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Understanding a Link between Household Food Insecurity and Body Mass Index (BMI): A Study of Veteran and Non-veteran Women

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Abstract

The study explored how household food insecurity differs by BMI among veteran and non-veteran women in California? This study is a cross-sectional study of female veterans and nonveterans. The study had important findings linking food insecurity and BMI. Women who experienced food insecurity (78.9% vs. 21.1%) or cut or skipped meals for lack of money (84% vs. 16%) tend to be overweight/obese than normal weight.

Keywords: food insecurity, overweight/obesity, veteran, women.

Introduction

Obesity is an escalating public health problem in developed nations, particularly the United States: obesity has doubled since 1980 despite advances in health (WHO, 2014; Fink et al., 2014). Obesity affects more than a third of US adults (Ogden et al., 2014). Even young adults are affected by this epidemic; the prevalence of obesity and overweight is rising among this population (Casagrande, Menke, & Cowie, 2016; Lee et al., 2010). Vulnerable population groups, including the elderly, the poor, and ethnic minorities, are being affected by obesity (Hernandez, Reesor, & Murillo, 2017; Siahpush et al., 2013; McVey, Lopez, & Padilla, 2020), and therefore, obesity is becoming an important topic in recent years. Few researchers studied obesity among Hispanics in California (McVey, Lopez, & Padilla, 2020).

The causes of obesity are multifactorial. We can alter some factors to bring about changes in the growth dynamics of the epidemic, and others are non-modifiable. Only a few research studies focus on modifiable causes, such as poverty (E.g., Drewnowski, 2004; McVey, Lopez, & Padilla, 2020; Mathieu-Bolh, 2021). Household income had an inverse association with obesity prevalence (Benusic & Cheskin, 2021). Therefore, the purpose of this study was to explore the impact of family poverty variables on overweight/obesity. The proposed research answered the following questions: How does the prevalence of overweight/obesity differ by family poverty variables among women in California? How do veteran status and family poverty variables, combined with sociodemographic factors, affect the prevalence of overweight/obesity among women in California? This study assumes family poverty variables as risk factors for overweight/obesity. The proposed research is timely, as there is a growing demand for veteran research and obesity. There is a need to address the obesity crisis now, as obesity leads to several health complications, such as hip fracture, affecting an individual's mobility (Rikkonen et al., 2021). Since CHIS releases new variables and new data sets every other year, the use of CHIS is valuable for studying topics such as veteran status, which has not been studied widely by social science researchers (California Health Interview Survey, 2016a).

This study explored the impact of several family poverty variables. The incidence of family poverty is defined by multiple interactive factors, including family poverty level, Medi-Cal coverage, and food hardships experienced by the family, such as food insecurity, skipped meals due to lack of money, and inability to eat balanced meals by the family members due to lack of funds. Family food security is defined as "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (WHO, 1996). Lack of access to food is considered to be food insecurity. During the recession, the food insecurity rate increased from 11% to 14% (Rabbitt et al., 2017).

Although one in four Americans participates in food assistance programs such as Supplemental Nutritional Assistance Program (SNAP), food security varies by geographic location (Coleman-Jensen et al., 2017; Gregory & Coleman-Jensen, 2013; Leonard et al., 2018). Some researchers did not find a strong correlation between a family's low income and food-insecurity variables (Gundersen et al., 2017). Despite their low socioeconomic status, some families did not experience food insecurity; 33% of families below the Federal Poverty Threshold (FPT) did not experience food insecurity (Wight et al., 2014). Such associations provide a basis for using food insecurity and family poverty level as predictors of obesity, as they will not create any issues related to multicollinearity.

Literature Review

A review of studies addressing the factors that impact overweight/obesity shows heterogeneity in overweight/obesity across groups formed by ethnicity, education, veteran status, and family poverty level. Ethnic variations in Body Mass Index (BMI) have been studied by many researchers (Choi, 2012; Kim & Leigh, 2010; Masterson et al., 2017; Siahpush et al., 2013; Smith et al., 2016). Some found the prevalence of overweight/obesity among Latinos and Latino Immigrants (Choi, 2012; Masterson et al., 2017; McVey, Lopez, & Padilla, 2020; Smith et al., 2016). Education was inversely correlated with obesity (Kim & Leigh, 2010).

Conflicting findings have been presented about the risk factors for overweight/obesity, although food insecurity emerged as a predictor in several studies. Income, in general, had a strong correlation with obesity among women (Choi, 2012; Martin & Lippert, 2012; Kim & Leigh, 2010). Household income had an inverse association with obesity prevalence (Benusic & Cheskin, 2021).

Several researchers looked at the health outcomes of food insecurity on women (E.g., Chaudhuri, et al., 2021). Others examined the association between food insecurity and obesity (Choi, 2012; Ryan-Ibarra et al., 2017; Hernandez, Reesor, & Murillo, 2017; Martin & Lippert, 2012; Smith et al., 2016). Some found that individuals with lower food security experienced higher rates of obesity (Choi, 2012; Ryan-Ibarra et al., 2017; Hernandez, Reesor, & Murillo, 2017) among the elderly (Hernandez, Reesor, & Murillo, 2017) and mothers with children (Martin & Lippert, 2012). Similarly, Smith et al. (2016) found a positive association between food insecurity and obesity among Mexican American women. Few studies on veterans correlated food insecurity with obesity (Berkowitz et al., 2017). For example, Berkowitz et al. (2017) found that 14.3% with food insecurity experienced obesity. Specifically, the research on food insecurity among female and male veterans is scarce (Brostow et al., 2017; Widome et al., 2015). Research on male veterans (Brostow et al., 2017) focused on the predictors of food insecurity, finding that 6.4% of male veterans experience food insecurity. Another study found that 25% of veterans experienced food insecurity (Widome et al., 2015).

There is a multitude of factors associated with overweight and obesity. Studies on the association between family poverty variables and overweight/obesity have obtained inconsistent results. Investigation of the risk factors for obesity, including family poverty variables, in combination with veteran status, is often lacking in these studies. Also, limited data is available to establish the relationship between family poverty-related food hardships and obesity among women. Consequently, the present study used food insecurity as an independent variable.

Methodology

Extracted data for this study from the 2016 California Health Interview Survey (CHIS) Adult Survey database to explore the research questions of this study (California Health Interview Survey, 2016a). The primary dependent variable of the study had two weight categories: normal weight and overweight/obesity. BMI is calculated by dividing an individual's weight by their height (in meters) squared (CDCP, 2012). Body Mass Index (BMI) greater than what is considered healthy indicates overweight (BMI 25.0 to 29.9) or obesity (BMI 30 and above) among adults (CDCP, 2012).

CHIS contained the main independent variables of this study – family poverty variables -- were derived based on the microenvironmental factors such as family's poverty level, food insecurity, skipping a meal due to lack of income, inability to eat the balanced meals due to lack of money, and Medi-Cal coverage (California Health Interview Survey, 2016c). Family poverty level, divided into categories "poor" (<300 FPL) and "not poor" (<=300 FPL), was constructed using Federal Poverty Level (FPL) definitions.

This study selected veteran women who received one or more services from a VHA or other health care facility. This study used two sets of criteria to identify the veterans using a non-probability, purposive sampling procedure: 1) the sample was limited to female veterans (N=201); 2) women 18 years of age and above (California Health Interview Survey, 2016b). The study used a stratified-proportionate sampling procedure to produce a sample comprised of 10% of female nonveterans (n=175) from California. A veteran or a nonveteran was a unit of analysis.

Regarding demographics, 48.4% were married, 29.8% were separated, divorced, widowed, or living with a partner, and 21.8% were never married (Table 1). The racial and ethnic makeup of the study participants was diverse; 70.7% were White, non-Hispanics, 16.2% were Hispanics, and 12.8% were Asians. In terms of age, 19.7% were between 18 and 44 years, 52.4% were between 45 and 74, and 27.9% were 75 years and above. Two-thirds (63.3%) were homeowners, and 36.7% had rental or other arrangements. Most of the study participants (77.4%) lived in urban areas, and the rest (22.6%) lived in rural areas in CA. Less than a half (41.8%) were employed, and over two-fifths (44.5%) were college graduates. Two-fifths (43.4%) reported having physical or mental disabilities. The average household size of the study subjects was 2.28.

Table 1: Sociodemographic Characteristics, N=376

Sociodemographic Characteristics	f	%
Marital Status		
Married	182	48.4%
Never Married	82	21.8%
Widow/Separated/Other	112	29.8%
Age		
less than 45 years	74	19.7%
45-54 years	39	10.4%
55-64 years	60	15.9%
65-74 years	98	26.1%
75 and above	105	27.9%
Employed	157	41.8%
Federal Poverty Level		
0- 90% FPL	33	8.8%
100 - 199% FPL	62	16.5%
200 - 299% FPL[a]	42	11.2%
300% FPL and above	239	63.6%
Ethnicity		
White, Non-Hispanic	238	63.3%
Asian	47	12.2%
Latina	61	16.2%
Other	30	8.3%
Education		
High School Diploma or less	104	27.6%
Some College or AA Degree	105	27.9%
College Degree	167	44.5%
Home Owner	238	63.3%
Disabled	163	43.4%
Place of Residence		
Rural	85	22.6%
Urban	219	77.4%
Time Served in Active Duty		
Never (0)	175	46.5%
1 month to 2 years	54	14.4%
>2 to 4 years	81	21.5%
>4 to <20 years	53	14.1%
20 plus years	13	3.5%
Average Household Size (mean=2.28)		

Statistical Package for Social Sciences was used to analyze data. Descriptive statistics were used to understand the background of the study participants. Chi-square statistics were used to understand the prevalence of overweight/obesity in family poverty variables.

Results

Descriptive Statistics

Two-thirds (63.3%) were overweight/obese, and 36.7% had normal weight. The family poverty variables included FPL, food hardships, and medical coverage. More than a third (36.4%) were poor (< 300% FPL) and 63.6% were not poor (>=300% FPL) and one-fifth (19.9%) had Medi-Cal coverage (19.9%). Family poverty-related food variables include study samples' inability to afford to eat balanced meals (10.1%), not being able to afford food that did not last (9.8%), and food insecurity (10.1%).

Table 2: Overweight/Obesity by Food Insecurity and Poverty, N=376

Health Hardships	Normal Weight (n=138)	Overweight /Obesity (n=238)	χ^2
Experiencing Food Insecurity			
No	130(38.5%)	208(61.5%)	4.456**
Yes	8 (21.1%)	30(78.9%)	
Could not afford to eat balanced meals			
No	129(38.2%)	209(61.8%)	3.084*
Yes	9(23.7%)	29(76.3%)	
Cut or Skipped Meals			
No	134(38.2%)	217(61.8%)	4.940**
Yes	4(16.0%)	21(84.0%)	
Being Poor			
No	91(38.1%)	148(61.9%)	0.532
Yes	47(34.1%)	90(65.7%)	
Medical Coverage			
No	113(37.5%)	188(62.5%)	0.458
Yes	25(33.3%)	50(66.7%)	
**p < .10(approaching significance); **p < .05; df=1;*			

Food Insecurity and Poverty Variables by BMI Categories

The study found statistically significant differences between normal weight and overweight/obese women in their experience with food insecurity (χ^2 = 4.456; df=1; p<.035) and skipping a meal for lack of money (χ^2 = 4.940; df=1; p<.026) (Table 2). The females who experienced food insecurity tend to be overweight/obese (78.9% vs. 21.1%) than those with normal weight. The females who cut or skipped meals for lack of money tend to be overweight/obese (84% vs. 16%) than those with normal weight. However, statistically, significant differences were only approaching significance between normal weight and overweight/obese women in their experience with having difficulty with a balanced meal (χ^2 = 3.084; df=1; p<.079). Found no statistically significant differences between normal weight and overweight/obese women in FPL and Medi-Cal coverage (p>.05).

Discussion

This study explored the factors contributing to overweight/obesity among a community sample using the California Health Interview Survey (California Health Interview Survey, 2016a). Specifically, this research analyzed the power of family poverty variables and sociodemographic characteristics for predicting overweight/obesity among women. Inferential analysis of independent variables and covariates yielded three significant predictors of overweight/obesity. These three factors -- food insecurity, veteran status, and Latina status -- had a greater likelihood of predicting overweight/obesity.

This research fills a gap by yielding a significant, positive relationship between food insecurity experienced by family members and overweight/obesity of women. This result aligns with research on food insecurity and obesity (Choi, 2012; Ryan-Ibarra et al., 2017; Hernandez, Reesor, & Murillo, 2017) using a nonveteran population. Since food insecurity emerged as a strong predictor of overweight/obesity, health professionals need to respond to this problem through research, policy, and practice. Developing effective food assistance policies to lessen the impact of food insecurity on overweight/obesity can minimize the identified risk factor. Public policies focusing on food hardships must revisit how to modify food policies so that food insecurity and obesity do not co-occur among the people who receive food benefits.

Researchers examining Latinos and Latino immigrants supported this positive association (Choi, 2012; Masterson et al., 2017; Smith et al., 2016). This research has implications for health interventions. For example, developing hospital-based programs may prioritize weight management programs for minority families. In addition, outreaching minority households and women who experience food insecurity, veteran, and Latina, will yield the most significant benefits.

This research lays a foundation for future research focusing on the relationship between these variables, using various population groups based on income, health conditions, gender, and geographic region, and using large national-level data sets. Future research must focus on how such public policies deter obesity by oversampling people who receive public assistance. Some food-related hardship variables were not used in the multivariate analysis due to their strong association with food insecurity. Future family food insecurity studies can examine the food hardship variables by combining them with various variables.

The strength of this research was its use of a representative sample of female veteran and nonveteran samples from California; the results can be generalized to a population with similar characteristics. This study has a few limitations. Less than 12% of the model in the study experienced food insecurity limiting the researcher's ability to develop various group-based outcomes, such as outcomes-based on veteran status.

Consequently, more research should be conducted using these variables and many female veterans. Since this study is cross-sectional, the findings are associative. The study used a variety of self-reported measures, which might have errors. This study did not include changes in physical conditions or activities, affecting the study's outcome. This study identified important family factors influencing overweight/obesity among women, which will assist the interventions with examined groups, including people who experience food insecurity, female veterans, and Latina. This study suggests the need for culturally sensitive nutrition education for Hispanic women, as outlined by McVey, Lopez, & Padilla (2020). Also, gender-responsive intervention is needed as food insecurity has serious health consequences for women. The study findings emphasize the importance of providing healthy and affordable food options for adults who experience food insecurity. This hidden poverty-related problem has serious health outcomes, such as obesity. Targeting attainment of food security specifically among ethnic minorities wants further consideration.

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