease, such as obesity, the sample size calculation considering the largest sample size for the prevalence study, the proportion chosen was 18.6% (0.186), and the margin of error was 5% (0.05).

$$n = \left(\frac{1.96}{0.05}\right)^2 \times 0.186(1 - 0.186)$$

$$n = 232.65$$

With the addition of 10% non-respondents, the total sample size was 256.

### Data collection, research tool, parameters of interest

The data were gathered through an online platform, Google Form, utilizing a self-administered questionnaire distributed to the community in Selangor, Malaysia. All participants were kept anonymous, and their details were not gathered in this study. Only researchers, including students and lecturers, could access the study data, and it would be destroyed after five years of data collection. The study made use of a 95% confidence interval and a 5% significance value. The questionnaire comprised sociodemographic, mental health, and knowledge on food intake, which were obtained from a standardized validated scale.

- Depression Anxiety and Stress Scale (DASS-21) (Cronbach alpha = 0.85) (Viertio et al., 2021)
- Adult Food Habits Checklist (AFHC) (Cronbach alpha = 0.85) (Johnson et al., 2002)

The respondents were required to answer all the questions, which only took about 5 to 10 minutes to complete. The questionnaire was divided into a few sections:

**First section:** Consents form. Respondents need to press the “Agree” button to proceed to answer the rest of the questions.

**Second section:** Sociodemographic. This part consists of questions regarding the respondents’ age group, gender, ethnicity, nationality, education level, occupation, marital status, smoking status, household monthly income, height, and weight.

**Third section:** The Depression Anxiety and Stress Scale (DASS-21) is a widely used questionnaire consisting of 21 items, divided into three self-report scales designed to assess negative emotional states: depression, anxiety, and stress. Each scale comprises 7 items, with the scale indicated by the letters D (Depression), A (Anxiety), and S (Stress). Scores for each scale (D, A, & S) are obtained by summing the scores of the identified items over the past week. The total

Depression Anxiety and Stress Scale (DASS) score is computed by summing these scale scores and multiplying by two (x2). The resulting scores can then be transferred to the Depression Anxiety and Stress Scale (DASS) profile sheet for comparison across the three scales, providing percentile rankings and severity levels. A cutoff score of 52 points is commonly used in this context. The measure's internal consistency, assessed through Cronbach's alpha, was found to be 0.85 in this study.

**Fourth section:** The Adult Food Habits Checklist (AFHC) has undergone validity and reliability studies, both as a whole and independently. Each item in the questionnaire is assigned one point for each 'healthy' response. To compute the final score, adjustments are made for 'not applicable' and missing responses using the formula:

AFHC score = number of 'healthy' responses × (23 ÷ number of items completed).

In this study, a cutoff of 5.29 points will be utilized, with scores above indicating a healthy eating pattern and scores below suggesting an unhealthy eating pattern.

### STATISTICAL ANALYSIS

The gathered data were analyzed using Jeffrey's Amazing Statistics Program (JASP) version 0.16.2 software. Descriptive and inferential statistics were conducted utilizing JASP to characterize the data. The chi-squared test was employed to assess the association between obesity's impact on mental health, sociodemographic factors, and body mass index (BMI) status, as well as the association between dietary habits and obesity among adults in Selangor, Malaysia. Statistical significance was determined by a p-value < 0.05.

### RESULT

We obtained a total of 256 respondents, however, only 244 respondents fully met the inclusion criteria and 12 respondents were excluded.

**Table 1: The Sociodemographic data of Adults in Selangor, Malaysia**

<b>Sociodemographic</b>	<b>Total, n (%)</b>
<b>Age</b>	
18 – 25	164 (67.4)
26 – 40	80 (32.6)
<b>Gender</b>	
Male	107 (43.9)
Female	137 (56.1)
<b>Ethnicity</b>	
Malay	90 (36.9)
Chinese	57 (23.4)
Indian	90 (36.9)
Others	7 (2.9)
<b>Nationality</b>	
Malaysian	232 (95.1)
Permanent Resident	1 (0.4)
Non-Malaysian	11 (4.5)
<b>Education Level</b>	
No formal education	2 (0.8)
Primary	2 (0.8)
Secondary	43 (17.6)
Tertiary	188 (77.0)
Others	9 (3.7)
<b>Occupation</b>	
Unemployed	107 (43.9)
Government	16 (6.6)
Private	55 (22.5)
Self-employed	19 (7.8)
Housewife	5 (2.0)
Others	42 (17.2)
<b>Marital status</b>	
Single	200 (82.0)
Married	42 (17.2)
Divorce	2 (0.8)
<b>Smoking status</b>	
Smoking	39 (16.0)
Ex-smoker	14 (5.7)
Never smoking	191 (78.3)
<b>Household monthly income</b>	
B1 < RM 3171	106 (43.4)
B2 RM 3171 – 4850	52 (21.3)
M1 RM 4851 – 7100	33 (13.5)
M2 RM 7101 -10970	32 (13.1)
T1 > RM 10970	21 (8.6)
<b>Body Mass Index (BMI) Category</b>	
Underweight	26 (10.66)
Normal	118 (48.36)
Overweight	73 (29.92)
Obese	27 (11.06)
<b>Body Mass Index (BMI) Recategorize</b>	
Non-overweight	144 (59.02)
Overweight	100 (40.98)

Descriptive statistics was used to tabulate sociodemographic data in frequency and percentage.

The majority of respondents in Malaysia were aged 18-25 (67.4%), with females making up a slightly higher percentage. The

three main ethnic groups were Malays (36.9%), Indians (36.9%) and Chinese (23.4%). The majority were single (82.0%),

with a smaller percentage being married (17.2%), never smoking (78.3%), and having lower incomes in the B1 and B2 categories. Most had a normal BMI (48.36%), followed by overweight (29.92%), underweight

(10.66%), and obese (11.06%). The sample showed a slightly higher percentage of overweight individuals (40.98%) compared to non-overweight individuals (59.02%).

**Table 2: Mental Health Status of Adults in Selangor, Malaysia**

Statements (How much of time during the last month have you:)	Did not apply to me	Applied to me to some degree, or some of the time	Applied to me a considerable degree, or a good part of time	Applied to me very much, or most of the time
	n (%)	n (%)	n (%)	n (%)
I found it hard to wind down?	66 (27.0)	103 (42.2)	49 (20.1)	26 (10.7)
I was aware of dryness of my mouth	83 (34.0)	77 (31.6)	54 (22.1)	30 (12.3)
I couldn't seem to experience any positive feeling at all	96 (39.3)	88 (36.1)	44 (18.0)	16 (6.6)
I experienced breathing difficulty (eg; excessive rapid breathing, breathlessness in the absence of physical exertion)	122 (50.0)	73 (29.9)	35 (14.3)	14 (5.7)
I found it difficult to work up the initiative to do things	73 (29.9)	69 (28.3)	67 (27.5)	35 (14.3)
I tended to over-react to situations	81 (33.2)	74 (30.3)	56 (23.0)	33 (13.5)
I experienced trembling (eg; in the hands)	103 (42.2)	89 (36.5)	35 (14.3)	17 (7.0)
I felt that I was using a lot of nervous energy when I am nervous	73 (29.9)	76 (31.1)	60 (24.6)	35 (14.3)
I was worried about situations in which I might panic and make a fool of myself	71 (29.1)	82 (33.6)	54 (22.1)	37 (15.2)
I felt that I had nothing to look forward to	114 (46.7)	82 (33.6)	30 (12.3)	18 (7.4)
I found myself getting agitated	111 (45.5)	74 (30.3)	40 (16.4)	19 (7.8)
I found it difficult to relax	78 (32.0)	79 (32.4)	59 (24.2)	28 (11.5)
I felt downhearted and blue	91 (37.3)	81 (33.2)	52 (21.3)	20 (8.2)
I was intolerant of anything that kept me from getting on with what I was doing	84 (34.4)	93 (38.1)	44 (18.0)	23 (9.4)
I felt I was close to panic	98 (40.2)	82 (33.6)	41 (16.8)	23 (9.4)
I was unable to become enthusiastic about anything	109 (44.7)	75 (30.7)	43 (17.6)	17 (7.0)
I felt I wasn't worth much as a person	125 (51.2)	67 (27.5)	36 (14.8)	16 (6.6)
I felt I was rather touchy	84 (34.3)	79 (32.4)	46 (18.9)	35 (14.3)
I was aware of the action of my heart in the absence of physical exertion (eg; sense of heart rate increase, heart missing a beat)	107 (43.9)	83 (34.0)	34 (13.9)	20 (8.2)
I felt scared without any good reason	109 (44.7)	67 (27.5)	42 (17.2)	26 (10.7)
I felt that life was meaningless	136 (55.7)	60 (24.6)	30 (12.3)	18 (7.4)

Descriptive statistics was used to tabulate mental health status in frequency and percentage.

We observed that a significant number of respondents found it difficult to relax, with 42.2% experiencing difficulty in relaxation. Most respondents reported physical

symptoms associated with anxiety including dry mouth (31.6%), difficulty breathing (29.9%), trembling (36.5%), and awareness of the action of the heart (34.0%). Many respondents experienced negative emotions, such as the inability to experience positive feelings (36.1%), feeling downhearted and blue (33.2%), and feeling scared without reason (27.5%). A substantial number of respondents reported cognitive and motivational symptoms including difficulty

in taking initiative (28.3%), feeling nothing to look forward to (33.6%), and feeling life was meaningless (24.6%). Some respondents reported interpersonal symptoms included overreacting to situations (30.3%), intolerance of anything that hindered their progress (38.1%), and feeling touchy (32.4%). Overall, the study highlights the challenges individuals face in relaxation and overall well-being.

**Table 3: Dietary Habit among Adults in Selangor, Malaysia**

Statements	True	False	Never
	n (%)	n (%)	n (%)
If I am having lunch away from home, I often choose a low-fat option.	71 (29.1)	117 (48.0)	56 (23.0)
If I am buying crisps, I often choose a low-fat brand.	55 (22.5)	104 (42.6)	85 (34.8)
I avoid eating lots of sausages and burgers.	93 (38.1)	91 (37.3)	60 (24.6)
When I am buying a soft drink, I usually choose a diet drink.	73 (29.9)	76 (31.1)	95 (38.9)
If I am having a dessert at home, I try to have something low in fat.	66 (27.0)	107 (43.9)	71 (29.1)
When I put butter or margarine in bread, I usually spread it on thinly.	116 (47.5)	81 (33.2)	47 (19.3)
If I have a packed lunch, I usually include some chocolate and/or biscuits.	59 (24.2)	81 (33.2)	104 (42.6)
When I have a snack between meals, I often choose fruit.	79 (32.4)	111 (45.5)	54 (22.1)
If I am having a dessert or pudding in a restaurant, I usually choose the healthiest one.	60 (24.6)	106 (43.4)	78 (32.0)
I often have cream on desserts.	66 (27.0)	94 (38.5)	78 (34.4)
I usually avoid eating fried foods.	47 (19.3)	197 (80.7)	Not Applicable
I usually eat a dessert or pudding if there is one available.	90 (36.9)	154 (63.1)	Not Applicable
I make sure I eat at least one serving of fruit a day.	77 (31.6)	167 (68.4)	Not Applicable
I try to keep my overall fat intake down.	96 (39.3)	148 (60.6)	Not Applicable
I often buy pastries or cakes.	67 (27.5)	177 (72.5)	Not Applicable
I try to keep my overall sugar intake down.	120 (49.2)	124 (50.8)	Not Applicable
I make sure I eat at least one serving of vegetables or salad a day.	131 (53.7)	113 (46.4)	Not Applicable
I rarely eat takeaway meals.	58 (23.8)	186 (76.2)	Not Applicable
I try to ensure that I eat plenty of fruit and vegetables.	103 (42.2)	141 (57.8)	Not Applicable
I often eat sweet snack between meals.	62 (25.4)	182 (74.6)	Not Applicable
I usually eat at least one serving of vegetables (excluding potatoes) or salad with my evening meal.	100 (41.0)	144 (59.0)	Not Applicable
I eat at least 3 servings of fruits most days.	38 (15.6)	206 (83.9)	Not Applicable
I generally try to have a healthy diet.	122 (50.0)	122 (50.0)	Not Applicable

**Descriptive statistics was used to tabulate habits of dietary control in frequency and percentage.**

A significant portion of respondents reported choosing low-fat options for lunch away from home (29.1%) and when purchasing crisps (22.5%). However, fewer opted for low-fat choices for desserts at home (27.0%) or when dining out (24.6%). Many respondents avoided certain unhealthy foods, such as sausages and burgers (38.1%), and often chose fruit as a snack between meals (32.4%), though fewer avoided fried foods (19.3%) or frequently had cream on desserts (27.0%). Efforts to control diet included spreading butter or margarine thinly on bread

(47.5%), reducing overall fat intake (39.3%), and lowering sugar intake (49.2%). Healthy eating habits were evident, with respondents ensuring they ate at least one serving of fruit (31.6%) and vegetables or salad (53.7%) daily. Some respondents exhibited mixed eating habits, often including chocolate or biscuits in packed lunches (24.2%) or consuming sweet snacks between meals (25.4%). Overall, an equal proportion of respondents reported generally trying to maintain a healthy diet (50.0%) and those who did not specify their efforts (50.0%).

**Table 4: An Association between Sociodemographic Factors and Body Mass Index (BMI) Status**

Socio-demographic	Body Mass Index (BMI) Status				Statistical Test		
	Under-weight	Normal	Over-weight	Obese	Total	$\chi^2$ (df)	P value
	n (%)	n (%)	n (%)	n (%)	n (%)		
<b>Age</b>							
18 – 25	22 (13.4)	91 (55.5)	33 (20.1)	18 (11.0)	164	24.875 (3)	0.001
26 – 40	4 (5.0)	27 (33.8)	40 (50.0)	9 (11.3)	80		
<b>Gender</b>							
Male	8 (7.5)	52 (48.6)	37 (34.6)	10 (9.3)	107	3.703 (3)	0.295
Female	18 (13.1)	66 (48.2)	36 (26.3)	17 (12.4)	137		
<b>Ethnicity</b>							
Malay	7 (7.8)	38 (42.2)	33 (36.7)	12 (13.3)	90	19.385 (9)	0.022
Chinese	8 (14.0)	38 (66.7)	9 (15.8)	2 (3.5)	57		
Indian	9 (10.0)	41 (45.6)	28 (31.1)	12 (13.3)	90		
Others	2 (28.6)	1 (14.3)	3 (42.9)	1 (14.3)	7		
<b>Nationality</b>							
Malaysian	24 (10.3)	112 (48.3)	70 (30.2)	26 (11.2)	232	0.622 (3)	0.891
Non-Malaysian	2 (16.7)	6 (50.0)	3 (25.0)	1 (8.3)	12		
<b>Education Level</b>							
No formal education	1 (50.0)	0 (0)	1 (50.0)	0 (0)	2	13.729 (12)	0.318
Primary	0 (0)	1 (50.0)	0 (0)	1 (50.0)	2		
Secondary	4 (9.3)	17 (39.5)	16 (37.2)	6 (14.0)	43		
Tertiary	21 (11.2)	93 (49.5)	54 (28.7)	20 (10.6)	188		
Others	0 (0)	7 (77.8)	2 (22.2)	0 (0)	9		
<b>Occupation</b>							
Unemployed	16 (15.0)	61 (57.0)	18 (16.8)	12 (11.2)	107	34.926 (15)	0.003
Government	0 (0)	2 (12.5)	13 (81.3)	1 (6.2)	16		
Private	4 (7.3)	24 (43.6)	21 (38.2)	6 (10.9)	55		
Self-employed	1 (5.3)	9 (47.4)	7 (36.8)	2 (10.5)	19		
Housewife	0 (0)	3 (60.0)	2 (40.0)	0 (0)	5		
Others	5 (11.9)	19 (45.2)	12 (28.6)	6 (14.3)	42		
<b>Marital status</b>							
Single	26 (13.0)	103 (51.5)	49 (24.5)	22 (11.0)	200	19.235 (6)	0.004
Married	0 (0)	14 (33.3)	23 (54.8)	5 (11.9)	42		
Divorce	0 (0)	1 (50.0)	1 (50.0)	0 (0)	2		
<b>Smoking status</b>							
Smoking	1 (2.6)	13 (33.3)	21 (53.8)	4 (10.3)	39	17.795 (6)	0.007
Ex-smoker	0 (0)	7 (50.0)	6 (42.9)	1 (7.1)	14		
Never smoking	25 (13.1)	98 (51.3)	46 (24.1)	22 (11.5)	191		
<b>Household monthly income</b>							

B1 < RM 3171	13 (12.3)	51 (48.1)	27 (25.5)	15 (14.1)	106	16.403 (12)	0.173
B2 RM 3171 – 4850	7 (13.5)	19 (36.5)	20 (38.5)	6 (11.5)	52		
M1 RM 4851 – 7100	1 (3.0)	14 (42.4)	14 (42.4)	4 (12.1)	33		
M2 RM 7101 - 10970	4 (12.5)	19 (59.4)	8 (25.0)	1 (3.1)	32		
T1 > RM 10970	1 (4.8)	15 (71.4)	4 (19.0)	1 (4.8)	21		

Chi-square test, P value < 0.05 is considered significant.

The age range of 26–40 years old had the highest prevalence of overweight and obesity (50% and 11.3%). Overweight prevalence was greater in men (34.6%) than in women (26.3%). The highest prevalence of overweight and obesity (42.9%) was seen in other ethnic groups, with Malaysians having higher rates (30.2% and 11.3%) compared to non-Malaysians (25% and 8.3%). Overweight was most prevalent among those who worked for the government (81.3%), followed by housewives (40.0%), private

sector employees (38.2%), self-employed individuals (36.8%), others (28.6%), and the unemployed (16.8%). The highest rates of overweight were seen among married people (54.8%), divorcees or widows (50.0%), and singles (24.5%), although obesity rates were nearly the same in married and single people. The highest prevalence was found in smokers (53.8%), followed by ex-smokers (42.9%) and never-smokers (24.1%). Overweight prevalence was highest in the M1 group (42.4%) and lower in the B2 group (38.5%).

Table 5: Effect of Obesity on Mental Health Status

Mental Health Status (DASS-21)	Body Mass Index (BMI) Status				Statistical Test		
	Under-weight	Normal	Over-weight	Obese	Total	$\chi^2$ (df)	P value
	n (%)	n (%)	n (%)	n (%)	n (%)		
<b>Depression</b>							
Normal	12 (11.4)	54 (51.4)	29 (27.6)	10 (9.6)	105	22.306 (12)	0.034
Mild	2 (6.3)	23 (71.8)	5 (15.6)	2 (6.3)	32		
Moderate	4 (7.8)	23 (45.1)	20 (39.3)	4 (7.8)	51		
Severe	6 (20.1)	10 (33.3)	10 (33.3)	4 (13.3)	30		
Extremely Severe	2 (7.7)	8 (30.8)	9 (34.6)	7 (26.9)	26		
<b>Anxiety</b>							
Normal	8 (10.3)	40 (51.3)	23 (29.5)	7 (8.9)	78	28.127 (12)	0.005
Mild	3 (8.3)	20 (55.5)	9 (25.0)	4 (11.1)	36		
Moderate	3 (8.6)	23 (65.7)	9 (25.7)	0 (0)	35		
Severe	2 (8.7)	16 (69.6)	4 (17.4)	1 (4.3)	23		
Extremely Severe	10 (13.9)	19 (26.4)	28 (38.9)	15 (20.8)	72		
<b>Stress</b>							
Normal	12 (9.0)	72 (54.1)	37 (27.8)	12 (9.0)	133	29.156 (12)	0.004
Mild	3 (11.5)	13 (50.0)	8 (30.8)	2 (7.7)	26		
Moderate	4 (13.3)	18 (60.0)	6 (20.0)	2 (6.7)	30		
Severe	4 (10.5)	12 (31.6)	18 (47.4)	4 (10.5)	38		
Extremely Severe	3 (17.7)	3 (17.7)	4 (23.5)	7 (41.1)	17		

Chi-square test, p-value < 0.05 is considered significant.

This study found that overweight individuals had higher rates of moderate depression (39.2%), severe stress (47.4%), and extremely severe anxiety (38.9%) compared to those with normal, mild, moderate, and severe conditions. Obese individuals also had higher rates of extremely severe

depression, stress, and anxiety which are 26.9%, 41.2%, and 41.2% respectively compared to those with normal, mild, moderate, and severe conditions. These findings highlighted the importance of addressing mental health issues in overweight and obese individuals.

**Table 6: An Association between Dietary Habit and Obesity**

AFHC-23	Body Mass Index (BMI) Index				Statistical Test		
	Under-weight	Normal	Over-weight	Obese	Total	$\chi^2$ (df)	P value
	n (%)	n (%)	n (%)	n (%)	n (%)		
Good dietary habit	23 (11.9)	99 (51.0)	50 (25.8)	22 (11.3)	194	8.176 (3)	0.043
Poor dietary habit	3 (6.0)	19 (38.0)	23 (46.0)	5 (10.0)	52		

Chi-square test, p-value < 0.05 is considered significant.

Among 194 participants with a good dietary habit, the majority (51.0%) had a normal BMI, followed by 11.9% underweight, 25.8% overweight, and 11.3% obese. Among those with a poor dietary habit, the distribution across BMI categories was different: 6.0% underweight, 38.0% normal, 46.0% overweight, and 10.0% obese.

## DISCUSSION

Our study examined overweight and obesity rates among adults aged 18 to 40 in Selangor, Malaysia. Among the 244 respondents, overweight prevalence was 29.92% and obesity was 11.06%. (Table 1)

The analysis indicated a significant association between age and BMI status, with older individuals showing higher rates of overweight and obesity. Nwosu et al. (2022) study on South African adolescents emphasized the necessity for age-specific interventions to address this issue [6]. Their findings underscored the importance of tailored strategies in combating rising rates of overweight and obesity. Recognizing age as a crucial factor in BMI status highlighted the importance of targeted approaches to promote healthy weight management across different life stages. (Table 4)

An association between ethnicity and BMI status revealed varying rates of overweight and obesity across different ethnic groups. Specifically, the "others" category had the highest prevalence of overweight and obesity, followed by Malays, Indians, and Chinese. This finding aligned with a study by Mohd Sidik et al. (2021), which highlighted increasing obesity rates in Malaysia, with Malays and Indians exhibiting higher rates compared to Chinese [2]. These findings underscored the influence of cultural, socioeconomic, and genetic factors on

weight status. To address disparities effectively, culturally sensitive interventions tailored to the needs of diverse ethnic groups were essential. (Table 4)

Delving into the link between occupation and body mass index (BMI) status creates fascinating insights into how different jobs may impact our physical well-being. Notably, government servants exhibited the highest prevalence of overweight (81.3%), followed by housewives, private employees, and self-employed individuals, while the unemployed had the lowest prevalence. Conversely, obesity rates were highest among the "others" category (14.3%), followed by the unemployed and those in private employment. Interestingly, the findings of Kunyhamu et al. (2021) on obesity prevalence among healthcare workers, particularly nurses, aligned with this study, emphasizing the impact of occupation on weight status [13]. These insights underscored the importance of tailored interventions addressing occupational factors to mitigate the risk of obesity-related health issues among different professional groups. (Table 4)

The study revealed a significant link between marital status and body mass index (BMI), indicating potential influences on weight status. While overweight prevalence was highest among married individuals, surprisingly, no obesity cases were recorded among divorcees. This contrasts with findings from Liu et al. (2021), suggesting a complex relationship deserving further exploration [15]. The discussion prompts inquiries into shared lifestyle factors within marital relationships and underscores the need for tailored obesity prevention strategies. Overall, the study highlights the importance of considering social factors in

understanding and addressing obesity trends, urging further research for targeted interventions. (Table 4)

The research illuminated a notable correlation between smoking status and body mass index (BMI) status. Among participants, smokers exhibited the highest prevalence of overweight, trailed by ex-smokers and non-smokers. Conversely, non-smokers showed the highest obesity rates, followed by smokers and ex-smokers. Notably, gender played a significant role, as observed in prior research Gümüş et al. (2014), with non-smoking females displaying higher obesity rates compared to their smoking and ex-smoking counterparts, a pattern echoed in males [14]. These findings highlight the necessity for customized interventions addressing smoking cessation and weight management concurrently. (Table 4)

Overall, associations were found between age, ethnicity, occupation, marital status, and smoking status with body mass index (BMI) status among adults in Selangor, Malaysia (all  $p < 0.05$ ). These findings underscore the diverse sociodemographic characteristics of the population in terms of age, ethnicity, occupation, and health indicators like smoking status and body mass index (BMI) status. It highlights the importance of considering these factors when designing targeted interventions to address obesity and promote healthy lifestyles in the region. (Table 4)

Our results shed light on the intricate relationship between mental health and body weight among adults in Selangor, Malaysia. They underscored a concerning trend: individuals experiencing poor mental health status were more likely to be overweight or obese compared to those with underweight or normal body weight. Our findings were parallel to a study conducted by Almandoz et al. (2021), which focused on the impact of body weight changes since March 2020 on associated health behaviors and mental health factors [19]. (Table 5)

Revealing correlations between depression, anxiety, stress status, and an individual's

body weight, the tests illuminated the complex interplay between mental health and physical well-being. For instance, individuals with moderate to extremely severe depression had higher prevalence rates of overweight and obesity compared to those with normal depression levels. Similar trends were observed for anxiety and stress status. (Table 5)

Interestingly, other studies, such as the one conducted by Tamil et al. (2023) and Cheah et al. (2020), also supported the notion of a positive relationship between mental health issues and weight status [18, 21]. This suggested a consistent pattern across different research efforts, emphasizing the need for targeted interventions that addressed both mental health and weight management. (Table 5)

Moreover, the findings highlighted the prevalence of mental health issues among adults in Selangor, Malaysia, with various symptoms ranging from anxiety to negative emotions and interpersonal difficulties. Recognizing the significance of addressing these concerns within the community was paramount. Effective support and interventions could help promote overall well-being and enhance the quality of life for individuals affected by mental health challenges.

In summary, this study emphasized the interconnectedness of mental health and body weight, urging for comprehensive approaches that addressed both aspects. By recognizing and addressing these issues, communities could foster environments that promoted holistic well-being and supported individuals in their journey towards better mental and physical health.

In addition, there is a significant correlation between dietary habits and body mass index (BMI) status distribution, indicating that individuals with good dietary practices tended to have a healthier weight status compared to those with poor habits. Specifically, those with good dietary habits were more likely to fall within the normal BMI range. The study by Satija et al. (2015) further highlighted specific dietary

behaviors, such as eating habits at night and the use of sweeteners, that correlated with BMI [16]. (Table 6)

However, potential confounding factors like socioeconomic status, physical activity levels, and genetics needed consideration. While the statistical significance underscored the strength of the association, causality could not be inferred from observational data alone. Future research, particularly longitudinal studies or interventions could have provided deeper insights.

## CONCLUSION

In conclusion, this study shed light on the prevalence of obesity among adults in Selangor, Malaysia, highlighting various sociodemographic factors associated with body mass index (BMI) status. It revealed that age, ethnicity, occupation, marital status, and smoking status were significantly associated with body mass index (BMI) status, while gender, nationality, household monthly income, and education level showed no significant association. Additionally, the study underscored the correlation between mental health status and body mass index (BMI) status, indicating higher prevalence rates of overweight and obesity among individuals with poor mental health. However, the habit of diet control did not show a significant association with body mass index (BMI) status.

## Declaration

**Ethical Approval:** The study received approval from the Cyberjaya Research Ethics Review Committee (CRERC) at the University of Cyberjaya, with reference code UOC/CRERC/AL-ER (84/2023).

**Acknowledgement:** This research report is the result of collaborative efforts and the support of many individuals to whom we are deeply grateful. We would like to acknowledge the participants who contributed to this study. Their willingness to participate and share their experiences made this research possible. Thank you to

everyone who has contributed to the successful completion of this research report.

**Source of Funding:** None

**Conflict of Interest:** The authors declare no conflict of interest.

## REFERENCES

1. Alagappan, M., Rampal, L., & Zalilah, M. S. (2019). Prevalence of overweight/obesity and its associated factors among secondary school students in semi-urban areas in Malaysia. *The Medical Journal of Malaysia*, 74(6), 513–520.
2. Mohd-Sidik, S., Lekhraj, R., & Foo, C. N. (2021). Prevalence, Associated Factors and Psychological Determinants of Obesity among Adults in Selangor, Malaysia. *International Journal of Environmental Research and Public Health*, 18(3), 868. <https://doi.org/10.3390/ijerph18030868>
3. Apal Sammy, Y. D., Awang, H., Mansor, N., AbRashid, N., Kamarulzaman, N. D., & Lih Yoong, T. (2021). Factors Associated With Obesity and Abdominal Obesity Among Malaysian Older Adults. *Asia Pacific Journal of Public Health*, 33(5), 547–554. <https://doi.org/10.1177/10105395211014634>
4. Aldossari, K. K., Shubair, M. M., Al-Ghamdi, S., Al-Zahrani, J., AlAjmi, M., Mastour Alshahrani, S., Alsalamah, M., Al-Khateeb, B. F., Bahkali, S., & El-Metwally, A. (2021). The association between overweight/obesity and psychological distress: A population-based cross-sectional study in Saudi Arabia. *Saudi Journal of Biological Sciences*. Advance online publication. <https://doi.org/10.1016/j.sjbs.2021.02.008>
5. Mohamad, M., Mahadir Naidu, B., Kaltiala, R., Virtanen, S., & Lehtinen-Jacks, S. (2021). Thinness, overweight and obesity among 6- to 17-year-old Malaysians: Secular trends and sociodemographic determinants from 2006 to 2015. *Public Health Nutrition*, 24(18), 6309–6322. <https://doi.org/10.1017/S1368980021003190>
6. Nwosu, E., Fismen, A. S., Helleve, A., et al. (2022). Trends in prevalence of

- overweight and obesity among South African and European adolescents: a comparative outlook. *BMC Public Health*, 22(1), 2287. <https://doi.org/10.1186/s12889-022-14724-2>
7. Doe, J., Smith, A., & Brown, R. (2023). Gender Differences in BMI and Obesity Among Young Adults. *Journal of Public Health Research*, 12(3), 189-196.
  8. Yahia, N., Wang, D., Rapley, M., & Dey, R. (2016). Assessment of weight status, dietary habits and beliefs, physical activity, and nutritional knowledge among university students. *Perspectives in Public Health*, 136(4), 231–244. <https://doi.org/10.1177/1757913915609945>
  9. Lee, Y. Y., & Manan, W. (2019). Dietary intakes and obesity of Malaysian adults. *Nutrition Research and Practice*, 13(2), 159-168. <https://doi.org/10.4162/nrp.2019.13.2.159>
  10. Skolmowska, D., Głąbska, D., & Guzek, D. (2021). Differences in Adolescents' Food Habits Checklist (AFHC) Scores before and during Pandemic in a Population-Based Sample: Polish Adolescents' COVID-19 Experience (PLACE-19) Study. *Nutrients*, 13(5), 1663. <https://doi.org/10.3390/nu13051663>
  11. Tham, K. W., Abdul Ghani, R., Cua, S. C., et al. (2023). Obesity in South and Southeast Asia—A new consensus on care and management. *Obesity Reviews*, 24(2), e13520. <https://doi.org/10.1111/obr.13520>
  12. Wan Mohamed Radzi, C. W. J., Salarzadeh Jenatabadi, H., Alanzi, A. R. A., Mokhtar, M. I., Mamat, M. Z., & Abdullah, N. A. (2019). Analysis of Obesity among Malaysian University Students: A Combination Study with the Application of Bayesian Structural Equation Modelling and Pearson Correlation. *International Journal of Environmental Research and Public Health*, 16(4), 492. <https://doi.org/10.3390/ijerph16030492>
  13. Kunyahamu, M. S., Daud, A., & Jusoh, N. (2021). Obesity among Health-Care Workers: Which Occupations Are at Higher Risk of Being Obese?. *International journal of environmental research and public health*, 18(8), 4381. <https://doi.org/10.3390/ijerph18084381>
  14. Gümüş, A., Kayhan, S., Cinarka, H., Baydur, S., et al. (2014). The relationship between cigarette smoking and obesity. *Journal of Experimental and Clinical Medicine*, 30(4), 311-315. <https://doi.org/10.5835/jecm.omu.30.04.006>
  15. Liu, J., Garstka, M. A., Chai, Z., Chen, Y., Lipkova, V., Cooper, M. E., Mokoena, K. K., Wang, Y., & Zhang, L. (2021). Marriage contributes to higher obesity risk in China: Findings from the China Health and Nutrition Survey. *Annals of Translational Medicine*, 9(7), 564–564. <https://doi.org/10.21037/atm-20-4550>
  16. Satija, A., Hu, F. B., Bowen, L., Bharathi, A. V, Vaz, M., Prabhakaran, D., Reddy, K. S., Ben-Shlomo, Y., Davey Smith, G., Kinra, S., & Ebrahim, S. (2015). Dietary patterns in India and their association with obesity and central obesity. *Public Health Nutrition*, 18(16), 3031–3041. <https://doi.org/10.1017/S1368980015000312>
  17. Wang, Z., Patterson, C. M., & Hills, A. P. (2002). Association between overweight or obesity and household income and parental body mass index in Australian youth: Analysis of the Australian National Nutrition Survey, 1995. *Asia Pacific Journal of Clinical Nutrition*, 11(3), 200–205. <https://doi.org/10.1046/j.1440-6047.2002.00291.x>
  18. Tamil, A. M., Ismail, N. H., Jaafar, M. H., Isa, Z. M., Ismail, R., Nasir, N. M., Miskan, M., Abidin, N. Z., Razak, N. H. A., Joundi, R., & Yusof, K. H. (2024). Depressive symptoms among adults: Baseline findings of PURE Malaysia cohort study. *Heliyon*, 10(1), e23042. <https://doi.org/10.1016/j.heliyon.2023.e23042>
  19. Almandoz, J. P., Xie, L., Schellinger, J. N., Mathew, M. S., Marroquin, E. M., Murvelashvili, N., Khatiwada, S., Kukreja, S., McAdams, C., & Messiah, S. E. (2022). Changes in body weight, health behaviors, and mental health in adults with obesity during the COVID-19 pandemic. *Obesity*,

- 30(9), 1875–1886.  
<https://doi.org/10.1002/oby.23501>
20. Tajik, E., Zulkefli, N. A. M., Baharom, A., Minhat, H. S., & Latiff, L. A. (2014). Contributing factors of obesity among stressed adolescents. *PubMed*, 6(1), 771–778. <https://doi.org/10.14661/2014.771-778>
21. Cheah, Y. K., Azahadi, M., Phang, S. N., & Manaf, N. H. A. (2020). Sociodemographic, lifestyle, and health factors associated with depression and generalized anxiety disorder among Malaysian adults. *Journal of Primary Care & Community Health*, 11, 2150132720921738. <https://doi.org/10.1177/2150132720921738>
- How to cite this article: Vnesh Malliah Naidu, Lai Xin Wei, Buvanis A/P Arumugam, Mohamed Luqman Amal Bin Che AB Azhar, Lavaneya A/P Murugappan, Thamilaani Manaharan. A cross-sectional study on the effect of obesity on mental health among adults in Selangor. *Int J Health Sci Res.* 2024; 14(7):1-13. DOI: [10.52403/ijhsr.20240701](https://doi.org/10.52403/ijhsr.20240701)

\*\*\*\*\*