

Food Insecurity Among Students At Rutgers University–New Brunswick

March 2018

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Acknowledgements

We thank Sara Goldrick-Rab of Temple University, Jed Richardson and the staff at Wisconsin HOPE Lab, and Jennifer Maguire of Humboldt State University for graciously sharing their survey instruments. We thank Kathe Newman of the Edward J. Bloustein School of Planning and Public Policy and Lauren Errickson and Amanda Bialek of Rutgers Against Hunger for their input on the survey instrument. We thank William K. Hallman, of the Rutgers Department of Human Ecology, for providing ideas and feedback on both the survey instrument and the report and Marc Weiner of the Edward J. Bloustein School of Planning and Public Policy for reviewing the final report. Kelsey Kaskoun and Chioma Nwankwo, research assistants in the Department of Human Ecology, provided invaluable assistance with data cleaning and analysis. Gina Pope of Nutritional Sciences provided editing assistance, and finally, we thank Kaitlyn Zullo of Student Affairs for doing the layout and graphic design of an earlier version of this report.

Suggested Citation

Cuite, C.L., Brescia, S.A., Porterfield, V., Weintraub, D.S., & Willson, K.A. (2018). Working paper on food insecurity among students at Rutgers-New Brunswick.
http://humeco.rutgers.edu/documents_pdf/RU_Student_Food_Insecurity_2018.pdf

Executive Summary

Food insecurity is defined as a “lack of reliable access to sufficient quantities of affordable, nutritious food” (Dubick, Mathews, & Cady, 2016, p. 6). The extent of this problem among college students has only recently been studied in a systematic way, and evidence suggests that food insecurity is a significant problem for students at colleges and universities across the country (Crutchfield et al., 2016; Freudenberg et al., 2011; Wisconsin Hope Lab, 2016). In addition, college students may face an even greater risk of food insecurity when compared to the general population (Goldrick-Rab, Broton, & Eisenberg, 2015), which is 12.3% nationwide and 11.1% in New Jersey (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2017). This report provides the first quantitative assessment of student food insecurity at Rutgers–New Brunswick, drawing on results of a survey administered in late fall of 2016. Furthermore, this report provides recommendations on how to address the issue of food insecurity on the Rutgers–New Brunswick campus.

Methods

A link to an online survey was emailed to all matriculated undergraduate and graduate students from Rutgers–New Brunswick (except Rutgers Biomedical Health Sciences students). The survey had a response rate of 19.17%, for a total of 8,393 student participants. Survey respondents were largely representative of the general student population. The survey instrument included questions from the United States Department of Agriculture (USDA) Household Food Security Survey, which is the most commonly used measure of food insecurity and was used to create a food insecurity index. In addition, the survey included questions from the Wisconsin HOPE Lab survey (Wisconsin Hope Lab, 2016) and multiple questions specific to Rutgers–New Brunswick.

Key Findings

- More than a third of Rutgers students are food insecure, with 36.9% of undergraduate students and 32.2% of graduate students reporting some level of food insecurity.
- Food insecurity is associated with lower grade point averages (GPAs), and this relationship is particularly strong for undergraduates.
- Undergraduates who live off campus are more likely to be food insecure than those who live on campus (46.1% vs. 29.4%, respectively).
- Undergraduates without a meal plan were significantly more likely to be food insecure than those who have purchased a meal plan (45.7% vs. 29.4%, respectively).
- A number of factors are related to food insecurity. Among undergraduates, students who were most likely to be food insecure were those who identified as Black/African American, Hispanic or Other, had parents with less education, received a Pell grant, had families who do not help them with expenses, are not citizens and report working jobs other than work study. Among graduate students, characteristics associated with food insecurity included identifying as Asian, and having parents with less education.
- A small but significant number of students--5.4%--report using off-campus food pantries, and students are much more likely to go to off-campus pantries than to the recently created Rutgers Student Food

Pantry. This is likely to change as advertising for the on-campus pantry had not yet begun in earnest at the time of survey.

Recommendations and Next Steps

The research presented here highlights the need for continued action to address the significant levels of food insecurity at Rutgers–New Brunswick. Recommendations include both building on the current work of the University as well as developing new initiatives.

- Increase coordination among the on-campus groups that already provide services to food insecure students, such as the Dean of Students, Counseling and Psychological Services, Equal Opportunity Fund, Academic Deans, Price Fellowship Program, School of Social Work, Athletics, Recreation, and the chaplaincies.
- Focus the University’s response on those groups most at risk for food insecurity, including Black/African American and Hispanic undergraduate students, Asian graduate students, first generation students, and those receiving Pell Grants.
- Expand emergency resources available to students where possible and examine institutional impediments towards accessing sufficient food.
- Educate faculty and staff about food insecurity and its relationship to academic performance.
- Continue campus-wide outreach to increase awareness, referrals, and utilization of the recently created Rutgers Student Food Pantry.
- Create a food security work group for Rutgers–New Brunswick to further study the problem and develop recommendations for how the University can best address food insecurity.

Next steps are focused on additional research. The research team currently plans to administer this survey a second time in the fall of 2019, which will be helpful in understanding if and how food insecurity at Rutgers–New Brunswick is changing over time. In addition, the research team is working with the New Jersey College and University Food Bank Alliance to further study and expand awareness of this problem on other college campuses throughout the state of New Jersey.

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Introduction

This report provides an overview of food insecurity among students on the Rutgers–New Brunswick campus. The data presented here are from a campus-wide student survey conducted in late 2016, and this report provides the first quantitative assessment of the prevalence of food insecurity among Rutgers students and identifies groups of students most at risk for the problem. Finally, the report discusses how Rutgers is currently supporting food insecure students and identifies additional steps the school can consider.

Food security is defined as access at all times to enough food for an active, healthy life (Coleman-Jensen et al., 2017). Conversely, food insecurity is defined as a “lack of reliable access to sufficient quantities of affordable, nutritious food” (Dubick et al., 2016, p. 6). Most research has focused on food security at the household level, and this is most often measured with the US Department of Agriculture (USDA) Household Food Security Survey (HFSS). This survey focuses on having enough money to purchase food, and includes questions that ask whether respondents could not afford to eat balanced meals or skipped meals specifically because they could not afford food.

There is evidence that the number of students experiencing food insecurity has been rising at colleges and universities across the country (Crutchfield et al., 2016; Freudenberg et al., 2011; Wisconsin Hope Lab, 2016). On February 27, 2017, the New Jersey Senate Committees on Health, Human Services and Senior Citizens and Higher Education held a special legislative hearing on food insecurity in higher education, organized by the Anti-Hunger Coalition of New Jersey. At this meeting, representatives from colleges and universities around the state, including Rutgers, discussed the need for more information about the prevalence of New Jersey college students who are food insecure.

The most recent data indicates that 12.3% of US households were food insecure at some point in 2016, and that in NJ, the prevalence of food insecurity was 11.1% during the period of 2014-16 (Coleman-Jensen et al., 2017). College students may face an even greater risk of food insecurity as compared to the general population (Goldrick-Rab, Broton, and Eisenberg, 2015), but the prevalence of food insecurity on college campuses is not well understood. Most national education surveys do not include questions about food insecurity in the college student population (Goldrick-Rab et al., 2015). Among colleges and universities that have measured food insecurity on their campuses, the number of reported food insecure students varies widely, with reports ranging from 14% to as high as 59% (e.g., Gaines, Robb, Knol, & Sickler, 2014; Patton-López, López-Chevallos, Cancel-Tirado, & Vazquez, 2014). Appendix A provides a table with information about ten recent studies of hunger on college campuses. Each of these studies vary on important dimensions, such as the time of year the surveys were administered, how student participants were recruited, response rates and sample representativeness. While most of the surveys use questions from the USDA HFSS, there is some variation in which items from the scale are included as well as the question time frame (30 days, three months, or one year). All of these differences make cross-school comparisons difficult (Broton & Goldrick-Rab, 2017).

Given that food insecurity, and its measurement, is largely about not having enough money to buy food, it is not surprising that, among the general population, poverty and lack of financial resources have been found to be related to food insecurity (Gundersen, Krieder & Pepper, 2011). Other characteristics, like being African American, Hispanic, a single mother or having a low level of education have also been found to be related to food security among the general population (Opsomer, Jensen, & Pan, 2003; Ribar & Hamrick, 2003, Wight, Kaushal, Waldfogel, & Garfinkel, 2014).

Similarly, among college students, food insecurity is largely a problem of a lack of resources, and some groups of college students are disproportionately likely to be food insecure, including those that have lower incomes (Freudenberg et al., 2011; Hughes, Serebryanikova, Donaldson, and Leveritt, 2011; Patton-López et al., 2014), receive financial aid (Gaines, Robb, Knol, & Sickler, 2014; Morris, Smith, Davis, & Null, 2016), are financially independent from their parents (Freudenberg et al., 2011; Gaines et al., 2014), and share accommodations with roommates (Chaparro, Zaghoul, Holck, Dobbs, 2009; Morris et al., 2016; Hughes et al., 2011). In addition, there is evidence that African American and Hispanic students are at a greater risk of being food insecure compared to their White peers (Freudenberg et al., 2011; Goldrick-Rab et al., 2015; Dubick et al., 2016).

Among college students, food insecurity is negatively correlated with academic achievement (as measured by grade point average; Maroto et al., 2015; Morris et al., 2016; Patton-López et al., 2014). Food insecure students are more likely to experience fair or poor physical health (Freudenberg et al., 2011; Patton-López et al., 2014; Knol, Robb, McKinley, & Wood, 2017) and have a greater risk of experiencing mental health concerns such as depression (Bruening, Brennhofer, van Woerden, Todd, and Laska, 2016; Goldrick-Rab et al., 2015). As a growing body of research indicates the importance and extent of food security on college campuses, Rutgers University has joined other institutions across the country to study the prevalence of food insecurity among its students.

Methods

The survey was administered online from November 22 through December 19, 2016. This time frame was the only period in the semester when there were no other school-wide surveys being administered, which helped to ensure a higher response rate. The survey took an average of 10 minutes to complete (excluding outliers). All 43,779 matriculated undergraduate and graduate students from Rutgers–New Brunswick were invited to participate in the survey. A total of 8,393 students completed the survey (6,823 undergraduates and 1,570 graduate students), resulting in a 19.17% response rate.

A series of three emails from the Vice Chancellor for Student Affairs invited students to participate in the survey, which was described as “a short survey about hunger and food insecurity” that would “help us to understand the magnitude of the problem at Rutgers.” In addition, school deans, faculty and various administrators sent targeted follow-up emails and distributed the survey URL via social media. Because students logged in with their 9-digit RUID, their responses were linked to their institutional data, which include demographic and academic information, such as age, gender, race/ethnicity, class level, school of enrollment, grade point average, and financial aid information. Students were required to agree with a consent form that outlined their rights as a research participant, including the data-sharing terms, in order to proceed with the survey. The Rutgers Institutional Review Board approved the recruitment and study procedures. Students who completed the survey were entered into a lottery for a chance to win one of four \$100 RU Express cards.

Survey respondents were compared with the general student population. No statistically significant differences between the population and respondents were found for race/ethnicity. Statistically significant but negligible differences emerged for a few variables, including class level, degree level, school, attendance status, and financial aid status. There were notable differences by sex, but the effect size was small. A table with the comparison of the total population of eligible students and those who completed the survey is included in Appendix B. Because the sample is representative of the population with only these small differences, the data presented in this report are not weighted.

Measures of Food Insecurity

The survey instrument assessed food security using the ten-item Household Food Security Survey (HFSS; USDA, 2012). Additional items included questions adapted from the Wisconsin HOPE Lab survey on college hunger (HOPE Lab, 2016). The research team developed multiple questions specific to Rutgers–New Brunswick. A final open-ended question asked about their experiences with student hunger and the difficulty of affording food while at Rutgers.

Measurement of food security followed the skip patterns and scoring methodology recommended by the USDA for the regular ten-item survey (USDA, 2012). All respondents were asked to rate how much three statements about food insecurity applied to them, “I was worried whether my food would run out before I had money to buy more”, “The food that I bought just didn’t last, and I didn’t have money to get more,” and “I couldn’t afford to eat balanced meals.” Respondents who indicated some food insecurity by responding “often true” or “sometimes true” to at least one of those questions were asked a series of four separate follow-up questions. These asked whether, in the prior 30 days, the respondents had ever: 1) cut the size of their meals or skipped meals; 2) eaten less than they thought they should have; 3) were hungry but did not eat; and 4) lost weight. Each question asked if respondents engaged in the behaviors specifically because they did not have enough money to afford food. For those

that said that they had cut the size of their meals or skipped meals, respondents were asked how often that had happened over the past 30 days. If the respondent said three or more days, it was counted as an affirmative response. Finally, respondents who answered “often true” or “sometimes true” to any of the four follow-up questions were asked if they ever “did not eat for a whole day because there wasn’t enough money for food.” Those that responded “Yes” were asked to indicate how many of the past 30 days they did not eat. Responses of three or more days were counted as affirmative responses.

Again, according to the guidelines from the USDA, these items were used to create an additive index of food security. Each affirmative response contributed 1 point to the index (USDA, 2012). Per the USDA, there were two levels of food security; high food security was operationalized as a score of 0 and marginal food security as a score of 1-2. The two levels of food insecurity were low food security as a score of 3-5 and very low food security as a score of 6-10.

Analyses

While some data are presented using simple frequencies, additional statistical analyses were used to understand relationships among the variables. For non-parametric tests of differences between groups, Chi square (χ^2) analyses were conducted. Pearson’s correlation coefficient tested bivariate relationships, and potential predictors of food security were explored using logistic regression. For more information on the statistical tests used here, please see Appendix C.

Results

About one-third of Rutgers students are food insecure.

The majority (63.1%) of Rutgers–New Brunswick undergraduate students are food secure, as are the majority of graduate students (67.8%). Graduate students are somewhat less likely to be food insecure than undergraduates ($\chi^2(3, N = 8,393) = 13.15, p = .004$). Table 1 indicates the breakdown of food security by school level. Those who report high food security or marginal food security indicated that they reported either having zero or one food-access problem or limitation, respectively. However, more than one-in-three undergraduate students report some level of food insecurity (36.9%), as did just under one third of graduate students (32.1%). One in five (20.2%) undergraduate students and 17.3% of graduate students report having very low food security, which means that they report experiencing all or almost all of the problems included in the HFSS.

Table 1. Food Security Levels of Rutgers Students

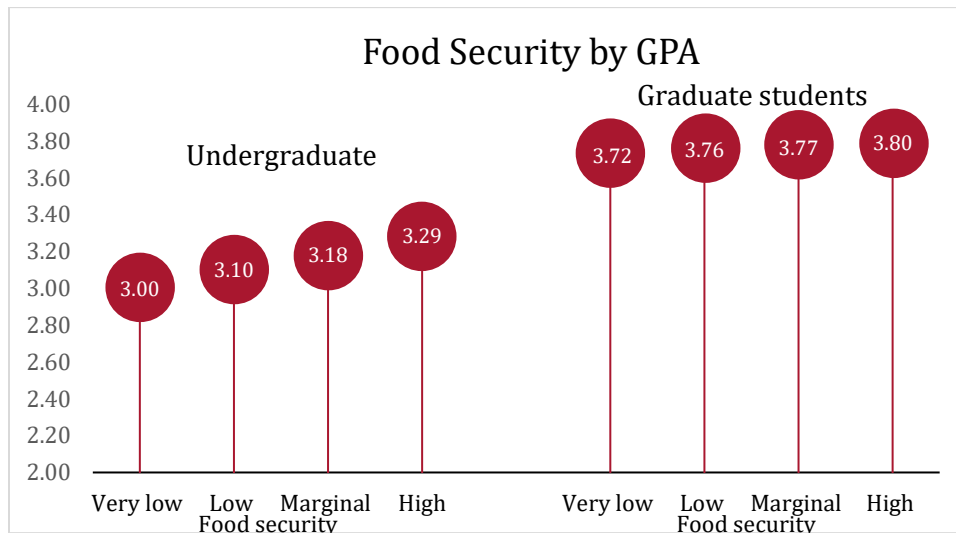
	Food Security Level	Undergraduate Students % (n = 6, 823)	Graduate Students % (n = 1,570)
Food Secure	High food security	45.7	49.9
	Marginal food security	17.4	17.9
Food Insecure	Low food security	16.7	14.8
	Very low food security	20.2	17.3

The frequency of responses to the individual questions that comprise the HFSS are in Appendix D. Some of the questions about severe food insecurity are important to highlight. Among undergraduates, 9.6% say that in the past 30 days, they have lost weight because there was not enough money for food, as do 7.6% of graduate students. In addition, 6.7% of all undergraduate students and 4.1% of all graduate students report that, in the past 30 days, they did not eat for an entire day because there was not enough money for food.

Food security is related to GPA.

We looked at the relationship between cumulative grade point average (GPA) and food security level among Rutgers-New Brunswick students. GPA was collected from the academic profile of each respondent, and thus was not self-reported. Within the sample, the mean GPA for undergraduates are 3.17, while the mean GPA for graduate students is 3.77. The mean GPAs by school level and food security are in Figure 1. We found that food insecurity (using the full 10-item measure) and GPA are significantly correlated among undergraduates ($r(4,759) = .22, p < .001$), and moderately correlated, but less strongly, for graduate students ($r(967) = .10, p < .001$; this correlation is likely lower given the overall higher GPAs for graduate students). For all students, there is a linear relationship such that lower food security is related to lower GPAs.

Figure 1. Food Security by GPA



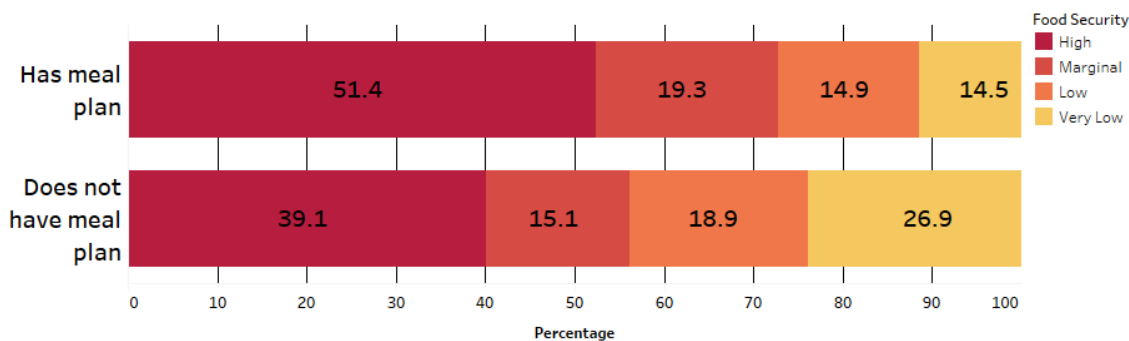
Undergraduates who live off campus are more likely to be food insecure as are undergraduate without meal plans.

Undergraduate students who live off campus are significantly more likely to be food insecure than those who live on campus ($\chi^2 (3, N = 6,459) = 213.32, p < .001$). Undergraduates living on campus have a 29.4% rate of food insecurity, compared to the much higher rate of 46.1% of those who live off campus. This relationship between where a student lives and food insecurity is not found among graduate students.

It is likely that undergraduates who live on campus have greater financial resources to be able to afford the cost of living in a residence hall. In addition, undergraduates who live on campus are required to have a meal plan with at least 110 meal swipes per semester (the equivalent of approximately seven meals per week). First-year undergraduates who live on campus are required to have even more meal swipes per semester, with 210 meals, or approximately 13 meals per week, being required. While larger meal plans are more expensive, the per cost meal drops with each increase in the size of the meal plan.

Because only 4.1% of graduate students report having a meal plan, we looked at the relationship between having a meal plan and food security among undergraduates only. As might be expected, undergraduate students with meal plans were significantly more likely to be food secure ($\chi^2 (3, N = 6,814) = 216.83, p < .001$). As indicated in Figure 2, among undergraduate students with a meal plan, 51.4% were highly food secure, compared with 39.1% of those who do not have a meal plan. Conversely, the respective rates of very low food security were 14.5% vs. 26.9% for those who do and do not have meal plans.

Figure 2. Food Security by Meal Plan Status



Students engage in common coping strategies for dealing with hunger.

Prior to conducting the survey, the research team had heard anecdotal reports from students that food insecure students with meal plans often take food from the dining hall or stay in the dining hall, studying or socializing, for extended periods of time so that they can eat more than one meal while using only one swipe. This prompted us to include questions about behaviors in the dining halls. We found that a quarter of all students with meal plans (25.1%) report that they have taken food from the dining hall for themselves specifically because they could not afford another meal, and 14.4% said that they have taken food from the dining hall to give to someone else who could not afford food. Almost one in five (19.0%) report that they sometimes stay in the dining hall for multiple meals without leaving to avoid having to pay for another meal they cannot afford.

The research team heard that some food insecure students frequently attend seminars and campus events at which free food is served for the sole purpose of getting a free meal. There is a webpage called “Free food @ RU” and a Facebook page called “Where the free food at? Rutgers” with over 4,000 members, and both list these types of events. We asked all respondents, regardless of meal plan status, if they ever attend events where free food was served specifically because they did not have enough money to buy food. Twenty-three percent of Rutgers students report doing this, and while only 11.7% of highly food secure students report doing this, 52.7% of students with very low food security attend events solely for free food.

Finally, 19.8% of all students report that they had to choose between paying for food or other educational expenses such as books. While only 8.5% of highly food secure and 10.6% of marginally food secure students said that they had to make this choice, 23.3% of low food secure and 57.6% of very low food secure students said that they had to choose between paying for food and educational expenses.

Some students use food pantries.

Because of the increasing number of anecdotal reports of food insecurity on campus, the Rutgers Division of Student Affairs, in cooperation with Rutgers Against Hunger, created an on-campus food pantry for Rutgers– New Brunswick students. The Rutgers Student Food Pantry officially opened its doors in October of 2016, and began to advertise in very late 2016, just after this survey was administered. As of the end of 2018 Spring semester, it had served approximately 300 students.

While 20.1% of students reported that they have had heard of the Rutgers Student Food Pantry, awareness of the pantry is likely to be higher now given that the survey was administered before the pantry was advertised. The pantry staff has been actively working to publicize through flyers, on-campus

mailings and social media. Of those that have heard of the pantry, 1.6% (and 0.3% of all students) reported having used the Rutgers Student Food Pantry during the Fall 2016 semester.

In contrast, 5.4% of all students report having used an off-campus pantry during the same period. Importantly, only 11.9% of the students who have used an off-campus pantry have heard about the Rutgers Student Food Pantry. While there may be other reasons that students may choose to use off-campus pantries, such as not wanting people on campus to know they are struggling with food insecurity, the low awareness of the Rutgers Student Food Pantry among those using off-campus pantries indicates a need for continued outreach to those vulnerable Rutgers students.

Who is most likely to be food insecure?

Some groups of students are more likely than others to be food insecure. To understand which groups of students are most at risk, we conducted two parallel logistic regressions, one for undergraduates and one for graduate students. For these logistic regressions, the four-level food insecurity index was reduced to two levels, food secure (high and marginal food security) and food insecure (low and very low food security). In each model, the effects of the other predictor variables are held constant, so that we are testing the unique effect of each of variable on food insecurity. Predictor variables were chosen based on the data available through the students' profiles, as well as existing research on food insecurity among college students. The odds ratio (OR) for each significant predictive variable is provided, which indicates the relative likelihood of being food insecure given the different levels of the predictor. More detail is provided in Appendix E.

Among undergraduates, gender, being a veteran and having been in foster care were not related to food security. The low numbers of veterans and former foster care students makes it very hard to draw conclusions about the effects of these factors on food insecurity. The following variables were predictive of food security.

- Race is significantly related to food insecurity among undergraduates. Compared to White students, Black or African American students are 1.76 times and Hispanic students are 1.77 times more likely to be food insecure. In addition, students classified as "other" are 1.52 times more likely than Whites to be food insecure, and this group comprises students who are not White, Black/African American, Hispanic, or Asian, as well as those who classify themselves as multi-racial.
- Undergraduate students who have jobs other than work-study are 1.57 times more likely to be food insecure.
- Undergraduates whose families do not help with expenses are 1.40 more likely to be food insecure.
- Undergraduate students who receive a Pell Grant are 1.39 times as likely to be food insecure as those who do not.
- Undergraduates whose parents have lower levels of education are 1.21 times more likely to be food insecure.
- Undergraduate students who are not citizens (and are either permanent residents or foreign nationals) are 1.32 times more likely to be food insecure.
- Being older is related to being food insecure among undergraduates, such that for every year older a student is, they are 1.05 times more likely to be food insecure.

We ran a similar logistic regression for graduate students. The only difference in the model was the removal of the variable for receiving a Pell Grant (those grants are for undergraduates only, with a few exceptions; US Department of Education, 2017). These variables were much less predictive with graduate students, and only two variables predicted food insecurity. Those students whose parents had less education were 1.45 times more likely to be food insecure. In addition, the race/ethnicity variable was a significant predictor of food insecurity among graduate students. When compared to White graduate students, Asian students were 2.49 times more likely to be food insecure.

Many students participate in hunger-related activism on campus.

Inspired by stories of hunger throughout NJ during the Great Recession of 2008, Rutgers created Rutgers Against Hunger, known as RAH (rah.rutgers.edu). RAH sponsors many events throughout the year, including a University-wide Adopt-A-Family campaign before the winter holidays. It accepts donations of food and cash and partners with many agencies around the state to distribute them. In addition, RAH supports student awareness, engagement and activism through the Student Organized RAH (SORAH) program.

Many students are aware of RAH; 41.3% report having heard of it, but a much lower percentage, 13.3%, report having heard of SORAH. While 14.2% of all students (and 34.2% of those that have heard of RAH) report ever having donated food or money to RAH, 34.6% of all students report having participated in at least one hunger-related activity, such as the Run for RAH or Meals Swipes for Charity.

Conclusions

The findings presented here indicate that food insecurity is a problem for a significant number of Rutgers students. The study revealed very important information about the experiences and behaviors of Rutgers–New Brunswick students related to the growing reality of food insecurity. Overall, we found that 63.1 % of all Rutgers undergraduate students and 67.8% of graduate students are food secure, while 16.7% and 14.8% report low food security and 20.2% and 17.3% report very low food security, respectively. While this is higher than levels of food insecurity among New Jerseyans overall, it is in line with levels at other colleges and universities. Not surprisingly, students who live on campus and those with meal plans are more likely to be food secure. We found a higher incidence of food insecurity among Black/African American and Hispanic undergraduate students, and Asian graduate students. In addition, first generation students and undergraduates receiving Pell Grants had higher rates of food insecurity. Based on the survey findings presented in this report, we offer recommendations for university administrators, policymakers, and future research.

The analysis in Appendix B shows that based on available demographic information, our sample is representative of the Rutgers University-New Brunswick student population. That is, the demographic composition of the sample of students who participated in the survey closely matches that of the overall student-body attending Rutgers-New Brunswick. However, it is possible that food insecure students may have been more likely to respond to the survey, resulting in a participation bias within the sample. For example, the email invitation to participate identified the survey topic as hunger and food insecurity. Food insecure students may have been more interested in an opportunity to provide feedback to the University on this issue, and therefore more likely to complete the survey. Food insecure students may also have been more likely to participate in the survey in order to be eligible to win one of the \$100 RU Express cards. Therefore, food insecure students may have been overrepresented in our sample relative to food secure students. While we were unable to follow up with non-respondents to estimate the extent of this potential bias, our analysis of the representativeness of the sample suggests that these participation biases were likely small, and are unlikely to significantly affect our estimates of food insecurity among Rutgers University-New Brunswick students.

Rutgers already has many programs designed to address food insecurity among its students, and there are additional programs that can be considered by the University. One of the most important programs already developed is the recently created Rutgers Student Food Pantry. It is being directly marketed to students, and faculty and staff can provide referrals to the pantry as well. Local food pantries that serve Rutgers students have also been encouraged to refer students to the on-campus pantry. The leadership of the pantry has joined the New Jersey College and University Food Bank Alliance, and they are working with other on-campus pantries to develop best practices in operating a pantry for students. While this is a critical approach to helping students with food insecurity, it is not a sufficient response to the issue of food insecurity at Rutgers–New Brunswick. In addition, the University recently raised the minimum wage for student workers to \$11/hour, affecting 13,000 student workers (Barchi, 2017). This is another step in improving the food security and financial wellbeing of students.

While there are more analyses to be done to further understand the scope of food insecurity at Rutgers, a number of recommendations emerge from this early stage of analysis. A comprehensive, campus-wide response to food insecurity should include support services for students who experience food insecurity at all levels, and not assume students who hold meal plans are immune from the problem. Efforts should address the higher incidence of food insecurity among Black/African American and Hispanic undergraduate students, Asian graduate students, first generation students, and those receiving Pell

Grants by coordinating with places on campus that already provide services designed specifically for these groups. In addition, taking a coordinated approach to expand ongoing efforts and build awareness of campus resources related to food insecurity may help increase access to these resources for students who are not currently connected to any of the available support systems. This must include the cooperation of all campus student services, in particular, Dean of Students, Counseling and Psychological Services, Educational Opportunity Fund, Academic Deans, Price Fellowship Program, School of Social Work, Athletics, Recreation, and the chaplaincies.

Because food insecurity is so prevalent, many students are in need of on-campus support. University administrators could design training sessions to raise awareness of services and educate staff, faculty, and students on effective strategies for identifying and then connecting students who experience food insecurity to the appropriate resources. Our survey indicates that it is sometimes peers who identify the problem of food insecurity and offer assistance in the form of taking food from the dining hall. Thus, peers may play an important role in identifying and helping food insecure students, and student training could be particularly important.

As a part of this effort, Rutgers can expand education and awareness of the problem of food insecurity within the classroom. For example, in what ways can we take an interdisciplinary approach to educate and respond to this growing epidemic? How can the formal curriculum address this topic through education and intervention strategies? What unique role can members of the Rutgers community play in addressing food insecurity?

Because food insecurity is largely a problem of a lack of resources, public institutions, as well as state and federal policymakers, can invest more resources to prevent or ameliorate food insecurity. Many food insecure students are likely already receiving financial aid of some sort towards their higher education; failing to support their nutritional needs and allowing their academic performance to suffer as a result seems to be counterproductive, and a more comprehensive approach to meeting these needs is required. An initial step might be to connect these students with federal or state food assistance programs wherever possible. Unfortunately, most undergraduates are not eligible for the Supplemental Nutrition Assistance Program (SNAP; Lower-Basch & Lee, 2014), which is the largest federal nutrition assistance program. In fact, only 2.2% of Rutgers students report that they currently receive SNAP benefits. The Office of Off-Campus Living and Community Partnerships has been investigating ways to enroll eligible students in SNAP while simultaneously connecting them to other available resources.

Finally, we recommend the creation of a food security working group for Rutgers–New Brunswick. This group can be comprised of administrators, faculty, staff and students, who can further study this issue and identify ways to address food insecurity on campus.

Additional research can help shed light on the problem of food insecurity at Rutgers–New Brunswick. We recommend additional surveys to understand how food insecurity is changing over time. (The next survey is tentatively scheduled for the fall of 2019.) Any additional surveys should also include measures of housing insecurity, which has been found to be a concern for a significant number of college students at other institutions (e.g., Wisconsin HOPE Lab, 2016). We also have begun to work with the New Jersey College and University Food Bank Alliance to further study and expand awareness of this problem on other college campuses around the state of New Jersey.

This survey has been the first step to understanding the extent of food insecurity in students at Rutgers–New Brunswick. Additional research, both quantitative and qualitative, is needed to further understand students' experience of food insecurity on campus and to test recommendations developed from the current analysis. In addition, further quantifying the impact of food insecurity on student learning and

development will aid substantially in justifying the need for resources of time and money to target this problem. In the meantime, the current findings begin to illuminate some of the ways Rutgers can build on its current efforts to respond to the problem of food insecurity among Rutgers–New Brunswick students.

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Appendix A: Research About Food Insecurity on College Campuses

TABLE A.1: Studies of food insecurity at selected four-year colleges and universities in the US

Institution(s)	Sample	Prevalence of Food Insecurity	Citation
Large Southwestern University	209 freshmen living on campus	32% of students were food insecure in the past month, 37% were food insecure in the past 3 months	Bruening, M., Brennhofner, S., van Woerden, I., Todd, M., & Laska, M. (2016). Factors related to the high rates of food insecurity among diverse, urban college freshmen. <i>Journal of the Academy of Nutrition and Dietetics</i> , 116 (9), 1450-1457.
California State University, Long Beach	1,039 students	24% of students were food insecure	Crutchfield, R., California State University, "Serving Displaced and Food Insecure Students in the CSU," January 2016, https://presspageproductioncontent.s3.amazonaws.com/uploads/1487/cohomelessstudy.pdf?10000
City University of New York	1,086 undergraduate students	39.2% of students were food insecure	Freudenberg, N., Manzo, L., Jones, H., Kwan, A., Tsui, E., & Gagnon, M. (2011). Food insecurity at CUNY: Results from a survey of CUNY undergraduate students. Retrieved from City University of New York https://www.gc.cuny.edu/CUNY_GC/media/CUNY-Graduate Center/PDF/Centers/Center%20for%20Human%20Environments/cunyfoodinsecurity.pdf
Eastern Illinois University, Western Illinois University, Northern Illinois University, Southern Illinois University	1,822 undergraduate students	35% of students were food insecure in the past 9 months	Morris, L.M., Smith, S., Davis, J., & Null, D. B. (2016). The prevalence of food security and insecurity among Illinois University students. <i>Journal of Nutrition Education and Behavior</i> , 48(6), 376-382.
University of Alabama	557 undergraduate students	14% of students were food insecure in the past year	Gaines, A., Robb, C.A., Knol, L.L., & Sickler, S. (2014). Examining the role of financial factors, resources, and skills in predicting food security status among college students. <i>International Journal of Consumer Studies</i> , 38(4), 374-384.
University of Hawai'i at Manoa	410 undergraduate and graduate students	21% of students were food insecure in the past one year	Chaparro, M. P., Zaghoul, S. S., Holck, P., & Dobbs, J. (2009). Food insecurity prevalence among college students at the University of Hawai'i at Manoa. <i>Public Health Nutrition</i> , 12(11), 2097-2103.
Midsize Rural University in Oregon	354 undergraduate and graduate students	59% of students were food insecure in the past year	Patton-López, M.M., López-Cevallos, D. F., Cancel-Tirado, D.I., & Vazquez, L. (2014). Prevalence and correlates of food insecurity among students attending a midsize rural university in Oregon. <i>Journal of Nutrition Education and Behavior</i> , 46(3), 209214.
8 community colleges and 26 four year colleges including Michigan State University*, Rutgers University*, University of Oregon**, Stony Brook University**, UC Berkeley**, UC Los Angeles**, and University of Washington**	3,765 undergraduate students	48% of students were food insecure in the past month	Dubick, J., Mathews, B., & Cady, C. (2016). Hunger on campus: The challenge of food insecurity for college students. Boston, MA: National Student Campaign Against Hunger and Homelessness.
42 public institutions that are in the University of Wisconsin System (including UW Madison*) or the Wisconsin Technical College System	1,400 low-income students (received a Pell Grant) that were enrolled in a public Wisconsin college	24% of students were food insecure in the past month	Goldrick-Rab, S. (2016). <i>Paying the price: College costs, financial aid, and the betrayal of the American dream</i> . Chicago, IL: The University of Chicago Press.
All 10 campuses in the University of California System including UC Berkeley**, UC Davis**, UC Irvine**, UC Los Angeles**, UC San Diego**, and UC Santa Barbara**	8,932 undergraduate and graduate students	42% of students were food insecure in the past year	Martinez, S.M., Maynard, K., & Ritchie, L.D., University of California Global Food Initiative, "Student Food Access and Security Study," July 11, 2016, http://www.ucop.edu/global-foodinitiative/best-practices/food-accesssecurity/student-food-access-andsecurity-study.pdf

*Big 10 institution

**Public AAU institution

Appendix B: Sample Representativeness

The sample was evaluated to determine if it is representative of the greater population of eligible students. Traditional chi-square analyses were used to compare subgroup differences between all students eligible to participate in the survey, and those that completed the survey. Chi-square tests help determine whether statistically significant differences existed among any of the subgroups. A Cramer’s V statistic was calculated for each subgroup that was statistically significant to determine effect size. According to Cohen (1988), a Cramer’s V statistic less than 0.10 has a negligible effect, a value between 0.10 - 0.23 has a small effect, a value between 0.24 - 0.36 has a medium effect, with any value equal to or exceeding 0.37 representing a large effect.

Table B1: Sample representativeness

	Total N	Percent	Response N	Response Rate (%)	% Change	Expected Sample Value	Difference (Expected - Observed)	Difference ² /Expected	Chi-Square Value	p value	Cramers V
TOTAL	43,779		8,393	19.17							
Citizenship									9.00	0.01	0.01
US Citizen	35,748	81.66	6,967	19.49	0.32	6853	-114	1.88			
Permanent Resident	2,557	5.84	446	17.44	-1.73	490	44	3.99			
Foreign National	5,409	12.36	980	18.12	-1.05	1037	57	3.13			
Class Level: Total									133.26	0.00	0.06
First Year	7,124	16.27	1,702	23.89	4.72	1366	-336	82.78			
Sophomore	7,817	17.86	1,566	20.03	0.86	1499	-67	3.03			
Junior	8,778	20.05	1,705	19.42	0.25	1683	-22	0.29			
Senior	10,877	24.85	1,850	17.01	-2.16	2085	235	26.54			
Graduate	9,183	20.98	1,570	17.10	-2.07	1760	190	20.61			
Gender									656.36	0.00	0.12
Female	22,523	51.45	5,491	24.38	5.21	4318	-1173	318.68			
Male	21,256	48.55	2,902	13.65	-5.52	4075	1173	337.68			
Degree Level									26.09	0.00	0.02
Undergraduate	34,596	79.02	6,823	19.72	0.55	6633	-190	5.47			
Graduate or 1st Professional	9,183	20.98	1,570	17.10	-2.07	1760	190	20.61			
School									344.15	0.00	0.09
EJB School of Planning and Public Policy (UG)	183	0.42	53	28.96	9.79	35	-18	9.15			
EJB School of Planning and Public Policy (G)	231	0.53	51	22.08	2.91	44	-7	1.02			
Ernest Mario School of Pharmacy (G)	410	0.94	84	20.49	1.32	79	-5	0.37			

	Total N	Percent	Response N	Response Rate (%)	% Change	Expected Sample Value	Difference (Expected - Observed)	Difference ² /Expected	Chi-Square Value	p value	Cramers V
Ernest Mario School of Pharmacy (UG)	863	1.97	228	26.42	7.25	165	-63	23.65			
Graduate School of Applied & Professional Psych	188	0.43	29	15.43	-3.75	36	7	1.38			
Graduate School of Education	1,000	2.28	106	10.60	-8.57	192	86	38.32			
Mason Gross School of the Arts (G)	297	0.68	41	13.80	-5.37	57	16	4.46			
Mason Gross School of the Arts (UG)	288	0.66	123	42.71	23.54	55	-68	83.22			
Rutgers Business School - New Brunswick (UG)	3,776	8.63	700	18.54	-0.63	724	24	0.79			
School of Nursing (UG)	264	0.60	67	25.38	6.21	51	-16	5.31			
School of Arts and Sciences	21,043	48.07	3,910	18.58	-0.59	4034	124	3.82			
School of Communication & Info (G)	385	0.88	58	15.06	-4.11	74	16	3.39			
School of Engineering	3,857	8.81	732	18.98	-0.19	739	7	0.07			
School of Environmental and Biological Sciences	3,422	7.82	967	28.26	9.09	656	-311	147.39			
School of Management and Labor Relations (G)	335	0.77	63	18.81	-0.37	64	1	0.02			
School of Management and Labor Relations (UG)	400	0.91	43	10.75	-8.42	77	34	14.80			
School of Social Work	1,832	4.18	352	19.21	0.04	351	-1	0.00			
The Graduate School New Brunswick	4,505	10.29	786	17.45	-1.72	864	78	6.98			
Attendance Status									238.12	0.00	0.07
Full Time	38,511	87.97	7,843	20.37	1.19	7383	-460	28.65			
Part Time	5,268	12.03	550	10.44	-8.73	1010	460	209.47			
Race/Ethnicity									3.94	0.41	
Black/African American	3,315	7.57	636	19.19	0.01	636	0	0.00			
Asian	14,524	33.18	2788	19.20	0.02	2784	-4	0.00			
Hispanic	5,491	12.54	1102	20.07	0.90	1053	-49	2.31			
White	18,132	41.42	3410	18.81	-0.36	3476	66	1.26			
Other	2,317	5.29	457	19.72	0.55	444	-13	0.37			
Financial Aid											
Pell	12,761	29.15	2,720	21.31	2.14	2447	-273	30.56	43.14	0.00	0.03
No Pell	31,018	70.85	5,673	18.29	-0.88	5946	273	12.57			
Any Financial Aid	31,500	71.95	6,448	20.47	1.30	6039	-409	27.73	98.87	0.00	0.05
No Financial Aid	12,279	28.05	1,945	15.84	-3.33	2354	409	71.14			

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Appendix C: Statistical Tests

For those readers interested in more detail about the data analyses used in this report, this appendix provides a brief overview of the analytical methods used and where more information can be found.

- All analyses were conducted using SPSS version 23 (IBM, 2015).
- Alpha was set at .05, meaning that the likelihood of incorrectly rejecting the null hypothesis is 5 in 100. This is the conventional level used by most researchers, though it is arbitrary (Field, 2013).
- Pearson's correlation coefficient (r) is a measure of the strength of the relationship between two variables. The coefficient can range from -1 to 1, and the closer to the -1 or 1 the stronger the relationship. A positive correlation means both variables move in the same direction, while negative correlation means one variable increases while the other decreases. We used this to test the relationship between food security and GPA.
- Pearson's Chi-square tests (χ^2) are used to examine whether two categorical variables have a significant association. We used this test for both the binary measure of food insecurity and the full four-level food insecurity scale with other binary or multicategorical variables, such as living on campus or having a meal plan.
- Multiple linear regression allows us to understand the unique effects of predictor variables on an outcome variable. The relationship of each predictor is represented with b , which is a standardized weight that indicates the change in the outcome variable that is related to a unit of change in the predictor variable. Binary logistic regression is a version of linear regression that is used when an outcome variable has only two levels. In this report, we used this procedure to understand the effects of demographic and such as age on food insecurity (food secure vs. food insecure).

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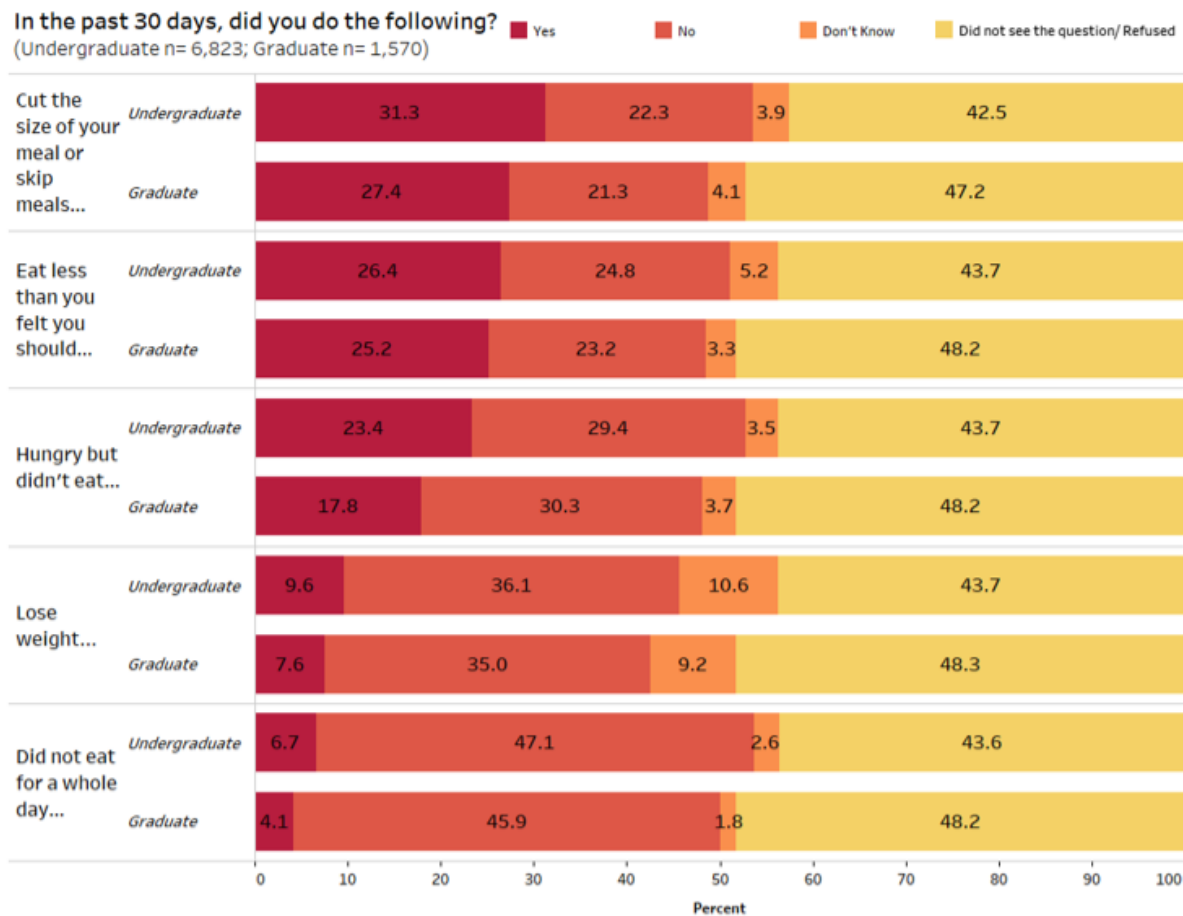
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Appendix D: Food Security Measures

Table D1. Food security questions by school level

		Often	Sometimes	Never
Undergraduate (n=1,570)	I couldn't afford to eat balanced meals	17.8	28.6	50.0
	I was worried whether my food would run out before I had money to buy more.	12.0	26.4	57.1
	The food I bought just didn't last, and I didn't have money to get more.	7.8	24.5	62.5
Graduate (n=6,674)	I couldn't afford to eat balanced meals	13.4	30.4	52.9
	I was worried whether my food would run out before I had money to buy more.	7.9	26.7	62.5
	The food I bought just didn't last, and I didn't have money to get more.	4.2	21.9	70.5

Figure D1. Measures of food security by school level



Appendix E: Logistic Regression

The tables below present the results from two parallel logistic regressions, one for undergraduates and one for graduate students. In each model, the effects of the other predictor variables are held constant, so that we are testing the unique effect of each of variable on food insecurity. Predictor variables were chosen based on the data available through the students' profiles, as well as existing research on food insecurity among college students.

The binary dependent variable, food insecurity, is coded as food secure = 0 (a combination of high and marginal food secure) and food insecure = 1 (a combination of low and very low food secure). The predictor variables are coded as following: citizenship (0 = citizen, 1 = permanent resident or foreign national), gender (0 = male, 1 = female), whether a student's family helps financially (0 = family helps, 1 = no help), having a job other than work-study (0 = no job, 1 = job), parents' highest education (reverse coded, 4 = high school or less, 3 = some college or two year degree, 2 = four year degree, 1 = graduate school), race (White is the index), having been in foster care (0 = yes, 1 = no), receiving a Pell Grant (0 = no Pell, 1 = receive Pell), and being a veteran (0 = not a veteran, 1 = veteran).

For undergraduates, the overall model was statistically significant compared to a constant only model, ($\chi^2 = 438.51, p < .001$). For graduate students, the overall model was also statistically significant, ($\chi^2 = 37.86, p < .001$). The odds ratio (OR) for each significant predictive variable is provided, which indicates the relative likelihood of being food insecure given the different levels of the predictor.

Table E1. Logistic regression predicting food insecurity among undergraduate students

	B	S.E.	Wald	df	p values	Exp(B)
Age	0.049	0.010	24.456	1	0.000	1.051
Citizenship	0.275	0.086	10.195	1	0.001	1.316
Family helps with expenses	0.333	0.062	28.632	1	0.000	1.395
Gender	-0.055	0.057	0.937	1	0.333	0.947
Have non-workstudy job	0.452	0.060	55.872	1	0.000	1.571
Race			77.306	4	0.000	
African American/Black	0.568	0.112	25.769	1	0.000	1.764
Asian American	-0.024	0.068	0.127	1	0.722	0.976
Hispanic	0.569	0.086	44.232	1	0.000	1.766
Other	0.416	0.124	11.145	1	0.001	1.515
Foster care	0.589	0.313	3.537	1	0.060	1.803
Receive Pell grant	0.332	0.066	25.603	1	0.000	1.394
Parents' highest education	0.190	0.028	47.299	1	0.000	1.210
Veteran Status	-0.154	0.291	0.280	1	0.596	0.857
Constant	-2.453	0.214	131.349	1	0.000	0.086

Table E2. Logistic regression predicting food insecurity among graduate students

	B	S.E.	Wald	df	p values	Exp(B)
Age	-0.007	0.026	0.078	1	0.780	0.993
Citizenship	0.574	0.383	2.251	1	0.134	1.776
Family helps with expenses	0.272	0.249	1.192	1	0.275	1.312
Gender	0.449	0.286	2.458	1	0.117	1.566
Have non-workstudy job	-0.158	0.232	0.465	1	0.495	0.854
Race			10.182	4	0.037	
African American/Black	0.252	0.467	0.292	1	0.589	1.287
Asian American	0.910	0.294	9.570	1	0.002	2.485
Hispanic	0.461	0.339	1.851	1	0.174	1.585
Other	0.085	0.685	0.015	1	0.901	1.089
Foster care	-0.647	1.179	0.301	1	0.583	0.523
Parents' highest education	-0.373	0.110	11.451	1	0.001	1.452
Veteran status	-20.162	13064.269	0.000	1	0.999	0.000
Constant	-2.418	0.762	10.055	1	0.002	0.089