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# Prevalence of overweight/obesity and associated factors in adults in Erbil, Iraq: A household survey

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Sherzad A. Shabu*

## Abstract

**Background and objective**: Overweight and obesity are important risk factors for the development of some important chronic diseases and are, thus, considered leading risks for deaths. This study aimed to find out the prevalence of overweight and obesity with their associated risk factors in the adult population.

**Methods**: A household cross-sectional survey was carried out in Erbil city, Iraq from April to June 2017. The study involved 1480 adults selected through a multi-stage sampling method. A specially designed questionnaire was used to collect socio-demographic and other relevant data from the participants through direct interview. The height and weight were measured for all participants.

**Results:** The overall prevalence of overweight and obesity was 74.3% (33.4% overweight and 40.9% obese). There was a statistically significant association between being overweight and obese and older age groups, female gender, being married, low level of education, unemployment, not smoking, and not performing physical exercises. Following a multivariate analysis age (OR = 2.36, 95% CI = 1.60-3.49), female gender (OR = 2.17, 95% CI = 1.53-3.08), and married status (OR = 1.87, 95% CI = 1.20-2.90) were found to be statistically significant factors associated with overweight and obesity.

**Conclusion:** The prevalence of overweight and obesity in the adult population in Erbil city is very high. This alarming epidemic requires serious consideration of the health policymakers and public health specialists to plan effective and preventive and control measures. Health education is one way through which people's awareness of this important health issue could be raised.

**Keywords:** Overweight and obesity; Prevalence; Household survey; Risk factors.

## Introduction

Overweight and obesity involve abnormal or excessive fat accumulation and are considered a risk to health. A common measure of obesity is the Body Mass Index (BMI), which is obtained from dividing the weight of the individual (in kilograms) on the square of his or her height (in meters). A BMI equal or more than 25 is considered overweight, while a BMI of 30 and above is considered obese. A weight that is higher than what is regarded as a healthy weight for a given height is considered overweight or obese.[1] Globally, overweight and obesity are considered to be the 5th leading risk for deaths,[2] with an estimation of 2.8 million annual deaths among adults.[3]

Overweight and obesity are well-recognized risk factors for increasing the prevalence of different chronic diseases, including cardiovascular diseases, diabetes, and cancer. The estimated number of overweight adults in the world, according to a recent report, was 2.1 billion in 2013, compared to 857 million in 1980.[4] According to WHO, the prevalence of obesity worldwide has nearly tripled since 1975. In 2016, the prevalence of overweight and obesity in adults aging eighteen years and over was 39% and 13% respectively. Overweight and obesity are responsible for more deaths than underweight in countries where most of the overweight and obese people live.[5]

* Department of Community Medicine, College of Medicine, Hawler Medical University, Erbil, Iraq.

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A study conducted in the USA in 2011-2012 revealed that 34.9% of adults aging 20 years and more are obese.[5] According to a WHO working document in Eastern Mediterranean Region, data about adults from 16 different countries of the region showed very high rates of overweight/ obesity in Kuwait, Egypt, United Arab Emirates, Saudi Arabia, Jordan, and Bahrain. The prevalence of overweight/ obesity in these countries ranged from 69% to 77% in men and from 74% to 86% in women.[6]A study conducted in China in 2015 revealed an overweight/obesity prevalence of 69.8%, increasing with age till the age of 60 and declining later on.[7] Primary or idiopathic obesity is the most common type of obesity, and it needs to be distinguished from the secondary obesity, which could be due to endocrine disease, genetic disorders, central nervous system lesions, or other causes.[8] With the increasing trends of overweight and obesity in developing countries, and because of the limited research from Iraqi Kurdistan Region on this important topic, we thought that this study would improve the existing knowledge about the prevalence of overweight and obesity and their associated risk factors. This study aimed to find out the prevalence of overweight and obesity and identify the associated risk factors among the adult population in Erbil city, Iraqi Kurdistan Region.

## Methods

A community-based cross-sectional survey, based on household visits was carried out in Erbil city, Iraq during the period April to June 2017. A multi-stage sampling method was used to select the study participants. At first, Erbil city was divided into 20 quarters based on the administrative map of the city. Later on, a systematic random sampling method was used to collect 30 households per each quarter. The first household in each quarter was selected randomly. The study population included all the adult inhabitants of these households, aged 18 years and more. Data collection was done through direct interview using a special questionnaire designed for this purpose. The questionnaire included personal and socio-demographic information such as age, gender, marital status, educational level, and occupation. It also included questions on smoking, alcohol consumption, diet, salt intake and performing physical exercise. The weight of the study participants was measured using UNICEF calibrated digital scale (Seca 890) with the participants were wearing light clothes and put off their shoes. An average of one kilogram was estimated to be deducted from the participants' weight to replace the weight of their clothes. The height of participants was measured in centimeters using a portable tape measure which was fixed on the wall. Participants were asked to stand bare feet with their backs against the wall with their heels touching the wall. Epi-info was used to calculate the required sample size. Assuming that the prevalence of overweight/obesity in Erbil city population is similar to the 68.7% reported in a previous study conducted in the city,[9] we found that a sample size of 1473 was sufficient to achieve a 95% confidence interval for the prevalence (±2.5%) in this population. The sample was increased to 1500 to accommodate for non-response. Ethical approval was obtained from the Research Ethics Committee of the College of Medicine, Hawler Medical University. Approval was also obtained from Erbil Governor and Erbil Mayer offices to access the different quarters in Erbil city. Verbally informed consents were obtained from the participants who were assured about the anonymity of the study. The statistical package for the social sciences (version 19) was used for data entry and analysis. A *p*-value equal or less than 0.05 was considered as statistically significant. The multivariate analysis was based on binary logistic regression to adjust for and examine the independent effects of possible covariates. Odds ratios (ORs) with their 95% confidence intervals (CI) were

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calculated. ORs were estimated to measure the strength of the associations while 95% confidence intervals and the *p*-values were estimated for significance testing.

## Results

From 600 visited households, 1480 adults (363 males and 1117 females) were interviewed in this study. Age group 60 years and older constituted about a quarter of the participants, with an overall mean ± SD age of 46.4 ± 16.3 years, and a minimum age of 20 and a maximum one of 92 years. The participants were mainly housewives (62.6%) followed by government office-based (20.1%). The participants were mainly (45.1%) illiterates and most of them were married (90.1%) as shown in Table 1.

**Table 1:** The socio-demographic characteristics of the studied sample.

| Variable | Frequency | Percentage |
|---|---|---|
| **Age** | | |
| 20-29 | 251 | (17.0) |
| 30-39 | 336 | (22.7) |
| 40-49 | 307 | (20.7) |
| 50-59 | 211 | (14.3) |
| 60+ | 375 | (25.3) |
| **Gender** | | |
| Male | 363 | (24.5) |
| Female | 1117 | (75.5) |
| **Occupation** | | |
| Government office-based | 298 | (20.1) |
| Government labor-based | 3 | (0.2) |
| Private office-based | 37 | (2.5 |
| Private labor-based | 2 | (0.1) |
| Housewife | 926 | (62.6) |
| Student | 35 | (2.4) |
| None | 179 | (12.1) |
| **Education** | | |
| Illiterate | 667 | (45.1) |
| Primary | 339 | (22.9) |
| Secondary | 170 | (11.5) |
| Tertiary | 304 | (20.6) |
| **Marital status** | | |
| Single | 142 | (9.6) |
| Married | 1334 | (90.1) |
| Divorced | 2 | (0.1) |
| Widow | 2 | (0.1) |

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Of 1480 study participants, 494 (33.4%) were overweight, and 604 (40.8%) were obese. Most of the participants (93%) declared having an active lifestyle, but more than 94% of them were not practicing physical exercises. The majority of the participants were not smokers (92%), as shown in Table 2. A statistically significant association was found between being overweight/obese and older age groups, female, married, low educational level, unemployment, nonsmokers and not performing physical exercises, as shown in Table 3.

**Table 2:** Dietary and other lifestyle characteristics of the study participants.

| Characteristic | Frequency | Percent |
|---|---|---|
| **Weight status (n=1477)** | | |
| Underweight | 3 | (0.2) |
| Normal weight | 379 | (25.6) |
| Overweight | 494 | (33.4) |
| Obese | 604 | (40.8) |
| **Practicing exercise (n=1480)** | | |
| No | 1396 | (94.3) |
| Yes | 84 | (5.7) |
| **Smoking (n=1480)** | | |
| No | 1369 | (92.5) |
| Yes | 111 | (7.5) |

**Table 3:** Association between weight status and other variables.

| Variables | Weight status | | | *P* value |
|---|---|---|---|---|
| | Normal weight No. (%) | Overweight/obese No. (%) | Total No. (%) | |
| **Age groups** | | | | |
| 20-29 | 134 (53) | 117 (47) | 251(100) | |
| 30-39 | 97 (29) | 237 (71) | 334 (100) | |
| 40-49 | 51 (17) | 256 (83) | 307 (100) | <0.001 |
| 50-59 | 30 (14) | 180 (86) | 210 (100) | |
| 60+ | 67 (18) | 308 (82) | 375 (100) | |
| **Gender** | | | | |
| Male | 141 (39) | 222 (61) | 363 (100) | <0.001 |
| Female | 238 (21) | 876 (79) | 1114 (100) | |
| **Marital status** | | | | |
| Single | 85 (60) | 57 (40) | 142 (100) | <0.001 |
| Ever married | 294 (22) | 1041 (78) | 1335 (100) | |
| **Education level** | | | | |
| Illiterate | 122 (18) | 544 (82) | 666 (100) | |
| Primary | 86 (26) | 251 (74) | 337 (100) | <0.001 |
| Secondary | 60 (35) | 110 (65) | 170 (100) | |
| Tertiary | 111 (37) | 193 (63) | 304 (100) | |
| **Employment** | | | | |
| No | 265 (23) | 872 (77) | 1137 (100) | <0.001 |
| Yes | 114 (34) | 226 (66) | 340 (100) | |
| **Smoking** | | | | |
| No | 337 (25) | 1029 (75) | 1366(100) | |
| Yes | 42 (38) | 69 (62) | 111 (100) | <0.001 |
| **Performing exercise** | | | | |
| No | 340 (24) | 1054 (76) | 1394 (100) | <0.001 |
| Yes | 39 (47) | 44 (53) | 83 (100) | |

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The multivariate analysis of the studied variables showed age (OR 2.36, 95% CI 1.60-3.49), female (OR 2.17, 95% CI 1.53-3.08) and ever married (OR 1.87, 95% CI 1.20-2.90) as statistically significant factors associated with overweight/obesity as its shown in Table 4.

## Discussion

This study revealed that the overall prevalence of overweight and obesity among Erbil adults is 74.3%, with a prevalence of 33.4% for overweight and 40.9% for obesity. These results were higher compared to those of a study conducted in Erbil on the prevalence of metabolic syndrome, which revealed an overall prevalence of 68.7%, and a 35% prevalence of obesity.[9] They are also much higher than those of a study conducted in Basrah which revealed a 55.1% prevalence of overweight and obesity.[10] They were also much higher than those of an Iranian study, which revealed a 21.7% prevalence of obesity.[11] The current study revealed a significantly higher prevalence of overweight/obesity among the older age groups. These results are consistent with those reported by a study conducted in Malta which showed that those aged 55-64

**Table 4:** Multivariate analysis of factors associated with overweight/obesity.

| Variable | OR | 95% CI | | *P* value |
|---|---|---|---|---|
| | | Lower | Upper | |
| **Age in years** | | | | |
| 20-29 | Ref | | | |
| 30-39 | 2.36 | 1.60 | 3.49 | <0.001 |
| 40-49 | 4.63 | 2.98 | 7.19 | <0.001 |
| 50-59 | 6.42 | 3.84 | 10.73 | <0.001 |
| ≥60 | 4.10 | 2.66 | 6.30 | <0.001 |
| **Gender** | | | | |
| Male | Ref | | | |
| Female | 2.17 | 1.53 | 3.08 | <0.001 |
| **Marital status** | | | | |
| Single | Ref | | | |
| Ever married | 1.87 | 1.20 | 2.90 | 0.01 |
| **Employment** | | | | |
| Employed | Ref | | | |
| Non-Employed | 1.16 | 0.76 | 1.77 | 0.49 |
| **Education** | | | | |
| Tertiary | Ref | | | |
| Illiterate | 1.09 | 0.67 | 1.77 | 0.73 |
| Primary | 1.00 | 0.62 | 1.61 | 0.99 |
| Secondary | 1.05 | 0.66 | 1.66 | 0.85 |
| **Practicing exercise** | | | | |
| Regular exercise | Ref | | | |
| No exercise | 1.42 | 0.84 | 2.39 | 0.19 |
| **Smoking** | | | | |
| Smokers | Ref | | | |
| Non-smokers | 0.88 | 0.53 | 1.47 | 0.63 |

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years old exhibiting the highest prevalence of overweight for both genders.[12] A study conducted on Chinese adults also revealed that the prevalence of overweight increased with age up to the age of 60, and it declined after that.[7] This can be due to having a more sedentary lifestyle and performing less physical exercises while getting older. This study revealed that the prevalence of overweight/obesity is significantly higher among females compared to males, 79%, and 61%, respectively. These results agree with those of a study conducted in Iran, which revealed a prevalence of 63.9% and 49.7% among females and males, respectively.[13] They also agree with those of a study from Basrah that revealed a prevalence of 54.7% in females and 45.3% in males.[10] This difference can be attributed to the fact that females have a more sedentary lifestyle as the majority of female participants in our study were housewives. On the contrary, a study conducted on Chinese adults revealed a significant increase in BMI, waist circumference and hip circumference among males compared to female.[7] A significant statistical association was found between being overweight or obese and low educational level of the participants, 82% prevalence among illiterate participants compared to 74% of the primary education level, 65% and 63% among secondary and tertiary education levels respectively. This could be due to the low awareness level of the illiterate people about the health consequences of obesity since health awareness is expected to rise with the individual's educational level. These results were consistent with those of the Basrah's study, which revealed a significant increase in the rates of overweight and obesity among illiterates (34% and 35.3%) compared to those having a higher education level than secondary school (17.8% and 17.6%).[10] According to our study, higher (77%) prevalence of overweight/obesity were among unemployed adults compared to the employed ones (66%), and these were statistically significant. The study conducted in Nepal and Bangladesh showed a higher prevalence of overweight and obesity among employed women in Nepal, but a lower prevalence among employed women in Bangladesh.[14] A significant association was found between overweight/obesity and smoking status with a prevalence of 75% among nonsmokers compared to 62% among smokers. These results were consistent with those of a study conducted on Saudi adults.[15] These findings might be attributed to the fact that smoking is associated with decreased appetite. The study is primarily limited by having a larger sample of female participants. Since the household visits were made during the day hours, many men members of the households might have been at work. This limitation has possibly increased the overall prevalence of overweight and obesity since the prevalence was significantly higher among female participants.

## Conclusion

The overweight and obesity prevalence in Erbil city is very high. Overweight and obesity were significantly associated with increasing age, female gender, and marital status. This high prevalence requires serious consideration of the health policymakers and public health specialists to plan effective and preventive and control measures so that serious health consequences can be avoided.

## Competing interests

The author declares no competing interests.

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