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Research Article

Prevalence and Factors Associated with Food Insecurity Among College Students at a Mid-Atlantic State University – A Pilot Study

Lynn Monahan Couch[1]*, Mary Beth Gilboy[1] and Ashlie Delshad[2]

[1]Department of Nutrition, West Chester University of Pennsylvania, West Chester, PA, USA

[2]Department of Political Science, West Chester University of Pennsylvania, West Chester, PA, USA

***Corresponding Author**: Lynn Monahan Couch, Department of Nutrition, West Chester University, West Chester, Pennsylvania, USA.

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Abstract

Background: A college education is becoming essential to compete in the job market of the future. However, challenges that impact academic success and retention face young adults entering college, including financial hardships, housing instability and food insecurity.

Aim: The aim of this pilot study is to examine the prevalence and socio-economic factors of food insecurity among college students attending a Mid-Atlantic state university.

Methods: A convenience sample (n = 108) of undergraduate students completed an online survey. This cross-sectional, online survey employed the United States Department of Agriculture's (USDA) Household Food Security 6-item module and questions on socio-economic factors that impact food security.

Results: Ninety-two students completed the survey (85.2% response rate), 30.2% were food insecure. Food insecure students were significantly more likely to report not having money to make ends meet (p = 0.00), receiving free food/meals (p = 0.00), borrowing money (p = 0.00), having student loans (p = 0.11) and working to attend school (p = 0.13).

Conclusion: This pilot study adds to the growing evidence of food insecurity among college students and informs university administrators, faculty and staff of the socio-economic factors students at risk for food insecurity face.

Keywords: *Food Insecurity; College Students; Socio-Economic Factors; Mid-Atlantic University*

Introduction

By 2020, postsecondary education or training after high school will be required for 65% of the jobs in the United States [1]. However, many challenges that impact academic success and retention face young adults who attend college, including financial hardships, housing instability and food insecurity [2,3]. Food insecurity (FI) is defined as "a lack of adequate amounts of nutritious, high-quality foods on a regular basis" [4]. In 2015, the United States Department of Agriculture (USDA) reported FI in 12.7% of American households [5]. FI is associated with poor health outcomes, including chronic disease, obesity and poor nutritional status [6,7]. Despite FI becoming more widely acknowledged as an issue on college campuses, exemplified by the rise in college food pantries from four in 2008 to over 350 today [8], there is limited research [9-11,13] on the socio-economic factors that may affect food accessibility among the college student population.

Recent studies on the prevalence of FI among college students have ranged from 14% to 59% [9,10], with most reporting higher rates for college students than in US households. For example, in a 2016 study, Bruening., *et al*. [11] found that between 32 - 37% of freshman students at a diverse, urban college were food insecure. Thirty-five percent of undergraduate students from four, public Illinois universities were considered food insecure [12], 25% of students surveyed from an East Coast, urban university reported FI [13] and Chaparro., *et al.* [14] found FI in 21% of students attending the University of Hawaii-Manoa.

Food insecurity among college students has many negative impacts, including an overall perception of poor health and poor effects on academic performances. Researchers found that food insecure students were twice as likely or more likely to report fair or poor general health compared to other students [10,15]. Academically, food insecure students tend to have lower grades [9,15], are more likely to have a lower GPA than students who are food secure [17], and may have difficulty attending classes [6]. Martinez and colleagues [18] found more food insecure students suspended their studies due to financial constraints compared to food secure students in a survey of the California university system (15% vs. 3%). Studies have also found that FI is more prevalent in college students who experience housing instability, (poor housing options, inadequate financial support) [13], despite most studies reporting that FI students are working [16].

Some colleges and universities are beginning to address food insecurity by linking students with food assistance programs, food banks, or opening food pantries on their campuses [16]. However, students are not consistently using these types of resources. For college students in particular, the desire to "fit-in" is an important consideration and seeking aid for FI may be seen as a shameful or embarrassing act [19]. That said, further research is needed to understand the scope of FI at colleges and universities and to identify factors associated with FI to develop effective screening tools and interventions.

The purpose of this paper is to describe the results of a pilot study on the prevalence of FI and present the socio-economic factors associated with FI based on data from students attending a Mid-Atlantic, public university. Findings of this study will help to direct university efforts on prevention and intervention strategies to alleviate food insecurity on college campuses.

Methods

Research Design and Participants

In this cross-sectional study, a 52-item online survey [20] was administered to a convenience sample of 108 college students enrolled in one of three sections of a community nutrition course at a Mid-Atlantic state university during the Spring 2016 semester. The survey included questions on FI and social-economic factors (income, debt, financial aid, housing, coping/poverty) that could put students at risk for FI. Demographic characteristics were also collected. The instructors of the courses invited their students to participate and provided a link to the online survey, which included an informed consent agreement prior to the start of the survey. The survey took approximately 15 minutes to complete and students were given two weeks to finish the survey; there were no monetary/prize incentives for participation in the survey, however, one professor offered a two-point grade incentive to encourage participation.

Of the 108 students enrolled in the course, 92 students completed the survey, an 85.2% response rate. Table 1 shows the demographic data of the respondents. Compared to the overall demographics of the university, this study had a higher percentage of females (88.6% vs. 60.0%) and whites (94.3% vs. 79.7%). The pilot study protocol was approved the Institutional Review Board of the university.

Outcome Variable	Food Secure N (%)	Food Insecure N (%)	P Value
Demographics			
Sex (n = 88)			0.101
Male	9 (10.2)	1 (1.1)	
Female	50 (56.8)	28 (31.8)	
Age (n = 86)			0.282
18 - 25	56 (65.1)	27 (31.4)	
26 - 35	1 (1.2)	2 (2.3)	
Race/Ethnicity (n = 91)			0.729
Hispanic	3 (3.3)	1 (1.1)	
Non-Hispanic, white	57 (68.7)	26 (31.3)	0.056
Non-Hispanic, black	1 (1.1)	1 (1.1)	
Non-Hispanic, Asian	0 (0.0)	1 (1.1)	
Mixed/Other	0 (0.0)	1 (1.1)	
Food Insecurity			
Food Insecurity (n = 89)	60 (67.4)	29 (32.6)	

Table 1*: Demographics and food insecurity prevalence of food secure vs. food insecure students (n = 92).*

**p-values were significant at 0.05*

Food Insecurity

The first six questions of the survey measured FI status using the USDA Household Food Security SF-6-item Short Form, which was developed by the National Center for Health Statistics [21]. The SF-6 form included six "yes or no" questions that asked participants, "In the last 12 months, have you ever run out of money to buy food, had insufficient resources to eat a balanced diet, had to cut meal size or skip meals because there was not enough money, eat less to make food last longer, experienced hunger due to a lack of resources or felt unsure of where your next meal would come from?". For the questions, answers of "yes" indicated a level of food security and scored with one point. Students who scored zero or one were classified as 'food secure', those between two and four were classified as 'low food secure' and those that scored five to six were 'very low food secure'.

In analyzing the data, we combined the two classifications of 'low food secure' and very low food secure' into one classification of 'food insecure' as it is more appropriate for our study given the relatively small sample size. Additionally, this classification scheme is consistent with other studies that used this tool [10,19] and meets our goal of examining the scale of food insecurity among college students.

Socio-economic Factors

The socio-economic and demographic survey questions were modified from previous surveys on food insecurity in college students [10,14]. We included questions about whether students had ever participated in food assistance programs, have health insurance, if they pay off their credit cards monthly, about reliance on financial aid, work status and their overall health.

Statistical Analysis

The survey data were analyzed using cross-tabulations (with chi-square as the measure of significance) and t-tests to examine the extent to which socio-economic factors explain variations in food insecurity among our sample of college students. All data were analyzed using SPSS statistical software [22]. The statistical significance was set at $P < 0.05$.

Results

The 92 students who completed the survey were primarily single (86.9%), female (88.6%), white (94.3%), traditional-age students between 18 - 24 years (94.3%) and were mostly full-time undergraduates (92.0%). The prevalence of FI among the students surveyed was 32.6%, (n = 29). There were no significant demographic differences between students who were food insecure compared to those who were not food insecure.

Socio-Economic Factors of Food Insecurity

Within the questions about factors associated with FI and strategies to cope with poverty, those who were food insecure were significantly less likely than those who were food secure to report that in the last 12 months, they had money left over at the end of any given month (15.4% vs. 84.8%, p = 0.000), and they were significantly more likely to report having received free food or meals (70% vs. 30%, p = 0.000). Food insecure students were also significantly more likely than their food secure counterparts to report not having enough money to pay their rent/mortgage (66.7% vs. 33.3%, p = 0.008), and one food insecure student even reported being evicted due to not paying rent (p = 0.019).

Additionally, 63.6% (n = 21) of those classified as food insecure had to borrow money from friends and/or family to pay bills; this figure is roughly twice that reported by food secure students (p = 0.000). Those who were food insecure were also significantly less likely to state that they could have afforded college without working compared to food secure students (13.6% vs. 86.4%, p = 0.013) and less food insecure students applied for any financial aid than food secure students (41.3% vs. 58.7%, p = 0.008). Lastly, those who were food insecure were significantly less likely to rate their overall health as excellent compared to those who were food secure (13.8% vs. 86.2%, p = 0.011).

Outcome Variable	Food Secure N (%)	Food Insecure N (%)	P-value
Has health insurance (n = 87)	59 (67.8)	28 (32.2)	0.595
Perceived overall health as “excellent” (n = 29)	25 (86.2)	4 (13.8)	0.011
Has some money left over at the end of the month (n = 52)	44 (84.8)	8 (15.4)	0.000
Coping/Poverty In the last 12 months, the student:			
Has received free food or meals (n = 20)	6 (30.0)	14 (70.0)	0.000
Did not pay full amount of rent/mortgage (n = 3)	1 (33.3)	2 (66.7)	0.008
Was evicted from home/apartment for not paying rent (n = 1)	0 (0.0)	1 (100.0)	0.019
Borrowed money from friends/family to pay bills (n = 33)	12 (36.4)	21 (63.6)	0.000
Financial Aid			
Applied for financial aid (n = 63)	37 (58.7)	26 (41.3)	0.008
Employment			
Had a job for pay during school year (n = 60)	38 (43.2)	22 (25.0)	0.278

***Table 2**: Socio-economic factors related to food insecurity in food secure vs. food insecure students (n= 92).*

**p-values were significant at 0.05*

Discussion

This pilot study demonstrated that FI does exist on our campus (30.2%). In fact, the rate of FI is more than double the average for US households at 12.7% [5], is three times larger than the reported 8.6% FI rate for the county in which the university is located [23] and is over twice the 12.4% FI rate for the state of Pennsylvania [24]. This suggests that university students are at a high risk for FI. Our results are similar to other recent studies that reported between 25 - 60% food insecurity among American students [11-12,18] with similar results in Australia and Canada, perhaps indicating a worldwide prevalence of FI among college students [19,25].

Only a few studies address the socio-economic factors that may predict FI or that connect FI to the socio-economic status of college students [9-11]. Our study found that there was a significant relationship between FI and financial instability. The resultant lack of money to pay rent/bills and the need to borrow money to make ends meet increased the risk for FI. Similarly, Hughes., *et al.* [25] reported that almost 22.0% of college students borrowed money to purchase food and studies have found that receiving financial aid were positively associated with FI, indicating that financial aid status may be a predictor of FI in college students [9,26].

This study suggests that there are students who are struggling financially, including not having enough money to purchase food. Although the prevalence of FI on college campuses is becoming more widely known, the causes of this FI are complex and currently, there is not a standardized strategy to reach these students. Retention efforts include tutoring, mentoring and advising, but to date, there is little published on the food and housing needs in order for young adults to stay in college [6,18, 27].

University administrators have a unique and important role in determining the prevalence of FI on their campuses and to put into place early detection and nutrition-related resources. This will ensure that students have access to healthy, nutritious foods to support academic retention and success. Short- and long-term goals should be developed by an interdisciplinary team; including key campus stakeholders (administration, dining services, admissions, financial aid, academic faculty, student services) and community leaders (food banks, hunger coalitions, health department, etc).

Recommendations for meeting the needs of students with FI will require allocated space and possible funding. Whereas some of the projects can be 'service learning' activities, the assessment tools will need to be managed by the University administration. A possible strategy for early detection could use the USDA Household Food Security SF-6-item module for freshman, transfer and graduate students to screen for FI. This could be done in person at orientation or as an online assessment with links to available campus and community resources for food insecure students.

On-campus resource pantries can offer students both food and other necessities such as clothing, toiletries, etc. A pantry would serve as an immediate, short-term solution and a way to connect with resource-limited students. Establishing a campus garden would provide fresh, local access to fruits and vegetables for FI students and could allow students to volunteer at the garden in exchange for fruits/vegetables, similar to what a community supported agriculture (CSA) program offers their members.

Innovative and creative programs or services could include developing a "Share Back" program where unused meals on student meal plans are automatically made available for hungry students, or to create a bagged lunch program, where FI students could pick up a bagged lunch for a small fee, or funds could be raised by students to run the program.

Policy changes that improve access and streamline processes in applying for the Supplemental Nutrition Assistance Program (SNAP) and other food assistance programs are needed, as well as a national policy for reduced meal plans for those students who demonstrate FI similar to the National School Lunch program (NSLP) currently used in K-12 grades.

Future studies are necessary to elucidate the socio-economic factors that lead to FI in college students. As policies and programs are implemented, tools to assess acceptance, cultural sensitivity, and success in alleviating hunger in college students to improve learning and retention in school is crucial.

Limitations

Limitations to this study include the cross-sectional design that only speaks to associations within this particular population and cannot be generalized across this university nor the college population as a whole. There is also potential for selection and gender bias, as this convenience sample was predominately female, white, nutrition-major students enrolled in a nutrition course, Freudenberg., *et al*. found that students of color reported higher levels of FI than white students [16]. Despite these limitations, the data adds to the literature on the prevalence of college FI and possible predictors of FI among college students.

Conclusion

This pilot study demonstrated significant prevalence of FI and some of the major socio-economic factors associated with FI among undergraduate students attending a Mid-Atlantic university. Hunger and financial instability have a negative impact on learning and retention. Overall, our findings affirm the need for university administrators to put into place strategies to reach out to students who are most likely to be experiencing FI and to offer resources to create effective and sensitive interventions to eradicate this growing public health concern.

Conflict of Interest

The authors declare that they have no competing interests.

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