Spring 4-29-2020

Food Insecurity among Undergraduate Students in the College of Education at the University of New Mexico

Qamar Hadi
University of New Mexico - Main Campus

Qamar Hadi

Candidate

IFCE – Nutrition and Dietetics Program

Department

This thesis is approved, and it is acceptable in quality and form for publication:

Approved by the Thesis Committee:

Deborah Cohen, DCN, RD, Chairperson

Diana Gonzales-Pacheco, DCN, RD

Kathryn Coakley, PhD, RD

Food Insecurity among Undergraduate Students in the College of Education at the University of New Mexico

By

Qamar Hadi

B.S., Biology, University of New Mexico, 2013

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Science

Nutrition

The University of New Mexico

Albuquerque, New Mexico

May, 2020

AKNOWLEDGEMENTS

I hereby acknowledge Dr. Deborah Cohen, my advisor and committee chair for her

patience, understanding, constant encouragement and guidance, and for following up with

my thesis progress every step of the way, as well as contributing to my academic and

professional development.

I would also like to thank my committee members, Dr. Kathryn Coakley and Dr.

Diana Gonzales-Pacheco for their valuable input and suggestions for the research project as

well as my professional development.

I would also like to thank my other professors, fellow graduate students, and the

Methodology Group for the statistical analysis assistance.

Special thanks to Dr. Myers and Shannon Kindilien for the assistance with the

statistical analysis program R and their positive feedback.

Lastly, I would like to thank my parents, my siblings, and best friends for their

endless encouragement and moral support throughout my academic career, and especially

this year.

Food Insecurity among Undergraduate Students in the College of Education at the University of New Mexico

By

Qamar Hadi

B.S., Biology, University of New Mexico, 2013

Master of Science

Nutrition

ABSTRACT

The purpose of this study was to assess factors associated with food insecurity among undergraduate students at the University of New Mexico (UNM). New Mexico has a higher estimated prevalence of adult food insecurity compared to the United States. The study design was a cross-sectional survey that collected self-reported socio-demographic data (race/ethnicity, age, living conditions, etc.) and food security status using an adapted 10-item USDA Adult Food Security Survey Module (AFSSM) from 83 undergraduate students enrolled in the UNM College of Education (COE). Data analysis was performed using Fisher's Exact test and logistic regression. The results showed that 43% of students were food insecure and 22.9% were very food insecure. Further data analysis showed that age, marital status, household combined income earned, and children living in household were associated with food security status. Socio-demographic factors are associated with food insecurity among undergraduate students at UNM and should be further explored.

Table of Contents

Chapter 1

Introduction

The United States Department of Agriculture (USDA) defines food insecurity as "the measure of lack of access, at times, to enough food for an active, healthy life for all household members and/or limited or uncertain availability of nutritionally adequate foods" (1). The USDA defines hunger as: "very low food security (old label= food insecurity with hunger) with reports of multiple indications of disrupted eating patterns and reduced food intake" (1).

Although the fifth largest state in geographic size (2), New Mexico (NM) ranks 37th in population. According to the US Census Bureau, Census American Community Survey (ACS) in 2018, the median household income for New Mexicans was approximately $12,000 less than that of the US average ($48,059 compared to $60,293) (3). Therefore, New Mexican households (individuals and families) need to budget their income for housing, utilities, transportation, medical care, and education more than the average person in the US.

In 2018, the population of NM was 2,095,428 (3) and the number of students who attended UNM was 24,393 (4). Approximately 1.16% of New Mexico's population are students attending UNM. Many students attend college in order to improve their economic status. Many of these individuals, in addition to attending college, also work full-time. Some of these individuals may be food insecure or at risk for food insecurity due to the financial burden placed on them as a result of costs related to tuition, course fees, textbooks and other expenditures associated with attending a university. With tuition and other college related expenses increasing along with decreasing unemployment rates, it is becoming more difficult

for an individual in NM to pursue a college degree without being employed in some type of paying job while attending school, either part or full-time. Budgeting for food may be a low priority for many of these individuals, especially those who have families, dependents, and for those who may be supporting parents or other family members.

The adult prevalence of food insecurity in NM was 15.5 % in 2017, compared to the prevalence in the US of 12.5% (5). Due to many financial burdens faced by college students in NM, the risk for becoming food insecure may be above the average US college student. Food insecurity could potentially affect students' ability to concentrate in class, influence the ability to effectively study and decrease productivity, all of which may interfere with academic responsibilities and achieving academic success. The aim of this study was to understand factors associated with food insecurity among college students at UNM. This study measured food security status and factors associated with food insecurity including hunger, ethnicity, socioeconomic status, living on/off campus, among university students (males and females, ages 18-65 years) enrolled at the UNM COE between the time frame of January 2019-May 2019.

RESEARCH QUESTION

What are the factors associated with hunger and self-reported food insecurity including ethnicity, socioeconomic status, living on/off campus, among undergraduate students (males and females, ages 18-65 years) enrolled at the UNM COE between the time frame of January 2019-May 2019?

NULL HYPOTHESIS

There are no factors associated with hunger and self-reported food insecurity including ethnicity, socioeconomic status, living on/off campus, among undergraduate students (males and females, ages 18-65 years) enrolled at the UNM COE between the time frame of January 2019-May 2019.

Chapter 2
Literature Review

The purpose of this literature review is to review the recent evidence regarding the prevalence of food insecurity and the various factors associated with food insecurity among college students in the United States, Canada, and South Africa. Two of the studies that will be reviewed were conducted in Canada and South Africa to provide a broader overview of the public health concern of food insecurity among college students outside of the US.

Berg et al (6) investigated food insecurity among 1416 college students [males, n= 864 (62.3%), females, n= 518 (37.5%); African, n= 967 (69.7%), White, n= 319 (23%); 18-86 years of age] at the University of the Free State, South Africa, using a cross-sectional, web-administered survey in 2013. The outcomes were measured by the Australian National Nutrition Survey (one-item measure) and the USDA Community Food Security Assessment Toolkit (10-item measure). The response rate was low at 4.6% (N= 31014 surveys administered, 1416 responded). The results showed the prevalence of food insecurity to be 65% (70.5% males, 60.4% females) according to the one-item measure and 60% (65.8% males, 55.1% females) according to the 10-item measure, specifying food insecurity "with hunger" and 25% "without hunger." The highest prevalence of food insecurity was found amongst those who were black/colored (79% vs. 65.6%), undergraduate (65.8%), first-generation college students (72.6%), males (70.5%), unmarried (67.4%), unemployed (66%), those relying on loans (68.3%), and those borrowing money for food (87%). The authors of this study concluded that higher education institutions would be better off offering students affordable, convenient, and nutritious meals if they plan on investing in higher education for

a larger percentage of the population and that students do not benefit from their education if they go to class feeling hungry.

Farahbakhsh et al (7) examined the relationship between food security status and self-perceived diet, health, and academic quality among 58 college students [males, n= 23 (39.7%), females, n= 35 (60.3%)] who received food hampers from the Campus Food Bank at the University of Alberta, Canada, from 2013-2014. A face-to-face survey was administered to participants by approaching them during peak hours of usage (six measures of self-rated health and well-being derived from the validated Canadian Community Health Survey) as well as an online dietary screener (Dietary Screener Questionnaire of the USA National Cancer Institute of foods consumed over the previous 30 days) to measure food insecurity. The response rate was 20.4% of the food pantry users. The results showed that 10.3% (n= 6) were food secure, 44.8% (n= 26) were moderately food insecure, and 44.8% (n= 26) were severely food insecure. Overall, 32.8% (n= 19) rated their general health as fair/poor, 27.6% (n= 16) rated their mental health as fair/poor and 60.3% (n= 35) indicated at least one adverse academic outcome due to not having enough money for food.

The students who were severely food insecure had a greater likelihood of reporting poor mental and physical health as well as lower quality of academic performance. The authors concluded that food insecurity negatively impacts university students' health, diet, and academic performance. The authors also indicated that interventions should be implemented at the government as well as the university levels to alleviate the root causes of food insecurity, which are likely to be inadequate student loans, lack of well-paying youth employment, lack of financial management skills and high tuition and fees.

Patton-López et al (8) studied food insecurity and factors associated with food insecurity in 354 students [male, n= 96 (27%), female, n= 258 (73%); Latino, n= 29 (8.2%); 72% between 18-24 years of age] who attended a rural university in western Oregon during 2011, by using a 40-item, web-based survey. The main outcome measure was food insecurity, and was assessed using the 6-item short form USDA Household Food Security Survey Module (HFSSM). Socioeconomic factors and demographic variables were assessed using multivariate logistic regression models. A total of 354 students completed the survey (5438 were sent the survey for a response rate of 7%). Results showed 59% of the participants were deemed food insecure at some point during the previous year. Factors associated with food insecurity included fair/poor health, being employed, and having an income < $15,000/year. Good academic performance (grade point average of $\geq$ 3.1) was inversely associated with food insecurity. The authors concluded that food insecurity is a serious concern among their university students and further research should examine types of food support systems that could be implemented to aid the affected students.

Morris et al (9) investigated the relationship between food security and socio-demographic factors in 1882 undergraduate students [male, n= 629 (33.%), female, n= 1253 (66.6%); White, n= 1456 (77.4%); $\geq$ 18 years of age] from four urban universities in Illinois in 2013. The USDA HFSSM was used to assess food insecurity which was administered through the universities' student listserv. The main outcome measures were food security status (by using the 10-item HFSSM questionnaire) as well as questions pertaining to demographics such as age, sex, race, and academic standing (i.e., GPA). The statistical analysis included frequencies and Chi-square tests (comparing food security to

demographics). A total of 48,658 surveys were administered and 1882 responded to the survey for a response rate of 3.78%. The results of this study showed that 35% of the participants were food insecure (16.6% with low food insecurity and 18.4% with very low food security). Of the participating students, 70% received financial support through student loans, 56.1% had part-time jobs, and 36.3% were unemployed. There were significant ($p < 0.001$) associations between food insecurity and race, GPA, living situation, and financial support. The authors concluded that there was a significant association between food insecurity and the factors mentioned previously. Interventions such as campus food banks and free food pantries need to target students of those demographics.

Silva et al (10) investigated food insecurity and associations with housing instability and university students' academic standing. The study was done in a large, urban university, the University of Massachusetts, in Boston, which does not have on-campus living options. Undergraduate and graduate student participants [N= 390; male, n= 152 (39%), female, n= 234 (60%); White, n= 168 (43%); 56% between ages 18-22 years] were surveyed in classroom settings in 2014. The outcome measures (food insecurity and housing insecurity) were assessed using a 32-item survey developed by the research team to accommodate the specific needs of the students of this university. Data analysis included descriptive statistics and t-tests to examine associations between food insecurity and demographics.

The results of this study showed that nearly a quarter of participants had experienced some form of food insecurity in the past year, and responses included *worrying about not having enough money for food* (27.4%), *skipping meals due to a lack of money to buy food* (26.9%), and *inability to eat nutritious meals due to monetary struggles* (27.3%). Two

hundred fifty participants (6.4%) reported having experienced severe food insecurity. There was a statistically significant (p < 0.01) affect in the individuals' ability to attend and perform in class from food insecurity and housing insecurity (e.g., not certain they could remain in their housing for next two weeks). Statistical (descriptive) analyses indicated that 46.6% of those who reported being housing insecure were "somewhat" to "very affected" in their ability to attend class, and 17.5% of those who did not report being housing insecure were "somewhat" to "very affected" in their ability to attend class. In addition, 81% of housing insecure students were "somewhat" to "very affected," and 22.9% of those not housing insecure were "somewhat" to "very affected" in their ability to perform in class.

Descriptive analyses indicated that 58.6% of food insecure students were "somewhat" to "very affected," and 16.4% of those not food insecure were "somewhat" to "very affected" in their ability to *attend* class. Also, 87.5% of the food insecure students were "somewhat" to "very affected," and 22.1% of those not food insecure were "somewhat" to "very affected" in their ability to *perform* in class. The authors concluded that the combination of food insecurity and housing insecurity negatively impact urban university students in terms of their academic performance and class attendance, placing them at a higher risk of not completing classes.

McArthur et al (11) conducted a study to measure prevalence and correlates of food insecurity among college students in Appalachia North Carolina, to compare food insecure and food secure students on correlates, and identify predictor variables. The study site was a university that showed high rates of poverty, obesity, and food insecurity. Participants were undergraduate and graduate students [N= 1093; males, n= 317 (31.6%), females, n=723

(68.4%); White, n= 957 (91.7%)] who were recruited during the 2015-2016 academic year. Outcome measures were assessed using a 73-item cross-sectional, anonymous, online questionnaire sent through the university listserv. This questionnaire contained the 10-item USDA AFSSM. Students were asked to report how they generally felt about their current food situation, by selecting all applicable descriptors from a list of 16 descriptors, followed by an 8-item money expenditure scale (MES). The MES was followed by a 29-item coping strategies scale (CSS) based on strategies used by food insecure persons. Students then completed a 4-item academic progress scale (APS), and then followed by a 4-item questionnaire from the National Health and Nutrition Examination Survey (NHANES) Social Support Scale. The questionnaires also elicited information on self-rated health status, food preparation and intake behaviors.

Statistical analysis was performed using the USDA's scoring system for the 10 AFSS questions, Chi-square tests for homogeneity compared proportions of food-secure and food-insecure students on demographic and behavioral variables and on MES and APS scores and a regression model was created to identify predictor variables for food insecurity. Of the 6000 recruited students, 1217 submitted questionnaires (for a response rate of 20.3%). The results of this study showed that based on students' AFSS scores, 588 students (53.8%) were food secure [n= 337 (30.8%) were high food secure and n= 251 (22.9%) were marginally food secure], whereas 505 students (46.2%) reported having experienced food insecurity over the previous 12 months [n= 239 (21.9%) were low food secure and n= 266 (24.3%) were very low food secure]. Approximately 62% of food insecure students were female, 16.8% were graduate students, 87% were undergraduate students, 60% were juniors or seniors, almost 90% self-classified as non-Hispanic White (reflecting the low level of diversity at the

university). Approximately 95% were not married and were full-time students, and 75% lived off-campus. In addition, approximately 60% of food insecure students held ≥ 1 part-time job, 75% had personal monthly incomes of < $500, 70% received financial aid, and approximately 75% had not purchased a meal plan.

Health-related findings indicated that about 121 (27%) of food insecure students rated their health status as fair or poor and that 175 (38%) were either overweight or obese, as classified by body mass index (BMI) category which was based on self-reported weight and height data. The authors concluded that further research needs to be done to account for overrepresentation and underrepresentation of some of the student populations. For example; White, female students were overrepresented in this study. The findings are not generalizable to other genders and ethnic minorities. Further, the authors suggest investigating the usefulness of food assistance programs available to students, in terms of the quality of food that is provided and the effectiveness on students' food security status.

Mirabitur et al (12) investigated the effects of college-student characteristics (gender, race/ethnicity, degree type, car access, and housing type) on food security and fruit-vegetable (FV) intake and how those associations differed between students who lived in housing with and without food provision. Those who lived in a dormitory, fraternity or sorority house, or a cooperative were grouped as having housing with food provision. Those who lived in an apartment, condo, or house with roommate(s), parent(s), with a partner, or alone were grouped as having housing without food provision. Two anonymous surveys were e-mailed to random samples of 5000 (undergraduate, graduate, and non–degree-seeking) students at a large, midwestern, public university in 2012 and 2013.

The response rate was 7%, yielding a sample of 514 students [males, n= 143 (27.8%),

females, n= 371 (72.2%); White, n= 337 (65.6%); $\geq$ 18 years of age]. The outcome measures

included the 6-item short form USDA AFSSM and a 2-item measure to report daily FV

servings that asked the students how many servings of fruit and vegetables they consumed on

a daily basis. Students were also asked to indicate the type of housing in which they lived

(dormitory; fraternity or sorority; cooperative; apartment, condo, or house with roommate(s);

apartment, condo, or house with parent(s); apartment, condo, or house with a partner;

apartment, condo, or house alone; other). Statistical analysis included Rao-Scott–adjusted

Chi-square tests, logistic regression, and multivariable linear regression using Stata.

The results showed that 46.3% of the students reported high, 12.2% marginal, 25.1%

low, and 16.4% very low food security. The mean daily FV servings for all students was 4.6

servings. Female students had a mean daily FV intake of 4.8 servings, which is significantly

higher ($p = 0.04$) than the 4.3 daily servings of male students. Students with high food

security ate, on average, 4.9 daily servings of FV, whereas those with marginal food security

consumed the least, 4.0 daily servings ($p = 0.01$). Students who lived in housing with food

provision reported 5.0 daily FV servings, significantly higher than those in housing without

food provision, who reported 4.4 daily servings ($p = 0.007$).

Among those who lived in housing without food provision, underrepresented

minorities were 2.73 times more likely to have lower food security than were White students

($p < .001$), and students without car access were 2.24 times more likely to have lower food

security than were students with car access ($p = .03$). In addition, PhD/graduate-professional

students' risk of lower food security was 0.32 ($p < .001$) meaning that undergraduate students

were 3.13 times more likely to have lower food security. These associations were not

11

significant among students living in housing with food provision. Among those in housing with food provision, Asian students ate 1.42 daily FV servings more than White students did ($p < .001$) and this was the only significant relationship between student characteristics and FV intake that emerged among those living in housing with food provision.

The authors concluded that future research should investigate the FV intake of college students by food security status because they found that among students living in housing without food provision, those with marginal and low food security ate significantly fewer daily FV servings than did students with high food security, controlling for gender, race/ethnicity, degree type, and car access. Lower FV intake is associated with lower general health status, lower GPAs, and academic hiatus. They also added that these findings suggest that housing with food provision may buffer the effects of being male, lacking car access, and having marginal or low food security on FV intake in college students.

Payne-Sturges et al (13) investigated the prevalence of food insecurity among students at a large mid-Atlantic public university. Their purpose was to examine the association between food insecurity, demographic characteristics, potential risk factors, and self-reported physical and mental health and academic performance. The authors originally aimed to recruit approximately 250 students out of 27,000 undergraduate students based on sample size calculations. Two hundred thirty seven students were recruited to take a 10-mintue web-based survey, for a 62% response rate [males, n= 45 (19%), females, n= 192 (81%); White, 49%; average age= 20.7 years]. The outcome measures were the 18-item USDA HFSSM plus questions on demographics, student status, economic factors, housing

stability, living arrangements, academic performance, and self-rated physical health and depression symptoms.

The statistical analyses included Chi-square tests and multivariate logistic regression analysis. Results showed that among the students surveyed, 15% (n= 35) were food insecure, with an additional 16% (n= 39) being at risk of food insecurity (marginal food insecurity). Among the food insecure, a subset of 43% (n= 15) of students had indications of very low food security or food insecurity with hunger. Food insecure students were more likely to report inability to eat balanced meals (80%), eating less (69%), and being hungry (69%) because there wasn't enough money for food during the past year. Off-campus living situation, financial independence, financial aid, use of university meal plans, employment, age, race, household income, and housing stability problems demonstrated statistically significant ($p < 0.05$) differences between the three food security statuses: food secure, food insecure, and at risk/marginal food insecurity.

Food security status was not associated with residency status or use of food assistance programs. African American or other race/ethnicity were significantly more likely to be food insecure or at risk than White students (AOR = 4.00, 95% confidence interval (CI)= 1.83-8.71, p value < .0001, and AOR = 5.26, 95% CI= 1.85-14.98, p value = .002, respectively). Additionally, receiving multiple forms of financial aid (AOR = 3.43, 95% CI= 1.85-6.37, p value < .001) and housing instability significantly (AOR = 8.00, 95% CI= 3.57-17.93, p value < .0001) increased the odds of being food insecure. Receiving financial support from family was associated with a decrease in the odds of food insecurity (AOR = 0.28, 95% CI= 0.12-0.67, p value = .004). Food insecurity status was not significantly associated with financial independence, student status, credit hours, years in school, living situation,

employment, or having a university meal plan after adjusting for age, gender, and family income. Also, food insecure and at-risk students were more likely to report their overall health as fair, poor, or very poor and reported lower energy levels compared with food secure students.

Food insecure students reported more frequent depression symptoms (little interest, feeling down, feeling tired, poor appetite, and feeling bad about oneself) and they experienced disruptions in academic work as a result of depression symptoms. The authors suggested that future studies should further investigate the negative effects of food insecurity on college students in terms of physical and mental health and academic outcomes, such as delayed graduation, discontinuous enrollment, and attenuation of academic goals as possible consequences of food insecurity.

Bruening et al (14) studied the longitudinal associations between food insecurity (FI) and health behaviors/outcomes based on a secondary analysis of a large, NIH-funded study, SPARC (Social Impact of Physical Activity and nutRition in College), aimed at assessing the nutrition, physical activity behaviors and weight outcomes of college freshmen in Arizona. College freshmen [N = 1138; males, n= 397 (35%), females, n= 741 (65%); White, 51%; $\geq$ 18 years of age; at baseline] who lived in six residence halls on three campuses of a single metropolitan university were recruited during the fall and spring semesters of the 2015–2016 academic year. Outcome measures included the 6-item short form USDA AFSSM to assess food security status, anthropometric variables (weight and height) were measured, and participants completed web-based surveys to assess self-reported eating, alcohol consumption, physical activity, sleep, and mental health. Outcomes were assessed at four

different times. Statistical analysis included Chi-square tests and logistic regression models. Data were collected at the beginning and end of both Fall and Spring semesters. Times 1 and 2 represent the beginning and end of the fall semester and Times 3 and 4 represent the beginning and end of the spring semester.

The sample consisted of 1138, 555, 428, and 400 freshmen at Times 1, 2, 3, and 4, respectively. The results showed that the prevalence of food insecurity was significantly higher at the end of the first semester (Time 2; 35%, $p \leq 0.01$) and end of the second semester (Time 4; 36% $p \leq 0.01$) when compared with the start of the first semester (Time 1; 28%). Food insecurity was significantly associated with lower odds of frequent breakfast consumption (OR $= 0.67$, $p \leq 0.01$), frequent evening meal consumption (OR $= 0.55$, $p \leq 0.01$), healthy eating habits on campus (OR $= 0.68$, $p \leq 0.01$), and healthy physical activity habits on campus (OR $= 0.66$, $p \leq 0.01$). Concurrent food insecurity was also significantly associated with higher odds of stress (OR $= 1.69$, $p \leq 0.01$), and depressed mood (OR $= 1.98$, $p \leq 0.01$). The authors found it particularly concerning that FI was associated with the students' mental health status. They suggested that mental health clinics and other student resource centers may consider screening for food insecurity using brief assessment tools, particularly during stressful times of the school year.

Hagedorn et al (15) conducted a multi-campus regional study among students at 10 four-year institutions in the Appalachian and Southeast regions of the United States to determine the prevalence of food insecurity among college students and factors associated with it, such as money expenditures, coping strategies, and academic performance. The outcomes were measured utilizing a 73-item survey that contained the following: the 10-item USDA AFSSM, the 8-item MES, the 29-item CSS, and the 4-item APS. Statistical analysis

included Pearson Chi-square tests, Wilcoxon analyses, and logistic regression. The survey was completed by 14,293 students across all 10 universities (response rate was approximately 14.4%). A sample of 13,642 had completed data that was qualified to determine food insecurity prevalence, and a sample of 9179 [males, n= 2385 (27.1%), females, n= 6406 (72.9%); White, 73.3%; $\geq$ 18 years of age] qualified for the investigation of the relation between food insecurity and money expenditures, coping strategies, and academic performance.

The results showed that the prevalence of food insecurity at all 10 universities ranged from 22.4% to 51.8% with an average prevalence of 30.5% (n= 2800) for the full sample. The MES (OR: 1.53), CSS (OR: 1.19), and APS (OR: 0.93) behaviors were significant predictors of food insecurity, as well as GPA (OR: 0.73). Academic year, health status, ethnicity, financial aid, and cooking frequency also were significant predictors of food security status. Specifically, sophomore (OR: 1.57) and junior (OR: 1.29) academic years showed heightened risk for food insecurity. Further, ethnic minority (OR: 1.55) students who reported fair/poor health (OR: 1.33), received financial aid (OR: 1.34), and cooked sometimes (OR: 1.24) or never (OR: 1.67) had increased odds of food insecurity. Based on these results, the authors concluded that there needs to be policy changes at the campus, state, and national level to address longer-term student needs to alleviate food insecurity and its harmful effects. They also suggested that advocacy should include expanding college students' Supplemental Nutrition Assistance Program (SNAP) eligibility, making college more affordable, and reforming of the campus dining programs for low-income students.

Martinez et al (16) investigated relationships between food insecurity and health-related outcomes including BMI and overall health in a graduate and undergraduate college student population [N= 8705; males, n= 2817 (33%), females, n= 5818 (67%); White, 34%, Asian, 31%, Hispanic, 21%; average age= 23 years]. The students were randomly sampled in the University of California 10-campus system to participate in an online survey in spring 2015. The students could either participate in The National College Health Assessment II (NCHA) survey (administered by the American College Health Association) or an independent campus survey (administered by the UC Institutional Research and Program Planning). The outcome measures included the 6-item short form USDA AFSSM to measure food insecurity status plus three items developed for the NCHA survey used in both online surveys to assess health behaviors, including diet quality, sleep sufficiency, and physical activity. Students self-reported their height and weight for the BMI calculations. Statistical analysis included t-tests, Chi-square post hoc tests, and path analysis to simultaneously examine individual and combined relationships of diet, physical activity, and sleep to food insecurity and health.

Of the 67,645 randomly sampled students, 8705 (the response rate was 12.9%) completed the survey on food insecurity, 8556 had complete data on both height and weight and 8546 had complete data on self-rated health. The results showed that 3438 (40% of total sample, 67% female, 32% male, 24% White, 77% minorities) of students were food insecure. Average BMI was 23.7 kg/m2 and the self-rated health score was 2.6 (SD, 1.0), which was equivalent to good. Significant differences were found between food secure and food insecure groups in mean days of enough sleep (3.6, SD, 2.0 vs. 2.9, SD, 1.9, (p < 0.001) respectively), moderate-to-vigorous physical activity (MVPA) (1.8, SD, 1.5 vs. 1.7, SD, 1.6,

(p < 0.01) respectively), and daily fruit/vegetable servings (2.5, SD, 1.4 vs. 2.0, SD, 1.3, (p < 0.001) respectively). A higher prevalence of students experiencing food insecurity were overweight or obese (i.e., BMI at or above 25 kg/m2) compared to students who were food secure (33% vs 25%, p < 0.001).

Path analysis showed that food insecurity was related to fewer days of enough sleep (Beta coefficient (B)= 0.21, p < 0.001), which in turn was related to an increase in BMI (B= 0.03, p = 0.001) and poor health (B= 0.17, p < 0.001). Food insecurity was also related to fewer days of MVPA (B= 0.03, p = 0.03), which in turn was related to an increase in BMI and poor health (B= 0.23, p < 0.001). Lastly, food insecurity was related to fewer daily servings of FV (B= 0.16, p < 0.001), which in turn was related to poor health (B= 0.11, p < 0.001). The authors concluded food insecurity may affect student health via multiple concurrent behavioral mechanisms that include poor lifestyle behaviors, which are known risk factors for poor health over the long term. They suggested that there ought to be more rigorous solutions to these problems as opposed to only providing food pantries as a short-term solution. They stated that for example, a university school meal program where students can qualify for free, reduced price or full price meals on campus was highly recommended.

Soldavini et al (17) investigated the prevalence of food insecurity and identified characteristics associated with food security status separately for undergraduate and graduate students at the University of North Carolina (UNC) during the fall term of 2016. Of the 29,895 students invited to participate in the online survey, 4819 students had completed responses (response rate was 16%). The sample included 59.8% undergraduate students [males, n= 755 (15.7%), females, n= 2100 (43.6%); White, 40.5%; mean age= 20 years] and

40.2% graduate students [males, n= 561 (11.6%), females, n= 1,367 (28.4%); White, 29%; mean age= 27.3]. The outcome measures were assessed using the 10-item USDA AFSSM to measure food security status and collected the students' self-reported information (height and weight) to calculate BMI. Statistical analysis included analysis of variance to compare mean age of students and other characteristics across food security status levels. Multinomial logistic regression was also used to examine the association between food security status and student status (undergraduate vs. graduate student).

The results of this study showed that in undergraduate students, 52.6% had high food security, 22.3% had marginal food security, and 25.2% were food insecure. For graduate students, 61.5% had high food security, 20.7% had marginal food security, and 17.8% were food insecure. Compared with undergraduate students, graduate students were significantly less likely to experience marginal food security (OR: 0.75, 95% CI= 0.59 - 0.95) or food insecurity (OR: 0.47, 95% CI= 0.37 - 0.60). For both undergraduate and graduate students, age (p <0.01), race/ethnicity (p <0.01), dependent children (p <0.01), enrollment status (p <0.04), employment status (p <0.01), having a car (p <0.02), financial aid (p <0.01), and perceived health rating (p <0.01) were significantly associated with food security status.

Additional characteristics significantly associated with food security status for undergraduate students included year in school (p <0.01), residency (p <0.01), BMI (p <0.01), cooking frequency (p <0.01), and having a meal plan (p <0.01). Among graduate students, marital status (p <0.01), and perceived cooking skills (p <0.02), were significantly associated with food security status. The authors concluded that even though graduate students are shown to be less food insecure than undergraduate students, they still displayed food insecurity and it should not be ignored. The authors suggested that undergraduate and

graduate students should be considered as separate groups with different situations and behavioral responses in order to more adequately address food insecurity.

El Zein et al (18) conducted a cross-sectional study assessing food insecurity and socio-demographic, health, academic, and food pantry correlates among first-year college students in the US [N= 855; males, n= 262 (31.2%), females, n= 579 (68.8%); White, 62.4%, minorities, 37.6%; age, 18 years (34.6%), $\geq$ 19 years (65.4%)]. The outcomes were measured using the 10-item USDA AFSSM online survey for food insecurity. Anthropometric measurements (weight, height, and waist circumference) were taken on campus by trained research assistants to calculate BMI. Sleep quality was measured using the 19-item Pittsburgh Sleep Quality Index (PSQI), perceived stress was measured using the 14-item Cohen's Perceived Stress Scale (PSS), disordered eating behaviors were measured using the Eating Attitudes Test-26 (EAT-26), and students were also asked to report whether a campus-based food pantry existed on their campus to test their awareness of campus food pantries. Statistical analysis included Chi-square test of independence and multiple logistic regression.

The results showed that of the 5426 students eligible to participate in the study, only 855 students completed the survey, for a response rate of 15.8%. The results found that 692 (81.0%) students were food secure with 476 (55.7%) having high food security and 216 (25.3%) with marginal food security. The remaining 163 (19%) students were classified as food insecure, consisting of 103 (12.0%) with low food security and 60 (7.0%) with very low food security. Food security status was significantly associated with race/ethnicity (p < 0.001), Pell grant status (p < 0.001), meal plan status (p = 0.001), place of residence (p =

0.001), and parental education (p < 0.001). In terms of overall health, food insecure students had significantly higher perceived stress (p < 0.001), disordered eating behaviors (p = 0.001), and poorer sleep quality compared to food secure students (p < 0.001). There were no significant differences between food insecure and food secure students with respect to BMI and waist circumference. Food insecure students had significantly higher odds of being classified as having high stress (OR = 4.65, 95% CI= 2.66 - 8.11), disordered eating behaviors (OR = 2.49, 95% CI= 1.20 – 4.90), and poor sleep quality (OR = 2.32, 95% CI= 1.43 – 3.76). Association of food insecurity with being overweight was not statistically significant.

There was a statistically significant percentage of food insecure students that use food pantries compared to the food secure students (22.2% vs 4.1%, p < 0.001). Yet, 77.8% of food insecure students were not making use of food pantries. The authors concluded that there was a need to develop evidence-based modalities to address this issue and its long term effects. These may include indexing Pell grants to tuition inflation, expanding work-study opportunities, providing full meal plan subsidies, hosting on-campus farmers' markets, expansion of SNAP outreach, and providing university support for financial and food literacy training.

In summary, 13 primary research articles have been reviewed in this literature review. The prevalence of food insecurity ranges from 15% to 60% across university campuses in the United States, Canada, and South Africa. The findings suggest that although female students are overrepresented in these studies, there may be an association between male students and food insecurity. Other socioeconomic factors such as living arrangements, race, loan use,

employment, being an undergraduate student, and physical/mental health were all associated

with food insecurity. There is no doubt that food insecurity is prevalent among the population

of college students and socio-demographic factors are associated with food security status.

Chapter 3

Methodology

STUDY DESIGN

This study was a descriptive, cross-sectional survey aimed to investigate food insecurity among college students at UNM. The 10-item USDA AFSSM was adapted for use in this study with added demographic questions. The purpose of the study was to evaluate factors associated with hunger and self-reported food insecurity including ethnicity, socioeconomic status, and living on/off campus, among undergraduate students (males and females, ages 18-65 years) enrolled in UNM during a period of time in the spring semester of 2019.

IRB APPROVAL

An application of the study objectives and design was submitted to the Office of the Institutional Review Board (OIRB) at UNM for human rights protection of the subjects involved in the study on October 23, 2018. IRB approval was granted on November 13, 2018.

SURVEY DEVELOPMENT

The USDA AFSSM was adapted for use in this study. The total number of questions included in the survey was 25. Three screening questions were developed to make sure the participants agree to the elements of consent, were undergraduate students, and were currently enrolled at the UNM COE. Twelve demographic questions were also included. An additional ten questions were taken directly from the USDA AFSSM. All questions were

multiple choice and each participant had the option of choosing not to answer any question. The survey was developed using Opinio, a secure UNM survey tool. The student investigator was trained by UNM Information Technologies (UNM IT) department staff to navigate and work on the survey software. The participants did not need any training to complete the survey. Links to resources were provided at the end of the survey and included: National School Lunch Program (NSLP); SNAP/Food Stamps; Women, Infants, and Children; Road Runner Food Bank; and Food Pantries.

The USDA's four food security levels were calculated through affirmative answers in the USDA AFSSM. An affirmative answer included answering "often" or "sometimes" to the 3-point questions and answering "yes" to the "yes/no" questions. The total number of affirmatives was the participants' total score. A score of 0 indicated high food security. Scores of 1–2 indicated marginal food security. Scores of 3–5 indicated low food security. Any score $\geq$ 6 indicated very low food security. The four categories of food security were also collapsed into food secure (high plus marginal food security) and food insecure (low plus very low food security).

SAMPLING AND RECRUITMENT

Subjects were recruited through the COE undergraduate student listserv by contacting the COE Program Operations Director. The inclusion criteria included: being enrolled at UNM in the COE either as a part-time or full-time undergraduate student, between the ages of 18-65 years, having access to the internet, and being able to read and comprehend English. The exclusion criteria included being a graduate student, freshman year at UNM and not enrolled at UNM.

Freshman (first-year) students were excluded from the study since the survey asked questions that required a response that included a 12-month time period during which time, those students might have lived in a situation not associated with being in college.

The Program Operations Director sent out the initial email to the students who met the inclusion criteria through the COE listserv. This email contained a description of the purpose of the study, a link to the survey (on Opinio), how long it would take to complete, and the study was completely voluntary. Students were not compensated for their participation. Students were also recruited via a recruitment flyer that was posted on a bulletin board inside the Travelstead Hall building in the COE.

DATA COLLECTION

Data were collected using UNM's Opinio software. The participants that clicked on the survey link consented to taking the survey. They could opt out of the survey at any time and complete it at a later time if they wished to do so. Participants had one month to complete the survey. Reminders were sent out at the beginning of each week during the study period of one month. The survey was open for responses for approximately four weeks, from January 22, 2019 until February 17, 2019. The survey closed February 17, 2019 at midnight at which time no more surveys were accepted.

DATA ANALYSIS

UNM's Opinio software has the ability to collect basic data including: absolute frequency, relative frequency, average, median, variance and standard deviation of each

question. Descriptive statistics were computed for all socio-demographic variables. Fisher's

Exact Test was used as an alternative to Pearson's Chi-square test to analyze the statistical

association between observed values and expected values of the socio-demographic variable

and food security variable. This test is used when the sample size is less than 1,000 for more

accurate results.

Multiple regression was done using a Binomial-Response Generalized Linear Model

(brglm) to account for the complete and/or quasi- separation errors. The model was tested for

collinearity, potential influential values (outliers), and assessed through McFadden's R^2 test

for goodness-of-fit ($R^2 = 0.40$ represents a good fit). RStudio version 3.6.1 (2019-07-05)

(19) was used for all computations.

Chapter 4
Results

RESPONSE RATE

The initial recruitment email was sent on January 22, 2019 to 1249 students. Five of the email addresses were invalid; therefore, the number of students that the email was sent to was 1244. Out of the 1244 students, 83 completed the survey for a response rate of 6.7% (**Figure. 1**).

Figure 1: Algorithm of participants meeting the inclusion criteria in the College of Education, at the University of New Mexico.
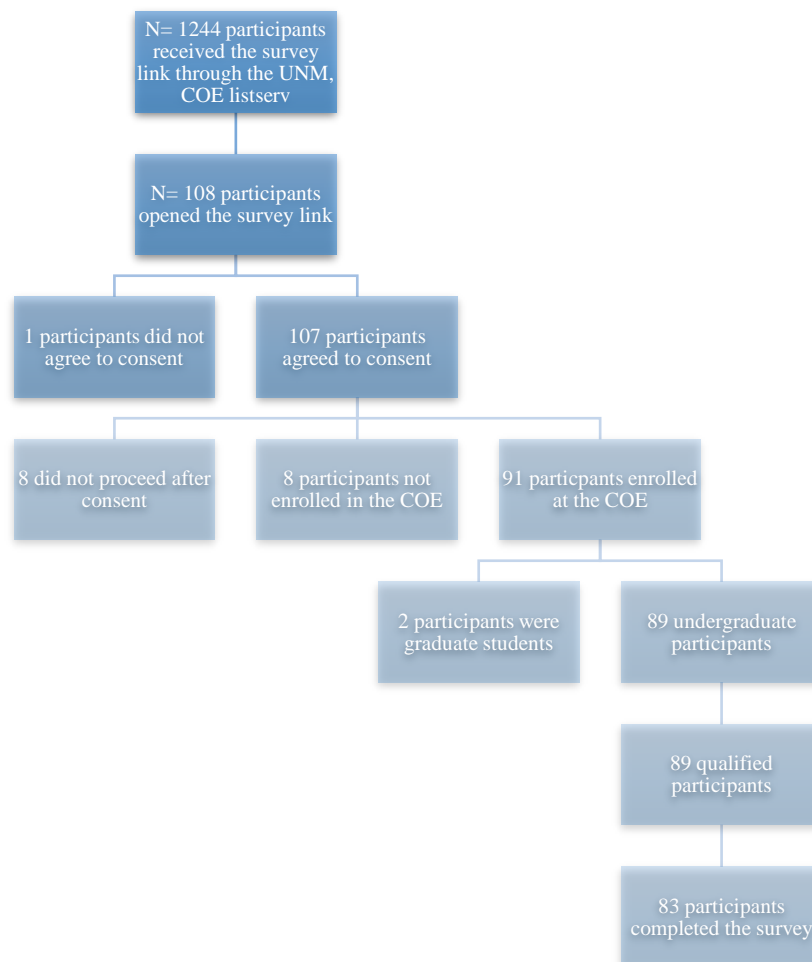
BASIC DEMOGRAPHICS

The total number of participants that had opened the survey link was 108; 83 completed the survey. Demographic characteristics of study participants are presented in **Table 1.** Of those that completed the survey, 12 (14.5%) were males, 70 (84.3%) were females, and 1 (1.2%) participant identified as other. The mean age of the participants was 26.8 years (age range was 18-57 years). The majority of participants were White, non-Hispanic (n= 39, 47.0%) and Hispanic/Latino (n= 38, 45.8%). Other ethnicities included Black or African American (n= 4, 4.8%), Asian/Pacific Islander (n= 4, 4.8%), American Indian or Alaska Native (n= 8, 9.6%), and other (n= 3, 3.6%).

Table 1 (cont.): Participants' demographic data.

Variable	Frequency (n)	(%)
Age (years)		
18 - 21	32	38.6
22 - 25	20	24.1
26 - 29	11	13.3
30 - 33	5	6.0
34 - 37	3	3.6
38 - 41	3	3.6
42 - 45	3	3.6
46 - 49	3	3.6
50 - 53	1	1.2
54 - 57	2	2.4
Self-reported Ethnicity *		
White, Non-Hispanic	39	47.0
Hispanic or Latino	38	45.8
Black or African American	4	4.8
Asian/Pacific Islander	4	4.8
American Indian or Alaska Native	8	9.6
Other	3	3.6
Gender		
Male	12	14.5
Female	70	84.3
Other	1	1.2
Living Conditions		
On-campus with meal plan	2	2.4
On-campus without meal plan	3	3.6
Off-campus without parents	20	24.1
Off-campus with parents/significant other	47	56.6
Off-campus with other relatives	1	1.2
Off-campus with roommate(s)	8	9.6
Other	2	2.4
Household Members		
One- just myself	10	12.0
Two- myself and one other	30	36.1
Three- myself and two others	16	19.3
Four or more- myself and three or more others	27	32.5
Employment Status		

Employed, working part-time	41	49.4
Employed, working full-time	16	19.3
Not employed, looking for work	6	7.2
Not employed, NOT looking for work	11	13.3
Retired	3	3.6
Disabled and/or not able to work	1	1.2
Other	5	6.0
Marital Status		
Married	19	22.9
Divorced	2	2.4
Never Married	62	74.7
Household Combined Income Earned		
$0 - $9,999	14	16.9
$10,000 - $19,999	14	16.9
$20,000 - $29,999	8	9.6
$30,000 - $39,999	16	19.3
$40,000 - $49,999	7	8.4
$50,000 - $59,999	4	4.8
$60,000 or more	12	14.5
Don't know	6	7.2
Prefer not to answer	2	2.4
Sources of Income*		
Jobs	74	89.2
Loans	14	16.9
Family/Relatives	16	19.3
Other	5	6.0
Children Living in Household		
None	53	63.9
One	16	19.3
Two	10	12.0
Three	3	3.6
Four or more	1	1.2
Food Assistance*		
National School Lunch Program	14	17.1
SNAP/Food Stamps	18	22.0
Women Infants and Children (WIC)	1	1.2
Road Runner Food Bank	0	0
Food Pantries	3	3.6
None	55	66.3
Other	1	1.2

*Note: Some of the percentages do not add up to 100 due to the nature of the questions allowing the participant to choose more than one answer; i.e., ethnicity, sources of income, etc.

Most of the participants lived off-campus with parents/significant others (n= 47, 56.6%), off-campus without parents (n= 20, 24.1%), or off-campus with roommate(s) (n= 8, 9.6%). A small number of the participants lived on-campus with a meal plan (n= 2, 2.4%) and on-campus without a meal plan (n= 3, 2.4%). The smallest number of participants lived off-campus with other relatives (n= 1, 1.2%) or indicated they had other living conditions (n= 2, 2.4%).

Most (n= 30, 36.1%) of the participants lived with at least one other person in their household or three or more people (n= 27, 32.5%). Some (n= 16, 19.3%) lived with only two other people, and 10 (12.0%) lived by themselves. Twenty three percent (n= 19) of the participants were married, while 74.7% (n= 62) were never married and 2.4% (n= 2) were divorced.

Regarding the participants' employment status, 41 (49.4%) were employed working part-time and 16 (19.3%) were working full-time. Six (7.2%) were not employed at the time they took the survey; however, they indicated that they were looking for work. Eleven (13.3%) participants indicated that they were not actively looking for work. Others indicated that they were either retired (n= 3, 3.6%), disabled/not able to work (n= 1, 1.2%), or had other employment situations (n= 5, 6.0%).

INCOME AND RESOURCES

The majority of participants did not have any children aged 17 years and younger living in their household (n= 53, 63.9%). The majority of participants did not use any food assistance programs included in this survey (n=55, 66.3%). Eighteen (20%) of the

participants used SNAP, formerly known as food stamps. The other participants indicated that they currently participate in the NSLP and/or the School Breakfast Program (n= 14, 17.1%); food pantries (n=3, 3.6%); the Women, Infants, and Children (WIC) program (n= 1, 1.12%); or other (non-specified) food assistance programs (n=1, 1.12%).

The source of income for most participants was through employment (n= 74, 89.2%), and fewer indicated that they received money from family members/relatives (n= 16, 19.3%), loans (n=14, 16.9%), and other sources (pension, disability, child support) (n=5, 6.0%). The majority of participants reported a household combined annual income between $0 - $29,999 (n= 36, 43.4%), the next biggest group earned between $30,000 - $39,999 per year (n= 16, 19.3%), and the last major group earned $60,000 or more (n= 12, 14.5%).

FOOD INSECURITY ANALYSIS

Of the 83 participants, 32 individuals (38.6%) had high food security and 15 individuals (18.1%) had marginal food security **(Table 2).** Thus, 47 (56.6%) individuals were categorized as food secure. Seventeen individuals (20.5%) were categorized as low food secure and 19 (22.9%) as very low food insecure. These two levels were also combined to calculate the prevalence of food insecurity in the sample (n= 36, 43.4%).

Table 2: Levels of food security- in the study sample per USDA definitions (n= 83).

Food Security Categories	N	%
Food Secure	**47**	**56.6**
High Food Security	32	38.6
Marginal Food Security	15	18.1
Food Insecure	**36**	**43.4**
Low Food Security	17	20.5
Very Low Food Security	19	22.9

Table 3 shows the prevalence of food security and food insecurity by socio-demographic characteristics of the participants. Fisher's Exact Tests were used to evaluate differences in characteristics between food secure (n= 47) and food insecure (n= 37) participants. Four characteristics were significantly different between the two groups (p < 0.05): age (p= 0.0249), marital status (p= 0.0256), household combined income earned (p= 0.0151), and children living in the household (p= 0.0397). There was no difference between food secure and food insecure participants for the following factors: ethnicity, gender, living conditions, household members, employment status, sources of income, and food assistance.

Table 3 (cont.): Socio-demographic characteristics by food security group.

Variable	Food Secure (n= 47)	Food Insecure (n= 36)	P-value
Age (years)	n (%)	n (%)	
18 - 21	16 (34.0)	16 (44.4)	0.0249*
22 - 25	16 (34.0)	4 (11.1)	
26 - 29	3 (6.4)	8 (22.2)	
30 +	12 (25.5)	8 (22.2)	
Ethnicity			
White, Non-Hispanic	22 (46.8)	17 (47.2)	0.4778
Hispanic or Latino	21 (44.7)	11 (30.6)	
Black or African American	1(2.1)	2 (5.6)	
Asian/Pacific Islander	1(2.1)	1 (2.8)	
American Indian or Alaska Native	2 (4.3)	4 (11.1)	
Other	0 (0)	1 (2.8)	
Gender			
Male	8 (17.0)	4 (11.1)	0.4342
Female	39 (83.0)	31 (86.1)	
Other	0 (0)	1 (2.8)	
Living Conditions			
On-campus: with/without meal plan	2 (4.3)	3 (8.3)	0.4716
Off-campus: with/without parents/significant other/relatives/roommate(s)	43 (91.5)	33 (91.7)	
Other	2 (4.3)	0 (0)	
Household Members			
One- just myself	7 (14.9)	3 (8.3)	0.3392
Two- myself and one other	13 (27.7)	17 (47.2)	
Three- myself and two others	10 (21.3)	6 (16.7)	
Four or more- myself and three or more others	17 (36.2)	10 (27.8)	
Employment Status			
Employed, working part-time	23 (48.9)	18 (50.0)	0.1903
Employed, working full-time	8 (17.0)	8 (22.2)	
Not employed, looking for work	2 (4.3)	4 (11.1)	
Not employed, NOT looking for work	9 (19.1)	2 (5.6)	
Retired	3 (6.4)	0 (0)	

Disabled and/or not able to work	0 (0)	1 (2.8)	
Other	2 (4.3)	3 (8.3)	
Marital Status			
Married	15 (31.9)	4 (11.1)	0.0256*
Divorced	0 (0)	2 (5.6)	
Never Married	32 (68.1)	30 (83.3)	
Household Combined Income Earned			
$0 - $9,999	6 (12.8)	8 (22.2)	0.0151*
$10,000 - $29,999	10 (21.3)	12 (33.3)	
$30,000 - $39,999	6 (12.8)	10 (27.8)	
$40,000 -$59,999	9 (19.1)	2 (5.6)	
$60,000 or more	11 (23.4)	1 (2.8)	
Don't know/Prefer not to answer	5 (10.6)	3 (8.3)	
Sources of Income			
Jobs	39 (83.0)	35 (97.2)	0.2393
Loans	2 (4.3)	0 (0)	
Family/Relatives	3 (6.4)	0 (0)	
Other	3 (6.4)	1 (2.8)	
Children Living in Household			
None	28 (59.6)	25 (69.4)	0.0397*
One	13 (27.7)	3 (8.3)	
Two	5 (10.6)	5 (13.9)	
Three	0 (0)	3 (8.3)	
Four or more	1 (2.1)	0 (0)	
Food Assistance			
National School Lunch Program	6 (12.8)	8 (22.2)	0.0678
SNAP/Food Stamps	4 (8.5)	8 (22.2)	
Women Infants and Children (WIC)	1 (2.1)	0 (0)	
Road Runner Food Bank	0 (0)	0 (0)	
Food Pantries	0 (0)	0 (0)	
None	36 (76.6)	19 (52.8)	
Other	0 (0)	1 (2.8)	

Note: Fisher's Exact Tests were used to evaluate differences in characteristics between the two groups, Significance at $P < 0.05$

REGRESSION ANALYSIS

A logistic regression was conducted to further investigate the four factors that were found to be significantly associated with food security using Fisher's Exact Test (age, marital status, household combined income earned, and the number of children living in household). After assessing model fit (McFadden score = 0.34), and accounting for perfect separation errors, the model **(Table 4)** shows that participants who had an annual combined income of $60,000 or more had lower odds of food insecurity (OR, 0.08; 95% CI, -4.90 - -0.08; p= 0.04) compared to participants who had a combined annual income of $0-9,999. Also, participants within the age of 22-25 years had lower odds of food insecurity (OR, 0.23; 95% CI, -2.96 - 0.04) compared to participants within the age of 18-21 years, which approached significance at p< 0.1. The factors of marital status (married or divorced compared to never married) and the number of children living in the household (having one or two or more children compared to having none) were not associated with food insecurity in the logistic regression model.

Table 4: Predictors of Food Insecurity

Variables	β(SE)	P	OR	95%CI
(Constant)	0.48(0.62)	0.44	1.67	[-0.74, 1.70]
Income: $10-29,999	0.10(0.82)	0.91	1.10	[-1.51, 1.70]
Income: $30-39,999	0.83(0.97)	0.39	2.29	[-1.08, 2.34]
Income: $40-59,999	-1.09(1.26)	0.39	0.34	[-3.56, 1.38]
Income: ≥ $60,000	-2.49(1.23)	0.04**	0.08	[-4.90, -0.08]
Income: don't know/no answer	-0.43(1.06)	0.68	0.65	[-2.51, 1.64]
Children: 1	-1.31(0.87)	0.13	0.27	[-3.01, 0.40]
Children: 2+	1.24(0.98)	0.21	3.47	[-0.68, 3.20]
Age group: 22-25	-1.46(0.77)	0.06*	0.23	[-2.96, 0.04]
Age group: 26-29	0.93(0.99)	0.35	2.53	[-1.01, 2.86]
Age group: 30+	-1.16(1.05)	0.88	0.85	[-2.21, 1.89]
Marital status: Divorced	1.49(2.11)	0.48	4.44	[-2.64, 5.62]
Marital status: Married	-1.12(0.94)	0.23	0.33	[-2.95, 0.71]

Note: β= Logit coefficients, SE= standard error, OR= odds ratio, CI= Confidence Interval
* p< 0.1, **p< 0.05

Chapter 5

Discussion

This study assessed food security status and factors associated with food insecurity including hunger, ethnicity, socioeconomic status, living on/off campus, among undergraduate university students (males and females, ages 18-65 years) enrolled at the UNM COE between the time frame of January 2019-May 2019.

Response Rate

Although the response rate was low at 6.7%, the findings of our study are consistent with the reports in the literature; 43.4% of the students at UNM, COE were food insecure with 22.9% of them being very food insecure. Participants were not compensated for their participation which may have contributed to the low response rate.

The USDA describes food insecurity as "reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake." Likewise, very low food security is described as "reports of multiple indications of disrupted eating patterns and reduced food intake" (1). Nearly one in five (22.9%) students were considered very low food secure indicating disruptions in diet, weight, and potentially hunger.

Demographics

More females participated in this survey than males. This was attributed to the unique population of the UNM COE. In the 2018-2019 academic year, 79.2% of students who graduated from the UNM COE with a bachelor's degree were female (20). Our findings are

consistent with the overall population of the COE. Unfortunately, males and other non-specified genders were underrepresented in this study. The participants who chose to identify as "other" were not given the opportunity to specify their specific self-identified gender because of how the question was worded. Gender was not associated with food security status in this study.

The two most commonly reported ethnicities/races included non-Hispanic White and Hispanic/Latino. There was an overrepresentation of these two groups even though the survey allowed the participants to choose more than one ethnicity/race. These findings are also consistent with the UNM COE population in the spring 2019 semester: 32.5% White and 50.3% Hispanic.

Most of the participants (62.7%) were in the age group of 18-21 or 22-25 years of age. This study included only undergraduate students who typically fall in this age range, thus these values were expected. Our results showed that participants 22-25 years of age had lower odds of food insecurity than participants 18-21 years of age. Students in the age range of 22-25 years might be more financially responsible and may have more college life experience in general. They might be able to better manage their time, work, and study habits due to having more experience compared to the younger age group.

Living Conditions

Participants were asked if they lived on/off the University campus, if they lived with parents or other relatives, and/or if they lived with roommates. The majority reported that they lived off campus with parents/significant others, which indicates that most of the

participants (n= 73, 89%) were living with at least one other person in their household. Participants who lived with three or more people constituted the next largest group. The number of individuals who lived in the same household was not found to be associated with food security. These results indicate that living with other individuals (parents, significant others, relatives, roommates, etc.) may not decrease the risk of food insecurity. Sharing of limited resources in a household may contribute to food insecurity.

Twenty three percent of participants were married while the majority was never married. There was a significant relationship between being married and being food secure, even though the percentage of these participants is small. Although living with another person was not shown to be enough to decrease the risk of food insecurity, being married describes a different financial situation. Married couples could have twice the income, receive a large tax return, only need to pay half the rent and bills, and share other financial responsibilities.

Most of the participants reported having no children and a few others had one child or more. It is unknown whether children living in the household were the participants' biological or dependent children. Findings showed that having one child in the household was associated with being food secure. One reason why this may be the case could be because the participant prioritizes providing sufficient food to the child and household above all else by attending college part-time, for example.

Those who reported an annual income of $\geq$ $60,000 were less likely to be food insecure, regardless of how many people lived with them. It is unknown who contributed the income in a particular household, i.e., the participants' parents, significant other, other relatives, or even if the participant lives on their own. Although the median annual household

income for New Mexicans in 2018 was $48,059 compared to the US average of $60,293, the cost of living in NM is lower than other states. It appears that college students at UNM COE are already at a disadvantage financially and college expenses may be overwhelming.

Other Factors

Sources of income, employment status, and the use of food assistance programs were not associated with food insecurity. The majority of the participants received their income through employment and reported to be either working part-time or full-time at the time of the study.

Many students who attended UNM COE most likely needed to work at least part-time in order to pay for their college and other expenses. In 2014, the four year graduation rate at UNM for first, full-time students was 15% compared to the nationwide four year graduation rate of 33.3% (22). Students who attend UNM may take a longer period of time to complete their degree and graduate because such a large number of UNM students need to be employed either part or full-time.

Participants were given the option of indicating the source of their income on the survey. Employment, loans, family/relatives and other options (pension, disability, child support, etc.) contributed to the household income. Although the majority of students in this sample indicated they were employed, they also appeared to need financial assistance from other sources.

Regarding the use of food assistance programs, participants had the option of choosing more than one category of food assistance programs on the survey. Although 9.6% of the food insecure participants received benefits from the NSLP and/or SNAP, one

individual indicated that they had received WIC program benefits; three indicated they had

utilized Food Pantries while none indicated that they had utilized the Road Runner Food

Bank. These findings suggest a lack of awareness/availability of these programs, stigma

associated with participating in these programs, and potential lack of transportation to

program sites.

In conclusion, the prevalence of food insecurity at UNM is similar to reports at other

college campuses. This issue needs to be addressed on the UNM campus and there is a need

to increase awareness of the various food assistance programs available in the community.

Since the household combined income factor was found to be highly associated with food

security status, solutions should be aimed at lowering tuition and college-related costs,

especially for undergraduate students.

Strengths/Limitations

      This is the first study to assess food insecurity among college students on the UNM campus. The study sample, although small, is representative of the UNM COE students in terms of race/ethnicity and gender. The survey used had validated questions to assess food insecurity in adults and was scored per USDA criteria.

      There were several limitations to this study. The response rate was low and could increase the likelihood of sampling error and nonresponse bias. The low response rate may be attributed to the lack of participant compensation. Although consistent with the current population of the COE, there was an overrepresentation of White, non-Hispanic and Hispanic/Latino females and an underrepresentation of males and other, non-specified genders. The study is also based on a self-reported assessment of food insecurity, which could result in lower accuracy. The 10-item adult food insecurity survey tool used in this study, although lowers respondent burden, does not fully account for children living within the household.

Implications for Future Research

      Future research on food insecurity should have a broader focus on UNM as a whole rather than just one college within the university. Participants should be compensated in order to increase the response rate. There is a need for research focused on specific prevalence within race/ethnicity and gender minorities. Since the findings of this study were based on a validated survey tool for adult food security, a survey tool appropriate for children living within households should also be used for those participants who have children.

Another limitation is that we did not assess gender identity which has been found to have a major association with food insecurity in college student populations.

Conclusion

The purpose of this study was to estimate the prevalence of food insecurity among undergraduate college students who are enrolled in the UNM COE. New Mexico has an estimated higher prevalence of adult food insecurity compared to the US as a whole. The findings of this study demonstrated that 43% of UNM COE students were food insecure; of those, 22.9% were very food insecure, consistent with findings across universities in the United States, Canada, and South Africa. Efforts should be made to increase awareness of campus food pantries and appropriate food assistance programs. Since household combined income decreased odds of food insecurity in this sample, solutions should be aimed at lowering tuition costs, especially for undergraduate students. Also, other approaches such as classes/modules on financial literacy, budgeting, and resource management should be implemented to help students better manage their expenses.

Appendix A: Study Survey

Food Insecurity among University Students in the State of New Mexico

Q1: Food Insecurity among Undergraduate Students at UNM Informed Consent for Survey2018A graduate student (Qamar Hadi) from the Department of Individual, Family, and Community Education, College of Education (COE), is conducting a research study. The purpose of the research is to obtain information of UNM COE undergraduate students to see if there are factors related to self-reported food insecurity. Some of these factors include hunger, ethnicity, socioeconomic status, and whether students live on or off campus. You are being asked to participate in this study because you are enrolled at UNM COE either as a part-time or full-time undergraduate student, you are 18-65 years old, are able to read and comprehend English, and have access to the internet. Your participation will involve answering questions related to your individual and household food insecurity. The survey should take about 10 minutes to complete. The survey includes questions such as age, marital status, gender, race/ethnicity, socioeconomic status, and information about some of your dietary habits. Your involvement in the study is voluntary, and you may choose not to participate. You can refuse to answer any of the questions at any time. There are no names or identifying information associated with your responses. There are no known risks in this study, but some individuals may experience discomfort when answering questions. Data will be deleted at the end of the study. The findings from this project will provide information on the prevalence of food insecurity among university students attending UNM. If published, your name or information will not be used in any article and results will be presented in summary form only. If you have any questions about this research project, please feel free to call the principal investigator at 505-277-6430. If you have questions regarding your rights as a research subject, or about what you should do in case of any harm to you, or if you want to obtain information or offer input you may call the UNM Office of the IRB (OIRB) at (505) 277-2644 or irb.unm.edu. Do you agree to participate in the above described research study?

◯ Agree   ◯ Disagree

Q2: Are you currently enrolled in the College of Education (COE)?

○   Yes   ○   No

Note: if you have answered/chosen item [2] in question 2, skip the following question

Q3: Please specify your current student status:

○ Undergraduate   ○ Graduate ○ Other

Note: if you have answered/chosen item [2] in question 2, skip the following question
Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q4: Please indicate your age in the space below:

☐

Note: if you have answered/chosen item [2] in question 2, skip the following question
Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q5: What is your ethnicity?

☐ White, Non-Hispanic   ☐ Hispanic or Latino   Black or
☐ African American   ☐ Asian/Pacific Islander
☐ American Indian or Alaska Native   ☐ Other

If you have chosen "other", please specify:

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q6: What gender do you identify as?

○ Male   ○ Female   ○ Other

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q7: Please select one of the following current living conditions:

○ On-campus with meal plan
○ On-campus without meal plan
○ Off-campus without parents
○ Off-campus with parents/significant other
○ Off-campus with other relatives
○ Off-campus with roommate(s)
○ Other

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q8: Please select how many people live in your household:

○ One- just myself   ○ Two- myself and one other
○ Three- myself and two others ○ Four or more- myself and three or more others

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q9: Which of the following categories best describes your employment status?

○ Employed, working part-time

○ Employed, working full-time

○ Not employed, looking for work

○ Not employed, NOT looking for work

○ Retired

○ Disabled and/or not able to work

○ Other

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q10: What is your marital status?

○ Married   ○ Divorced   ○ Never Married

Note: if you have answered/chosen item [2] in question 2, skip the following question
Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q11: How many children ages 17 and younger live in your household?

○ None ○ One   ○ Two   ○ Three ○ Four or more

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q12: Do you or the children in your household use any of the following:

☐ National School Lunch Program and/or School Breakfast Program

☐ SNAP/Food Stamps

☐ Women, Infants, and Children (WIC)

☐ Road Runner Food Bank

☐ Food Pantries

☐ None

☐ Other

If you have chosen "other", please specify:

```
┌─────────────────────────────────────────┐
│                                         │
│                                         │
└─────────────────────────────────────────┘
```

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q13: How much total combined income did all members of your HOUSEHOLD earn last year?

○ $0 - $9,999   ○ $10,000 - $19,999   ○ $20,000 - $29,999
○ $30,000 - $39,999 ○ $40,000 - $49,999   ○ $50,000 - $59,999
○ $60,000 or more   ○ Don't know   ○ Prefer not to answer

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q14:   Please specify the source of household income:

☐ Jobs   ☐ Loans   ☐ Family members/relatives

☐ Other

If you have chosen "other", please specify:

```
┌─────────────────────────────────┐
│                                 │
│                                 │
└─────────────────────────────────┘
```

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q15: These next 4 questions are about the food eaten in your household in the last 12 months, since January of last year and whether you were able to afford the food you need. Which of these statements best describes the food eaten in your household in the last 12 months:

○ Enough of the kinds of food we want to eat

○ Enough but not always the kinds of food we want

○ Sometimes not enough to eat

○ Often not enough to eat

○ Don't know/ refuse to answer

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q16: (I/We) worried whether (my/our) food would run out before (I/we) got money to buy more. Was that often true, sometimes true, or never true for your household in the last 12 months?

○ Often true

○ Sometimes true

○ Never true

○ Don't know/ refuse to answer

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q17: The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more. Was that often, sometimes, or never true for your household in the last 12 months?

○ Often true

○ Sometimes true

○ Never true

○ Don't know/ refuse to answer

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q18: (I/we) couldn't afford to eat balanced meals. Was that often, sometimes, or never true for your household in the last

12 months?

○ Often true

○ Sometimes true

○ Never true

○ Don't know/ refuse to answer

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q19: These next questions are about your dietary habits and other adults in your household in the last 12 months, since January of last year and whether you were able to afford the food you need. In the last 12 months, since last September, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

○ Yes   ○ No   ○ Don't know

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Note: if you have answered/chosen item [2, 3] in question 19, skip the following question

Q20: How often did this happen almost every month, some months but not every month, or in only 1 or 2 months?

○ Almost every month

○ Some months but not every month

○ Only 1 or 2 months

○ Don't Know

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q21: In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

○   Yes   ○   No   ○   Don't know

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q22: In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?

○   Yes   ○   No   ○   Don't know

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q23: In the last 12 months, did you lose weight because there wasn't enough money for food?

○   Yes   ○   No   ○   Don't know

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Q24: In the last 12 months, did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?

○   Yes   ○   No   ○   Don't know

Note: if you have answered/chosen item [2] in question 2, skip the following question

Note: if you have answered/chosen item [2, 3] in question 3, skip the following question

Note: if you have answered/chosen item [2, 3] in question 24, skip the following question

Q25: How often did this happen: almost every month, some months but not every month, or in only 1 or 2 months?

○ Almost every month

○ Some months but not every month

○ Only 1 or 2 months

○ Don't know

Appendix B: Recruitment Email

Subject Line: Opportunity to Participate in Research

Dear COE students,

A research project to evaluate food insecurity among college students is being conducted and your participation is highly valuable.

To better understand the specific factors associated with food insecurity among college students in New Mexico, the proposed study will obtain information to evaluate the factors associated with self-reported food insecurity including hunger, ethnicity, socioeconomic status, living on/off campus, among college students (males and females, ages 18-65 years) enrolled in the College of Education at the University of New Mexico, during Spring 2019.

You are receiving this email because you meet the following criteria:

- **enrolled at UNM in the College of Education either as a part-time or full-time undergraduate student**
- **between the age of 18-65 years**
- **you have access to the internet**
- **you are be able to read and comprehend in English**

The survey is about **25 questions** long and should take approximately **10 minutes** to complete. Answers are completely **anonymous**.

You do not have to be in this study, your decision to be in any study is totally voluntary. If you have any questions about this research project, please feel free to call the principal investigator at 505-277-6430.

If you feel you understand the study and would like to participate, please click on the following link to the survey: https://esurvey.unm.edu/opinio/s?s=92862

Thank you for your time,

Qamar Hadi

UNM Nutrition program graduate student

Principal Investigator: *Deborah Cohen*
Study Title: *Food Insecurity among University Students in the State of New Mexico*
IRB *#: (1340643-1)*

Appendix C: Recruitment Flyer

THE UNIVERSITY OF NEW MEXICO

Food Insecurity among University Students at UNM

Seeking people:

- enrolled at UNM in the College of Education either as a part-time or full-time undergraduate student
- ages 18-65 years
- must have access to the internet
- must be able to read and comprehend English to participate in the research project

The proposed study will obtain information to evaluate the factors associated with self-reported food insecurity including hunger, ethnicity, socioeconomic status, living on/off campus, among college students (males and females, ages 18-65 years) enrolled in the College of Education at the University of New Mexico, during Fall 2018.

If you decide to join the project, you will be asked to:

- Check your UNM email for the link to the survey

This project is being conducted by Qamar Hadi, a UNM Nutrition Program graduate student

Contact Information: Please call 505-277-6430 or email qhadi@unm.edu to get more information.

U.S. ADULT FOOD SECURITY SURVEY MODULE:

THREE-STAGE DESIGN, WITH SCREENERS

Economic Research Service, USDA

September 2012

Revision Notes: The food security questions in the U.S. Adult Food Security Survey Module are essentially unchanged from those in the original module first implemented in 1995.

September 2012:

- Corrected skip specifications in AD5
- Added coding specifications for "How many days" for 30-day version of AD1a and AD5a.

July 2008:

- Wording of resource constraint in AD2 was corrected to, "…because there wasn't enough money for food" to be consistent with the intention of the September 2006 revision.

September 2006:

- Minor changes were introduced to standardize wording of the resource constraint in most questions to read, "…because there wasn't enough money for food."
- Question numbers were changed to be consistent with those in the revised Household Food Security Survey Module.
- User notes following the questionnaire were revised to be consistent with current practice and with new labels for ranges of food security and food insecurity introduced by USDA in 2006.

Overview: The U.S. Adult Food Security Survey Module is the same set of questions that is administered as the U.S. Household Food Security Survey Module to households with no child present. For many measurement purposes, the adult module can be used both for households with and without children present.

The U.S. Adult Food Security Survey Module is the same set of questions that is administered as the U.S. Household Food Security Survey Module to households with no child present. For many measurement purposes, the adult module can be used both for households with and without children present.

- Advantages (compared with the 18-item household module):
  - Less respondent burden.
  - Improves comparability of food security statistics between households with and without children and among households with children in different age ranges.
  - Avoids asking questions about children's food security, which can be sensitive in some survey contexts.
- Limitations:
  - Does not provide specific information on food security of children.

<u>Transition Into Module</u> (administered to all households):

These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year and whether you were able to afford the food you need.

Optional USDA Food Sufficiency Question/Screener: Question HH1 (This question is optional. It is not used to calculate the Adult Food Security Scale. It may be used in conjunction with income as a preliminary screener to reduce respondent burden for high income households).

HH1.   [IF ONE PERSON IN HOUSEHOLD, USE "I" IN PARENTHETICALS, OTHERWISE, USE "WE."]

Which of these statements best describes the food eaten in your household in the last 12 months: —enough of the kinds of food (I/we) want to eat; —enough, but not always the <u>kinds</u> of food (I/we) want; —sometimes <u>not enough</u> to eat; or, —<u>often</u> not enough to eat?

[1] Enough of the kinds of food we want to eat

[2] Enough but not always the <u>kinds</u> of food we want

[3] Sometimes <u>not enough</u> to eat

[4] <u>Often</u> not enough to eat

[ ] DK or Refused

Household Stage 1: Questions HH2-HH4 (asked of all households; begin scale items).

[IF SINGLE ADULT IN HOUSEHOLD, USE "I," "MY," AND "YOU" IN

PARENTHETICALS; OTHERWISE, USE "WE," "OUR," AND "YOUR HOUSEHOLD."]

HH2. Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was <u>often</u> true, <u>sometimes</u> true, or <u>never</u> true for (you/your household) in the last 12 months—that is, since last (name of current month).

The first statement is "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more." Was that <u>often</u> true, <u>sometimes</u> true, or <u>never</u> true for (you/your household) in the last 12 months?

[ ]   Often true

[ ]   Sometimes true

[ ]   Never true

[ ]   DK or Refused

HH3.   "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get
more." Was that <u>often</u>, <u>sometimes</u>, or <u>never</u> true for (you/your household) in the last
12 months?

[ ]   Often true
[ ]   Sometimes true

[ ]   Never true
[ ]   DK or Refused

HH4.   "(I/we) couldn't afford to eat balanced meals." Was that <u>often</u>, <u>sometimes</u>, or <u>never</u>
true for (you/your household) in the last 12 months?

[ ]   Often true

[ ]   Sometimes true

[ ]   Never true

[ ]   DK or Refused

Screener for Stage 2 Adult-Referenced Questions: If affirmative response (i.e., "often true" or "sometimes true") to one or more of Questions HH2-HH4, OR, response [3] or [4] to question HH1 (if administered), then continue to *Adult Stage 2;* otherwise skip to *End of Adult Food Security Module.*

NOTE: In a sample similar to that of the general U.S. population, about 20 percent of households (45 percent of households with incomes less than 185 percent of poverty line) will pass this screen and continue to Adult Stage 2.

Adult Stage 2: Questions AD1-AD4 (asked of households passing the screener for Stage 2 adult-referenced questions).

AD1.   In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

[ ] Yes

[ ] No (Skip AD1a)

[ ] DK (Skip AD1a)

AD1a. [IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

[ ]   Almost every month

[ ]   Some months but not every month

[ ]   Only 1 or 2 months

[ ]   DK

AD2.   In the last 12 months, did you ever eat less than you felt you should because there

wasn't enough money for food?

[ ] Yes

[ ] No

[ ] DK

AD3.   In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?

[ ] Yes

[ ] No

[ ] DK

AD4.   In the last 12 months, did you lose weight because there wasn't enough money for food?

[ ] Yes

[ ] No

[ ] DK

Screener for Stage 3 Adult-Referenced Questions: If affirmative response to one or more of questions AD1 through AD4, then continue to *Adult Stage 3;* otherwise, skip to *End of Adult Food Security Module.*

NOTE: In a sample similar to that of the general U.S. population, about 8 percent of households (20 percent of households with incomes less than 185 percent of poverty line) will pass this screen and continue to Adult Stage 3.

Adult Stage 3: Questions AD5-AD5a **(asked of households passing screener for Stage 3 adult-referenced questions).**

AD5.   In the last 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?

   [ ] Yes

   [ ] No (Skip AD5a)

   [ ] DK (Skip AD5a)

AD5a. [IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

   [ ] Almost every month

   [ ] Some months but not every month

   [ ] Only 1 or 2 months

   [ ] DK

END OF ADULT FOOD SECURITY MODULE

User Notes

(1) Coding Responses and Assessing Household Adult Food Security Status:

Following is a brief overview of how to code responses and assess household food security status based on the Adult Food Security Scale. For detailed information on these procedures, refer to the *Guide to Measuring Household Food Security, Revised 2000,* available through the ERS Food Security in the United States Briefing Room.

Responses of "yes," "often," "sometimes," "almost every month," and "some months but not every month" are coded as affirmative. The sum of affirmative responses to the 10 questions in the Adult Food Security Scale is the household's raw score on the scale.

Food security status is assigned as follows:

- Raw score zero—High food security among adults
- Raw score 1-2—Marginal food security among adults
- Raw score 3-5—Low food security among adults
- Raw score 6-10—Very low food security among adults

For some reporting purposes, the food security status of the first two categories in combination is described as food secure and the latter two as food insecure.

(2) Response Options: For interviewer-administered surveys, DK ("don't know") and "Refused" are blind responses—that is, they are not presented as response options but marked if volunteered. For self-administered surveys, "don't know" is presented as a response option.

(3) Screening: The two levels of screening for adult-referenced questions are provided for surveys in which it is considered important to reduce respondent burden. In pilot surveys intended to validate the module in a new cultural, linguistic, or survey context, screening should be avoided if possible and all questions should be administered to all respondents.

To further reduce burden for higher income respondents, a preliminary screener may be constructed using question HH1 along with a household income measure. Households with income above twice the poverty threshold AND who respond <1> to question HH1 may be

skipped to the end of the module and classified as food secure. Using this preliminary screener reduces total burden in a survey with many higher income households, and the cost, in terms of accuracy in identifying food-insecure households, is not great. However, research has shown that a small proportion of the higher income households screened out by this procedure will register food insecurity if administered the full module. If question HH1 is not needed for research purposes, a preferred strategy is to omit HH1 and administer Adult Stage 1 of the module to all households.

(4) 30-Day Reference Period: The questionnaire items may be modified to a 30-day reference period by changing the "last 12-month" references to "last 30 days." In this case, items AD1a and AD5a must be changed to read as follows:

AD1a/AD5a.   [IF YES ABOVE, ASK] In the last 30 days, how many days did this happen?

_____ days

[ ]   DK

Responses of 3 days or more are coded as "affirmative" responses.

REFERENCES

1. Definition of Food Insecurity. Unites States Department of Agriculture Economic Research Service. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security/. September 4, 2019. Accessed January, 2020.

2. Size of States. State Symbols U.S.A. https://statesymbolsusa.org/symbol-official-item/national-us/uncategorized/states-size. Accessed Aril 17, 2020.

3. New Mexico. United States Census Bureau. https://www.census.gov/quickfacts/fact/table/nm,US/INC110217. July 1, 2018. Accessed Aril 17, 2020.

4. Office of Institutional Analytics. The University of New Mexico. http://oia.unm.edu/facts-and-figures/oer-fall-2018.pdf. 2018. Accessed February 13, 2019.

5. Health Indicator Report of Food Insecurity. New Mexico's Indicator-Based Information System (NM-IBIS). https://ibis.health.state.nm.us/indicator/view/FoodInsec.Overall.Year.NM_US.html. April 29, 2019. Accessed April 17, 2020.

6. Berg L, Raubenheimer, J. Food insecurity among students at the University of the Free State, South Africa. *S Afr J Clin Nutr.* 2015;28(4):160-169.

7. Farahbakhsh J, Hanbazaza M, Ball G, Farmer A, Maximova K, Willows N. Food insecure student clients of a university-based food bank have compromised health, dietary intake and academic quality: Health, diet and academics of food insecure students. *Nutr Diet.* 2016;74(1):67–73.

8. Patton-López M, López-Cevallos DF, Cancel-Tirado DI, Vazquez L. Prevalence and Correlates of Food Insecurity Among Students Attending a Midsize Rural University in Oregon. *J Nutr Educ Behav.* 2014;46(3):209-214.

9. Morris LM, Smith S, Davis J, Null DB. The Prevalence of Food Security and Insecurity Among Illinois University Students. *J Nutr Educ Behav*. 2016;48(6):376-382.

10. Silva MR, Kleinert WL, Sheppard VA, Cantrell KA, Freeman-Coppadge DJ, Tsoy E, Roberts T, Pearrow M. The Relationship Between Food Security, Housing Stability, and School Performance Among College Students in an Urban University. *J Coll Stud Ret.* 2017;19(3):284-299.

11. McArthur LH, Ball L, Danek AC, Holbert D. A High Prevalence of Food Insecurity Among University Students in Appalachia Reflects a Need for Educational Interventions and Policy Advocacy. *J Nutr Educ Behav.* 2018;50(6):564-572.

12. Mirabitur E, Peterson KE, Rathz C, Matlen S, Kasper N. Predictors of college-student food security and fruit and vegetable intake differ by housing type. *J Am Coll Health*. 2016;64(7):555-564.

13. Payne-Sturges DC, Tjaden A, Caldeira KM, Vincent KB, Arria AM. Student Hunger on Campus: Food Insecurity Among College Students and Implications for Academic Institutions. *Am J Health Promot*. 2018;32(2):349-354.

14. Bruening M, van Woerden I, Todd M, Laska MN. Hungry to learn: the prevalence and effects of food insecurity on health behaviors and outcomes over time among a diverse sample of university freshmen. *Int J Behav Nutr Phys Act.* 2018;15(1):9.

15. Hagedorn RL, McArthur LH, Hood LB, Berner M, Steeves EA, Connell CL, Wall-Bassett E, Spence M, Babatunde OT, Kelly EB, Waity JF, Lillis JP, Olfert MD. Expenditure, Coping, and Academic Behaviors among Food-Insecure College Students at 10 Higher Education Institutes in the Appalachian and Southeastern Regions. *Curr Dev Nutr*. 2019;3(6):nzz058.

16. Martinez SM, Grandner MA, Nazmi A, Canedo ER, Ritchie LD. Pathways from Food Insecurity to Health Outcomes among California University Students. *Nutrients*. 2019;11(6):pii:E1419.

17. Soldavini J, Berner M, Da Silva J. Rates of and characteristics associated with food insecurity differ among undergraduate and graduate students at a large public university in the Southeast United States. *Prev Med Rep*. 2019;14:100836.

18. El Zein A, Shelnutt KP, Colby S, Vilaro M, Zhou W, Greene G, Olfert M, Riggsbee K, Morrell J, Mathews A. Prevalence and correlates of food insecurity among U.S. college students: a multi-institutional study. *BMC Public Health.* 2019;19(1)**:**660.

19. R Core Team. The R project for statistical computing. https://www.r-project.org/. 2019. Accessed April 17, 2020.

20. UNM OIA. Degrees Awarded 2015-2019. https://public.tableau.com/profile/unm.oia#!/vizhome/DegreesAwarded2013-2017/Degrees. October 18, 2019. Accessed January 25, 2020.

21. UNM Graduation Rate and Retention Rates. College Factual. https://www.collegefactual.com/colleges/university-of-new-mexico-main-campus/academic-life/graduation-and-retention/. Accessed March 18, 2020.