

## **Prevalence and correlates of food insecurity among students attending a midsize rural university in Oregon**

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**Word count:** 3103.

## **Prevalence and correlates of food insecurity among students attending a midsize rural university in Oregon**

### **ABSTRACT**

**Objective:** To examine the prevalence and identify correlates of food insecurity among students attending a rural university in Oregon.

**Methods:** Cross-sectional non-probability survey of 354 students attending a midsize rural university in Oregon during May 2011. Main outcome was food insecurity measured using the USDA Household Food Security Survey Module: Six-Item Short Form. Socioeconomic and demographic variables were included in multivariate logistic regression models.

**Results:** Over half of students (59%) were food insecure at some point during the previous year. Having fair/poor health (OR: 2.08, 95%CI: 1.07 – 4.63), being employed (OR: 1.73, 95%CI: 1.04 – 2.88) and with incomes below \$15,000 per year (OR: 2.23, 95% CI: 1.07 – 4.63) was associated with food insecurity. In turn, good academic performance (GPA 3.1 or higher) was inversely associated with food insecurity.

**Conclusions:** Food insecurity seems to be a significant issue for college students. It is necessary to expand research on different campus settings, and further strengthen support systems to increase access to nutritious foods for this population.

**Key words:** Food insecurity, college students, rural, Oregon.

**Abstract word count:** 164 words.

1 **Prevalence and correlates of food insecurity among students attending a midsize rural**  
2 **university in Oregon**

3  
4  
5 **INTRODUCTION**

6  
7 Household food insecurity is defined as the limited or uncertain availability of nutritionally  
8 adequate and safe foods, and limited or uncertain ability to acquire acceptable foods in socially  
9 acceptable ways.<sup>1</sup> As measured by the U.S. Department of Agriculture (USDA) Household Food  
10 Security Module,<sup>2</sup> food insecurity is a marker of economic hardship as it assesses the adequacy  
11 and stability of a household's food supply over the preceding 12 months for active, healthy living  
12 of all household members. The most recent national data in 2011 indicate that 14.9% of all  
13 households (17.9 million) were food insecure.<sup>3</sup> Furthermore, low-income households with  
14 incomes below 185% of the poverty threshold (34.5%), and households with children (20.6%)  
15 were higher than the national average.<sup>3</sup>

16 Previous research has observed that food insecurity can disrupt optimal development  
17 throughout the life cycle, from prenatal period on into elder years.<sup>4-9</sup> A growing body of  
18 literature has documented the effects of food insecurity on cognitive, academic, and psychosocial  
19 development among school age and teenage students. These studies consistently observe that  
20 food insecurity is associated with lower academic performance, poor health, and decreased  
21 psychosocial function.<sup>4,10,11</sup>

22 Among college students, financial hardship can translate into budget demands that  
23 compete with food dollars (e.g. tuition, text books, housing, utilities, health care).<sup>12,13</sup> Over the  
24 last 30 years, the price of higher education has steadily outpaced inflation, cost of living, and  
25 medical expenses.<sup>14</sup> Recent changes to federal loan policies regarding the amount and duration of

26 federal aid received as well as how soon interest will begin to accrue after college may  
27 exacerbate the financial challenges students face.<sup>15</sup> Food insecurity, as a potential consequence  
28 of the increasing cost of higher education, and its likely impact on student health, learning and  
29 social outcomes should not be considered an accepted aspect of the impoverished student  
30 experience, but a major student health priority.<sup>16</sup>

31 College students face life-changing milestones during their transition to adulthood which  
32 may have long lasting effects.<sup>17,18</sup> Food insecurity during these years can potentially impact  
33 college students' cognitive, academic, and psychosocial development.<sup>4</sup> However, little research  
34 has addressed this issue. Studies addressing food insecurity among college students suggest a  
35 higher prevalence of food insecurity compared with the general population.<sup>19,20</sup> A study in  
36 Hawai'i found that 45% of students were food insecure or at risk of food insecurity<sup>20</sup> while  
37 another study in Australia found that almost 72% of students were food insecure.<sup>19</sup> No such  
38 studies have been conducted in the continental United States or in rural areas. The purpose of the  
39 present study is to address this gap in the literature by analyzing the prevalence and identifying  
40 correlates of food insecurity among students attending a rural university in Oregon.

41

## 42 **METHODS**

43

### 44 **Design and Participants**

45

46 A cross-sectional non-probability web-based 40-item survey was distributed via e-mail to all  
47 students (N=5,438) attending a midsize rural university in western Oregon during May 2011. A  
48 total of 354 students completed the survey (7% response rate). The email contained an informed  
49 consent form and provided a link to the survey where participants confirmed consent prior to  
50 beginning the survey. The study was part of a broader effort to increase access to food among

51 students on campus. The online survey was open for a two-week period during which weekly  
52 reminders were sent.<sup>21,22</sup> The study protocol was approved by the Institutional Review Board at  
53 this university.

54

## 55 **Theoretical Framework**

56 Based on previous research,<sup>2,3,19,20,23</sup> relevant factors associated with food insecurity among  
57 university students were included. Questions regarding credit card debt<sup>24</sup>, employment<sup>25</sup>, and  
58 financial aid<sup>26</sup> were also added. The correlates used in this model are shown in Table 1.

59

## 60 **Food insecurity**

61 The *U.S. Household Food Security Survey Module: Six-Item Short Form* was used to measure  
62 food insecurity status.<sup>2</sup> The 6-item scale has been shown to have reasonably high specificity and  
63 sensitivity and minimal bias with respect to the 18-item measure.<sup>27</sup> The six items of the food  
64 security scale were reduced to two categories: 0 = food secure, 1= food insecure.<sup>27</sup> The internal  
65 consistency of the scale (Cronbach's alpha = 0.83) was similar to a previous study that used the  
66 same six-item scale.<sup>28</sup>

67

## 68 **Statistical analysis**

69 Summary statistics were calculated for all variables included in this study. Chi-square goodness-  
70 of-fit tests were used to compare the fit of our sample with selected campus-wide demographic  
71 characteristics provided by the university's registrar office. A two-step multivariate logistic  
72 regression model was built to evaluate the association between correlates and food insecurity  
73 status (step 1), adjusting for socio-demographic factors (step 2). All analyses were conducted

74 using Stata 11 (StataCorp, College Station, TX, 2009). The Hosmer-Lemeshow test<sup>29</sup> was  
75 performed to assess model fit using the `lfit` command.

76

## 77 **RESULTS**

78 Table 2 presents the summary statistics for all variables included in the study. The sample was  
79 representative of the student population at this university for full-time ( $\chi^2_{\text{goodness of fit}} = 0.10$ ,  $p =$   
80  $0.75$ ), undergraduate ( $\chi^2_{\text{goodness of fit}} = 1.98$ ,  $p = 0.16$ ) and Latino students ( $\chi^2_{\text{goodness of fit}} = 1.29$ ,  $p =$   
81  $0.26$ ), but overrepresented female students ( $\chi^2_{\text{goodness of fit}} = 24.5$ ,  $p = 0.00$ ). Less than a third of the  
82 sample reported residing on-campus (29%). Those who reported residing off-campus either live  
83 with roommates (35%); or have other arrangements (36%), such as living by themselves (18%),  
84 or with their parents (4%). Half of the students (50.3%) said they had a job in addition to  
85 attending college. Those who reported the number of hours worked ( $n=164$ ) worked an average  
86 of 18.2 hours per week ( $sd=9.3$ ). The majority (79%) of students reported having health  
87 insurance, which was obtained primarily from their parents (67%) or the university (22%). Very  
88 few students (12%) reported having no credit card debt. The majority of participants were female  
89 (73%), single (73%), and 18-24 years old (72%). Eight-percent reported being Hispanic or  
90 Latino.

91 Food insecurity affected 59% of students. Participation in food assistance programs  
92 (Emergency food from a church, food pantry/bank, or emergency kitchen; WIC; SNAP /food  
93 stamps; private organizations) reached 27% of the sample. Most of these were SNAP recipients  
94 ( $n=67$ , 70%). Table 3 presents the results of the final multivariate logistic regression model. The  
95 p-value (0.74) for the Hosmer-Lemeshow test indicates good model fit. Income less than \$15,000  
96 was the strongest correlate of food insecurity among this sample of students (OR: 2.23, 95% CI:

97 1.07 – 4.63). Similarly, students reporting fair/poor health were more likely to be food insecure  
98 (OR: 2.08, 95%CI: 1.07 – 4.63). Employed students and those participating in food assistance  
99 programs were also more likely to be food insecure (OR: 1.73, 95%CI: 1.04 – 2.88; OR: 1.91,  
100 95%CI: 1.05 – 3.45, respectively). However, students with a GPA of 3.1 or higher were 60% less  
101 likely to be food insecure (OR: 0.40, 95%CI: 0.22 – 0.69). No significant associations were  
102 found with living arrangement, health insurance status, physical activity, enrollment status or  
103 demographic factors.

104

## 105 **DISCUSSION**

106

107 The present study found that the prevalence of food insecurity (59%) among a sample of college  
108 students attending a midsize rural university in Oregon was higher than the general population  
109 (15%), or even other college student populations (e.g. 39% among students at City University of  
110 New York;<sup>30</sup> 45% among students at University of Hawai'i at Manoa<sup>20</sup>). Food insecurity is an  
111 indicator of economic hardship that college students are facing. A recent story on *The Atlantic*  
112 pointed out that across the country, stretching financial aid dollars or wages from part-time work  
113 has become more challenging for college students during the great recession, partly because  
114 “parents have fewer resources to help out, there is greater competition for work-study jobs, and  
115 many schools have increased tuition to cover their expenses.”<sup>31</sup> Without parent’s safety nets  
116 students are often forced to work many hours, some even working fulltime while completing  
117 their college degrees. In this study, students reported working an average of 18 hours, ranging  
118 from 4 to 42 hours per week. Students who were employed were almost twice as likely to report  
119 experiences with food insecurity, suggesting that financial assistance and employment are falling

120 short of meeting financial demands of attending a university. Time spent working many hours  
121 and lack of adequate food may affect students' academic success.<sup>19,25</sup> Previous studies have  
122 observed a relationship between lower academic performance and food insecurity.<sup>4,7,11,32</sup>  
123 Likewise, the results of this study suggest that students who report experiencing food insecurity  
124 are less likely to report a GPA of 3.1 or higher.

125 Educational attainment is one of the most important contributors for upward social  
126 mobility.<sup>18</sup> It is also an important marker in the transition to adulthood,<sup>17</sup> and a reflection of  
127 cumulative advantages and disadvantages.<sup>33</sup> Food insecurity among college students may signal  
128 previous trajectories of disadvantages and shape future trajectories into adulthood. Although  
129 students from middle/upper-middle class families may experience short-term episodes of food  
130 insecurity, they are likely to have reliable sources of support (e.g. parents, extended family). For  
131 low-income students, however, food insecurity is likely an outcome of their disadvantaged  
132 trajectories, which can make them more vulnerable to living in poverty and not completing  
133 higher education. Even worse, not only are they facing food insecurity but they may also be  
134 jeopardizing their potential for academic success and future earnings. Addressing food insecurity  
135 should be one of the considerations for policy makers in the context of promoting higher  
136 education as a stepping-stone to the middle-class. At this stage of transition into adulthood, more  
137 robust support systems might lead to successful educational attainment and social mobility.<sup>17</sup>

138

139

#### 140 **Limitations**

141 The present study findings have several limitations. First, it was a cross-sectional study that  
142 relied on students' self-report. Second, the non-probability, low-response rate sample may have



143 increased the likelihood of sampling error and non-response bias.<sup>34</sup> However, the sample was  
144 representative of the university population for full-time, undergraduate and Latino students; and  
145 overrepresented female students at this university. Third, the study used the short form of the  
146 USDA food security scale. Unlike the full 18-item scale, the short form scale does not directly  
147 measure children's food insecurity, and doesn't capture the most severe adult food insecurity (in  
148 which children's food intake is likely jeopardized).

149

## 150 **IMPLICATIONS FOR RESEARCH AND PRACTICE**

151

152 The present study contributes to our understanding of food insecurity among young adults in  
153 higher education and its associated challenges. A key finding is that food insecurity is a  
154 significant issue for more than half of college students surveyed. To have a better picture of the  
155 food insecurity situation across the country, it is necessary to expand the focus on college  
156 students' risk behaviors<sup>35,36</sup> to include social and economic factors influencing a student's health,  
157 including income, employment, debt, housing costs, and food insecurity. Future research should  
158 also explore food insecurity among college student families with children; and assess not only  
159 eating behaviors but the campus nutrition environment.<sup>37</sup> Moreover, longitudinal and qualitative  
160 studies should also be considered to monitor the persistence of food insecurity throughout the  
161 college years.

162 It is also necessary to expand research on different campus settings, and further  
163 strengthen support systems to increase access to nutritious foods for this population. When faced  
164 with food insecurity, people use a variety of coping mechanisms such as utilizing federal  
165 nutrition assistance programs, receiving food from other family members, and seeking

166 emergency food boxes from food banks.<sup>38-40</sup> In this context, on-campus food banks and gardens  
 167 may be valuable interventions.<sup>20</sup> A number of institutions across the country have or are in the  
 168 process of implementing these initiatives.<sup>31</sup> The Oregon Food Bank, for instance, has produced a  
 169 manual about how to establish a campus food pantry.<sup>41</sup> Also, SNAP eligibility requirements for  
 170 college students could be revised. However, food assistance initiatives have shown only limited  
 171 ameliorative effect,<sup>42,43</sup> which point to the need for broader food system, right-based approaches  
 172 to food security.<sup>43,44</sup>

173 Therefore, it is necessary to consider other initiatives and policies to increase access to  
 174 nutritious foods, and more broadly, improve students' economic stability (i.e. are they able to  
 175 address their basic needs, including food, so that they can focus on their education).<sup>26,45</sup> In other  
 176 words, the promise of higher education as a tool for a better future needs to be met with adequate  
 177 financial and other social supports for college students (particularly low-income, first generation,  
 178 and minorities<sup>45</sup>) to succeed.

179

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**Table 1. Description of correlates of food insecurity among students at a midsize rural university, Oregon, USA.**

<b>Correlate</b>	<b>Question</b>	<b>Level</b>	<b>Values</b>
Self-reported health	<i>How would you rate your overall health?</i>	Discrete	0 = Excellent, Very Good, Good 1 = Fair, Poor
Moderate physical activity	<i>How often do you participate in at least moderate physical activity? (Examples of moderate physical activity: walking, water aerobics, bicycling slower than 10 miles per hour, tennis (doubles), ballroom dancing, general gardening)</i>	Discrete	0 = 0-2 days a week 1 = 3 or more days a week
Having health insurance	<i>Do you currently have health insurance?</i>	Discrete	0 = No 1 = Yes
Having a campus meal plan	<i>Do you have a campus meal plan?</i>	Discrete	0 = No 1 = Yes
Participating in food assistance programs	<i>Have you ever participated in any of the following food assistance programs such as emergency food from a church, food pantry/bank, or emergency kitchen, WIC (Women, Infants, and Children), SNAP (Supplemental Nutrition Assistance Program, formerly known as Food Stamps), private organizations, other? Please select all that apply</i>	Discrete	0 = No participation 1 = Participation in any food assistance program
Living arrangement	<i>Where do you currently live?</i>	Discrete	0 = Lives off campus (with roommates, other) 1 = Lives on campus
Credit card debt	<i>How much credit card debt do you currently have?</i>	Discrete	0 = \$499 or less, \$500 or more 1 = None
Undergraduate student	<i>At Western, are you a?</i>	Discrete	0 = Graduate student, other 1 = Undergraduate student
Full-time student	<i>Do you attend Western as a full-time or part-time student?</i>	Discrete	0 = Part-time student 1 = Full-time student
GPA (3.1 or higher)	<i>What is your GPA (Grade Point Average)?</i>	Discrete	0 = Lower than 3.1 1 = 3.1 or higher
Receives financial aid	<i>Do you currently receive financial aid (including scholarships, private and federal loans, and/or grants)?</i>	Discrete	0 = No 1 = Yes
Employed	<i>Besides attending college, do you have a job?</i>	Discrete	0 = No 1 = Yes
Income	<i>What is your annual income?</i>	Discrete	0 = \$15,000 or more 1 = Less than \$15,000
Sex	<i>What is your sex?</i>	Discrete	0 = Male 1 = Female
Single	<i>What is your marital status</i>	Discrete	0 = Married, living with a partner 1 = Never married (single)
Latino	<i>Are you Hispanic or Latino</i>	Discrete	0 = No 1 = Yes
Age	<i>What is your age (in years)?</i>	Discrete	0 = 25 or older 1 = 18 – 24

**Table 2. Summary statistics among students at a midsize rural university, Oregon, USA, (n=354).**

Variables	n (%)
<i>Outcome variable</i>	
Food insecure	208 (58.8)
<i>Correlates</i>	
Fair/poor health	66 (18.6)
Moderate physical activity (3 or more days a week)	270 (70.6)
Has health insurance	279 (78.8)
Has a campus meal plan	92 (26.0)
Participates in food assistance programs	96 (27.1)
Living arrangement	
On campus	104 (29.4)
Off campus with roommates	123 (34.8)
Off campus other	127 (35.9)
Credit card debt	
None	41 (11.58)
\$499 or less	252 (71.2)
\$500 or more	61 (17.2)
Undergraduate student	306 (86.4)
Full-time student	310 (87.6)
GPA (3.1 or higher)	230 (65.0)
Receives financial aid	268 (75.7)
Employed	178 (50.3)
Income (less than \$15,000)	278 (78.5)
Female	258 (72.9)
Single	259 (73.2)
Latino	29 (8.2)
Age	
18 – 24	255 (72.0)
25 or older	99 (28.0)

**Table 3. Multivariate logistic regression of factors associated with food insecurity among students at a midsize rural university (n=354).**

	B	P value	OR	95% CI		
Fair/poor health	0.73	0.026	2.08	1.09	-	3.95
MPA (3 or more days a week)	-0.42	0.123	0.66	0.39	-	1.12
Has health insurance	-0.34	0.350	0.71	0.35	-	1.44
Has a campus meal plan	0.70	0.088	2.02	0.90	-	4.52
Participates in FAP	0.65	0.033	1.91	1.05	-	3.45
Lives on campus	0.17	0.670	1.19	0.54	-	2.63
Has no credit card debt	-0.89	0.093	0.41	0.15	-	1.16
Undergraduate student	-0.22	0.688	0.81	0.28	-	2.31
Full-time student	0.04	0.946	1.04	0.31	-	3.51
GPA (3.1 or higher)	-0.93	0.001	0.40	0.22	-	0.69
Receives financial aid	0.13	0.684	1.14	0.60	-	2.16
Employed	0.55	0.035	1.73	1.04	-	2.88
Income (less than \$15,000)	0.80	0.032	2.23	1.07	-	4.63
Female	-0.04	0.897	0.96	0.52	-	1.78
Single	-0.57	0.105	0.56	0.28	-	1.13
Latino	-0.02	0.956	0.98	0.40	-	2.36
Age (18 - 24)	0.38	0.291	1.46	0.72	-	2.96
Intercept	0.46	0.399	1.59			

The non-significant Hosmer-Lemeshow test ( $\chi^2=5.13, p=0.74$ ) indicates a good model fit.

MPA: moderate physical activity (per CDC guidelines).

FAP: Food Assistance Programs (emergency food from a church, food pantry/bank, or emergency kitchen, WIC, SNAP, private organizations).