

# Obese and Overweight Women and Public Health Issues in Hillah City, Iraq

Amean A. Yasir, Zainab Kh. A. Al-Mahdi Al-Amean

## I. INTRODUCTION

**Abstract**—In both developed and developing countries, obesity among women is increasing, but in different patterns and at very different speeds. It may have a negative effect on health, leading to reduced life expectancy and/or increased health problems. This research studied the age distribution among obese women, the types of overweight and obesity, and the extent of the problem of overweight/obesity and the obesity etiological factors among women in Hillah city in central Iraq. A total of 322 overweight and obese women were included in the study, those women were randomly selected. The Body Mass Index was used as indicator for overweight/obesity. The incidence of overweight/obesity among age groups were estimated, the etiology factors included genetic, environmental, genetic/environmental and endocrine disease. The overweight and obese women were screened for incidence of infection and/or diseases. The study found that the prevalence of 322 overweight and obese women in Hillah city in central Iraq was 19.25% and 80.78%, respectively. The obese women types were recorded based on BMI and WHO classification as class-1 obesity (29.81%), class-2 obesity (24.22%) and class-3 obesity (26.70%), the result was discrepancy non-significant, P value < 0.05. The incidence of overweight in women was high among those aged 20-29 years (90.32%), 6.45% aged 30-39 years old and 3.22% among  $\geq 60$  years old, while the incidence of obesity was 20.38% for those in the age group 20-29 years, 17.30% were 30-39 years, 23.84% were 40-49 years, 16.92% were 50-59 years group and 21.53% were  $\geq 60$  years age group. These results confirm that the age can be considered as a significant factor for obesity types (P value < 0.0001). The result also showed that the both genetic factors and environmental factors were responsible for incidents of overweight or obesity (84.78%) p value < 0.0001. The results also recorded cases of different repeated infections (skin infection, recurrent UTI and influenza), cancer, gallstones, high blood pressure, type 2 diabetes, and infertility. Weight stigma and bias generally refers to negative attitudes; Obesity can affect quality of life, and the results of this study recorded depression among overweight or obese women. This can lead to sexual problems, shame and guilt, social isolation and reduced work performance. Overweight and Obesity are real problems among women of all age groups and is associated with the risk of diseases and infection and negatively affects quality of life. This result warrants further studies into the prevalence of obesity among women in Hillah City in central Iraq and the immune response of obese women.

**Keywords**—Obesity, overweight, Iraq, body mass index.

THE global prevalence of obesity has increased at an inexorable rate, reaching epidemic proportions [1]. The World Health Organization (WHO) considered the women to be obese or overweight if her body mass index (BMI) is  $\geq 25$ , and obese if BMI is  $\geq 30$  [2]. A recent cohort study revealed link between the number of years of living with obesity is directly associated with a higher risk of disease and mortality [3].

There are many factors that lead obesity to become a major public health problem. If this issue is not addressed, it is likely that the number of overweight and obese individuals will continue to rise to even greater numbers, leading to a rise in the number of negative health outcomes and also healthcare costs [4]. Many studies mentioned the interactions between obesity and infection, and obesity mostly associated bacterial and viral infection, as well as high blood pressure and type 2 diabetes [5]. Many articles have its emphasis on reviewing current knowledge regarding the association between obesity and the risk and outcome of several infectious diseases. The findings indicate that the association between obesity and infections has not been comprehensively established in a wide range of infectious diseases [6]-[11]. There is a complex interaction taking place between immune cells and metabolic cells [12], [13]. Obesity violates the well-balanced system of adipocytes and immune cells, with subsequent disturbance to the immune surveillance system [12]. This work also examines the various etiologies of obesity. Obesity is not a single disease; more than 300 different genes and gene markers have been identified that are associated with obesity, and there are numerous environmental factors that appear to be necessary for the expression of obesity [14], [15]. The studies concerning interactions of the genetic factor with environmental factors constitute a new challenge to establish obesity [16]. Stigma and discrimination toward obese persons are pervasive and pose numerous consequences for their psychological and physical health. Weight stigma has negative implications for public health, and threatens the psychological and physical health of obese individuals, impedes the implementation of effective efforts to prevent obesity, and exacerbates health disparities [17]. The individual health consequences for weight stigma are unhealthy eating and lower physical activity, psychological disorders, stress induced pathophysiology and substandard health care and decreased health care utilization. The public health consequences are a disregard of societal and environmental contributors to obesity, impaired obesity prevention efforts, increased health disparities and social inequalities, and

A. Y. Amean is with the Collage of Nursing, University of Babylon. Hillah City, Iraq (phone: 00964(0)7812267818; e-mail: amean1966@yahoo.com).

A. A. Zainab is with Collage of Nursing, University of Babylon. Hillah City, Iraq (phone: 00964(0)7803773140; e-mail: zalmahdi@uobabylon.edu.iq).

ultimately worsens life outcomes for obese persons. All of these points can lead to morbidity and mortality [18]-[20]. For this reason, the present work will focus on the overweight and obesity distribution among different age groups, the incidence of diseases and/or infection, as well as the etiological factors and different negative attitudes among overweight and obese women in Hillah city in Iraq.

A total of 322 obese and overweight women were randomly selected from different socio demographic and economic level for this study.

*A. Assessment of Obesity*

Body mass index [BMI] depends on both the weight-for-height for classifying overweight and obesity in adults.

BMI is a person's weight in kilograms divided by the square of person height in meters (kg/m<sup>2</sup>) [21].

$$BMI = \left[ \frac{\text{Weight in Kg}}{(\text{Height in meter})^2} = \frac{Kg}{(m)^2} \right]$$

- BMI ≥ 25 is overweight
- BMI ≥ 30 is obesity (Table I).

Body mass index is a good and useful tool for measuring the population-level of overweight and obesity for both men and women and for all age groups.

Overweight and obesity etiological factors:

Etiological factors divided in to four determinants which include:

1. Genetic or inherited factors: this was estimated from family history for the incidence of obesity.
2. Environmental factors: this can be divided into many categories including eating breakfast, eating alone/ together, consumption of high calorie foods, etc.
3. Both genetic and environmental factors.
4. Endocrine factors [14]-[17]. The frequencies of diseases and infections were recorded among all cases. Weight stigma, bias and negative attitude were recorded among overweight and obese for depression, guilt, shame, sexual problems, social isolation and lower work achievement [17].

*B. Biometric Analysis*

Graphs and statistical analysis were done using PRISIM software.

II. RESULTS

TABLE I  
WHO CLASSIFICATION OF OVERWEIGHT AND OBESITY BY BMI [21]

Category	BMI (KG/M <sup>2</sup> )	Obesity Class
Underweight	< 18.5	
Normal	18.5–24.9	
Overweight	25.0–29.9	I
Obesity	30.0–34.9	
	35.0–39.9	II
Extreme obesity	40.0 +	III

Cases were grouped into overweight and obese women according to the WHO classification into four groups, overweight women (19%), class-1 obesity (30%), class-2

obesity (24%), and class-3 obesity (27%) [21], the classification is shown in Table II.

TABLE II  
OVER WEIGHT AND OBESITY AMONG WOMEN IN HILLAH CITY

Nutritional Status	No.	Percentage
Overweight (25.0-29.9 kg/m <sup>2</sup> )	62	19.25%
Class-1 Obesity (30-34.9 kg/m <sup>2</sup> )	96	29.81%
Class-2 Obesity (35-39.9 kg/m <sup>2</sup> )	78	24.22%
Class-3 Obesity (≥ 40 kg/m <sup>2</sup> )	86	26.70%
Total	322	100%

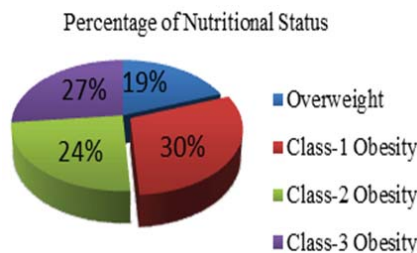


Fig. 1 Percentage of nutritional status among women in Hilla city, Iraq, Chi-Square:7, df=3, P value < 0.05 the result was discrepancy non-significant

Results shows that the incidence of overweight among the 20-29 years age group was high (p< 0.05), while there were no overweight cases recorded among the 40-49 years or 50-59 years age groups. The highest percentage for obesity was recorded among the 40-49 years age group (see Table III, Fig. 2).

Regarding to the etiology of obesity, cases were divided into four groups, the first group represents 3.1% of all cases, those cases have genetic predisposition to be obese women. The second group in which obesity is due to environmental factors, such as high-calorie food intake (sweets and high-fat foods) and low physical activity, while the third group of obesity is due to the combination of genetic and environmental factors, which represent the higher ratio 84.78% (p-value < 0.0001) and in the fourth group, obesity is due to endocrine and metabolic disease (1.55%), (see Table IV, Fig. 3), while 90% (289 cases) of overweight and obese woman have a family history of obesity.

TABLE III  
DISTRIBUTION OF OVERWEIGHT/OBESITY ACCORDING TO WOMEN'S AGE

Age Groups	BMI/No. of overweight women (%)	BMI/No. of obese women (%)
20-29	56 (90.32%)	53 (20.38)
30-39	4 (6.45%)	45 (17.30)
40-49	0	62 (23.84)
50-59	0	44 (16.92)
≥60	2 (3.22)	56 (21.53)
Total (322)	62 (19.25%)	260 (80.74%)

Chi-square, df: 110.8, 5; P value < 0.0001 \*\*\*\*

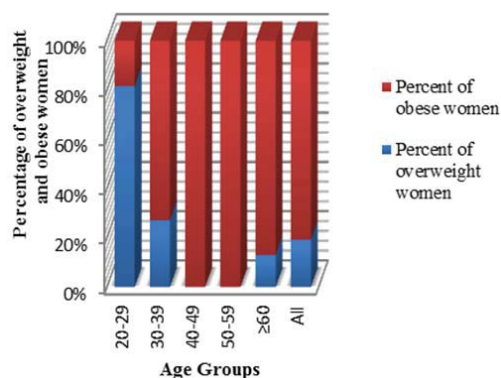


Fig. 2 Percent of overweight and obese women among different age groups

Many cases of diseases and/or infection were recorded among the overweight and obese women taking part in the study (see Table V, Fig. 4).

Among the 322 cases of overweight and obese women, weight stigma and bias generally refer to the negative attitudes recorded, and includes depression, sexual problems, social isolation and lower work achievement (see Table VI, Fig. 5).

TABLE IV  
THE ETIOLOGY OF OVER WEIGHT AND OBESITY

Etiological factors	No. of. cases	Percentage (%)
1-Genetic factor (genetic predisposition)	10	3.1%
2-Environmental factors: *High calories food intake (sweats and high fat food) * Low physical Activity) *Others	34	10.55%
3-Genetic factors+ Environmental factor	273	84.78%
4-Endocrine and metabolic disease.	5	1.55%

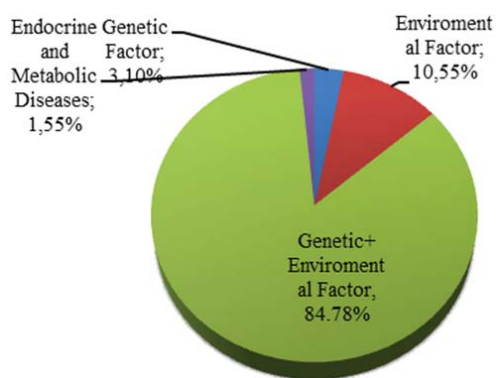


Fig. 3 Percentage of etiological factors of overweight and obesity, Chi-square 619.7 df=3 p value < 0.0001\*\*\*\*

### III. DISCUSSION

Overweight and obesity in women is a serious public health problem with a rapidly increasing prevalence found worldwide.

Cases were grouped into overweight and obese women according to the WHO classification into four groups,

overweight women (19%), class-1 obesity (30%), class-2 obesity (24%) and class-3 obesity (27%).

The highest percentage of overweight women were recorded among the 20-29 age group, while the highest ratio of obesity was recorded among the 40-49 years, 50-59 years age group, respectively, and can be attributed to hormonal changes among older women.

The results are consistent with other study conducted in the United States, which showed that obesity among middle-aged adults aged their age between (40-59 years) higher than among younger adults aged between (20-39 years) and among older people aged 60 years or older [22].

TABLE V  
DISEASES AND OR INFECTIONS RECORDED AMONG OVERWEIGHT AND OBESE WOMEN IN HILLAH CITY/IRAQ

Diseases and or Infections recorded	Frequency of Incidence (no. of cases)
High blood pressure (recorded among women ≥35)	25
Type 2 diabetes	10
Stroke	3
Cancer, including breast cancer	4
Breathing disorders, including sleep apnea, a potentially serious sleep disorder	70
Gynecologic problems, such as infertility and irregular periods (recorded among women in reproductive age 15-45)	7
Uterine Fibroid 25	5
Gout 17	17
Nonalcoholic fatty liver disease, a condition in which fat builds up in the liver and can cause inflammation or scarring	73
Osteoarthritis	12
Cellulitis and Skin conditions, including poor Wound healing	8
Gallbladder	25
Gallstone	12
Headache	25
Teeth problems	44
Hair fall	70
Skin blackness	18
Varicose Veins	45
Recurrent Urinary Tract Infection	20
(Atopic Dermatitis) Eczema	10
Susceptibility to influenza infection	50
Tuberculosis	10
Stomach ulcer (Helicobacter pylori)	20
Pneumonia	4

The etiology of obesity can be divided into four major groups which include genetic factors (single-gene defects or polygenic obesity), and environmental factors, which include programming of genetic expression, intrauterine factors, early developmental factors, familial and ethnic factors, diet composition and eating patterns, amount of physical activity, drugs, trauma, stress, emotional factors, surgery and infection, endocrine and metabolic diseases and abnormal regulation of body weight or body fat [9]. The present study showed that both genetic and environmental factors are responsible for overweight and/or obesity 84.78% (see Table IV, Fig. 3).

More than 300 different genes and gene markers have been identified that are associated with obesity and there are numerous environmental factors that appear to be necessary

for the expression of obesity. Most studies on obesity demonstrate that obesity is the interaction of a genetic predisposition and environmental factors to accumulate excess adipose tissue. Both genetic and environmental factors should be present for obesity to occur [14], [15].

A significant number of cases of metabolic diseases and/or

infection were recorded among the 322 cases of overweight and obese women taking part in this study (see Table V, Fig. 4).

The effects of obesity on the development of metabolic and cardiovascular problems in obese women are well documented [23].

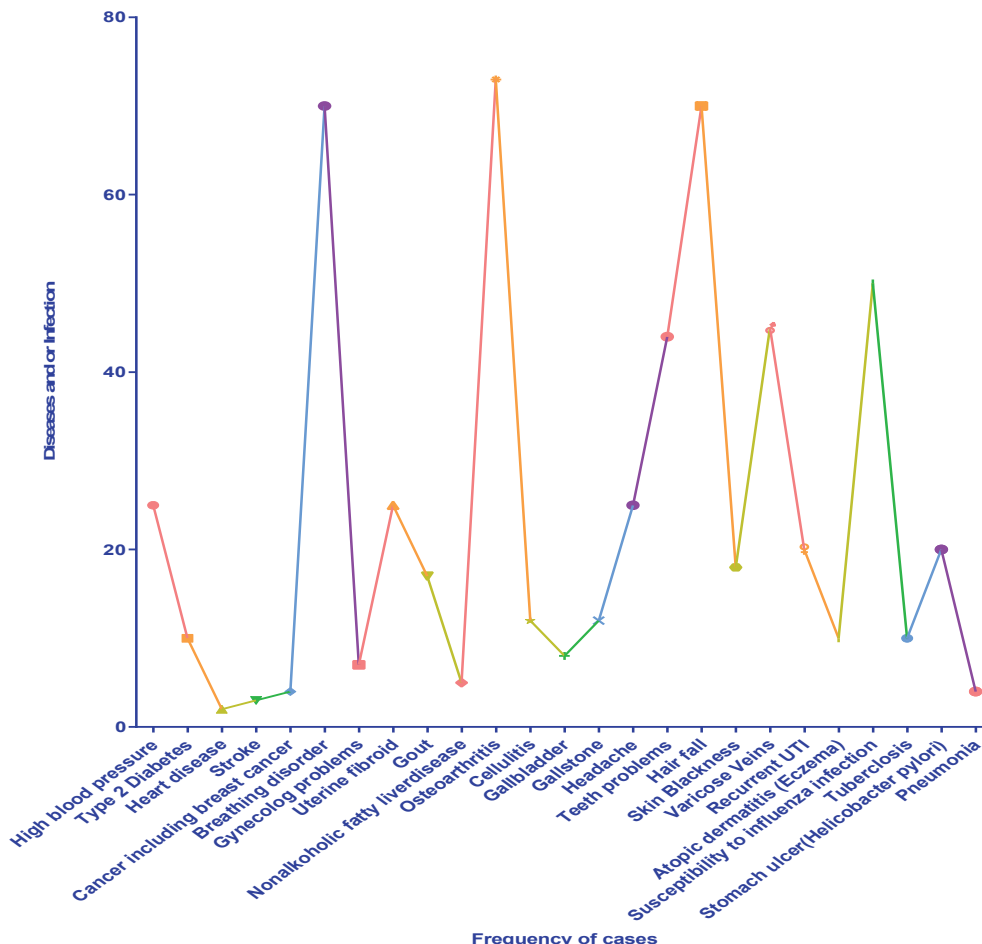


Fig. 4 Frequency of diseases and/or infections recorded among overweight and obese women in Hillah city/Iraq

TABLE VI  
QUALITY OF LIFE AMONG OVERWEIGHT AND OBESE WOMEN IN HILLAH CITY/IRAQ

Weight stigma and bias generally refer to negative attitudes	Incidence (%)
Depression (Higher risk for younger women with poor body image)	200 (62%)
*Sexual problems	42 (13%)
*Shame and guilt	150 (47%)
*Social isolation	120 (37%)
*Lower work achievement	90(30%)

The risk of diabetes mellitus increases with being overweight or obese and with a more visceral distribution of body fat. High fat levels enhance the degree of insulin resistance in overweight or obese people [24]. In turn, insulin resistance and increased visceral fat are the hallmarks of

metabolic syndrome, an assembly of risk factors for developing diabetes and cardiovascular disease [24]-[26].

Studies in women show that overweight or obesity was considered as risk factor for development of coronary artery disease (CAD) [27].

The mechanism of action is likely the relationship between obesity and insulin resistance. In a large cohort study of 37,000 women in Washington State, women with a BMI of 35 had an odds ratio (OR) of 2.7 for CAD and an OR of 5.4 for hypertension [28].

Obese women more likely to develop a number of potentially serious health problems, these health problems include high level of triglycerides and low high-density lipoprotein (HDL), cholesterolemia, type 2 diabetes, metabolic syndrome, high blood pressure, a combination of high blood sugar, heart disease, stroke, cancer, including cancer of the



endometrium, ovaries, uterus, cervix, endometrium, ovaries, breast, esophagus, liver, gallbladder, colon, rectum, pancreas, kidney and prostate, breathing disorders, sleep apnea, gynecologic problems, such as irregular periods, infertility, sexual health issues, and nonalcoholic fatty liver disease, a condition in which fat builds up in the liver and can cause scarring and inflammation, gallbladder disease, as well as skin conditions including poor wound healing osteoarthritis [4].

Our study recorded a significant number of infectious diseases (see Table V, Fig. 4).

Other study data indicate an association between obesity

and infectious diseases [29], [30]. Obesity may influence either the risk of getting an infection or the outcome of an infection once it is established. Obesity-related immune system dysregulation, decreased cell-mediated immune responses, obesity-related co-morbidities, respiratory dysfunction and pharmacological issues have been proposed as possible mechanisms [29], [31]. In the absence of sufficient scientific evidence, no dosing guidelines of anti-microbial for obesity have been published, although such works would be eagerly awaited [32].

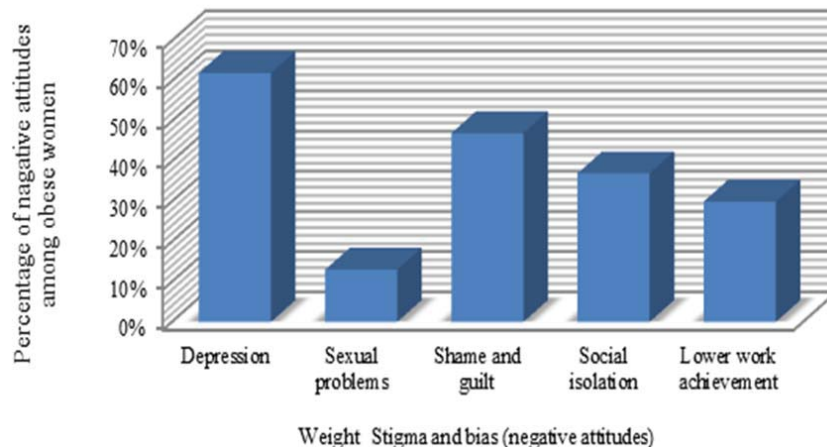


Fig. 5 Weight stigma and bias (negative attitudes) recorded among overweight and obese women in Hillah city/Iraq

Recent studies have proved that the immune response was impaired in obese people, which leads to an increased susceptibility to infection via different pathogenic bacteria such as *Mycobacterium tuberculosis*, *Helicobacter pylori* or viral infections such as influenza, coxsackievirus, and the encephalomyocarditis virus. Many obesity-associated changes such as excessive inflammation, metabolic changes, altered adipokine signaling, and even epigenetic regulation could affect the immune response [33].

The present work screened the negative attitudes for all cases which included depression, sexual problems, shame and guilt, social isolation and lower work achievement. The results of the study show the highest prevalence of depression among overweight and obese women (Table V, Fig. 5).

Depression on a level indicating psychiatric morbidity was more often seen in obese individuals, Professor Marianne Sullivan and her team from Sahlgrenska University Hospital, Sweden wrote in a journal article. They reported that the depression scores for obese people were as bad as, or worse than, those for patients with chronic pain.

Quality of life among obese women may be lower, too. Obese women may not be able to take part in everyday activities as easily as they like and may avoid public places. Obese people may even encounter discrimination. Other weight-related issues that may affect quality of life include: depression, disability, sexual problems, shame and guilt, social isolation, lower work achievement [17].

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