

Is Food Insecurity Associated with Weight Status in Saudi Women?

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Abstract. Food insecurity is positively associated with overweight and obesity especially among women. The objectives of our study were to measure the prevalence of food insecurity among low-income women, and to assess the association between food insecurity and weight status, and socioeconomic status. Cross-sectional study, conducted in Al-Ahsa among 147 low-income women were interviewed to collect data about socioeconomic and anthropometric measurement and indicator. Fifty seven percent of the women reported as food insecure and majority of them were married, unemployed and housewife. Mean BMI was 26.5(kg/m²) for all women which is in overweight category with significant difference between groups. The multinomial regression models shows overweight women were significantly more likely to be housewife (odds ratio= 1.43, $P = 0.05$) and food insecure (odds ratio=2.19, $P = 0.02$), and no significant association with obesity. This study demonstrated that problem of food insecurity is present in Saudi Arabia and associated with weight status and some socioeconomic factor, more effort should be directed to decreasing the level of food insecurity in the community.

Keywords: Food insecurity, obesity, overweight, Saudi Arabia.

1. Introduction

Food insecurity is “Limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” [1]. Research shows food insecurity is positively associated with overweight and obesity especially among women [2]-[5]. Adams and colleagues [3], found that food insecurity without hunger is associated with increased likelihood of obesity in whites (odds ratio = 1.36) and food insecurity with hunger was associated with increased risk of obesity for Asians, Blacks and Hispanics (odds ratio = 2.81). Townsed *et al* [2], they found the prevalence of overweight in women increased as the severity of food insecurity increased among American women aged 20 years or older. Saudi Arabia is undergoing drastic nutrition transitions, the prevalence of obesity and overweight, especially in women, is a feature that is turning into a major public health problem. Al-Baghli and colleagues [6] found the prevalence of overweight was 32.8% and obesity was 45.5% in Al-Ahsa city, also they reported married women, and unemployed, low education level with low income had higher prevalence of obesity and overweight. The objectives of our study were to measure the prevalence of food insecurity among low-income women, and to determine the factors related to food insecurity such as weight status and socioeconomic status.

2. Material and Methods

2.1. Design and Subjects

This is an across-sectional study, conducted in Al-Ahsa located at The Eastern Province of Saudi Arabia. The permission to conduct the study was obtained from the Ftat Al-Ahsa Society and Al-Ber Society and the Ethic Committee of College of Agriculture and Food Science, King Faisal University, approved this study

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protocol. Participants were recruited from community societies (Ftat Al-Ahsa and Al-Ber) that primarily serve low-income families. A total 149 women participated in this study with consideration of possible literacy issues, the author verbally highlighted the main points of the consent form for participants, who read the consent form silently to themselves and were given the opportunity to ask any study related questions. Willing participants then signed the informed consent form.

2.2. Instrument

A pretested interview questionnaire was used to collect the following data; socioeconomic data as age, marital status, level of education, employment status, number of children and household income. Weight was measured to the nearest 0.1 kg and height to the nearest 0.1 cm then Body Mass Index (BMI) calculated and classified according to World Health Organization [7]. A ten-item Radimer/Cornell food insecurity scale [8], was translated to Arabic and pretested for clarity of meaning in a rural community with similar characteristics to the study subjects. The reliability of the items $\alpha = 0.81$ which was deemed acceptable. Classifying women by severity of food insecurity according to their answers to four categories food secure household food insecure, individual food insecure, and child hunger.

2.3. Analysis

We used the Statistical Package for Social Sciences SPSS program version 19 to analysis the data. Descriptive statistics, including frequencies, percentages, means and stander devotion were used. One-way analysis of variance was used for continues variable and Chi square for categorical data. Separate Multinomial regression models were estimated with overweight and obesity as dependent variables respectively, we compared overweight and obese with normal weight as reference category, the independent variable was food insecurity and the control variables were age over 40 years, greater the primary school, household income and housewife.

3. Results

Table 1. Demographics characteristic according to food security status

characteristic	All (n%)	Food secure (n=63)	Household food insecure (n=31)	Individual food insecure (n=17)	Child hunger (n=36)	^a P-value
Age (years)	41.89	42.2	42.32	42.52	38.58	0.51
Mean (s.d)						
< 40 years	66 (44.9)	27 (42.9)	11 (35.5)	10 (58.8)	18 (50)	0.40
≥ 40 years	81 (55.1)	36 (57.1)	20 (64.5)	7 (41.2)	18 (50)	
Marital status						
married	141 (95.9)	62 (98.4)	29 (93.5)	16 (94.1)	34 (94.4)	0.19
Divorced, widow	6 (4.1)	1(1.6)	2 (6.5)	1 (5.9)	2 (5.6)	
Number of children	5.53 (3.65)	5.9 (3.88)	5.06 (3.7)	4.17 (2.72)	5.91 (3.5)	0.27
Mean (s.d)						
Household size	7.4 (3.7)	7.9 (3.9)	7.6 (4.1)	5.8 (2.6)	7.5 (3.3)	
Education (years)	5.27(2.2)	5.63(2.7)	5.16(2.1)	5.47(2.2)	4.63(2.4)	0.83
Mean (s.d)						
No schooling	46 (31.3)	21 (33.3)	9 (29)	5 (29.4)	11 (30.6)	0.29
primary	50 (34)	19 (30.2)	11 (35.5)	7 (41.2)	13 (36.1)	
secondary	42 (28.6)	15 (23.8)	11 (35.5)	4 (23.5)	12 (33.3)	
university	9 (6.1)	8 (12.7)	-	1 (5.9)	-	
Employment status						
housewife	137 (93.2)	60 (95.2)	29 (93.5)	15 (88.2)	33 (91.7)	0.75
working	10 (6.8)	3 (4.8)	2 (6.5)	2 (11.8)	3 (8.3)	
Household income (SR ^b)	1989.63 (623.88)	2073.88 (647.8)	2132.85 (641.75)	1871.11 [*] (675.94)	1790.00 ^{**} (425.57)	0.042*
Mean (s.d)						

P<0.05; ^a One-way ANOVA or χ^2 analysis, ^b Saudi Real, 1 USD = 3.75 SR. ^{}Significant deference between food secure and Individual food insecure, ^{**}Significant deference between food secure and child hunger.

Table 1 shows that 43% of women reported to be food secure, 21% household food insecure, 12% individual food insecure and 24% child hunger. The mean age of women was 41.8 years, majority of them

were married and housewife with mean of five children in all groups. Women in child hunger group reported the lowest mean years of education (4.64 years), with significant mean differences between the groups for household income.

Table 2 shows the mean values of anthropometric measurement and indicator according to food security status, in general the mean BMI was 26.5(kg/m²) for all women which is in overweight category with significant difference between groups (food secure and child hunger). The mean weight, and mean BMI were significantly higher for women from child hunger (66 kg, BMI 27) compared to other groups.

Table 2. Anthropometric measurement and indicators according to food security status

Measurement	All (n=147)	Food secure (n=63)	Household food insecure (n=31)	Individual food insecure (n=17)	Child hunger (n=36)	^a P-value
^b Weight (kg) Mean (s.d)	63.57 (12)	58.93 (8.97)	64.37 (13.84)	62.1 (15.61)	66.22 (10.83)	0.030*
Height (m) Mean (s.d)	1.55 (2.4)	1.54 (0.071)	1.54 (0.076)	1.54 (0.079)	1.55 (0.066)	0.53
^c BMI (kg/m ²) Mean (s.d)	26.56 (5.36)	24.38 (3.77)	27.16 (6.35)	25.96 (7.13)	27.68 (4.77)	0.024*
18.5 - 24.9	76 (49)	30 (47.6)	15 (48.4)	11 (64.7)	16 (44.4)	0.002*
25 - 29.9	52 (35.4)	21 (33.3)	7 (22.6)	4 (23.5)	20 (55.6)	
≥30	23 (15.6)	12 (19)	9 (29)	2 (11.8)		

^a One-way ANOVA or χ^2 analysis, ^b Significant difference between food secure and child hunger, ^c Significant difference between food secure and child hunger. ^d Significant difference between individual food insecure and child hunger. *P<0.05

Result from the regression models were shown in Table 3. In weight status model being housewife was a significant predictor of women overweight but not obesity than those working women (odds ratio= 1.43 [CI= 1.19-2.31] $P = 0.05$), while women who were food insecure were twice as likely to be overweight but not obese compared to those who food secure (odds ratio=2.19 [CI=1.12-4.5] $P = 0.02$), there were no significant risk factors associated with obesity.

Table 3. Multinomial regression models: predicting likelihood of obesity, overweight and at risk waist circumference

	characteristic	P- value	Odds ration	95% CI
Over weight	Food insecure	0.02*	2.19	1.12 - 4.52
	Age over 40	0.84	0.19	0.07 - 2.61
	Over primary school degree	0.63	1.04	0.871 - 1.25
	Housewife	0.05*	1.43	1.19 - 2.31
	Household Income	0.08	0.99	0.99 - 1.02
Obese	Food insecure	0.11	0.25	0.045 - 1.49
	Age over 40	0.73	1.25	0.27 - 1.91
	Over primary school degree	0.62	0.94	0.87 - 1.25
	Housewife	0.54	1.44	0.33 - 2.34
	Household Income	0.88	1.01	0.99 - 1.002

*P<0.05

4. Discussion

The findings show that 57.2% of the women in present study were food insecure. This is similar to several studies conducted among women [9]-[12]. However, the prevalence reported in present study was considerably higher than that found for in Trinidad (26%) [13], and in Jordan (32%) [14]. That due to these women had more years of education and employed. In present study, only nine women had university degree eight of them were in food secure group and more than 90% of women didn't work. While we didn't find any significant association between socioeconomic variables and food insecurity, only for household income that finding is supported by several studies found income is an important determinant of household food insecurity [14]-[17], more women from food insecure group were overweight and obese compared to food secure group. Similar to findings reported in elsewhere [2]-[5]. A study by Townsend *et al* [2], examined the relationship between food insecurity and overweight in US women aged 20 years or older, they found the prevalence of overweight increased as food insecurity increased. Hanson *et al* [4], found marginally food

secure women tended to be overweight ($P = 0.05$), whereas women with low food security were significantly more likely to be obese ($P = 0.01$). While being a housewife and food insecure were substantial risk factors for overweight but not for obesity. Consistent with our findings Townsend *et al* [2], found women who are food insecure were 30% more likely to be overweight than those who were food secure (odds ratio = 1.3, $P = 0.005$). The Ugandan women [5], who being a housewife (odds ratio = 2.2, CI: 1.4 to 3.7), less education years (odds ratio = 1.6, CI: 1.2 to 2.1), lower household income (odds ratio = 1.6, CI: 1.1 to 2.0), were substantial risk factors for overweight. But, Kaiser *et al* [11] and Martin and Ferris [10], found food insecurity significantly related to obesity not overweight, whereas Hanson *et al* [4], found women with low food security were more likely to be obese ($P=0.01$). The present study had some limitations. First, this is across sectional study we cannot attribute caused or effect. Second the small sample size ($n=147$) limits the generalization of the study finding to whole women in Saudi Arabia. Third, although the Radimer/Cornell hunger and food insecurity instrument has been used in developed and developing countries, but in Saudi Arabia this is the used for the first time with low-income women. Forth, there may be variation in the interpretation of the items, which could lead to under, or over reporting of food insecurity. Finally, women may be embarrassed to answer the questions that are related to their income (cultural shame), to overcome this problem the women were interviewed in the absence of any family member and society staff, we explained that nothing they told her would be shared with anyone. In conclusion, our study has shown that food insecurity was highly prevalent among women and associated with weight status and some socioeconomic variables. This finding may provide useful insight for nutrition educator to plan effective intervention strategies to prevent food insecurity among low-income women and their families.

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