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Prevalence and Correlates of Food Insecurity Among Students Attending a Midsize Rural University in Oregon

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

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Running head: Food insecurity among college students

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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.¹ As measured by the U.S. Department of Agriculture (USDA) Household Food
10 Security Module,² 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.³ 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.³

16 Previous research has observed that food insecurity can disrupt optimal development
17 throughout the life cycle, from prenatal period on into elder years.⁴⁻⁹ 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.^{4,10,11}

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).^{12,13} Over the
24 last 30 years, the price of higher education has steadily outpaced inflation, cost of living, and
25 medical expenses.¹⁴ 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.¹⁵ 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.¹⁶

31 College students face life-changing milestones during their transition to adulthood which
32 may have long lasting effects.^{17,18} Food insecurity during these years can potentially impact
33 college students' cognitive, academic, and psychosocial development.⁴ 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.^{19,20} A study in
36 Hawai'i found that 45% of students were food insecure or at risk of food insecurity²⁰ while
37 another study in Australia found that almost 72% of students were food insecure.¹⁹ 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.^{21,22} The study protocol was approved by the Institutional Review Board at
53 this university.

54

55 **Theoretical Framework**

56 Based on previous research,^{2,3,19,20,23} relevant factors associated with food insecurity among
57 university students were included. Questions regarding credit card debt²⁴, employment²⁵, and
58 financial aid²⁶ 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.² 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.²⁷ The six items of the food
64 security scale were reduced to two categories: 0 = food secure, 1= food insecure.²⁷ 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.²⁸

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 test²⁹ 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;³⁰ 45% among students at University of Hawai'i at Manoa²⁰). 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.”³¹ 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.^{19,25} Previous studies have
122 observed a relationship between lower academic performance and food insecurity.^{4,7,11,32}
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.¹⁸ It is also an important marker in the transition to adulthood,¹⁷ and a reflection of
127 cumulative advantages and disadvantages.³³ 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.¹⁷

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.³⁴ 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^{35,36} 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.³⁷ 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.³⁸⁻⁴⁰ In this context, on-campus food banks and gardens
 167 may be valuable interventions.²⁰ A number of institutions across the country have or are in the
 168 process of implementing these initiatives.³¹ The Oregon Food Bank, for instance, has produced a
 169 manual about how to establish a campus food pantry.⁴¹ Also, SNAP eligibility requirements for
 170 college students could be revised. However, food assistance initiatives have shown only limited
 171 ameliorative effect,^{42,43} which point to the need for broader food system, right-based approaches
 172 to food security.^{43,44}

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).^{26,45} 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 minorities⁴⁵) to succeed.

179

180 **References**

- 181 1. Nord M, Prell M. Struggling to Feed the Family: What Does it Mean to be Food
 182 Insecure? *Amber Waves*. June, 2007: 8.
- 183 2. Bickel G, Nord M, Price C, Hamilton W, Cook J. *Guide to Measuring Household Food*
 184 *Security*. Alexandria, VA: Food and Nutrition Service, USDA;2000.
- 185 3. Coleman-Jensen A, Nord M, Andrews M, Carlson S. *Household Food Security in the*
 186 *United States in 2010*. Washington DC: US Department of Agriculture, Economic
 187 Research Service;2012.
- 188 4. Alaimo K, Olson CM, Frongillo EA. Food Insufficiency and American School-Aged
 189 Children's Cognitive, Academic, and Psychosocial Development. *Pediatrics*.
 190 2001;108(1):44-53.
- 191 5. Alaimo K, Olson CM, Frongillo EA. Family Food Insufficiency, but Not Low Family
 192 Income, Is Positively Associated with Dysthymia and Suicide Symptoms in Adolescents.
 193 *The Journal of Nutrition*. 2002;132(4):719-725.
- 194 6. Conway KS, Kutinova A. Maternal health: does prenatal care make a difference? *Health*
 195 *Econ*. 2006;14:461-488.

- 196 7. Cook JT, Frank DA. Food Security, Poverty, and Human Development in the United
197 States. *Annals of the New York Academy of Sciences*. 2008;1136(1):193-209.
- 198 8. Lee JS, Frongillo EA. Nutritional and Health Consequences Are Associated with Food
199 Insecurity among U.S. Elderly Persons. *The Journal of Nutrition*. 2001;131(5):1503-
200 1509.
- 201 9. Holben D. Position of the American Dietetic Association: Food Insecurity in the United
202 States. *Journal of the American Dietetic Association*. 2010;110(9):1368-1377.
- 203 10. Perez-Escamilla R, Pinheiro de Toledo Vianna R. Food Insecurity and the Behavioral and
204 Intellectual Development of Children: A Review of the Evidence. *Journal of Applied
205 Research on Children: Informing Policy for Children at Risk*. 2012;3(1):9.
- 206 11. Jyoti DF, Frongillo EA, Jones SJ. Food Insecurity Affects School Children's Academic
207 Performance, Weight Gain, and Social Skills. *The Journal of Nutrition*.
208 2005;135(12):2831-2839.
- 209 12. Roberts R, Golding J, Towell T, Weinreb I. The Effects of Economic Circumstances on
210 British Students' Mental and Physical Health. *Journal of American College Health*.
211 1999;48(3):103-109.
- 212 13. Robb CA, Moody B, Abdel-Ghany M. College student persistence to degree: The burden
213 of debt. *Journal of College Student Retention: Research, Theory and Practice*.
214 2011;13(4):431-456.
- 215 14. Phillips M. Cost of College on the Rise (Again). *Freakonomics: The Hidden Side of
216 Everything*. 2011. <http://www.freakonomics.com/2011/10/27/cost-of-college-on-the-rise-again/>. Accessed January 20, 2012.
- 217
- 218 15. Hopkins K. Look Out for These Federal Aid Changes in 2012. *USNews.com/Education*.
219 2012. [http://www.usnews.com/education/best-colleges/paying-for-
220 college/articles/2012/01/25/look-out-for-these-federal-aid-changes-in-2012](http://www.usnews.com/education/best-colleges/paying-for-college/articles/2012/01/25/look-out-for-these-federal-aid-changes-in-2012).
- 221 16. Hughes R. Food insecurity: the skeleton in the national closet. *Public Health Nutrition*.
222 2009;12(11):1973.
- 223 17. Settersten R, Ray B. *Not quite adults : why 20-somethings are choosing a slower path to
224 adulthood, and why it's good for everyone*. New York: Bantam Books Trade Paperbacks;
225 2010.
- 226 18. Pallas AM. Educational transitions, trajectories, and pathways. In: Mortimer JT,
227 Shanahan M, eds. *Handbook of the Life Course*. New York, NY: Plenum; 2003:165-184.
- 228 19. Hughes R, Serebryanikova I, Donaldson K, Leveritt M. Student food insecurity: The
229 skeleton in the university closet. *Nutrition & Dietetics*. 2011;68(1):27-32.
- 230 20. Chaparro MP, Zaghoul SS, Holck P, Dobbs J. Food insecurity prevalence among college
231 students at the University of Hawai'i at Manoa. *Public Health Nutrition*.
232 2009;12(11):2097-2103.
- 233 21. Thomas SJ. *Using web and paper questionnaires for data-based decision making: from
234 design to interpretation of the results*. Thousand Oaks, CA: Corwin Press; 2004.
- 235 22. Archer TM. Web-Based Surveys. *Extension Journal* 2003;41(4):4TOT6.
- 236 23. Subramanian S, Delgado I, Jadue L, Vega J, Kawachi I. Income inequality and health:
237 multilevel analysis of Chilean communities. *Journal of epidemiology and community
238 health*. 2003;57(11):844-848.
- 239 24. Nelson MC, Lust K, Story M, Ehlinger E. Credit Card Debt, Stress and Key Health Risk
240 Behaviors Among College Students. *American Journal of Health Promotion*.
241 2008;22(6):400-407.

- 242 25. Miller K, Danner F, Staten R. Relationship of Work Hours With Selected Health
243 Behaviors and Academic Progress Among a College Student Cohort. *Journal of*
244 *American College Health*. 2008;56(6):675-679.
- 245 26. Gutter M, Copur Z. Financial Behaviors and Financial Well-Being of College Students:
246 Evidence from a National Survey. *Journal of Family and Economic Issues*. 2011:1-16.
- 247 27. Blumberg SJ, Bialostosky K, Briefel RR, Hamilton WL. The Effectiveness of a Short
248 Form of the Household Food Security Scale. *American Journal of Public Health*.
249 1999;89(8):1231-1234.
- 250 28. Gulliford M, Mahabir D, Rocke B. Reliability and validity of a short form household
251 food security scale in a Caribbean community. *BMC Public Health*. 2004;4(1):22.
- 252 29. Archer KJ, Lemeshow S. Goodness-of-fit test for a logistic regression model fitted using
253 survey sample data. *The Stata Journal*. 2006;6(1):97-105.
- 254 30. Freudenberg N, Manzo L, Jones H, Kwan A, Tsui E, Gagnon M. *Food Insecurity at*
255 *CUNY: Results from a Survey of CUNY Undergraduate Students*. New York, NY: The
256 Campaign for a Healthy CUNY;2011.
- 257 31. Robbins K. Among Dorms and Dining Halls, Hidden Hunger. *The Atlantic*. May 4, 2010.
- 258 32. Roustit C, Hamelin A-M, Grillo F, Martin J, Chauvin P. Food insecurity: could school
259 food supplementation help break cycles of intergenerational transmission of social
260 inequalities? *Pediatrics*. 2010;126(6):1174-1181.
- 261 33. Pallas AM. Educational participation across the life course: Do the rich get richer? In:
262 Owens T, Settersten R, eds. *New Frontiers in Socialization: Advances in Life Course*
263 *Research*. Oxford, UK: Elsevier Science; 2002:327-354.
- 264 34. Singleton RA, Straits BC. *Approaches to Social Research*. 3rd ed. New York, NY:
265 Oxford University Press; 1999.
- 266 35. Cluskey M, Grobe D. College Weight Gain and Behavior Transitions: Male and Female
267 Differences. *Journal of the American Dietetic Association*. 2009;109(2):325-329.
- 268 36. Greene GW, Schembre SM, White AA, et al. Identifying Clusters of College Students at
269 Elevated Health Risk Based on Eating and Exercise Behaviors and Psychosocial
270 Determinants of Body Weight. *Journal of the American Dietetic Association*.
271 2011;111(3):394-400.
- 272 37. Freedman MR. Development, Evaluation, and Validation of Environmental Assessment
273 Tools to Evaluate the College Nutrition Environment. *Journal of American College*
274 *Health*. 2010;58(6):565-568.
- 275 38. Swanson J, Olson C, Miller E, Lawrence F. Rural Mothers' Use of Formal Programs and
276 Informal Social Supports to Meet Family Food Needs: A Mixed Methods Study. *Journal*
277 *of Family and Economic Issues*. 2008;29(4):674-690.
- 278 39. Heflin C, London AS, Scott EK. Mitigating Material Hardship: The Strategies Low-
279 Income Families Employ to Reduce the Consequences of Poverty. *Sociological Inquiry*.
280 2011;81(2):223-246.
- 281 40. Mammen S, Bauer J, Richards L. Understanding Persistent Food Insecurity: A Paradox
282 of Place and Circumstance. *Social Indicators Research*. 2009;92(1):151-168.
- 283 41. Cunningham SE, Johnson DM. *So You Want to Start a Campus Food Pantry? A How-To*
284 *Manual*. Portland, OR: Oregon Food Bank;2011.
- 285 42. Nord M, Golla AM. *Does SNAP Decrease Food Insecurity? Untangling the Self-*
286 *Selection Effect*. Washington, DC: Economic Research Service, U.S. Department of
287 Agriculture;2009.

- 288 43. Chilton M, Rose D. A Rights-Based Approach to Food Insecurity in the United States.
289 *American Journal of Public Health*. 2009;99(7):1203-1211.
- 290 44. Anderson MD. Beyond food security to realizing food rights in the US. *Journal of Rural*
291 *Studies*. 2013;29:113-122.
- 292 45. Engle J, Tinto V. *Moving Beyond Access: College Success For Low- Income, First-*
293 *Generation Students*. Washington, DC: Pell Institute for the Study of Opportunity in
294 Higher Education;2008.
- 295
- 296

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

Correlate	Question	Level	Values
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).