



# Association Between Depression, Socioeconomic Factors and Dietary Intake in Married Women, Bandar Abbas, Iran

Samira Bahramitabar <sup>1</sup> and Shahram Zare <sup>2,\*</sup>

<sup>1</sup>Department of Oncology, University of Southern California, Los Angeles, United States

<sup>2</sup>Department of Community Medicine, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

\*Corresponding author: Department of Community Medicine, Hormozgan University of Medical Sciences, Bandar Abbas, Iran. Tel: +98-9171613924, Email: shzare159@gmail.com

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## Abstract

**Background:** Socioeconomic factors and dietary intake have suggested being effective in the appearance of depression. A limited number of studies have addressed such factors in Iranian communities. In this study, we investigated the relationship between depression, dietary intake, and socioeconomic factors among married women within a developing community in the south of Iran.

**Methods:** This cross-sectional study was conducted on 480 married women in 2014. A multi-stage cluster sampling method was used for sampling. The Beck depression inventory was used to assess the level of depression. 24-hour dietary intake information was collected using a self-administered diet history questionnaire. Demographic information and socioeconomic status were also collected using a predesigned questionnaire. The data were analyzed using the Pearson correlation coefficient, *t* test, chi-square test, analysis of variance, and linear and logistic regression models.

**Results:** The average age of subjects in this study was 38.6 (SD = 6.7) years. The prevalence of depression in married women was found to be 42.7%. A significant direct correlation was observed between the depression score and age, body mass index, the number of children, and family size. The daily intake of most macronutrients was inversely related to the depression level. Moreover, logistic regression analysis revealed that married women with lower education levels (odds ratio (OR) = 3.39, 95%CI: 1.83 - 5.43), unemployed spouses (OR = 5.72, 95%CI: 2.21 - 9.86), and low socioeconomic statuses (OR = 3.74, 95%CI: 2.33 - 5.07) were more likely to be depressed.

**Conclusions:** The findings of this study suggest that compared to other subpopulations in Iran and foreign communities, married women in Bandar Abbas show higher rates of depressive symptoms. Education, employment, and economic status are among the most important predictors of depression in married women. Therefore, it is essential to consider these factors in future studies.

**Keywords:** Depression, Diet, Socioeconomic Factors, Women

## 1. Background

Major depressive disorder (MDD) is one of the most prevalent psychiatric problems in the general population and is associated with socioeconomic factors. It is typically more common in women than in men and severely affects daily functioning (1). Changes in appetite and sleeping pattern, fatigue, indecisiveness, and lack of motivation are the most prominent characteristics of this disease. Depression is also a significant contributor to the global burden of diseases and it has affected people across the world. At its worst, it can even lead to suicide. According to the 2012 World Health Organization (WHO) report, it is estimated that depression affects 350 million people worldwide (2). Although in recent years, Iran has not conducted any national depression prevalence studies, regional studies have indicated that 3.4% to 29.6% of the general population suffers from a degree of depression. Ahmadi and Yousefi re-

ported that the prevalence of depression in Bakhtiari nomads is 29.6% (3). Kavyani et al. showed that the prevalence of depression in Tehran is 12.6% for women and 8.4% for men (4). Hadavi et al. conducted a study on the population of Rafsanjan, a city near Bandar Abbas, and suggested that the prevalence of mild, moderate, and major levels of depression in women referring to health centers was 18%, 19.1%, and 3.4%, respectively (5). In 2009, Phillips et al. reported that mood disorders, including MDD, were generally more common in women than in men. The prevalence of mood disorders, in their study, was 7.3% in women and 5.0% in men (6).

Although various studies have investigated the relationship between dietary intake and depressive symptoms, the obtained results have often been inconsistent. In some studies, dietary intake and nutritional status have been suggested to reduce depression and a low-quality diet has been linked to depression (7, 8). Whereas, Gougeon

et al. in a cohort of community-dwelling older Canadians showed that among healthy older adults, dietary patterns did not appear to be related to depression (9). In Iran, few studies have been conducted on this issue. In a study in the south of Tehran, Payab et al. reported that the daily intake of different macronutrients was lower among depressed individuals (10).

Bandar Abbas is the most southern city in Iran with a developing community. To the best of our knowledge, there has been no prevalence study on the depression of the general population of the city, and in this context, just a few studies have been conducted on patients suffering from specific diseases. Moreover, no information is available on the connection between socioeconomic factors, dietary intake, and depression in this community, specifically among married women.

## 2. Objectives

Therefore, the purpose of this study was to investigate the relationship between depression, dietary intake, and socioeconomic factors in married women in Bandar Abbas, a typical developing community in Iran.

## 3. Methods

### 3.1. Sample and Sampling Method

We conducted a cross-sectional study focusing on Bandar Abbas, the most southern city in Iran. The research data were collected in December 2014 and the subjects were 480 married women residing in the city in the past three years. As there was no information related to the prevalence of depression in married women in the city, the desired sample size was determined to be 480 individuals based on a 95% confidence level, a 5% accuracy, and a 20% increase in the initially calculated sample size to have a better precision of the results. A multi-stage cluster sampling method was used to randomly select the cases. In the first stage, 48 alleys in the city were randomly selected by using the city council information and in the second stage, in each selected alley, 10 eligible married women were chosen by using systematic house-to-house referring. In this study, we excluded women who did not have the ability to communicate with the interviewer and those who had a previous diagnosis of any severe mental or cognitive problem. All subjects were asked for written informed consent for participating in the study. The informed consent form had been previously approved by the Medical Ethics Committee of Hormozgan University of Medical Sciences.

### 3.2. Measurements

#### 3.2.1. Demographic Information

In order to collect the demographic data, we used a general information questionnaire to record the demographic characteristics such as age, education level, occupational status, family size, and socioeconomic characteristics.

In this study, the ownership of the household appliance was used as the criteria for the socioeconomic status of the participants. Information about household appliances such as furniture, handmade carpet, refrigerator, washing machine, dishwasher, microwave, personal computer, car, and residential property ownership was recorded. Having 1 - 3, 3 - 6, and 7 - 9 of these nine items indicated that the participants were in the low, middle, and high socioeconomic status, respectively (10).

#### 3.2.2. Weight and Height Measurements

Height and weight were measured according to the WHO protocol (11). A participant's height was measured to the nearest 0.1 cm using a stadiometer. Weight was measured without shoes and minimum dress by a Seca digital scale with an accuracy of 0.1 kg. The measurements were performed by trained health workers. The body mass index (BMI) was calculated as weight in kilogram divided by the square of height in meter. BMI categorization was based on the WHO standard guideline. Accordingly, women with a BMI of less than 18.5 were considered as being extremely underweight, 18.5 - 25 as normal, 25 - 30 as overweight, and above 30 as obese (11).

#### 3.2.3. Dietary Intake and Nutrition

A three-day food recall was used for dietary assessment. In this study, the participants were asked to record their 24-hour dietary intake in the last three days in a pre-designed dietary intake form (12). The ingredients of the food during these three days were categorized and their value was calculated and encoded. The data were then analyzed using a locally developed Dorosty Food Processor (DFP) software. This software is based on Iranian traditional foods and eating habits and is used for assessing macro and micronutrient intakes (13).

#### 3.2.4. Depression Assessment

The Beck Depression Inventory (BDI) is a 21-item multiple-choice self-report inventory that assesses the severity of depression. It is also one of the most commonly used instruments for screening depressive individuals in general populations. The total score for an individual is the sum of all BDI item scores and ranges from 0 to 63 with a higher score indicating more severe depressive symptoms

(14). In this study, the Persian version of the BDI (BDI-II-Persian) was used to measure the scores. This version of BDI was examined in an Iranian population and showed high internal consistency (Cronbach's alpha = 0.87) and acceptable test-retest reliability ( $r = 0.74$ ) (15). In this study, we divided the subjects into four groups; a score 0 - 10 was considered as normal, 11 - 16 as mild, 17 - 30 as moderate, and 31 - 63 as severe depression (15).

### 3.2.5. Statistical Analysis

The collected data were analyzed by Statistical Package for Social Sciences, version 19 (SPSS Inc., Chicago, Ill., USA). Descriptive statistics were used to describe the results. The Kolmogorov-Smirnov test was used to test the distribution of the data. In the case of normal data, the analysis of variance and *t* test were used; otherwise, the analysis was carried out by Mann-Whitney or Kruskal-Wallis tests. The relationship between categorical data and depression levels was evaluated using the chi-square test and the relationship between quantitative variables was evaluated by the Pearson correlation coefficient. Moreover, linear and logistic regression models were used to examine the relationship between depression scores and the collected variables. A value of  $P < 0.05$  was considered statistically significant.

## 4. Results

A total number of 480 individuals participated in this study. The age range of the participants was between 16 and 66 with an average of  $38.6 \pm 6.7$  years. Moreover, the average weight, height, and BMI of the participants were  $63.4 \pm 9.8$ ,  $164.3 \pm 4.2$ , and  $24.2 \pm 3.4$ , respectively. Table 1 shows the general characteristics of participants. The results indicated that 42.7% of the participants suffered from a degree of depression. The depression severity of the subjects showed that severe, moderate, and mild forms of depression could be seen in 5.4%, 12.1%, and 25.2% of the participants, respectively. A significant direct correlation was observed between the depression score and age ( $r = 0.21$ ,  $P = 0.017$ ). The results revealed that there was a significant difference in the BMI of depressed and normal subjects ( $P < 0.05$ ). It was also shown that depression was significantly correlated with the number of children and family size ( $r = 0.26$ ,  $P = 0.015$  and  $r = 0.19$ ,  $P = 0.011$ , respectively).

In this study, we evaluated the effect of qualitative characteristics on the severity of depression by using the chi-square test. The results demonstrated that only had marital status and occupation of women significant influences on the severity of depression (see Table 1 for detailed results).

The logistic regression analysis was used to explore the strength of the relationship between qualitative characteristics and depression.

For the regression model, the individuals' marital status, education, employment, spouse's employment, family size, and socioeconomic status were considered as the independent variables when entered into the logistic regression model to be tested as the predictors of depression status.

Table 2 shows the results of the logistic regression analysis. The odds ratios (ORs) are presented in this table as the estimators of the relative risk of personal characteristics. The OR determines how much is more likely that the characteristic of interest contributes to developing depression. For instance, the OR for widows compared to non-widowed women was 6.72. This means that widowed women were 6.72 times more likely to have depression. Illiteracy or low education (elementary level) in women and their husbands (OR = 3.39 and OR = 2.63, respectively), unemployment in women and their husbands (OR = 1.71 and OR = 5.72, respectively), and a low socioeconomic status (OR = 3.74) were among the factors that put married women at a greater risk of depression.

To evaluate the effect of quantitative factors on the depression score of participants, a multivariable regression model was fitted to the data. A summary of the results is shown in Table 3. Weight, height, and BMI were not effective factors in predicting depression score, but the effects of age and family size were significant in the model ( $P < 0.05$ ).

The daily dietary intake of the study participants is presented in Table 4. The variance analysis showed that the mean daily energy, protein, and carbohydrate intake had significant inverse relationships with the depression level ( $P < 0.05$ ). However, the percentages of energy intake from proteins, fats, and carbohydrates were not connected to the severity of depression.

## 5. Discussion

This study was designed to determine the association between depression, personal characteristics, socioeconomic factors, and dietary intake in married women living in Bandar Abbas, the most southern city in Iran. In our study, the prevalence of depression was 42.7%, which is higher than previous reports from other rural or urban areas. For example, according to a study by Ahmadi and Yousefi on nomads of Bakhtiari, the prevalence of depression was 29.6% (3). In addition, Kavyani et al. demonstrated that the prevalence of depression in 20 - 65-year-old women in Tehran was 12.6% (4) and Hadavi et al. in their study on women who referred to Rafsanjan's health

**Table 1.** Depression Prevalence and Association Between Qualitative Demographic Variables and Severity of Depression<sup>a</sup>

Depression Severity	Mild (N = 121)	Moderate (N = 121)	Severe (N = 58)	Total (N = 205)	$\chi^2$	P Value
<b>Marital status</b>					11.83	0.003 <sup>b</sup>
Married	118 (24.6)	55 (11.5)	21 (4.4)	194 (40.5)		
Widowed	3 (0.6)	3 (0.6)	5 (1.0)	11 (2.2)		
<b>Education level</b>					2.44	0.625
Illiterates or elementary school	74 (15.4)	38 (7.9)	16 (3.3)	128 (26.6)		
Secondary or high school	32 (6.7)	15 (3.1)	9 (1.9)	56 (11.7)		
University	15 (3.1)	5 (1.1)	1 (0.2)	21 (4.4)		
<b>Education level of spouses (n = 467)</b>					8.92	0.063
Illiterates or elementary school	36 (7.7)	15 (3.2)	8 (1.7)	59 (12.6)		
Secondary or high school	45 (9.7)	35 (7.5)	9 (1.9)	89 (19.1)		
University	34 (7.3)	8 (1.7)	4 (0.9)	46 (9.9)		
<b>Occupation</b>					9.74	0.045 <sup>b</sup>
Housekeeper	86 (17.9)	51 (10.6)	16 (3.4)	153 (31.9)		
Self-employed	10 (2.1)	2 (0.4)	4 (0.8)	16 (3.3)		
Government employee	25 (5.2)	5 (1.0)	6 (1.3)	36 (7.5)		
<b>Occupation of spouses (n = 467)</b>					1.20	0.977
Unemployed	6 (1.3)	5 (1.1)	1 (0.2)	12 (2.6)		
Self-employed	65 (13.9)	36 (7.7)	13 (2.8)	114 (24.4)		
Government employee	30 (6.4)	16 (3.4)	5 (1.1)	51 (10.9)		
Retired	11 (2.4)	5 (1.1)	1 (0.2)	17 (3.7)		
<b>Family size</b>					0.26	0.878
≤ 4	59 (12.3)	33 (6.9)	11 (2.3)	103 (21.5)		
≥ 5	62 (12.9)	30 (6.2)	10 (2.1)	102 (21.2)		
<b>Socioeconomic status</b>					5.27	0.260
Low	49 (10.2)	22 (4.6)	15 (3.1)	86 (17.9)		
Middle	55 (11.4)	31 (6.5)	10 (2.1)	96 (20.0)		
High	17 (3.6)	5 (1.0)	1 (0.2)	23 (4.8)		
<b>Total</b>	121 (25.2)	58 (12.1)	26 (5.4)	205 (42.7)		

<sup>a</sup> Values are expressed as No. (%).

<sup>b</sup> Statistically Significant.

centers, reported the prevalence of 18%, 19.1%, and 3.4% for the mild, moderate, and severe forms of depression, respectively (5). In other countries, Phillips et al. reported that the prevalence of mood disorders, including MDD, in Chinese women was 7.3% (6) and Cao et al. obtained a depression prevalence rate of 30.7% among reproductive women in rural areas of China (16). Furthermore, Timur and Sahin showed that the prevalence of depression among premenopausal and postmenopausal women in Turkey was 41.8% (17).

Consistent with a few other studies, we found a significant positive association between depression and age (5,

10, 18). It is noteworthy, however, that several studies have also shown a negative association or no association between age and depression (19-22). Furthermore, our study showed that although BMI was not a significant predictor of depression score in the regression model, a positive association was uncovered between depression and the BMI of the subjects. This finding also contradicts the results from some other studies (10, 18).

The spouse's social support has proven to protect married women from mental disorders and depression in the face of life adversities. This is more pronounced in traditional societies. Some studies report that married women

**Table 2.** The Logistic Regression Analysis of Qualitative Variables for Depression

Depression Severity	Normal (N = 275)	Depressed (N = 205)	B	S.E	F	OR (95% CI)
<b>Marital status</b>						
Married <sup>a</sup>	273	194	-	-	-	-
Widowed	2	11	2.05	2.98	0.012	7.73 (2.23 - 14.43) <sup>b</sup>
<b>Education level</b>						
Illiterates or elementary school	88	128	1.22	0.87	0.015	3.39 (1.83 - 5.43) <sup>b</sup>
Secondary or high school	138	56	-0.06	0.54	0.342	0.094 (0.13 - 2.57)
University <sup>a</sup>	49	21	-	-	-	-
<b>Education level of spouses (n = 467)</b>						
Illiterates or elementary school	39	59	0.97	0.72	0.008	2.63 (1.13 - 4.15) <sup>b</sup>
Secondary or high school	154	89	0.01	0.41	0.312	1.01 (0.29 - 1.93)
University <sup>a</sup>	80	46	-	-	-	-
<b>Occupation</b>						
Housekeeper	181	153	0.54	0.73	0.032	1.71 (1.08 - 4.21) <sup>b</sup>
Self-employed	21	16	0.43	0.97	0.132	1.54 (0.39 - 4.81)
Government employee <sup>a</sup>	73	36	-	-	-	-
<b>Occupation of spouses (n = 467)</b>						
Unemployed	3	12	1.74	1.63	0.022	5.72 (2.21 - 9.86) <sup>b</sup>
Self-employed	192	114	-0.16	0.51	0.223	0.85 (0.19 - 2.49)
Government employee <sup>a</sup>	73	51	-	-	-	-
Retired	5	17	1.58	1.59	0.031	4.86 (1.5 - 9.07) <sup>b</sup>
<b>Family size</b>						
≤ 4 <sup>a</sup>	118	103	-	-	-	-
≥ 5	157	102	-0.03	0.43	0.435	0.74 (0.22 - 1.64)
<b>Socioeconomic status</b>						
Low	49	86	1.32	0.61	0.026	3.74 (2.33 - 5.07) <sup>b</sup>
Middle	177	96	0.15	0.49	0.121	1.16 (0.41 - 2.44)
High <sup>a</sup>	49	23	-	-	-	-

Abbreviation: OR, odds ratio.

<sup>a</sup> Reference group.

<sup>b</sup> Statistically significant.

who have not lost their husbands perform better in the face of life problems (10). Our results revealed significantly higher depression rates among widows compared to women who have not lost their spouses.

Many previous studies concentrated on the relationship between depression and socioeconomic factors. It seems that inappropriate socioeconomic factors are among the major intensifiers of depression. Our study showed a negative relationship between depression and socioeconomic status. This result is consistent with the results of Christiani et al. on women in major cities of Indonesia (23) and Payab et al. in Rey, the south of Tehran, Iran (10).

Comparing our results with those from other published studies, an inverse correlation was found between the education level of the women or their spouses and depression status. This result was in accordance with other studies (17, 21, 23). The inverse relationship between education level and depression can be interpreted as the ability of educated people in adapting to an uncertain life. This ability will yield better performance in dealing with serious problems. Moreover, we found a significant association between the occupation of women and their state of depression. Similarly, the occupation status of spouses was strongly associated with depression in women. Women whose husbands were unemployed were 5.7 times more

**Table 3.** Regression Model for Depression Score and Quantitative Characteristics as the Dependent Variables<sup>a</sup>

Variable	$\beta \pm SE$	P Value
Constant <sup>b</sup>	6.26 $\pm$ 2.12	0.031
Age <sup>b</sup>	0.19 $\pm$ 0.06	0.013
Weight	0.04 $\pm$ 0.02	0.156
Height	-0.02 $\pm$ 0.03	0.093
BMI	0.14 $\pm$ 0.05	0.117
Family size <sup>b</sup>	1.36 $\pm$ 0.32	0.017
Number of children <sup>b</sup>	1.24 $\pm$ 0.27	0.023

Abbreviation: BMI, body mass index.

<sup>a</sup> R-square = 0.69.

<sup>b</sup> Statistically significant.

**Table 4.** Daily Diary Intake Parameters of the Participants Based on Depression Severity

Variable	Depression Severity				Total (N = 480)	ANOVA (P Value)
	Normal (N = 275)	Mild (N = 121)	Moderate (N = 58)	Severe (N = 26)		
Energy, kcal <sup>a</sup>	2127 $\pm$ 432	2120 $\pm$ 394	1986 $\pm$ 543	1704 $\pm$ 547	2068 $\pm$ 486	0.011
Protein, g <sup>a</sup>	69.5 $\pm$ 29.3	63.4 $\pm$ 23.2	56.7 $\pm$ 18.6	46 $\pm$ 18.8	64.2 $\pm$ 24.5	0.003
Fat, g <sup>a</sup>	68.2 $\pm$ 7.3	66.9 $\pm$ 7.8	63.26 $\pm$ 7.5	61.3 $\pm$ 6.9	65.3 $\pm$ 7.4	0.065
Carbohydrate, g <sup>a</sup>	345.3 $\pm$ 87.6	329.3 $\pm$ 77.1	287.2 $\pm$ 81.1	255.2 $\pm$ 83.7	312.7 $\pm$ 80.9	0.026
Percentage of energy intake from proteins	23.6 $\pm$ 4.3	22.3 $\pm$ 5.2	23.8 $\pm$ 5.1	22.3 $\pm$ 4.0	23.4 $\pm$ 4.7	0.433
Percentage of energy intake from fats	23.9 $\pm$ 5.9	22.8 $\pm$ 6.1	24.1 $\pm$ 4.7	24.6 $\pm$ 5.1	23.7 $\pm$ 5.4	0.567
Percentage of energy intake from carbohydrates	52.5 $\pm$ 4.2	53.9 $\pm$ 5.1	52.1 $\pm$ 4.9	53.1 $\pm$ 3.9	52.9 $\pm$ 4.8	0.521

<sup>a</sup> Values are expressed as mean  $\pm$  SD.

prone to depression. Likewise, women whose spouses were retired were 4.8 times more liable to depression. These results were consistent with the results of other studies (5, 10).

Contradictory results are published on the effect of dietary intake on depression. The results of some studies in the literature are in favor of the inverse effect of higher dietary intake of minerals and macronutrients on the prevalence of depressive symptoms (7-10). Consistent with these studies, our findings showed that taking more carbohydrates, proteins, and energy resulted in lower depression levels, and that average daily fat intake was not significantly different between normal and depressed individuals. Our results revealed that depressed married women had poor dietary intake and low education level and counseling on improved nutrition and dietary habits are extremely important. These findings are, however, contrary to the results of some other studies (9).

This study demonstrated that married women in Bandar Abbas are subject to depressive symptoms and more

attention should be dedicated to their socioeconomic and educational status. In our study, alternative factors that may be associated with depression in married women and the causal relationships between variables were not examined. Moreover, we did not control possible confounding variables that might affect the outcomes. The consideration of such factors requires further scrutiny.

### Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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## Footnotes

**Conflict of Interests:** The authors declare no potential conflict of interests.

**Ethical Considerations:** All subjects were asked for written informed consent for participating in the study. The informed consent form was previously approved by the Medical Ethics Committee of Hormozgan University of Medical Sciences.

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