

# Oregon State University Food Security Study: Cascades Campus

OSU DIVISION OF STUDENT AFFAIRS

FOOD INSECURITY TASKFORCE

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## Executive Summary

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Food insecurity (FI) is a growing concern among college students. As part of a larger study of the prevalence and patterns of FI among OSU students requested by the Oregon State University (OSU) Food Insecurity Taskforce, this report focuses on the Oregon State University - Cascades campus student body. FI was measured using the United States Department of Agriculture (USDA) 10-item Food Security Survey Module (FSSM) with a 2-item food sufficiency screener. Two sampling strategies were employed to improve upon existing sampling methods commonly used for estimating FI among college students. Our findings can be used to inform OSU's plan to ensure equitable food access among all students at the OSU Cascades Campus.

This report provides background on the issue of college student FI, broadly and within the context of the COVID-19 pandemic. This is followed by a detailed description of the methodology used to estimate FI among OSU students, followed by Cascades campus results, including indicators and patterns of FI among specific student sub-populations. The report ends with a discussion of the findings, including limitations and areas for potential future research.

Our findings using the course visit method indicate that 24.9% of the OSU Cascades campus student population is food insecure. Using the email survey method, we found a much higher food insecurity rate of 46.8%, which is likely inflated due to non-response bias. This indicates that methodology is an important consideration when measuring FI in this population.

Among OSU Cascades campus students, first-generation college students reported slightly higher rates of FI as did students who reported receiving institutional funding through Pell Grants and those who reported currently or formerly receiving SNAP benefits. Our analyses revealed that gender, funding, and receipt of the Supplemental Nutrition Assistance Program (SNAP) benefits are significant correlates of FI as are living arrangements such as living with children or living with family.

A lower prevalence of FI was found among students who reported living with their families or with children, indicating that living situations and familial support may provide a protective effect against FI. However, students who reported living with their spouses were more likely to report FI, though this relationship was not statistically significant when accounting for gender. These findings warrant further investigation.

This study corroborates other research indicating that college students are vulnerable to FI and highlights the importance of sampling methodology in estimating FI prevalence. These findings also highlight that prevalence of FI is unequally distributed among OSU student sub-populations, with higher rates of FI among students of color, first-generation students, undergraduate students. Additionally, students who are low income and receive Pell or SNAP benefits are at higher risk of FI. These findings can be used to promote equitable and targeted campus-based initiatives to increase access to food resources for all students, particularly for those most vulnerable to FI.

## Background

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In Fall 2019, the Oregon State University (OSU) Food Insecurity Taskforce convened to address food insecurity at OSU. A recommendation of the Taskforce was to first assess the prevalence of food insecurity among OSU students. With funding from the OSU Division of Student Affairs and the School of Public Policy's OSU Policy Analysis Lab, Clinical Assistant Professor Jenny Jackson and Professor Mark Edwards assembled a research team including eight undergraduate and graduate students to conduct an innovative survey in the Fall term of 2020. The results of the first phase of the study, focusing on the Corvallis campus can be found at:

<https://liberalarts.oregonstate.edu/spp/opal/projects>. After completion of the Corvallis study, the Policy Analysis Lab reconvened in the Winter of 2021 to conduct similar surveys for both the OSU E-campus and the OSU Cascades campus located in Bend, Oregon.

## *Food Insecurity*

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Food insecurity (FI) is defined as the inability to access an adequate supply of food due to a lack of money or additional resources. Food insecure households may be further categorized as having low food security (problems acquiring food leading to reduced diet quality) or very low food security (inability to afford food to the degree of multiple instances of reduced food intake) (Coleman-Jensen et al., 2020). In Oregon, 9.8% of households were food insecure in 2017-19, with 4.3% being very low food secure (Coleman-Jensen et al., 2020). In the area surrounding OSU Cascades, overall household FI ranged from 10.5% in Deschutes County to 14.2% in Jefferson County and 14.3% in Crook County, in 2018. (Feeding America, 2020a). By October of 2020, during the COVID-19 pandemic, household FI for the state of Oregon had surged to around 25% (OSU Policy Analysis Laboratory, 2020).

## *Variability in Food Insecurity Across Institutions*

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Pre-pandemic estimates of the prevalence of FI among college students ranged from 9% to well over 50% (Larin, 2018). In 2014, a study at Western Oregon University reported 59% of the student body was food insecure (Patton-Lopez et al., 2014). In 2017, a review of FI in postsecondary education settings in the U.S. found an average FI rate of 32.9% (Bruening et al., 2017). The high level of variation among estimates of FI in higher education can be largely attributed to study methodology, particularly survey modality and sampling design (Nikolaus, Ellison & Nickols-Richardson, 2020; Nikolaus, Ruopeng, Ellison, & Nickols-Richardson, 2019a). Surveys present inherent obstacles for validity and accuracy related to human responses, sampling representativeness, and generalizability. Nonetheless, surveys are the only method available to assess FI in populations of students, suggesting that careful attention must be given to improving external validity.

Concerns regarding FI survey validity may be exacerbated by the context of a college campus (Nikolaus, Ellison, & Nickols-Richardson, 2019a; Nikolaus, Ellison, & Nickols-Richardson, 2019b). Some limitations related to using standard FI surveys in the college setting include students' differing interpretations of FI questions (Nikolaus, Ellison, & Nickols-Richardson, 2019a), varying campus dining plans and practices (Van Woerden et al., 2019), and difficulty quantifying students' financial resources (Carnevale et al., 2015) and parental support (Nikolaus, Ellison, & Nickols-Richardson, 2019a). Additionally, college student FI rates reported by campus

surveys have shown differences based on the timing of the survey within both the school term (Van Woerden et al., 2019) and the school year (Riddle et al., 2020), as well as the type of campus when comparing online, metropolitan, and suburban campuses (Moore et al., 2020; Owens et al., 2020).

Research shows the prevalence of FI is greater among some groups, with race, ethnicity, parenting status, living arrangement, and income level demonstrating a relationship with FI in the college student population (Baker-Smith et al., 2020; Owens et al., 2020; Soria et al., 2020) as well as US households (Coleman-Jensen et al., 2020). In college students, gender identity and sexual orientation also have shown a correlation with FI (Baker-Smith et al., 2020; Owens et al., 2020; Riddle et al., 2020; Soria et al., 2020). Additionally, college students' year of study and first-generation status have been associated with FI (Owens et al., 2020; Riddle et al., 2020; Soria et al., 2020).

### *COVID-19 and College Student Food Insecurity*

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An examination of FI at several universities during COVID-19 found average FI rates of 22% among undergraduates and 19% among graduate students, with rates reaching greater than 30% in many historically marginalized and underrepresented groups (Soria et al., 2020). Goldrick-Rab et al. (2020) report in their study of multiple colleges an overall increase in FI rates from 33% to 38% between Fall of 2019 and Spring of 2020. Soldavini et al. (2020) report that at one university, the 10.8% rate of FI in Winter 2020 grew to 14.5% in the months soon after the pandemic hit.

### *Research Goals*

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Previous FI surveys of college students have produced questionably high and wide-ranging levels of FI, which may be the result of non-response bias among food-secure students. The earlier study of FI among students at OSU Corvallis indicates that differences in sampling methodology can produce dramatically different estimates of food insecurity. Thus, this study seeks to replicate the methods used in the Corvallis study by comparing sampling methods while estimating FI among OSU Cascades students in the Winter of 2021. These data are intended to inform OSU's strategies to ensure equitable food access among students, both in terms of the current COVID-19 pandemic response and long-term interventions on campus. This report provides information about students primarily affiliated with the OSU Cascades campus.

## Methodology

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The United States Department of Agriculture (USDA) defines ranges of food insecurity including “Food Security” and “Food Insecurity,” which can be further categorized into “Low Food Security” and “Very Low Food Security.” The USDA FSSM is a validated, widely used instrument for measuring food security and is available in multiple forms (USDA, 2020). The survey used to assess the prevalence of FI among OSU students consisted of the USDA 10-item Food Security Survey Module (FSSM) with a 2-item food sufficiency screener, determined to be the most accurate survey currently available for determining FI among college students (Nikolaus, Ellison, & Nickols-Richardson, 2019a). This survey is displayed in Table 1. Individuals were categorized as FI if they responded affirmatively to 3 or more items; otherwise, they were categorized as food secure. For our purposes of better understanding which groups of students were more likely to be food insecure, the survey also included questions about student demographics, financial aid, and living situations (see Appendix A for the complete survey).

This study used two sampling strategies – one based on survey distribution within a sample of courses, and the other based on survey distribution via email to the entire student body. The first sample included courses from the OSU Cascades Winter 2021 course catalog; specifically, a purposefully selected cross-section of courses that offered the survey to students across all colleges, including undergraduate students from first to final year as well as graduate students at all levels.

Researchers contacted 43 instructors to request permission to attend the first 5 minutes of a remotely delivered (i.e., Zoom) course session and administer the survey to willing students. Twenty-three professors granted permission for our research team to attend their class. Due to limitations of course availability, two professors were contacted with a request to visit three of their classes. One professor permitted us to two out of the three courses, but the other did not respond to our requests. Three instructors reported conflicts or scheduling complications that prevented their participation. Nineteen instructors did not respond to our initial or second request. Prior to the class visits, our team provided detailed information about the study and the consent form for the instructor to share with students prior to our visit. In total, our team visited 23 classes between February 15<sup>th</sup> and February 26<sup>th</sup>. Survey data were collected online via Qualtrics. During the course visits, student researchers introduced the survey to the students, who were invited to indicate eligibility, informed consent, and complete the survey using a link posted in the chat box.

At the end of the 11-day course-sampling effort, the same survey was emailed by the OSU Registrar to the entire Cascades campus student body. Thus, results from the course-sampling method could be compared to the results from the campus email-sampling method. For participation in the survey (whether recruited via the course visit or email) entry into a raffle for one of two \$100 gift cards was offered for survey participation. Data were de-identified and stored separately from the student information collected for the \$100 gift card raffle.

Data collected from the course visits yielded 292 responses. After missing data (i.e., incomplete, or duplicative responses) were removed, the final sample size was 289. Data collected from the email survey yielded many fewer participants, with only 79 responses. After missing data were removed, the final sample size was 78. Overall, after missing data were removed, our methods yielded 367 participants between February 15<sup>th</sup> and March 8<sup>th</sup> of 2021. Students who participated

in the course-sample wave of the survey were precluded from participating in the emailed survey. Responses were considered “missing” if the respondent did not complete the 2-item screener or, if applicable, the 10-item module. If a respondent completed the 10-item FSSM but did not provide any demographic or personal information, the FI response was included, and the remaining data were coded as missing. The course-based estimates may be more accurate due to less response bias and a higher response rate (72%). However, the email survey method is more commonly used for assessing the prevalence of FI among college students in the U.S. and may be useful for comparing OSU Cascades' findings with those from other college campuses where the email survey method is used. Thus, throughout this report, we present findings from both sampling methods used in this study.

Appendix B addresses the representativeness of the samples, comparing these to known demographic characteristics of the OSU population enrolled at the Cascades campus in September 2021.

Table 1: The USDA 10 item FSSM with a 2-item screener<sup>1</sup>

Question/Item	Affirmative Response (indicating insecure)	Negative Response (indicating secure)
<b>2 – item Food Sufficiency Screener</b>		
In the last 30 days, did you ever run short of money and try to make your food, or your food money go further?	Yes	No
Which of these statements best describes the food eaten in your household?	Enough but not always the kinds of food we want to eat, Sometimes not enough to eat, Often not enough to eat	Enough of the kinds of food we want to eat
<b>10 – item USDA Food Security Survey Module</b>		
I worried whether my food would run out before I got money to buy more.	Often true, Sometimes true	Never true, Don’t know
The food that I bought just didn’t last, and I didn’t have enough money to get more.	Often true, Sometimes true	Never true, Don’t know
I couldn’t afford to eat balanced meals.	Often true, Sometimes true	Never true, Don’t know
In the last 30 days, did you ever cut the size of your meals or skip meals because there wasn’t enough money for food?	Yes	No, Don’t know
In the last 30 days, how many days did this happen?	≥ 3 Days	1 – 2 Days
In the last 30 days, did you ever eat less than you felt you should because there wasn’t enough money for food?	Yes	No, Don’t know

<sup>1</sup>Respondents with 3 or more affirmative responses were categorized as “food insecure.” Respondents with 6 or more affirmative responses were further categorized as having “very low food security.”

In the last 30 days, were you ever hungry but didn't eat because there wasn't enough money for food?	Yes	No, Don't know
In the last 30 days, did you lose weight because there wasn't enough money for food?	Yes	No, Don't know
In the last 30 days, did you ever not eat for a whole day because there wasn't enough money for food?	Yes	No, Don't know
In the last 30 days, how many days did this happen?	$\geq 3$ Days	1 – 2 Days

## Results

### *Campus-Wide Findings (Cascades)*

Our estimates of FI on the OSU Cascades campus vary between the two sampling methods, indicating that methodology is an important consideration for measuring FI among college students. The prevalence of FI among OSU Cascades students in February and March of 2021 is presented in Table 2. Results indicate that 24.9% of the course-based survey participants were food insecure. The campus-wide, email-based survey yielded a FI rate of 46.8% (Table 2), exemplifying how data collection method, particularly the sampling scheme, can produce different results. The course-based estimates may be more reliable due to higher a response rate of 72%. However, because the email survey method is more commonly used for measuring FI on college campuses in the US, these results are useful for comparing OSU findings with those from other college campuses. Thus, throughout this report, we present findings from both sampling methods and the combined sample.

Table 2: Food Insecurity Prevalence (%) among OSU Cascades students<sup>1</sup>

Demographic characteristic	Course Sample		Email Sample	
	FI (%)	N <sup>2</sup>	FI (%)	N <sup>2</sup>
All Participants	24.9	289	46.8	78
<i>Class Standing</i>				
Frosh/Soph	21.1	81	36.4	25
Jr/Senior+	30.4	144	59.7	35
Graduate - Masters	18.7	50	33.4	10
<i>College</i>				
Agricultural Sciences	37	32	70	8
Business	25	48	12.5	4
Education	12.6	50	15.4	7
Science	25.5	40	87.5	6
Liberal Arts	29.3	14	40.5	20
Public Health and Huan Sciences	31.9	42	79	9
Earth, Ocean, and Atmospheric Sciences	32	5	-	-
Engineering	26.9	35	33.3	16
<i>Credit Hours</i>				
Part-time	17	66	57.1	19
Fulltime	27.5	212	43.7	55
<i>Race/Ethnicity</i> <sup>3</sup>				
White or Caucasian	24.8	207	46.7	56
American Indian or Alaska Native	54.7	3	100	1
Asian	15	9	25.1	2
Black, African American, African diaspora	0	2	-	-
Latinx or Hispanic	21	12	28.6	5
Native Hawaiian or Pacific Islander (NHPI)	100	1	-	-

Multiracial / Two or more	34.6	31	35.7	8
BIPOC <sup>4</sup>	29.3	58	34.7	16
<i>First-generation College Status</i>				
First-generation	28.8	111	61.8	34
Not first-generation	23.8	168	42.5	40
<i>Gender</i>				
Female	28.1	157	55.8	54
Male	20.9	117	30.4	18
Nonbinary <sup>5</sup>	0	3	57.2	3
Transgender <sup>6</sup>	0	5	57.2	3
<i>Funding</i>				
Reported Pell Grant	34.2	79	58.7	26
Reported Work-study	30.9	24	50	12
Reported other funding	11	12	20	3
No reported funding	21.8	185	45.4	43
<i>Participation in SNAP Food Assistance Program</i>				
Received SNAP within past year	46.2	33	75	18
Currently on SNAP	52.4	21	73.4	14
Has not received SNAP within past year	21.5	240	38.2	56
<i>Current Employment Status</i>				
Not employed	25.2	109	36.6	32
Employed	24.8	169	58.3	42
<i>Living Arrangement</i>				
Lives with children	16	51	10	14
Lives with family	12.7	87	30.9	25
Lives with spouse	28.2	103	63.5	26
Lives on campus	29.3	26	52.2	11
Lives in local county	26.8	234	51.1	67
Lives in Oregon	25.3	270	47.7	73
<i>School Dining Plan</i>				
Yes	28.5	26	57.7	12
No	26.5	204	49.6	53

<sup>1</sup> FI rates presented in Table 2 are weighted for known OSU-Cascades population characteristics, considering first-generation status

<sup>2</sup> Sub-sample sizes do not always sum to the total number of participants due to missing data.

<sup>3</sup> The race and ethnicity question allowed respondents to “check all that apply.” Respondents were coded with a category if they *only* selected that race/ethnicity. If a respondent selected more than one category, they were coded as “Multiracial.”

<sup>4</sup> The BIPOC (Black, Indigenous, and People of Color) category includes respondents who identified as a student of color including those who identified as multiracial and those who identified with a single race.

<sup>5</sup> We include all respondents who indicated identifying as nonbinary, including those who also indicated female or male, meaning this category is *not* exclusive.

<sup>6</sup> We include all respondents who indicated identifying as transgender, including those who also indicated female, male or nonbinary, meaning this category is *not* exclusive.

The results in Table 2 modestly confirm some anticipated patterns of FI among usually vulnerable groups of students. Focusing on results from the course-based sample, highest rates of FI appear

among third and fourth-year undergraduate students, students of color, female-identifying students, students who report receipt of funding such as Pell Grants, and students who receive SNAP benefits. These differences are all suggestive of patterns shown in other studies, including the OSU Corvallis campus study. For example, roughly 29% of first-generation college students reported being food insecure, which is 5 percentage points higher than for those who are not first-generation college students. Likewise, students of color (BIPOC) reported FI at a rate 4.5 percentage points higher than White students. Findings also indicate that female students reported FI at a rate about 7 percentage points higher than male students. However, suggestive as these are, small sample sizes preclude us from demonstrating that these are statistically significant factors ( $p > .1$ ).

As expected, students who reported having been on SNAP previously or who are currently enrolled in SNAP reported FI at a rate approximately 25 to 31 percentage points higher than those who have never been on SNAP. These differences are statistically significant ( $p < .05$ ). Below we provide more detailed analyses exploring the patterns of FI among specific groups.

Table 3 shows how several demographic characteristics are associated with FI, accounting for the other variables measured. This table reports adjusted odds ratios, or the likelihood of being food insecure given that a respondent is in a specific demographic group while controlling for other factors.

Table 3: Adjusted odds of food insecurity among OSU Cascades students, 2021

Variable	AOR <sup>1,2</sup>
<i>First-Generation College Status</i>	
Not first-generation (referent)	
First-generation	1.54
<i>Gender<sup>3</sup></i>	
Male (referent)	
Female	1.62*
<i>Funding</i>	
Did not report Pell Grant (referent)	
Pell Grant	2.20***
<i>SNAP</i>	
Has not received SNAP with past year (referent)	
Has received SNAP within past year	2.56*
Currently receiving SNAP	1.88
<i>Living Arrangement<sup>4</sup></i>	
Lives with children	0.47*
Lives with family	0.49**
Lives with spouse	1.35
Lives in local county	1.88
Constant	0.15***
N <sup>5</sup>	327

Legend: \*  $p < .1$ ; \*\*  $p < .05$ ; \*\*\*  $p < .01$

<sup>1</sup>Adjusted odds ratios are adjusted for all variables that were significant in univariate analyses of food insecurity on a 90% confidence interval (first-generation status, gender, living situation, SNAP receipt, and institutional funding).

<sup>2</sup> Using data from the Office of Institutional Research, we evaluated the representativeness of our sample and applied relative weights to better reflect the known demographic composition of the OSU Cascades Campus. For a more detailed description of this process, see Appendix B.

<sup>3</sup> The “female” and “male” categories include all respondents who identified as “female” or “male,” including those who also identified as transgender. The transgender variable is a binary variable indicating if a respondent selected “transgender” as a gender identity whether in conjunction with other identities such as male or female or independently.

<sup>4</sup> The referent category for each of the variables within “Living arrangements” is the opposite, such as “Does not live with children.”

<sup>5</sup> The sample number includes respondents totaled from both survey phases (course-based and email-based survey respondents) and does not include those respondents who did not provide demographic information. Respondents were only able to complete the survey once. Separate sensitivity analyses were performed on just the course sample data. These analyses produced similar results to the combined data, thus we present the results for the combined data in this table.

### *Food Security by Class Standing and College*

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Table 2 presents the differences among class standing and college. Students who indicated they were juniors or seniors had a higher rate of food insecurity by 9 percentage points compared to freshmen and sophomores; however, when other variables are controlled, class standing is not significantly associated with food insecurity.

Although the college in which a student is enrolled was not a significant correlate of FI once other variables in the model were controlled, there were nonetheless hints of differences in FI across colleges (Table 2). The email-sampling method showed greater differences across colleges than the course sample, but the small sample size in each subgroup is likely to be the source of these disparities in FI rates. These differences further illustrate the potential of response bias and the need for attention to sampling methodology.

While our survey collected information about credit enrollment, allowing us to evaluate the relationship between FI and full-time or part-time status, credit-hour enrollment was not associated with FI in either sample. It is notable, however, that full-time students reported being FI at a rate 10.5 percentage points higher than part-time students. This indicates a need for further research, particularly considering the small sample size of part-time students in this study.

### *Food Security by First Generation Status, Race and Ethnicity*

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The possible importance of first-generation college status is examined in Tables 2, 3, and 4. Table 2 shows that first-generation college students had a FI rate that appeared 5 percentage points higher than the FI rate of non-first-generation college students. Table 3 shows that first-generation status is no longer statistically significant when other variables were included in the model. While first-generation status was found to be a significant correlate of FI in the Corvallis study, this relationship was not observed in the Cascades campus data. Table 4 further explores the relationship between FI and first-generation status, including a second measure of student resource constraints, namely, receipt of the Pell Grant. When this variable is included, the first-generation status variable shows no correlation, while Pell Grant recipients appear to be 88% more likely to be food insecure. Taken together, these variables give further clues to which students at the Cascades campus are more vulnerable to FI.

Table 4: Impact of First-generation college status on FI

Variable	First Gen	Controlling for Pell Grant Receipt
First Generation Status	1.53*	1.38
Pell Grant Receipt (referent is no Pell Grant)		1.88***
Constant	0.38***	0.25***
N	353	353

The Corvallis study also found that FI rate among some racial groups decreased when accounting for first-generation status. Although race was not a significant correlate of FI in this study of the Cascades student body, due to the evidence from the Corvallis study of the relationship between race and first-generation status, we determined that it would be worth further investigating the relationship between race and first-generation status on FI. This analysis is represented in Appendix C.

#### *Food Security by Gender*

Table 2 shows slightly higher rates of FI among women than men in both the course and the email sample. Table 3 shows that adjusting for other variables, female students may have a greater likelihood of FI compared to male students, however, this result was not statistically significant. One explanation for this apparent reduction in the association may be a close correlation between gender and Pell Grant receipt as well as between gender and SNAP receipt. We found that even when controlling for first-generation status, race, and living arrangements, women were nearly 3 times as likely to report a history of SNAP receipt or to report currently receiving SNAP assistance (data not shown).

It is worth noting that the Corvallis study found higher rates of FI among non-binary and transgender students; however, the Cascades sample did not include enough non-binary or transgender students to obtain meaningful statistics on these demographic groups. This suggests the need for further research on food insecurity within the LGBTQ+ population.

#### *Food Security by Funding, Support and, Employment*

Our results show that need-based funding and support resources are important factors that signal the lived experiences of college students. Students may receive Pell Grants, work-study opportunities, or other funding resources. Table 2 presents FI rates based on funding status and receipt of SNAP benefits. Work study and graduate funding were not found to have a significant relationship with FI. Table 3 indicates that Pell Grant receipt has a positive relationship with FI, indicating that students who report receiving Pell Grants are 2.2 times more likely to be food insecure compared to students who did not report receiving Pell Grants. While receipt of support such as a Pell Grant may be anticipated to reduce students' needs, both in terms of educational costs and basic needs such as a food budget, it also signals that a student comes to college with fewer resources. This non-intuitive finding of higher FI among Pell Grant recipients is consistent with the finding of higher FI rates among SNAP recipients (Table 3). The SNAP program

provides resources intended to reduce FI, and enrollment in this program reveals a need. Qualifying for such programs is an indicator of financial hardship, which would be worse in the absence of these resources. Participation in financial and food assistance programs improves the situation and indicates that a real need exists.

We did not find employment to be a significant correlate of FI in this study. FI rates were similar between both employed students and unemployed students.

#### *Food Security by Living Arrangements and Location*

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Table 2 shows differences in FI rate among different living arrangements. The group that appears most insulated from FI are students living within family households, including students with children in the household. Students living with either their family or with children reported FI at nearly half the rate as students not living within family households (Table 2). Interestingly, students living with spouses are 1.35 times more likely to report being food insecure, though this was not statistically significant when other variables were included (Table 3).

## Discussion

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The results of this study corroborate prior research and our findings from the OSU Corvallis study: college students are particularly vulnerable to FI. Our findings show that 24.9% of the course-based sample survey participants at the OSU Cascades campus were food insecure in February and March of 2021. We consider this estimate to be most reliable (compared to the smaller, email-based survey sample) due to the response rate of approximately 72%, suggesting that this estimate may be less likely influenced by non-response bias. This caveat being noted, a benefit of having a larger total of student participants recruited through the combined survey methods (i.e., courses and email) is establishing sub-sample sizes large enough to identify potential predictors of FI.

In addition to providing an estimate of the prevalence of FI among OSU Cascades students, our findings indicate which sub-groups may be more likely to be food insecure. Our analysis identified several key correlates of FI, including gender identity, funding status, receipt of SNAP assistance, and living situation.

Our research identified patterns of FI among students based on their living situation. Students living locally to Bend, OR reported higher rates of FI. While OSU is in the position to help address FI among students through campus-based strategies, the local counties' responses to household FI may also be impactful to students. The results of this study are therefore relevant to broader local strategies addressing FI. It is recommended that local community and county public health policies and programs include college students as a particularly vulnerable group when planning FI interventions.

Results regarding first-generation status among Cascades Campus students were equivocal. Unsurprisingly, and consistent with other research and our previous study at OSU Corvallis, first-generation college status appears to be associated with FI. When controlling for race/ethnicity and receipt of SNAP, first-generation college students may be about 50% more likely to experience FI compared to their non-first-generation peers. However, we did not find that first-generation status was a significant correlate of FI when accounting for gender, funding, SNAP receipt, or living arrangement, which is counter to our findings at OSU Corvallis. We speculate that more first-generation students in the Cascades campus may be living with parents, and thus less vulnerable to FI, as compared to the Corvallis campus where students often relocate for college. This is an area also for further inquiry.

Finally, and notably, this research shows how different sampling methods can produce drastically different estimates of FI. To our knowledge, this study, in conjunction with the Corvallis study, is the first to examine and compare two different survey sampling strategies in the college student population. While the course-based methodology estimates the Cascades campus FI rate to be 24.9%, the email-based methodology produced a much higher estimate of 46.8%. This supports the hypothesis that variation among estimates of FI can be attributed to the methodology of studies, as suggested by Nikolaus et al (2020). Our findings contribute to the literature on college student FI, as well as the general sampling and survey methodology literature. Further research

among college campuses of different sizes is warranted to validate our findings and investigate other methodologies that could be used to improve upon the reliability of estimates.

### *Limitations and Future Improvements in Methodology*

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The small sample size was the greatest limitation in this study. OSU Cascades is a much smaller campus compared to the main OSU campus in Corvallis. This fact presented challenges for our research team both in collecting representative data samples and in data analysis. Notably, the email sample was particularly small (n=74). It is likely that food-secure students opted out of the survey at a higher rate in the email format than in the course-based format, which contributed to inflated FI rates in the email sample. All students in both samples were informed that their participation in the survey was completely voluntary and would not impact their academic standing and yet it appears that, as we anticipated, the course visit may have provided a context that encouraged more food secure students to participate.

The instrument used to measure FI in our survey also has limitations to be considered. The FI screener and questionnaire focuses on a 30-day reference period when assessing level of food security. However, FI is often an intermittent, recurring condition (Coleman-Jensen et al., 2020). The prevalence of FI among OSU students as captured by this study represents a snapshot of those experiences within the past month but may not reflect student food security over a longer timeframe. Because the survey refers to the previous 30 days instead of an annual rate, the overall level of FI experienced by the OSU Cascades student population during the academic year is undoubtedly under-estimated since more students are likely to become food insecure following the survey time period.

The timing of the survey provides an important context for interpreting our findings. We do not have baseline FI rates for OSU students prior to the COVID-19 pandemic for comparison. The rates of FI and correlates presented herein may be representative of unique situational circumstances during the pandemic, which may have further exacerbated already present inequities between specific groups or obscured existing patterns. The unique context of when these data were gathered may make our overall rates of FI for OSU students less comparable to the broader literature on college student FI completed elsewhere, pre-pandemic, and any research conducted post-pandemic. Future, regular assessments of FI among the OSU student body may help to determine typical rates of FI in this population.

Future research should aim to address some of these limitations and further investigate the relationships we have highlighted in this report. For example, data from the Cascades campus does not indicate a significant relationship between race and FI, though this relationship has been well documented in the literature and was observed in our Corvallis study. We believe that our small sample size, particularly the small sample size of students of color, may have impacted this research. Likewise, this research was unable to obtain meaningful statistics on the FI prevalence among nonbinary and transgender students due to the small sample sizes of this demographic. Future research should focus on investigating the patterns of FI among these subpopulations.

## **Acknowledgments**

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The OSU Division of Student Affairs and the Oregon State University Policy Analysis Laboratory provided funding for this study. We extend our deepest appreciation to the OSU Cascades students who participated in this study and to the faculty who supported this effort. Without their involvement, this assessment of FI at OSU would not have been possible.

We also extend our gratitude to the team of student researchers who assisted with data collection.

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## Appendices

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### Appendix A: Food Security Survey – Cascades Campus

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The results of this survey will help OSU improve the health and well-being of all our students. Your participation, whether or not you have had any difficulty accessing enough food, will help us to understand the problem of food insecurity at OSU.

This survey should take approximately 5 minutes to complete.

Before getting started, please review and consider the following consent information.

#### Consent

**Purpose:** The purpose of this study is to evaluate which groups of students are more or less food secure, particularly during the current COVID lockdown. We are surveying students to ask them about their level of food security (i.e. access to sufficient quantity of affordable, nutritious food), their current circumstances such as living situation, their economic security, and their receipt of public program help. We are interested in the entire student body at Oregon State University.

**Eligibility requirement:** To be eligible to participate in this study, you must be currently enrolled in a course offered by Oregon State University. You must also be at least 18 years of age.

**Activities:** We ask you to complete an online survey about your current circumstances related to food security, living situation, and economic security. This should take less than 5 minutes. At the end of the survey, you will be given the opportunity to submit your ONID email to enter a drawing for one of two \$100 gift cards.

**Voluntary:** You do not have to be in the study if you do not want to. Participation in this survey will not influence your grade in any courses in which you are enrolled nor impact your standing with the university. Data collected from this survey will not be used for any future research outside of this context.

**Risks:** We don't anticipate any risks or discomforts with this study. Know that you may stop the survey at any time or refuse to answer any question. Data collected from this research will not be stored for future research.

**Benefit:** This study is not designed to benefit you directly, however, the research content and the materials we provide may be supportive and informational to you.

**Confidentiality:** Other people may learn that you participated in this study but the information you provide will be kept confidential to the extent permitted by law. Should you choose to provide your ONID email at the end of the survey, it will not be linked to your responses.

**Study contacts:** For more information about this study, please contact the principal investigators, Mark Edwards or Jenny Jackson, by phone at 541-737-5379 or 541-737-4853 or by email at medwards@oregonstate.edu or Jenny.Jackson@oregonstate.edu.

You can also contact the Human Research Protection Program with any concerns that you have about your rights or welfare as a study participant. This office can be reached at (541) 737-8008 or by email at IRB@oregonstate.edu.

For students residing in the European Union, questions regarding General Data Protection Regulations can be address to OSU’s Data Protection Officer, Tom Ordeman at (541) 737-9800 or by email at dpo@oregonstate.edu.

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	Yes	No
I am at least 18 years of age or older	<input type="radio"/>	<input type="radio"/>
I currently attend OSU (in-person, remote, or online)	<input type="radio"/>	<input type="radio"/>
I agree to participate in this survey	<input type="radio"/>	<input type="radio"/>

---

The focus of this study is on the food security situation of students attending OSU. Even if you have had no difficulties obtaining food, we ask you to complete the following section to help us understand the food security of all OSU students.

---

In the last thirty (30) days, did you ever run short of money and try to make your food or your food money go further?

- Yes
- No

---

Which of these statements best describes the food eaten in your household?

- Enough of the kinds of food we want to eat
- Enough, but not always the kinds of food we want
- Sometimes not enough to eat
- Often not enough to eat

---

Thinking about the last thirty (30) days, please select whether the following statements were often true, sometimes true, never true, or if you **don't know**.

**In the last 30 days...**

	Often true	Sometimes true	Never true	Don't know
I worried whether my food would run out before I got money to buy more.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The food that I bought just didn't last and I didn't have enough money to get more.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I couldn't afford to eat balanced meals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

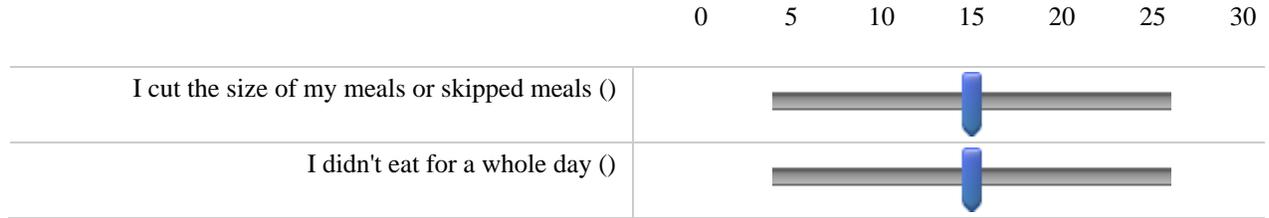
For the following statements, please indicate whether you have experienced the following situations in the last thirty (30) days by selecting **yes**, **no**, or **don't know**.

**In the last 30 days...**

	Yes	No	Don't know
Did you ever cut the size of your meals or skip meals because there wasn't enough money for food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did you ever eat less than you felt you should because there wasn't enough money for food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Were you ever hungry but didn't eat because there wasn't enough money for food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did you lose weight because there wasn't enough money for food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did you ever not eat for a whole day because there wasn't enough money for food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

You indicated that sometimes you would skip meals or didn't eat for a whole day. About how many days did this happen in the last thirty (30) days?

(Click and drag the slider to indicate the approximate number of days each of the following occurred)



Have you received SNAP benefits (*i.e.* "food stamps") in the past year?

- Yes
- No
- I'm not sure

---

Do you currently receive SNAP benefits?

- Yes
- No

---

To help us better understand who struggles with food security, and to ensure this survey is representative of the OSU student population, the following section will ask you a few questions about your academic progress, personal identity, and current living situations.

---

How many credit hours are you currently registered for? (Fall Term)

- 1 - 6 credits
- 7 - 11 credits
- 12 - 16 credits
- 17+ credits

---

Which type of student best represents you?

- Undergraduate student
- Post-baccalaureate student
- Masters student
- Doctoral student

---

Which College are you in?

- Agricultural Sciences or Forestry
  - Business
  - Education
  - Engineering
  - Science
  - Liberal Arts
  - Public Health and Human Sciences
  - Earth, Ocean, and Atmospheric Sciences
  - Veterinary Medicine or Pharmacy
  - I'm not sure
-

Do you receive institutional funding that pays for your tuition? (e.g. GTA/GRA, Fellowship, Fulbright, government scholarship).

- Yes, all of my tuition is covered.
  - Yes, but only some of my tuition is covered.
  - No
- 

What year are you in your undergraduate studies?

- 1st year
  - 2nd year
  - 3rd year
  - 4th year+
- 

Please select the following institutional support systems that apply to you. (*select all that apply*)

- I receive a Federal Pell Grant
  - I qualify for "Work Study" programs
  - Other (*please specify*):
- 

Are you employed this term?

- Yes
  - No
-

About how many hours per week do you work?

- 1 - 9 hours
  - 10 - 19 hours
  - 20 - 29 hours
  - 30+ hours
- 

What is the highest level of education of any of your parents or guardians?

- Less than a high school diploma
  - High school diploma or GED
  - Some college or associate/ trade degree
  - Bachelor's degree
  - Master's degree or higher
  - Don't know
-

What racial/ethnic backgrounds do you identify with? (*Select all that apply*).

- American Indian or Alaska native
  - Asian
  - Black, African American, African diaspora
  - Latinx or Hispanic
  - Native Hawaiian or Pacific Islander
  - White or Caucasian
  - Prefer not to disclose
  - Prefer to self-describe \_\_\_\_\_
- 

What gender(s) do you identify with? (*Select all that apply*).

- Woman
- Man
- Transgender
- Agender
- Non-binary
- Prefer not to disclose
- Prefer to self-describe

Do any children (*under 18*) currently live in your household?

- Yes
  - No
  - Prefer not to disclose
- 

Do any adult family members currently live in your household? (*e.g. parents, grandparents, siblings*)

- Yes
  - No
  - Prefer not to disclose
- 

Do you currently live with a spouse or partner?

- Yes
  - No
  - Prefer not to disclose
-

Are you currently living in Oregon?

- Yes
- No
- Prefer not to disclose

Do you currently live in the Bend area?

- Yes
- No
- Prefer not to disclose

---

Do you live on-campus this term?

- Yes
- No

---

Do you have an OSU dining plan this term?

- Yes
- No

---

Thank you for participating in this survey. Your responses will help us better understand food security at OSU and in our student population. Your answers and identity will remain confidential.

The following question will ask you if you would like to enter the drawing for one (1) of two \$100 gift cards. To protect your privacy, if you select "Yes", you will be redirected to a new survey which will ask you to input your ONID e-mail address. *(Make sure you have pop-ups enabled in your phone or computer browser!)*

By collecting your e-mail in a different survey, we ensure your responses in this survey cannot be connected to your identity.

Would you like to enter the drawing for one of two \$100 gift cards?  
(*Selecting "Yes" will redirect you to a new page.*)

- Yes, please!
- No, thank you.

## Appendix B: Representativeness of Samples

Using data provided by the Office of Institutional Research (OIR), we analyzed the representativeness of our sample. Table B-1 displays the frequency and percentage of each subgroup in the sample population as well as the overall OSU-Cascades population and percentages. Our sample very closely represents the general population in terms of class standing, gender, and race. Our sample appears to have oversampled first-generation students, and thus analyses were weighted to adjust for this oversampling. For further discussion of applying sample weights when population demographics are known see Solon, Haider, and Wooldridge (2013).

Table B-1: Representativeness of samples

Demographic characteristic	Course Sample N	Email N	Total Sample N	Sample Percent	OSU Cascades Population	OSU Cascades Percent
<i>Class Standing</i>						
Freshman	34	13	47	12.9	208	15.1
Sophomore	50	13	63	17.3	196	14.3
Junior	77	16	93	25.6	294	21.4
Senior	65	15	80	22.0	326	23.7
Post- baccalaureate	4	5	9	2.5	21	1.5
Undergraduate <sup>1</sup>	230	62	292	80.2	1050	76.4
Graduate - Masters	50	10	60	16.5	134	9.8
Graduate - PhD	0	0	0	0	0	0
Non-degree Graduate	0	0	0	0	190	13.8
<i>College<sup>2</sup></i>						
Agricultural	33	9	42	1.5	-	-
Business	49	4	53	14.6	-	-
Education	50	8	58	15.9	148	10.8
Science	40	7	47	12.9	114	8.3
Liberal Arts	14	20	34	9.3	208	15.1
Public Health and Human Sciences	44	9	53	14.6	146	10.6
Earth, Ocean, and Atmospheric Sciences	5	0	5	1.4	12	0.9
Veterinary Medicine or Pharmacy	0	0	0	0	-	-
Engineering	36	16	52	14.3	205	14.9
<i>First-generation College Student</i>	114	35	149	40.9	297	21.6
<i>Credit Hours</i>						
Part-time	68	22	90	24.7	758	55.2

Full-time	216	55	271	74.5	616	44.8
<i>Gender</i>						
Female	154	57	211	58	784	57.1
Male	121	15	136	37.4	590	42.9
Nonbinary	2	1	3	0.8	-	-
Transgender <sup>3</sup>	2	0	2	0.6	-	-
<i>Race and Ethnicity<sup>4</sup></i>						
White or Caucasian	210	57	267	73.4	1119	81.4
American Indian or Alaska Native	3	1	4	1.1	14	1.0
Asian	9	2	11	3	24	1.8
Black, African American, African diaspora	2	0	2	0.6	12	0.9
Latinx or Hispanic	12	5	17	4.7	132	9.6
Native Hawaiian or Pacific Islander (NHPI)	1	0	1	0.3	3	0.22
Multiracial / Two or more	32	9	41	11.3	70	5.1
BIPOC	59	17	76	20.9	255	18.6
<i>Living Arrangements<sup>5</sup></i>						
Lives with children	52	14	66	18.1		
Lives with family	88	25	113	31		
Lives with spouse	104	26	130	35.7		
Lives on campus	26	11	37	10.2		
Lives in local county	207	55	262	72		
Lives in Oregon	277	75	350	96.2		
<i>School Dining Plan</i>						
Yes	26	12	353	38		
No	208	55	1951	26.3		
<i>Participation in SNAP Food Assistance Program</i>						
Has received SNAP within past year	34	18	52	14.3		
Currently on SNAP	22	14	36	9.9		
Has not received SNAP with past year	246	59	305	83.8		

<sup>1</sup>Consistent with the Office of Institutional Research, we classified “post baccalaureate” students as “undergraduates.”

<sup>2</sup> The Office of Institutional Research did not have data on both the School of Agricultural Sciences or the Business school. For our course sampling we used Winter 2021 course offerings to supplement this information.

<sup>3</sup>We include all respondents who indicated identifying as transgender, including those who also indicated female or male, meaning this category is *not* exclusive

<sup>4</sup> The race and ethnicity question allowed respondents to “check all that apply.” Respondents were coded with a category if they *only* selected that race/ethnicity. If a respondent selected more than one category, they were coded as “Multiracial”

<sup>5</sup> Data for living arrangements, non-binary or transgender gender identities, and SNAP receipt were not available from the Office of Institutional Research and thus could not be compared to our sample data.

## Appendix C: Further Analysis of First-generation College Status and Race

Table C-1: Race and First-Generation Status and FI

Variable	Impact of Race on FI	Controlling for First-generation status	Controlling for Pell Grants	Controlling for SNAP	First-generation status and Pell Grant only
Student of Color (White as referent)	0.84	0.84	0.84	0.80	
First Generation Status <i>(Not first-generation as referent)</i>		1.72**	1.56*	1.66**	1.38
Reported receipt of Pell <i>(No reported Pell as referent)</i>			2.08***	1.73**	1.89***
Currently receiving SNAP <i>(Not currently receiving SNAP as referent)</i>				1.26	
Has received SNAP <i>(Not receiving SNAP as referent)</i>				2.99**	
Constant	0.95	0.38***	0.32***	0.26***	.32***
N	337	337	337	333	353

legend: \* p<.1; \*\* p<.05; \*\*\* p<.01

As Table C-1 illustrates, the impact of race on the risk of FI is not significant, and even surprisingly appears to show minority students with slightly lower FI risk. This indicates that in the context of OSU Cascades, race does not appear to have a significant relationship with FI, which is contrary to our findings in Corvallis. Furthermore, we found that the significance of first-generation status as a driver of FI remained significant until Pell Grant receipt was included as the sole control variable. This requires further investigation to determine what underlying factors may be contributing to this relationship.

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