Virginia Tech Food Access and Security Study

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Executive Summary

There is growing evidence to suggest that a substantial number of college and university students in the United States grapple with food insecurity during their studies. One of the most comprehensive surveys on this issue was conducted by The Hope Center with 33 participating four-year institutions. They estimated that 41% of students had low or very low food security (Goldrick-Rab et al. 2019). A review of food security studies by the U.S. Government Accountability Office (GAO) (2018) found similar results and that few students who qualified for food assistance were aware of federal food assistance programs such as the Supplemental Nutritional Assistance Program (SNAP).

In response to the increasing concern over students' access to food, this study aims to document food security at Virginia Tech. The study was designed with two parallel goals: to contribute to the national conversation on food access and security amongst higher education students and to inform a strategic response through data-informed programs and policies at Virginia Tech.

The first phase of the study was conducted between Fall 2017 and Spring 2018 and consisted of semi-structured key informant interviews. The second phase was conducted between December 2018 and January 2019 and consisted of an anonymous survey distributed to 32,242 students (27,421 undergraduate and 4,821 graduate) located in Blacksburg. A total of 2,441 (8.9%) undergraduate and 589 (12.2%) graduate students completed the entire survey (for a combined response rate of 9.4%).

This study finds that 29% ($\pm$3.8%) of undergraduate and 35% ($\pm$7%) of graduate students were classified as having low or very low food security based on the USDA food security instrument. These findings are comparable with The Hope Center study (Goldrick-Rab et al. 2019). Students with low/very low food security status were more likely to be Hispanic/Latino or Black/African American, be receiving a Pell grant or financing their education through sources that need to be repaid, have a low GPA, and/or have a disability. Graduate students were also more likely than undergraduate students to be unable to afford to eat balanced meals or have to cut the size of their meals due to a lack of available funds. In general, the proportion of graduate students experiencing food-access problems was greater than the proportion of undergraduate students.

A diet diversity score (DDS) was also developed from the student survey to measure the foods consumed by an individual within the previous 24 hours. The DDS is a proxy for dietary quality and helps provide insight into the barriers that students might face in accessing nutritious foods. The study found that on average students classified as having low/very low food security also had a lower DDS. This finding confirms that low food security is associated with a lower diet quality in addition to not having access to enough food.

Students who reported that they *sometimes* or *often* did not have enough to eat in the past 12 months were also asked if they have received benefits from a range of food assistance programs. Of the 219 students who were asked this question, only 9% (n=20) reported receiving some form of assistance. When asked why they had not used a food assistance program, the primary response was that they felt other people needed more assistance than they did. The next three most selected reasons were a lack of awareness about (1) whether they were eligible for a food assistance program, (2) what

programs exist, and (3) whom to speak with about what resources are available. These findings are consistent with the GAO (2018) report. These results reveal that students who potentially need food assistance may not know where to look for help, and administrative and/or social barriers related to existing on- and off-campus services may prevent students from seeking help even if they know it is available.

This report also documents a range of on- and off-campus food assistance services that are available for students and provides a summary of the feedback obtained from the key informant interviews on potential next steps that could be taken by Virginia Tech. These steps include enhancing the coordination among, and awareness of, existing food assistance programs on and off campus, and new ideas such as creating an on-campus food pantry or subsidizing the cost of dining for students in need. Regardless of which actions are taken, we believe this report reveals our collective responsibility to ensure that no student at Virginia Tech goes hungry or is unable to access nutritious foods, and to create a community that nurtures learning and growth for all of its members.

Introduction

College affordability and access to postsecondary education are receiving increased scrutiny by politicians and the public in the United States, fueled in part by growing evidence of substantial disparities in matriculation. For example, the National Center for Education Statistics (NCES) reports that, while 78% of students from the highest quintile of socioeconomic status[1] enroll in college, this number drops to 28% for the lowest quintile. Compared with the lowest quintile, students from the highest quintile are also more likely to enroll directly after high school graduation (79% vs. 32%), more likely to pursue a bachelor's degree (78% vs. 32%), and more likely to attend a selective institution (69% vs. 22%) (NCES 2019). For low- and middle-income students of color, enrollment gaps can be even wider, contributing to a host of disparate educational outcomes (Espinosa et al. 2019).

Yet, these statistics do not tell the entire story. For students who are able to overcome systemic barriers to higher education access, recent evidence suggests that a host of additional challenges can influence post-matriculation success and persistence. Food insecurity is one such barrier receiving considerable attention. Food security, as defined by the United Nations' Committee on World Food Security (CFS), means that "all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (CFS 2017, 6).

An accumulation of evidence suggests that a substantial number of college and university students in the United States grapple with food insecurity during their studies. In fact, a U.S. Government Accountability Office (GAO) review of current research found estimates of food insecurity among college students ranging from 9% to over 50% (GAO 2018). Further, in a widely publicized report from The Hope Center, researchers estimated that 41% of students were food insecure at the 33 participating four-year institutions (Goldrick-Rab et al. 2019). These figures far exceed the national rate of household food insecurity, recently estimated at 11.8% (Coleman-Jensen et al. 2018). In Southwest Virginia (SWVA), the rate of food insecurity is estimated at 12.1%, with Montgomery County (where Virginia Tech is located) having a higher rate of 13.8% (Feeding America 2019). Roanoke City and Buchanan County in SWVA have the highest rates of food insecurity at 16.4% and 15.1%, respectively (ibid.).

The prevalence of food insecurity at colleges and universities varies across institution type and region, but demographic data reveal that food insecurity disproportionately affects marginalized and underrepresented groups. Goldrick-Rab et al. (2019) found striking disparities in food insecurity between students who were Pell grant eligible and those who were not (49% vs. 35%); those who had been in the foster care system and those who had not (63% vs. 41%); and by those who identified with specific racial/ethnic groups (e.g., Black 56%, Hispanic 50%, Southeast Asian 38%, White 33%). Other notable gaps existed based on gender, sexual orientation, age, support of dependents, marital status, and on-/off-campus housing. Other research has documented additional disparities; for

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[1] NCES uses a composite measure of socioeconomic status comprised of family income, parent occupation, and parent education.

example, first generation students experience food insecurity at significantly higher rates than other students (Forman et al. 2018) as do students who are financially independent from their parents and those who carry substantial debt (Phillips, McDaniel, and Croft 2018).

A recent qualitative study by Fernandez, Webster, and Cornett (2019, 7) reveals that food security among students is typically 'fluid' and that *"collegiate food security is not a static condition."* They find that the fluidity between the various levels of food security tends to be driven by factors such as irregular access to financial resources and unexpected expenses such as healthcare costs, vehicle repairs, and/or increases in the costs of living.

While food insecurity is an important concern on its own, recent research suggests food insecurity is correlated with other important social, behavioral, and academic outcomes. Hagedorn and Olfert (2018) found food insecurity to be highly correlated with obesity and highly negatively correlated with overall health, coping skills, and personal financial skills. Hunger has been reported as a factor in a variety of counterproductive behaviors among students, including missing class, study sessions, and club meetings; opting out of co-curricular activities; deciding not to purchase textbooks; and dropping classes (Dubick, Matthews, and Cady, 2016). In addition to undesirable academic behaviors like neglecting academics and reducing course loads, food insecurity was a strong predictor of other academic outcomes, including significantly lower GPAs and the likelihood of considering dropping out (Phillips, McDaniel, and Croft 2018).

Higher education institutions are beginning to understand the scope and consequences of this problem, leading one team of researchers to claim that *"Food insecurity and hunger are gaining traction as recognized public health problems on college campuses"* (Forman et al. 2018, 1). Campuses have responded in a variety of ways, from developing local food pantries (Twill, Bergdahl, and Fensler 2016) to advocating for changes to eligibility requirements for the Supplemental Nutritional Assistance Program (SNAP), but most food insecure students are not utilizing these resources. Studies of food insecurity interventions on college campuses reveal that only 38% of food insecure students used one university's food pantry (El Zein et al. 2018), and only 3.7% participated in a food assistance program (e.g., SNAP, WIC) (McArthur et al. 2018). Qualitative data suggest that social stigma, resource awareness, self-identity, and resource accessibility all contribute to these low usage rates (El Zein et al. 2018).

In response to this growing body of research, this study seeks to document food security at Virginia Tech. The approach we have taken provides evidence about the prevalence of food insecurity with nuanced information about diet quality, contributing factors, and coping mechanisms. The data also allows for the identification of populations that are disproportionately affected on our campus. We designed this study with two parallel goals: to contribute to the national conversation on food access and security amongst higher education students and to inform a strategic response through data-informed programs and policies at Virginia Tech.

Methodology

In response to reports emerging throughout the United States on the presence of food insecurity on college campuses, a multi-disciplinary team of researchers at Virginia Tech conducted a two-phase

investigation on the state of food access and security among students at the university's Blacksburg campus in Virginia. The first phase was conducted between Fall 2017 and Spring 2018 and consisted of semi-structured key informant interviews. The second phase was conducted between December 2018 and January 2019 and consisted of a survey distributed to 32,242 students.

Phase I - Semi-Structured Key Informant Interviews

The qualitative component of this study consisted of semi-structured key informant interviews. From Fall 2017 to Spring 2018, 12 key informants – both on-campus and off-campus – were interviewed. The key informant interviews focused mainly on understanding the nature of food access and security among Virginia Tech students, as well as collecting contextual and sensitive information and discovering the institutional role of Virginia Tech in tackling these issues. Informants were chosen based on their official roles at Virginia Tech. Individuals who were in a position to provide assistance or were aware of students with limited access to nutritious and affordable foods were asked to participate. A snowball method was used to identify additional key informants.

Phase II - Student Survey

Between March 2017 and December 2018, a survey was developed to identify the number of students on campus who experience various degrees of food insecurity; the quality of student diets; the barriers to accessing cultural, nutritious, and affordable foods; and the available strategies to manage these barriers. Findings from the key informant interviews were used in the development of the survey.

The survey, approved by the Virginia Tech Institutional Review Board, was distributed to 27,421 undergraduate students and 4,821 graduate students (32,242 in total) through a series of three recruitment emails between December 19, 2018 and January 24, 2019. The survey was anonymous, and students were not offered any incentives to participate in the survey. A total of 2,441 (8.9%) undergraduate and 589 (12.2%) graduate students completed the entire survey (for a combined response rate of 9.4%) (see Appendix A for a detailed breakdown of the response rates). These response rates are equivalent to those obtained from similar studies (Goldrick-Rab et al. 2018; 2019).

The USDA and Diet Diversity Metrics

Two validated instruments were used in the survey. The USDA instrument, designed to measure food security in terms of reduced or disrupted food intake, was used to assess the extent to which students experienced food insecurity in the previous 12-month period (USDA 2012). The instrument uses a three-stage design with an initial screener question to identify the presence of low and very low food security. Each of the stages drills down further into an individual's food consumption patterns, finishing with a single question in the third stage to identify those who experience physical hunger due to lack of money for food. Scores are typically constructed using a 10-item instrument (Appendix B). For this study, the USDA question asking respondents *"In the last 12 months, did you lose weight because there wasn't enough money for food?"* was removed, since (1) students are often trying to lose weight and (2) the assumption that students lose weight due to low or very low food security is

problematic. For example, it is also possible that students in this situation may gain weight due to having limited access to nutritious foods (Hagedorn and Olfert 2018).

The removal of the weight loss question means that the USDA scores presented in this report are constructed on a scale from 1 to 9 (rather than 1 to 10). Table 1 provides the USDA definitions of the ranges of food security (USDA 2019). It should be noted that students with a score of 6 or more - i.e., that fall into the very low food security category - are considered to be experiencing hunger.

Table 1. Definition of USDA Instrument Food Security Scores

Score	Classification	Interpretation
0	High food security	Respondent has no reported indications of barriers or limitations of food-access.
1 - 2	Marginal food security	Respondent has one or two indications of food insecurity – typically in terms of anxieties over insufficient food in the house. There are little to no changes in diets or food access.
3 - 5	Low food security	Respondent has some indications of food insecurity – reports of reduced diet quality, variety, and/or desirability. Little to no indication of reduced food intake.
6 - 9	Very low food security	Respondent has multiple indications of food insecurity including disrupted eating patterns and reduced food intake.

Food insecurity has known effects on the quality and quantity of foods consumed, as well as obesity and obesity-related health conditions in the United States (Hagedorn and Olfert 2018). Therefore, the Food and Agriculture Organization's (FAO's) instrument to measure diet diversity of foods consumed by an individual was also included in the survey. The diet diversity score (DDS) is used as a proxy for dietary quality using a 24-hr recall method to assess the consumption of 16 food groups. A DDS was calculated for each respondent by aggregating consumed food groups into a 9-point score (see Appendix C for a description of how the score was calculated). Table 2 defines the categorization of the scores.

This report presents the main findings from both phases of the Virginia Tech Food Access and Security study. The remainder of the report is laid out as follows: first, the important variables identified in the key informant interviews are discussed, followed by the results from the USDA food security instrument and the DDS instrument. Disparities in food security status among different groups of respondents followed by the barriers and strategies to accessing foods indicated by students are subsequently summarized. The report then identifies the current resources for students who are facing either episodic or systemic food insecurity and concludes with a discussion of potential next steps that Virginia Tech could take to improve the quality of life for its under-resourced students.

Table 2. Definition of Diet Diversity Scores

Score	Classification	Interpretation
7 – 9	High diet diversity	Most food groups have been consumed in the previous 24-hr period and are likely to include protein and a variety of types of fruits and vegetables.
4 – 6	Moderate diet diversity	Some food groups have been consumed in the previous 24-hr period and are likely to include starch and some types of fruits and vegetables.
0 – 3	Low diet diversity	None or few food groups have been consumed in the previous 24-hr period and are likely to include starch. Fruit and vegetable consumption tends to be low. A score of 4 or less is considered to be a nutritionally inadequate diet.

Results

Findings from the Key Informant Interviews

The key informant interviews helped to identify the critical information that needed to be collected by the student survey. A central theme throughout the interviews was the need to locate the groups of students who are experiencing food access challenges and to ensure any initiatives developed to address food access and security are focused/targeted. In response to this need, a series of questions were developed to capture information on a respondent's academic status (undergraduate, graduate, year of study, etc.), home residency (in-state, out-of-state, international, and hometown location) and residency in Blacksburg (on or off campus), financial resources, assistantships/employment, age/height/weight, grade point average (GPA), race and/or ethnicity, level of disability, and gender identity to identify groups that might disproportionately experience low food security on the Blacksburg campus.

The interviews also raised questions about the potential link between food access and a student's success and experience at the university. One respondent asked *"what is the role of the university in ensuring that ... students from low economic incomes have access to food? Again, if they don't have access, then they're not going to succeed. They're not going to perform well in their classes, and they may end up not performing at the level that the university expected."* Another key informant was more direct: "*I ... feel like it's partially the responsibility of the university, if you're going to accept a student and say, "We want you here," we need to provide support systems for them to be able to succeed. Otherwise, I feel like we're ... setting them up for failure."* In response to these concerns, the survey asked students who indicated they were experiencing food access challenges whether they have accessed a food assistance program. Students could select from fourteen programs offered by Virginia Tech or other entities or enter a program that was not listed. A related concern was the

challenges a student may face in accessing/receiving assistance when needed. In response to this concern, students experiencing food access challenges who had not used a food assistance program were asked why they did not seek help.

In addition to informing the design of the student survey, the key informant interviews identified a range of recommendations that are discussed in the Next Steps section of this report.

Findings from the Virginia Tech Food Access and Security Survey

The student survey reveals the prevalence of episodic and chronic food insecurity among students at Virginia Tech's Blacksburg campus. When compared against demographic and socioeconomic characteristics, groups that are more vulnerable to food insecurity are identified. Results from the diet diversity portion of the survey confirms that low food security is associated with poorer quality diets. The barriers to accessing enough and preferred types of foods are identified by respondents classified as food insecure, but all respondents identified strategies used to reduce food expenditure.

All the percentages presented in this report are based on the data collected from the survey respondents. Conservative error margins are estimated for key percentages to provide a measure of how well estimates from the survey respondents can be generalized to the Blacksburg student population under normal statistical assumptions.[2] For example, 50% of all undergraduate respondents reported having enough food to eat and the kinds of food they want. To extend this estimate to the entire student population with a 95% confidence interval, an error margin of ± 2 percentage points needs to be added,[3] meaning that between 48%-52% of all undergraduate students at Virginia Tech are considered to have enough food to eat and the kinds of food they want. Where error margins are not reported in this report, the percentages refer to the survey respondents and are not estimates of the entire student population.

Food Security Status of Students at Virginia Tech

The screener question of the USDA food security instrument reduces respondent burden by filtering out students who are classified as highly food secure and introduces the idea of access to *enough* food as well as to *preferred* foods. Respondents who believe they have enough food to eat and the types of foods they want are deemed to meet the definition of a food secure person and are automatically assigned a score of 0 points. More than 50% of the respondents (55% of undergraduates and 52% of graduates) answered the screener question this way. The remainder of the respondents (n=1,391) were presented with Stage 1 questions of the USDA instrument. Students with affirmative responses were presented with Stage 2 questions (n=914). Subsequently, the single-question Stage 3 was

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[2] The sampling error margin here and in subsequent portions of the report is taken conservatively at the 95% confidence interval based on the Wald interval as 1/sqrt(n), where n is the sample size. This formula assumes the worst case scenario of 0.5 for the true population proportion, and hence is conservative. Note that this formula does not account for the sampling mechanism and assumes true random sampling.

[3] For simplicity, from here on the error margins will be referred to in the following manner: $\pm 2\%$ rather than saying ± 2 percentage points.

presented to those with affirmative responses to Stage 2 questions (n=680) (see Appendix B for more information on the USDA instrument).

Figure 1 shows that 7% ($\pm$2%) of undergraduate and 9% ($\pm$4%) of graduate students at Virginia Tech struggle with accessing enough food to eat. As Figure 2 shows in columns 2 and 3, the majority of these students experience multiple limitations to food access according to the USDA instrument. Figure 2 also reveals that students who believe they have enough food but not always the foods they want also experience food access problems. This finding suggests that these students may experience episodic food insecurity even though they generally feel like they have enough to eat; yet, a small subset of these students (16%) indicate that they have gone a whole day without eating due to a lack of money for food in at least one or two months in the past 12 months.

There are some notable differences in the food access problems faced by graduate versus undergraduate students. Figure 3 shows that the proportion of graduate students who cannot afford to purchase balanced meals is 7 percentage points higher than undergraduate students (p=0.033).[4] A similar result (an 8 percentage point difference, p=0.015) is found for the proportion of graduate versus undergraduate students who reduced the size of their meals because there was not enough money for food. In general, Figure 3 shows that a greater proportion of graduate students experience food access problems than undergraduate students.
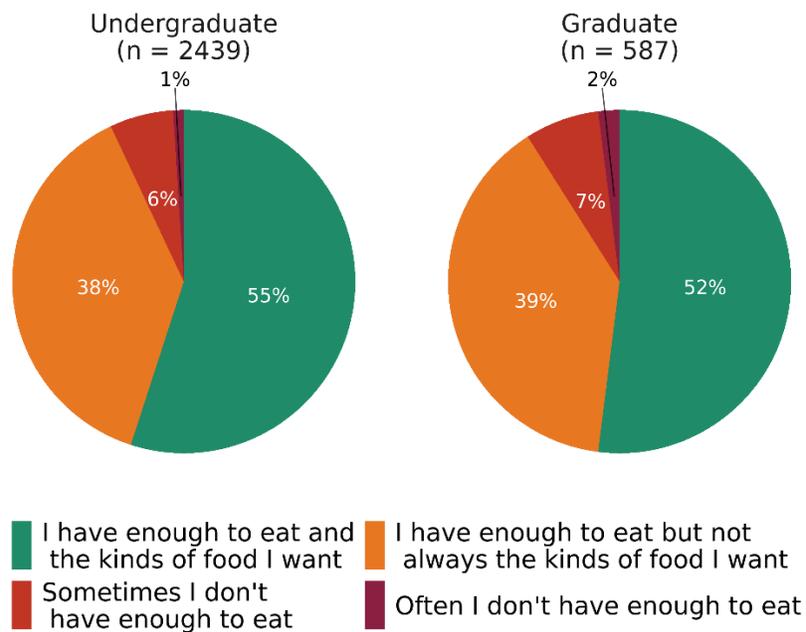
**Figure 1. USDA Food Security Instrument Screening Question**

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[4] Where two groups are compared, a p-value from a test for difference in group proportions is included to indicate whether the difference between the groups is statistically significant.
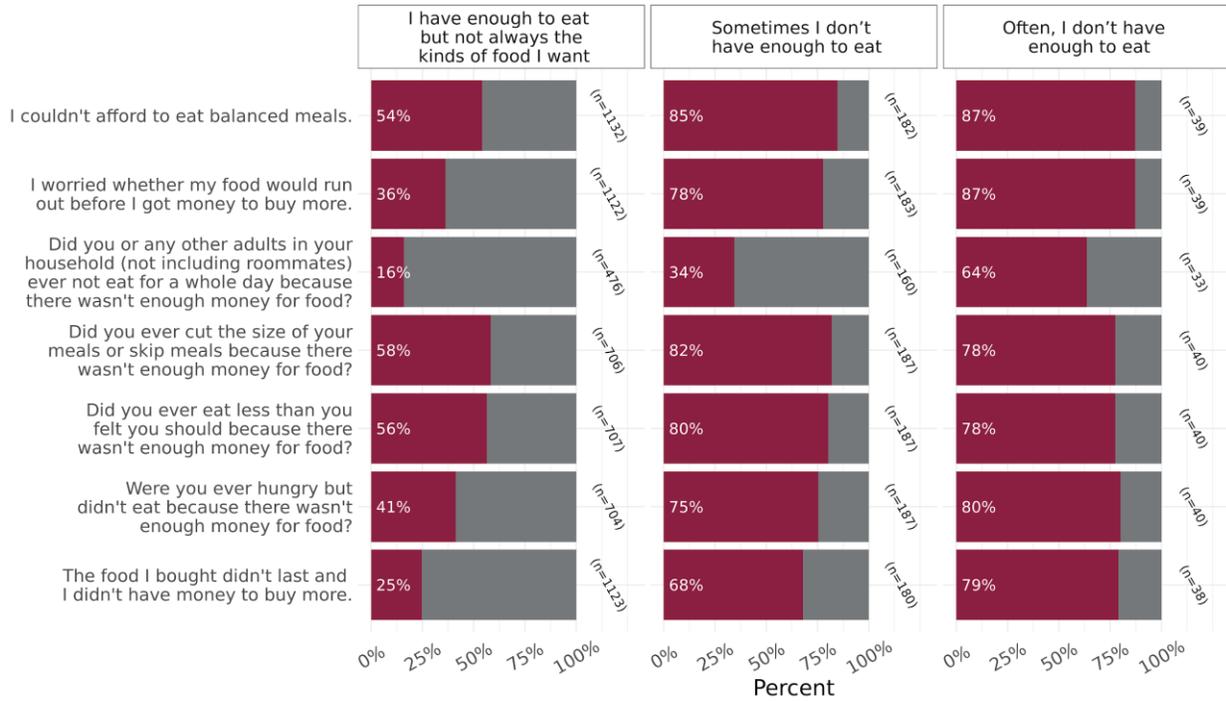
Figure 2. Responses to USDA Food Security Instrument Questions (All Stages)
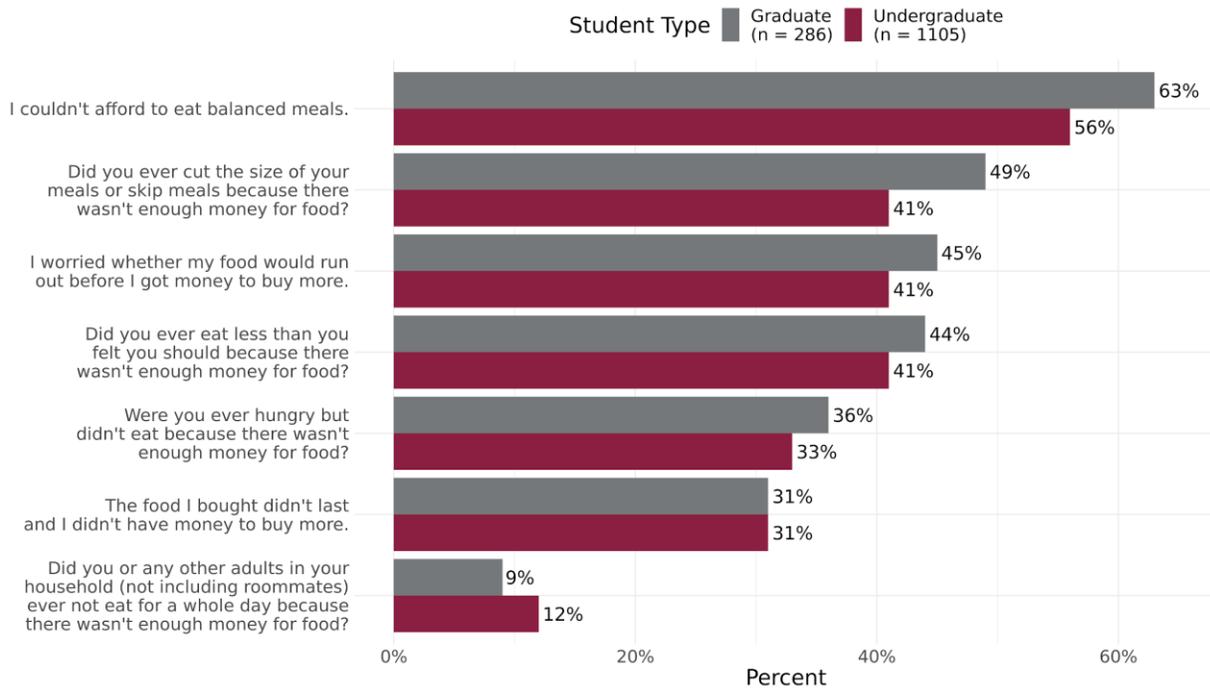

Figure 3. Responses to USDA Food Security Instrument by Student Types

Based on responses to the questions in the USDA instrument (see Figure 2 or 3), the respondent was scored and categorized into one of four groups - high, marginal, low, or very low food security (for more details see Appendix B). As Figure 4 shows, 29% (±3.8%) of undergraduate students and 35%

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(±7%) of graduate students are classified as having low or very low food security. This is comparable to recent research by The Hope Center on food security across 33 four-year colleges and universities in the United States (Figure 4). Their findings indicated that 41% of students (no error margins are reported) were classified as having low or very low food security (Goldrick-Rab et al. 2019). Unlike The Hope Center findings, however, the Virginia Tech sample had a very low proportion of students categorized as having marginal food security. As previously described in Table 1, the marginal food security group only includes students who have a score of 1 or 2.[5]
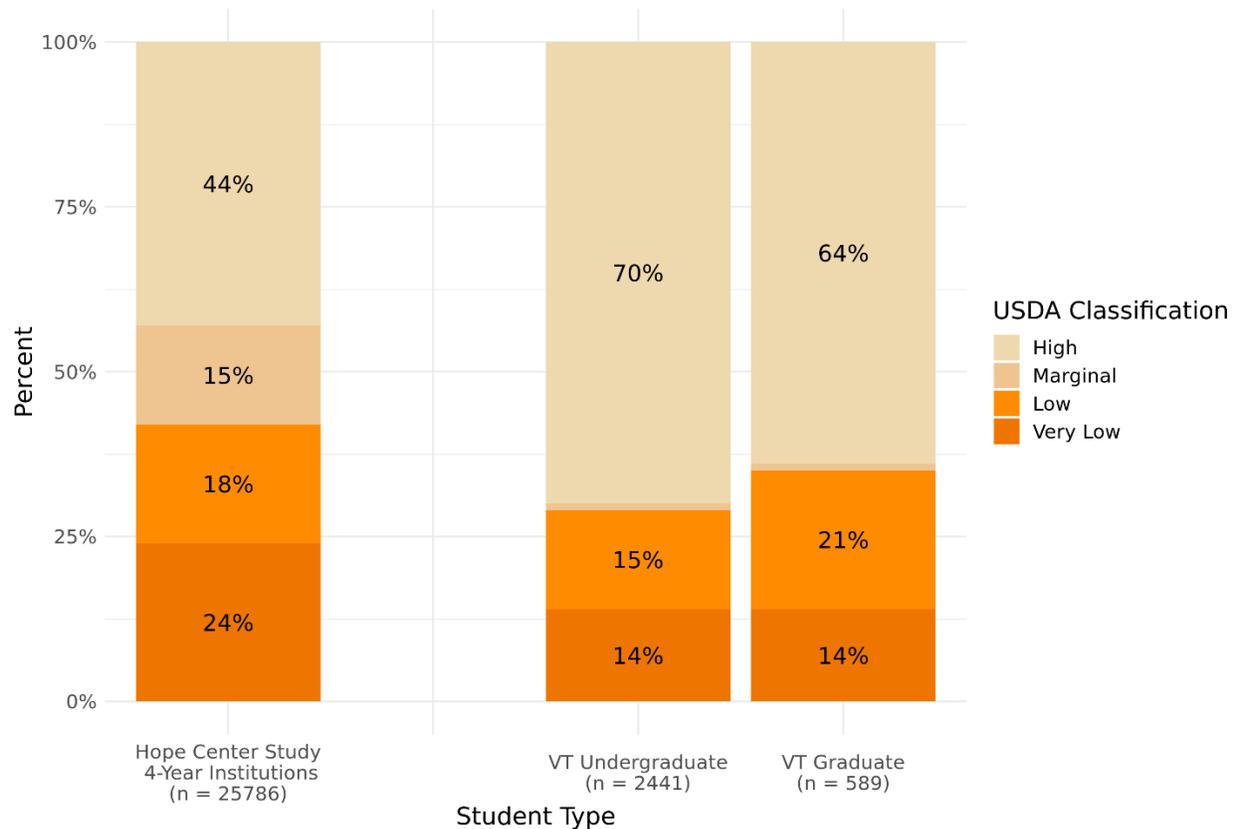
Figure 4. Food Security by Student Type

Risk Factors for Low Food Security

Breaking down the data by demographic or socioeconomic characteristics reveals that there are certain student groups at Virginia Tech that are more vulnerable to having low or very low food security. The most prominent disparities emerge based on race, type of financial aid, GPA, and disability status. For the remainder of the report, the percentages refer to the respondent data and are not generalized for the entire student population.

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[5] For conciseness and to abide by IRB guidelines on not identifying vulnerable groups, the marginal group is incorporated with the high food security group in some figures throughout the report.

- ➢ **RACE & ETHNICITY.** Respondents who consider themselves as White/Caucasian experience the lowest proportion of low/very low food security (27%) (Figure 5). Hispanic/Latino students are 2.6 times more likely to have low/very low food security status compared to White/Caucasian students ($p<0.0005$),[6] while Black/African American students are 1.9 times more likely ($p=0.003$). These results are consistent with other studies - see for example Dubick, Matthews, and Cady (2016) and Wood, Harris III, and Delgado (2016). Multiracial respondents are 1.7 times more likely to experience food insecurity than White/Caucasian respondents ($p<0.0005$).

- ➢ **FINANCIAL AID/SUPPORT.** Respondents who finance their education through sources that need to be repaid are 2.7 times more likely to have a low/very low food security status ($p<0.0005$) than respondents with funding that does not need to be repaid. Students receiving a Pell grant or who have a line of credit reported the highest levels of low/very low food security (50% and 54%, respectively) (Figure 6). Students receiving financial support from their family that *does not* need to be repaid had the lowest reported levels of low/very low food security (22% of 1,901 respondents).

- ➢ **GPA.** GPA is negatively correlated with food security - as GPA increases, the percentage of students falling in the low/very low food security groups declines. Respondents with a 0-2.49 GPA reported the highest levels of low/very low food security (48% of 113 respondents) (Figure 7). Compared with all other brackets of GPAs, respondents in the 0-2.49 bracket are 2.2 times more likely to be in the low/very low food security category ($p<0.0005$).

- ➢ **DISABILITY.** Respondents who stated they had or might have a disability reported higher levels of low/very low food security (43% and 47%, respectively) than respondents who do not have a disability (27%) (Figure 8). Respondents who reported an existing or potential disability are 2.1 times more likely to have low/very low food security status than respondents without a disability ($p<0.0005$). Interestingly, those who preferred not to say whether or not they had a disability are 4.1 times more likely to be food insecure than those who did not report having a disability ($p<0.0005$).

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[6] We used odds ratios to estimate how much more likely one group is to experience food insecurity than another. See Szumilas (2010) for more information on odds ratios.
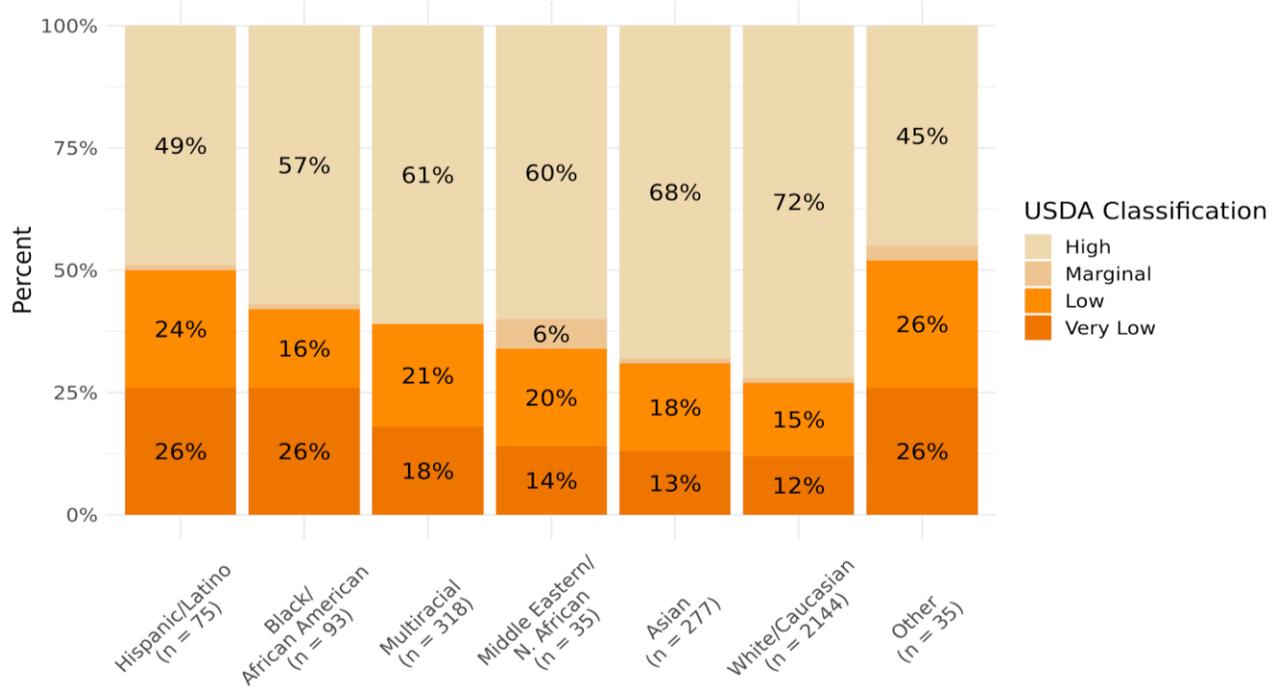
Figure 5. Food Security by Race and Ethnicity
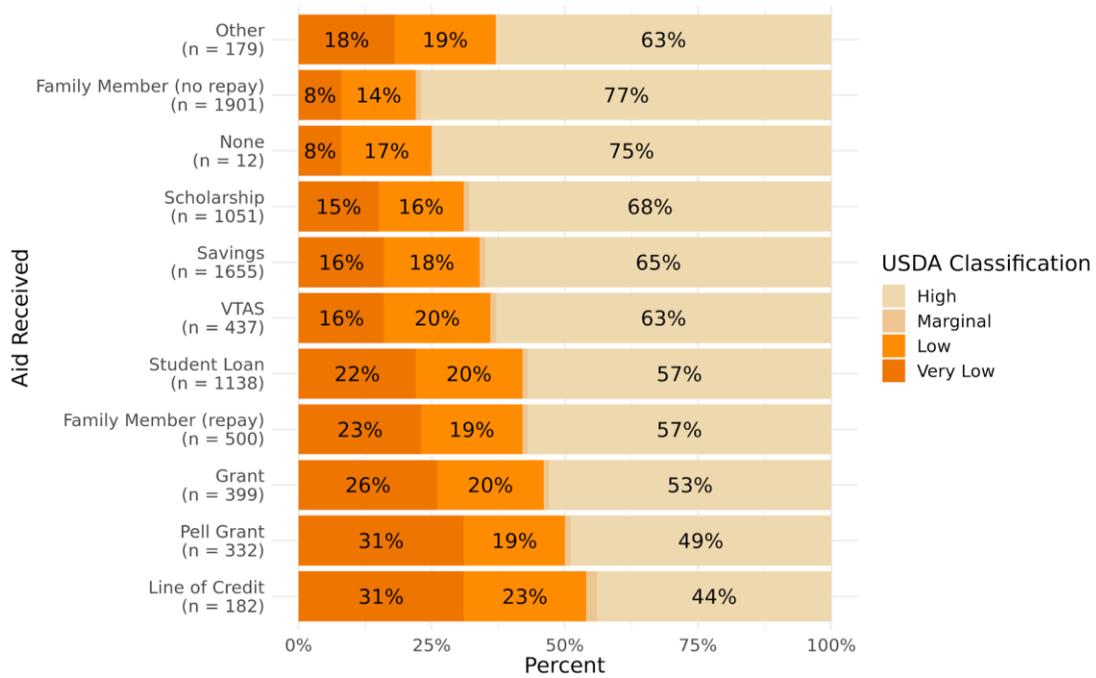
Figure 6. Food Security by Financial Assistance Type[7]

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[7] VTAS = Virginia Tech Assistantship or Stipend.
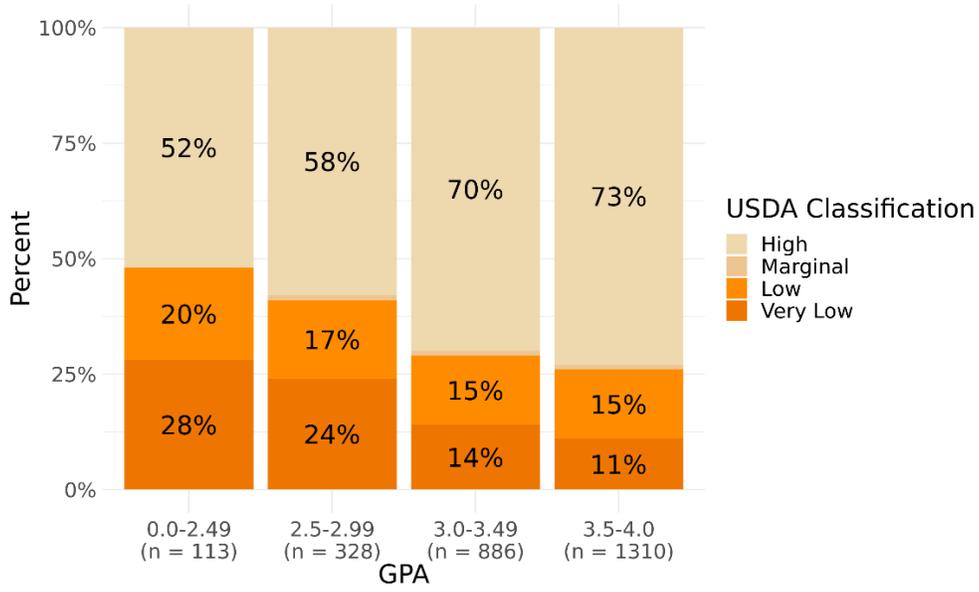
Figure 7. Food Security by GPA
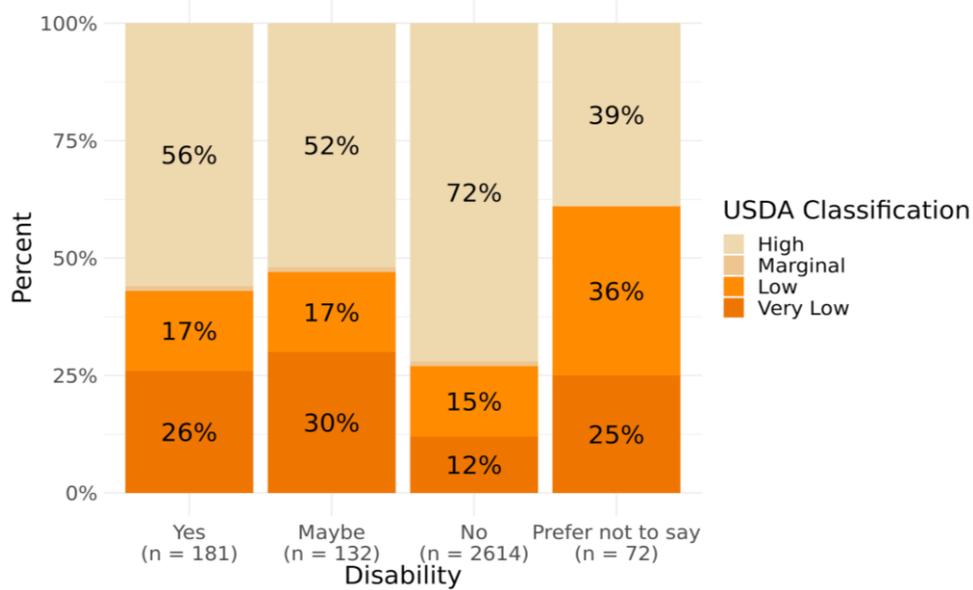
Figure 8. Food Security by Disability

Other groups with slightly narrower differences in proportions of food insecurity include residency status, accommodation, job status, college, and undergraduate year (see Appendix D for additional figures).

➢ **RESIDENCY.** International students are 1.4 times more likely to have a low/very low food security status than domestic students (p=0.06). Out-of-state students report the lowest prevalence of food insecurity (28% of 724 respondents).

- ➢ **HOUSING.** Respondents living off campus by themselves or with roommates are 1.4 times more likely to be food insecure compared to respondents living on campus (p<0.0005). The highest rate of low/very low food security status exists among students living off campus by themselves (40% of 184 respondents). The lowest rate is among students who live on campus (25% of 1,057 respondents).

- ➢ **EMPLOYMENT.** Respondents with full-time or part-time jobs have higher levels of low/very low food security (35% of 92 respondents and 36% of 962 respondents, respectively) than respondents with no job (24% of 1,541 respondents).

- ➢ **COLLEGES.** The two colleges with the highest levels of low/very low food security among their students were the College of Veterinary Medicine (42% of 89 respondents) and the College of Liberal Arts and Human Sciences (39% of 470 respondents). The lowest reported levels were found among students in the Pamplin College of Business (23% of 323 respondents).

- ➢ **UNDERGRADUATE YEAR.** The percentage of undergraduate respondents with low/very low food security increases from freshmen (23% of 727 respondents) to juniors (35% of 519 respondents).

Diet Diversity Among Students

Since the USDA score is designed to capture reduced or disrupted food intake, it may not identify students who have diets with low nutritional quality. Other studies such as The Hope Center report (Goldrick-Rab et al. 2019), the Illinois University Food Security Study (Morris et al. 2016), or the University of Hawaii Food Security Study (Chaporro et al. 2009) did not include a measure of food consumption. Given that food security is defined by the USDA as having access to foods to live an active and healthy life, the research team believed that measuring dietary diversity as a proxy for dietary quality was important.

Comparing the diet diversity score (DDS) with the food security status shows that on average students classified as having low or very low food security status have a lower DDS (Figure 9). Almost 50% of students with a low DDS are of low or very low food security status. Since DDS has been established as a proxy for dietary quality (Arimond and Ruel 2004), this confirms that low food security is associated with lower quality diets in addition to not having access to enough food.
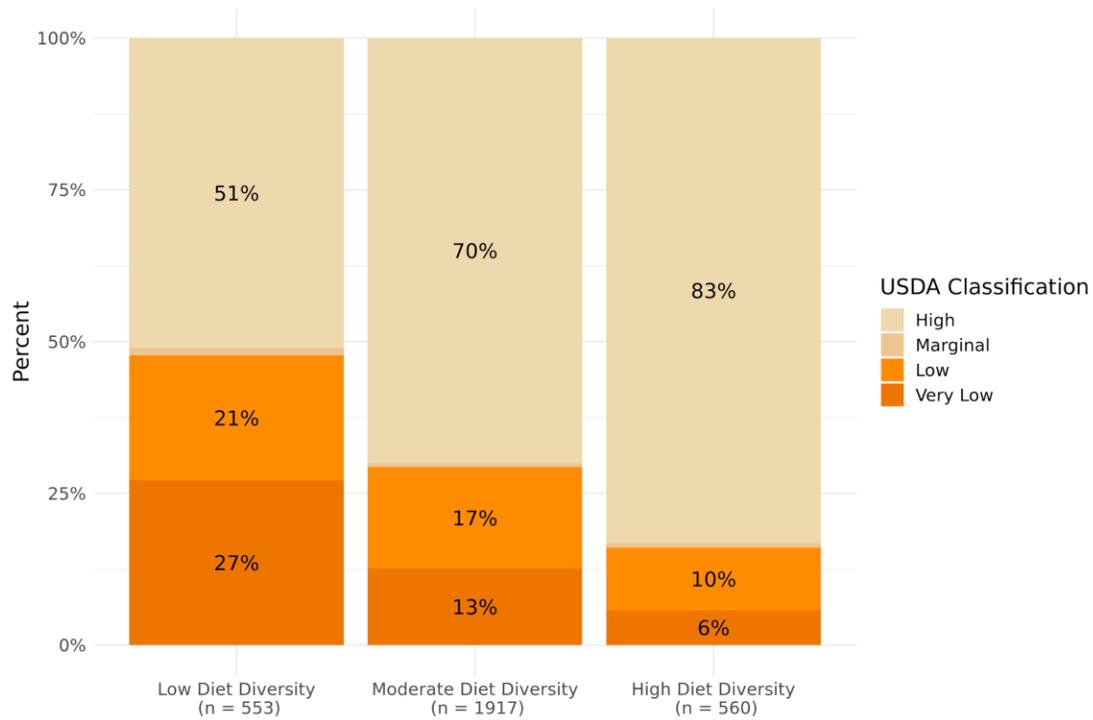
Figure 9. Food Security by Diet Diversity Score

Figure 10 reports the various food groups that respondents indicated they had consumed in the previous 24-hr period, aggregated into the food groups used to construct the DDS. Perhaps somewhat unsurprisingly, the proportion of students who had consumed a food group was statistically significantly higher for those in the high/marginal food security group when compared with students in the low/very low food security group for all foods except organ meats. The most substantial differences were found with the consumption of 'other fruits and vegetables' (14.8%, p<0.001), 'meat and fish' (14.4%, p<0.001), 'dark green leafy vegetables' (13.9%, p<0.001), 'vitamin A rich fruits and vegetables' (13.7%, p<0.001), and 'milk and milk products' (12.6%, p<0.001).

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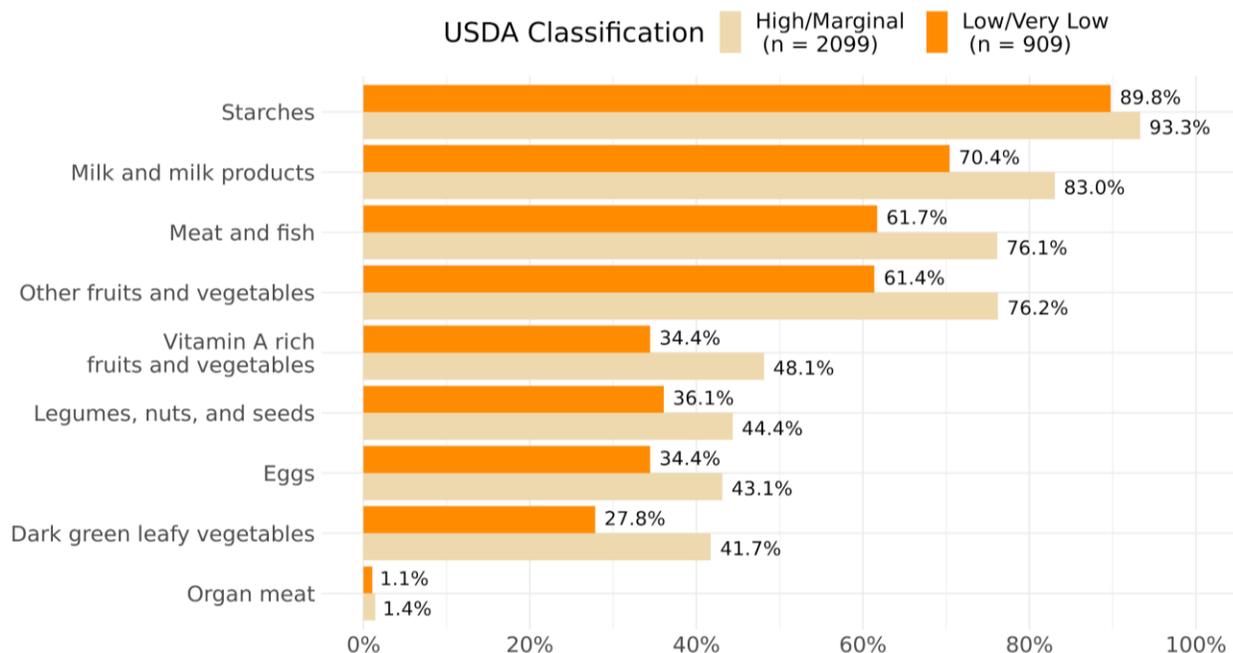
Figure 10. Food Security by Consumption of 9 Food Groups

On-Campus Dining and Food Security

Approximately 18% of undergraduate respondents do not have a dining plan compared to 86% of graduate respondents (Figure 11). For both undergraduate and graduate respondents, not having a dining plan is associated with higher levels of food insecurity (44% and 37%, respectively) (Figures 12 and 13). For undergraduates with a dining plan, a greater proportion of students with a premium flex plan experience low/very low food security (35%) than students with other types of dining plans (Figure 12).
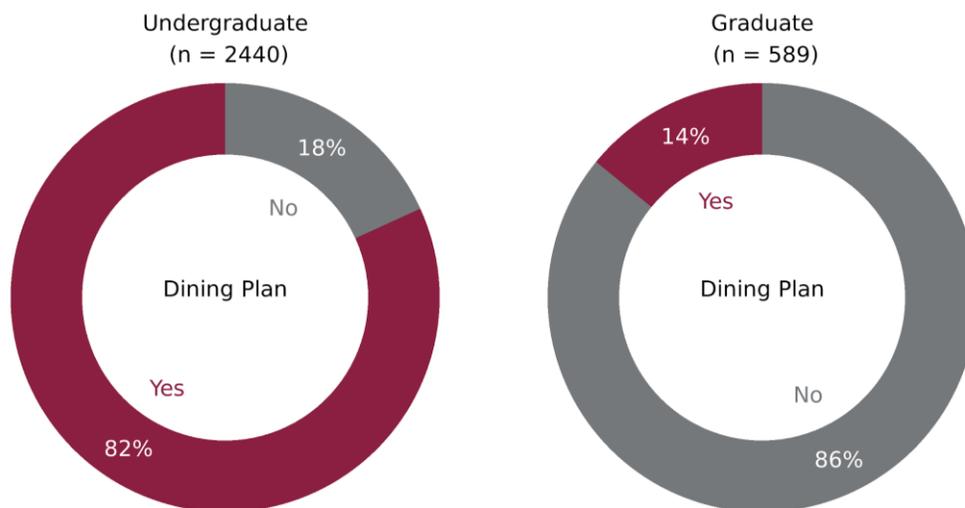
Figure 11. Dining Plan Usage by Student Type

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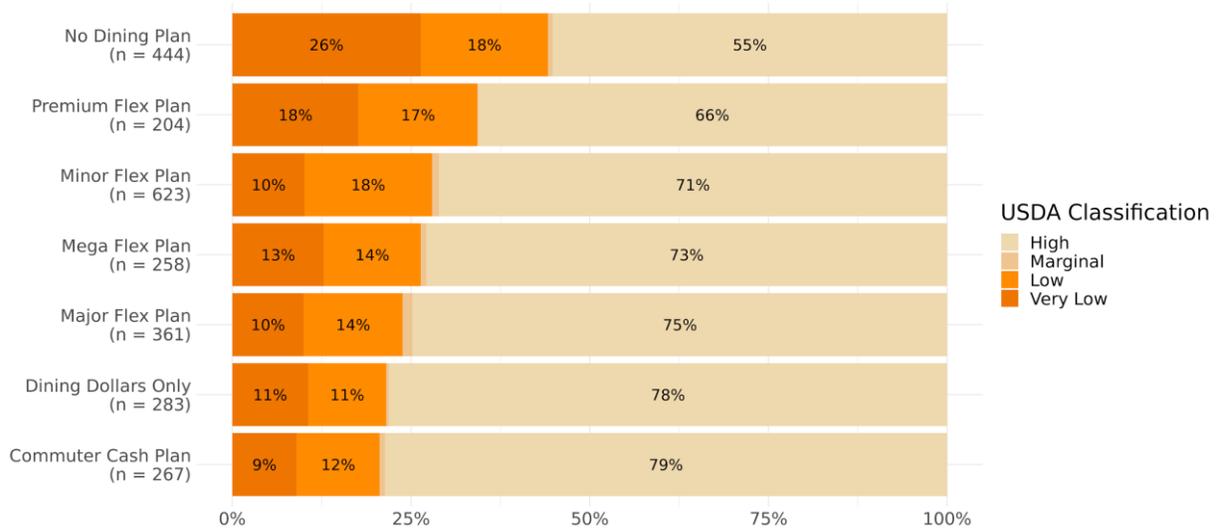
Figure 12. Food Security by VT Dining Plan Usage – Undergraduate Students
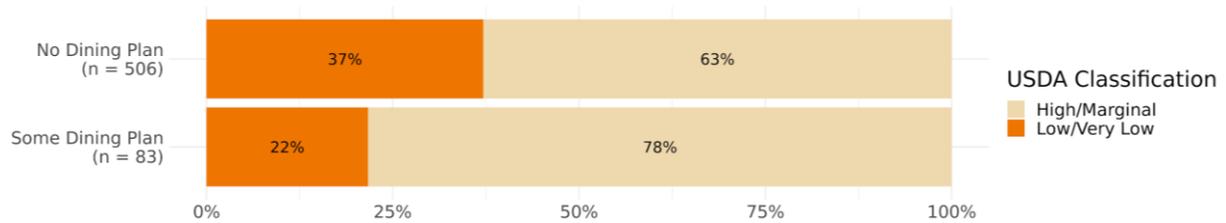
Figure 13. Food Security by VT Dining Plan Usage – Graduate Students

Barriers and Student Strategies to Food Access

Perceptions regarding access to enough and preferred foods is important to understanding the barriers to obtaining cultural, affordable, and nutritious foods. Respondents that indicated they had access to enough food but not the kinds of food they wanted were asked to report the barriers to their preferred foods (n=1,140) (Figure 14). The leading barrier for graduate students is a lack of money (46.5% of 228 students) and for undergraduate students is a lack of the foods they want (51.5% of 912 students). Other leading barriers include a lack of available good quality food, difficulty in getting to the store, and a lack of cultural foods available.

Respondents that indicated they did not have enough food, either *sometimes* or *often*, were asked to report the primary barriers they face. The leading barrier for both undergraduate and graduate students is a lack of money (77.8% and 84.6%, respectively) (Figure 15). Another leading barrier is difficulty in getting to the store and a lack of ability to cook or eat because of health problems. Eighteen percent of undergraduate students and 25% of graduate students indicated that there are other reasons not listed that prevent access to enough food. This emphasizes the need to better understand the food access problems faced by Virginia Tech students.

20
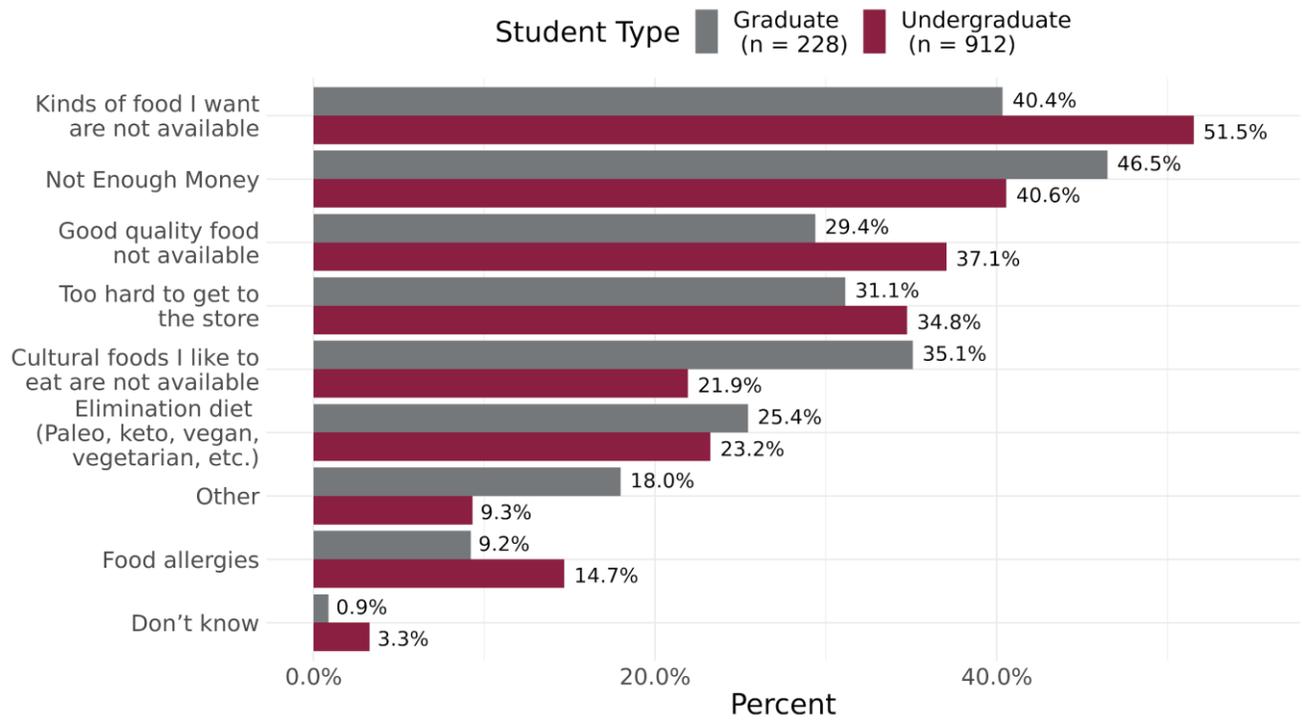
Figure 14. Barriers to Accessing Preferred Foods
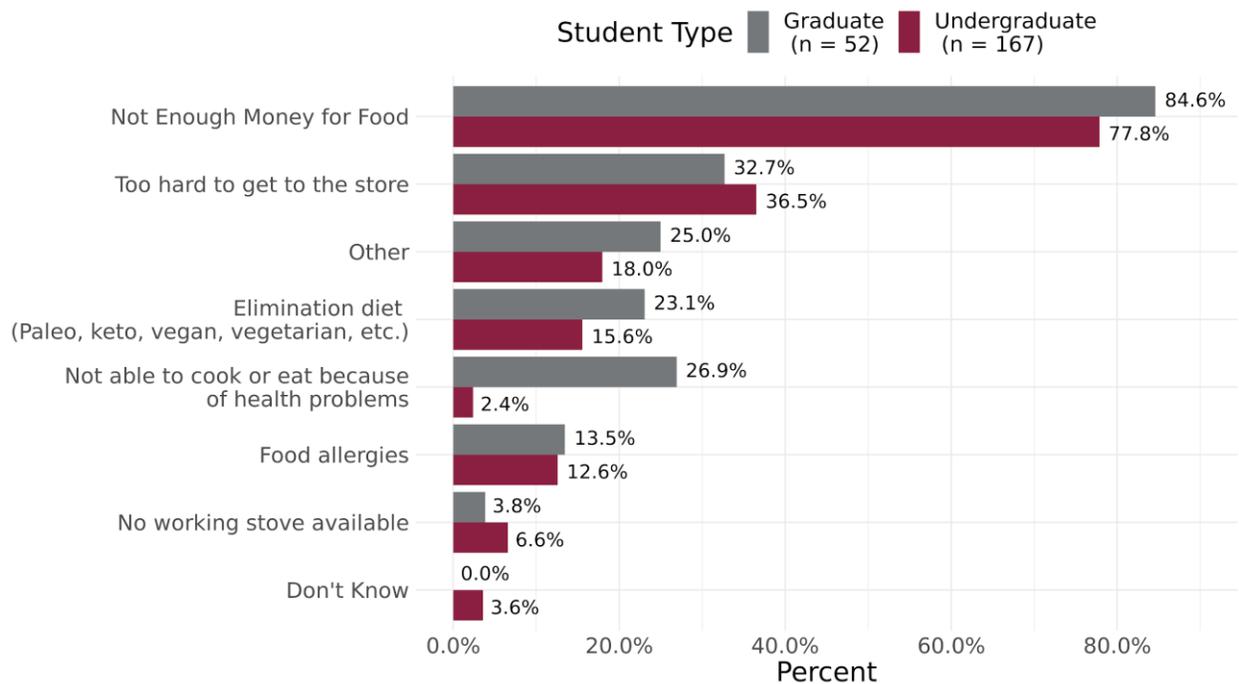
Figure 15. Barriers to Accessing Enough Foods

To understand how students deal with the cost of food in Blacksburg, all respondents were asked to indicate the various strategies they use to reduce food expenditure (Figure 16). A total of 2,891

respondents answered this question. The leading strategy is the use of a grocery store membership or a frequent use card for both graduate and undergraduate students (85% and 72%, respectively). Other leading strategies include purchasing sale items, avoiding purchasing expensive foods, and going to a grocery store where the food is cheaper.
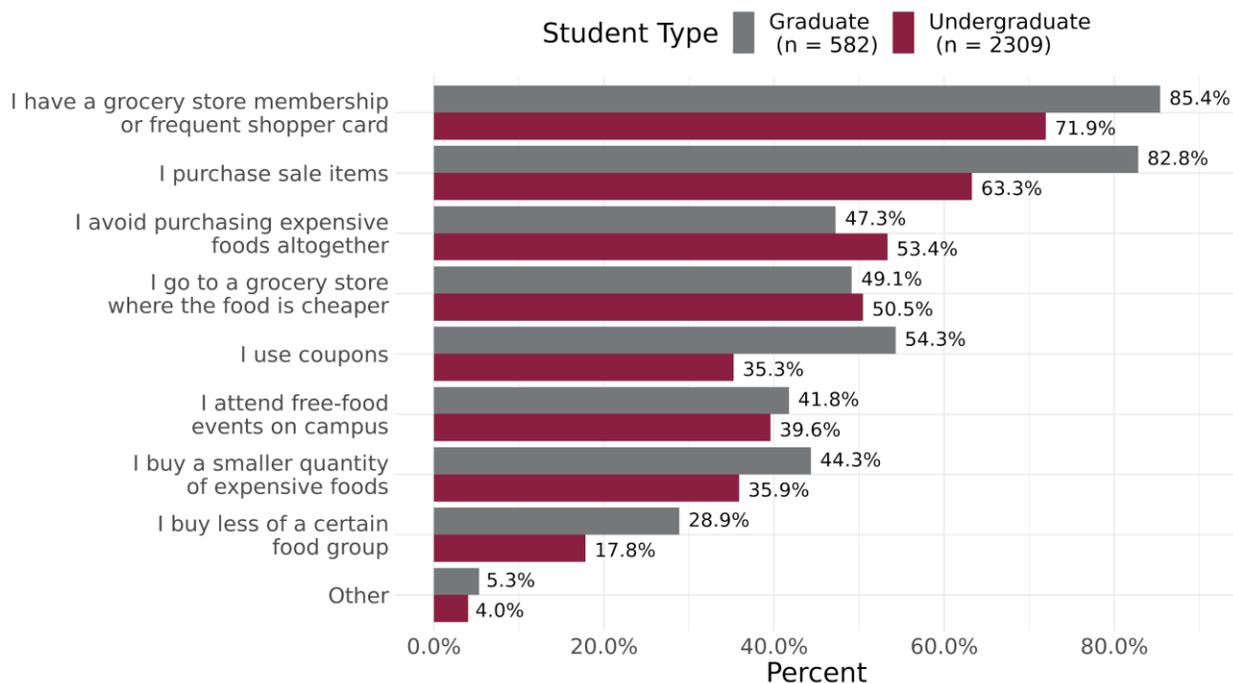

Figure 16. Food Expenditure Reduction Strategies

One strategy that 20% of students used was to buy less of a certain food group. When asked to specify what they bought less of, approximately 40% of undergraduate and 53% of graduate students indicated they reduced the amount of protein they purchased. The second most reduced food group was fresh produce (25% by undergraduate and 20% by graduate students). Another interesting observation was that undergraduate students reduced different categories of foods (i.e., organic food, healthy food, processed and prepared foods) more than graduate students. These findings emphasize that the types of food that students are able to afford needs to be included in the discussion alongside reduced or disrupted intake of food.

Students who reported that they *sometimes* or *often* did not have enough to eat in the past 12 months were also asked if they had received benefits from a range of food assistance programs to increase their access to food.[8] Of the 219 students who were asked this question, only 9% (n=20) reported receiving some form of assistance. Students who received assistance were exclusively of very low

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[8] These programs included emergency food (church, food pantry/bank, or emergency kitchen), WIC (Women, Infants, & Children Supplemental Nutrition Program), government-funded food programs (e.g., SNAP; food stamps), emergency assistance from the Dean of Students office, Medicaid or public health insurance, tax refunds (e.g., Earned Income Tax Credit), housing assistance, utility assistance, social security disability insurance, child care assistance, veteran's benefits, unemployment compensation/insurance, supplemental security income, and temporary assistance for families in need.

food security status. Students who had not received assistance were predominantly of low/very low food security status (90%) (Figure 17).
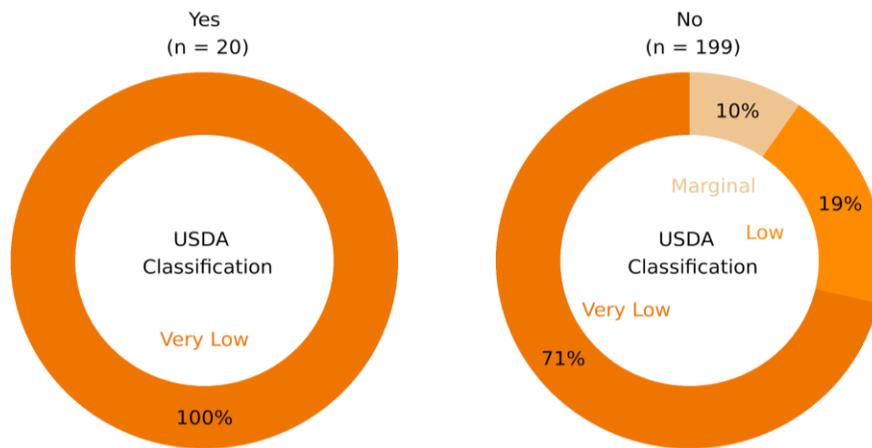
Figure 17. Students Receiving Assistance

When these respondents were asked why they had not used a food assistance program, the primary response was that they felt other people needed more assistance than they did (Figure 18). The next three most selected reasons were a lack of awareness about (1) whether they were eligible for a food assistance program, (2) what programs exist, and (3) whom to speak with about what resources are available. These findings are consistent with a recent GAO (2018) report that found a significant number of students who were eligible for the Supplemental Nutrition Assistance Program (SNAP) were not receiving benefits because they either did not know about the program or did not know how to navigate the SNAP application. Some respondents also reported they were worried about what people might think if they asked for assistance or felt uncomfortable reaching out to religiously affiliated food assistance programs.
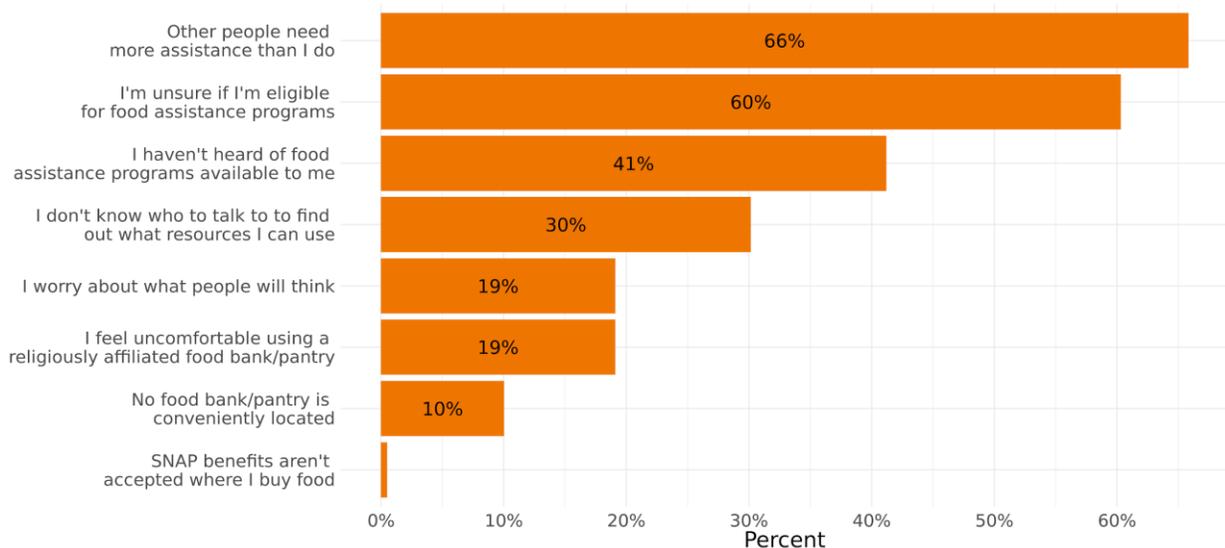
Figure 18. Reasons Why Students Who Reported Not Having Enough to Eat Did Not Seek Assistance

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Food Access Resources

A range of on- and off-campus services are available to assist students experiencing challenges when accessing food (see Appendix E).[9] The principal on-campus source for food assistance is Virginia Tech's Dean of Students Office (DOS), which offers emergency relief to students based on their specific needs. Students in need can be referred to or directly contact the DOS to explore their options and whether they are eligible to receive any financial assistance for food acquisition. Interestingly, a recent Virginia Tech Mental Health Task Force report (Wise et al. 2019) found comparable levels of students needing mental health services as students classified in this study as having low/very low food security. While there is no way to connect the data from the task force report and this study, there are some overlaps in the at-risk groups - e.g., low-income and minority students, students who live off campus, etc. Therefore, the Virginia Tech Cook Counseling Center should be a key partner in any coordinated response to improving food access for students in need.

There are two off-campus food pantries in the Blacksburg area. Since 2013, 209 Manna Ministries, a nonprofit, volunteer-based organization, has operated a food pantry specifically for Virginia Tech students, which has been endorsed by Virginia Tech's Division of Student Affairs. The food pantry is located on the edge of the Virginia Tech Campus in the Wesley Foundation building. A second food pantry located approximately one mile off campus is the Interfaith Food Pantry (IFP). The IFP serves anyone who has been screened by New River Community Action, Inc. (NRCA) as eligible for food assistance. To be eligible, a household's entire income must not be more than 200% of the federal poverty income guidelines. If a Virginia Tech student can prove they are eligible, they can obtain food assistance from IFP. Other food pantries are available in nearby counties, but students may need to live in or travel to these counties to access the services.

Virginia Tech also runs two off-campus food assistance partnerships, but these are not designed to serve students. The "Flex-Out-Hunger" program is a campus-community partnership sponsored by Virginia Tech Dining Services and the Virginia Tech Chapter of Sigma Phi Epsilon. This collaborative campus effort raised $34,619 in 2018 and has a target of raising $40,000 in 2019. The funds raised are directed to the Montgomery County Emergency Assistance Program (MCEAP) to feed hungry families in the local region. According to MCEAP, their office has been contacted by Virginia Tech students for food assistance. "Flex Out Hunger" also provides an opportunity for Virginia Tech students to donate the remaining balance of their dining plans at the end of the academic year. Dining services use these funds to purchase gift cards from local grocery stores and donates the gift cards to MCEAP who in turn purchases food for families in need. The second off-campus food assistance partnership is run by VT Engage. The Campus Kitchen program diverts unserved Virginia Tech dining services food to local food assistance relief agencies. Whether these redirected food resources are utilized by Virginia Tech students needing food assistance is unknown.

As mentioned above, the Virginia Tech Food Security and Access survey asked several questions about students' awareness and use of food assistance programs. The survey revealed that of the 199

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[9] A complete listing of programs that are available in the New River Valley (NRV) can be found in the NRV Thrive's 2019-2020 Food Assistance Directory (NRV Thrive 2019).

students who reported they *sometimes* or *often* did not have enough to eat in the past 12 months and *did not* report receiving assistance, 66% believed that others needed assistance more than they did. Sixty percent of students were unsure if they were eligible for food assistance programs while 41% were unaware of available assistance programs and 30% were uncertain who on campus to talk with about their food resource needs. Furthermore, thirty-eight students (19%) responded that they were uncomfortable utilizing a religiously affiliated food bank/pantry. Thirty-eight students (19%) also reported a degree of social stigma, that is, they would worry about what others think if they accessed food assistance on or off campus.

Despite the availability of campus food resources and external agencies' commitment to temporary hunger relief, utilizing such food emergency relief programs seldom eliminates food need as it relates to other systemic access issues, typically finances. This study reveals that students who potentially need food assistance may not know where to look for help, and administrative and/or social barriers related to existing on- and off-campus services may prevent students from seeking help even if they know it is available.

Next Steps

This study has found that students at Virginia Tech's Blacksburg campus have comparable levels of low/very low food security as students at other four-year colleges and universities in the United States. Since many academic institutions have been working to address low food security among their student body, there is now an emerging set of best practices and approaches that can inform actions at Virginia Tech. This section combines the recommendations and insights obtained from the key informant interviews with the results from the student survey and other studies, to provide a range of options that Virginia Tech can consider to increase food access and security among its students. Since this study focused on understanding the extent of the food access challenge at Virginia Tech, this final section is intended to inform future work focused on identifying sustainable systemic solutions at the institutional level to ensure all students are food secure.

❖ A Collective Responsibility

Multiple key informants spoke about Virginia Tech's collective responsibility to support all students who are offered admission, especially first generation, economically disadvantaged, and/or minority students. Virginia Tech's Principles of Community call for the need to "increase access and inclusion and to create a community that nurtures learning and growth for all of its members." It is therefore critical that the learning and growth of students experiencing hunger is understood and addressed so they have the support and services needed to thrive at Virginia Tech.

> *"I do think it's the University's responsibility to care for their students as long as they are enrolled in the student body. Yes, they are adults, but they are emerging adults. Part of that emergence is that you continue to provide care and service to them, which is our motto, that we serve others."* (Key informant)

❖ **Leverage Data to Target Solutions**

This study reveals there are groups of students who are disproportionately experiencing high levels of low/very low food security. A number of key informants recommended the university combine the results from this study with existing student data held by Virginia Tech to target food assistance services to those who may need them the most.

> *"So how do we use the information that we already have and that admissions uses … How do we use that for other purposes?"* (Key informant)

> *"If you have a student … that's on 100% Pell, why not say … here's some other resources that you could potentially access."* (Key informant)

The use of university data to create at-risk profiles for all incoming first-year students has been pioneered by Amarillo College's 'No Excuses Poverty Initiative' (Mangan and Schmalz 2019). The initiative uses its data to reach out to at-risk individuals before an emergency occurs. Given Virginia Tech's growth in the area of academic decision-support services, the data-analytics infrastructure for such a program may already be in place. Another lesson from Amarillo College's initiative is that students receiving support did not feel they deserved it. The majority of students at Virginia Tech who were experiencing hunger had the same sentiment, meaning that a targeted approach to identifying potential students in need is likely to be essential.

❖ **Create a First Generation and Low-Income Student Center**

While Virginia Tech supports first-generation students through the Office of Undergraduate Admissions, the Program for First-Generation Student Support, and the Graduate School's Mentoring Circle, several key informants recommended an office be created to centralize and coordinate support for first-generation and low-income undergraduate and graduate students.

> *"I think the first generation low income student center [would be …] a way to connect students, make them aware of resources, connect them to resources, [and] allow a place that students can go to where they're not outwardly identifying. [It needs to be …] discreet, manned by professional staff that are skilled and aware of these student needs."* (Key informant)

❖ **Subsidize Dining**

The most discussed idea among the key informants was the need to subsidize dining for students experiencing an immediate food access emergency and for students at risk of having food access problems. A clear theme was to ensure that the process is discrete, so there is no way to know whether a student is receiving assistance.

> *"If you want to give me a scholarship for everything else but then make me pay money for a meal plan when you know I can't afford it, that to me just doesn't sound right."* (Key informant)

> *"I just know that there are emergency support structures for students who are essentially in crisis. But … to my knowledge, there aren't a lot of resources for students with sustained need."* (Key informant)

Another concern was that low-income students who live on campus are required to have a dining plan that they may not be able to afford. One informant spoke about the need to *"either make it something that they can choose to have or provide financial aid for it."*

The most common recommendation was to provide a subsidized meal plan by either directly reducing the cost of food for students that qualify and/or expanding the scope of the existing Flex Out Hunger Program so that unused dining dollars can be donated to students as well as the Montgomery County Emergency Assistance Program (MCEAP).

❖ **Ensure Financial Aid/Assistance is Immediate, and Decisions are Free from Implicit Bias**

One key informant spoke of the need to leverage technology to develop a *"student-facing emergency food aid system,"* that ensures financial aid/assistance is received when needed. Such a system would transform what was considered to be a bureaucratic and face-to-face process of obtaining emergency financial assistance to one that is more immediate and removes any opportunity for implicit bias to impact decision-making. While such a transformation may raise concerns that emergency aid may be over-utilized, Goldrick-Rab et al. (2018, 36) argue that *"marketing language can create clear guidelines around who the resource is for, and what it looks like to use it appropriately."* Put differently, the risk that a limited amount of funding might be misused should not prevent the development of a system that could provide immediate financial assistance to someone in need. Goldrick-Rab et al. (2018) also stress the importance of celebrating a student's decision to seek help and making sure that services are universally accessible to students with disabilities and are staffed by people well trained in communicating across a wide range of differences in race, sexual orientation, religion, family status, etc.

❖ **Enhance Coordination**

All key informants spoke of the need to enhance coordination among those entities on and off campus who provide food assistance to students.

> *"I feel like we have everything we need to support these things, it's just about coordinating and being smart about how we do it."* (Key informant)

One recommendation is that Virginia Tech begins a series of conversations/workshops with stakeholders on and off campus, leveraging existing relationships between organizations such as The New River Valley Thrive program and VT Engage and the new Virginia Tech Center for Food Systems and Community Transformation. One key informant also spoke of the potential role that Virginia Cooperative Extension could play. *"We control the cooperative extension in our state, how do we pool some of those resources to provide … fruits and vegetables and healthy options at a low cost that are kind of outside of what we normally do?"*

In addition, engaging with and listening to the students was considered an essential aspect of any effort to better coordinate existing and develop new food assistance programs.

> *"I think students will probably be able to give you more and really interesting ideas about how you could change the current system, and how they're navigating that."* (Key informant)

While Goldrick-Rab et al. (2018, 36) stress the importance of engaging with students, they also caution that *"the work does not add to their considerable financial strains or render them more vulnerable—compensating them for their time and ensuring that they have a role in agenda-setting are key supports."*

It is also important to recognize that any initiatives developed by Virginia Tech should respond to the fluidity of students' food security status throughout the academic year and over their course of study (Fernandez, Webster, and Cornett 2019).

❖ **Ensure Students are Aware of Food Assistance Programs**

Making sure that students are aware of all the available food assistance services is critical, but relying on email and websites to do this is unlikely to be adequate. Amarillo College, mentioned previously, has taken a data-driven and predictive analytics approach to reaching at-risk students (Mangan and Schmalz 2019). The location of services also matters. Hiding services out of sight is unlikely to make them visible to students and does not promote a culture of care.

Several key informants also mentioned the critical role of academic advisors, who should be informed of all the available services and where to send students in need. In addition, faculty, staff, university libraries, custodians, and campus police also need to be aware of these services, given their direct interaction with students. One simple way to ensure that students know about existing services would be to include a link to them in course syllabi. Such an approach would also convey an important message that eating nutritious food is linked to a student's academic performance. Finally, including information about food assistance services in new and transfer student orientations and new faculty and staff orientations would help raise awareness of the services and reinforce Virginia Tech's collective responsibility to address the issue of food access and security.

❖ **Create a Campus Food Pantry**

In the Blacksburg area there are two food pantries that students could access. The Interfaith Food Pantry is located around one mile from campus and serves anyone in Blacksburg who has been screened by New River Community Action (NRCA) as being eligible for food assistance. The second pantry, 209 Manna Ministries, is located off the edge of campus and is focused on serving Virginia Tech students. Since neither of these pantries are run by Virginia Tech, a number of key informants recommended the university develop its own pantry in a central location that is universally accessible to students with disabilities. While 209 Manna Ministries is focused on serving Virginia Tech students, the student survey revealed that some students do not feel comfortable visiting a religiously-affiliated food pantry. Since all food assistance services provided by Virginia Tech need to be open to students from any race, sexual orientation, religion, language, nationality, family status, etc., the creation of a university-run food pantry deserves consideration. Clearly, any such development would need to occur in close collaboration with the existing food pantries.

❖ **Revisit the Campus Kitchen Program**

There was a recognition by several key informants that while the VT Engage Campus Kitchen program is providing an excellent service to local community members and partners, it is not serving students at Virginia Tech. If the university pursues the idea of establishing a food pantry, it could also consider connecting the pantry with the Campus Kitchen program so students in need have the option of eating a meal as well as obtaining food items. Any such development would need to be undertaken in close collaboration with Virginia Tech's Dining Services.

❖ **Provide Healthy Cooking and Eating and Life Skills Classes**

The student survey revealed that students in the low/very low food security group eat less fruits and vegetables, protein, and dairy products than students in the marginal/high food security group. While providing students with financial assistance to purchase food is critical, it is also important to ensure that the foods purchased and eaten are healthy. One key informant recommended the following idea that deserves consideration:

> *"I think if we had campus facilities where we could teach clusters of students, 10, 15 at a time, easy ways of cooking cheap nutritious food that doesn't require a lot of skill and a lot of specialty equipment, one pot meal kind of things, I think that that would be super popular."* (Key informant)

Other key informants spoke about the potential value of offering basic budgeting and life skills classes for students to learn how to manage their personal finances and plan their time at Virginia Tech.

❖ **Increase Graduate Student Stipends**

One challenge facing graduate students is that graduate stipends have not increased with the cost of living. One key informant stated:

> *"The reason that graduate students don't opt to live on campus is because housing is already more expensive on campus. Then you have the mandatory purchasing of a dining plan, and the cost of on-campus housing plus the mandatory dining plan together exceeds the … average graduate assistantship stipend."* (Key informant)

Since the university creates the price structure for on-campus services, consideration should be given to either changing these prices or increasing graduate stipends so on-campus living expenses could be covered, or both. Since offices, departments, and programs have flexibility in the amount of stipend they provide their students, information on what an appropriate on-campus living stipend is should also be communicated so informed decisions can be made about what to pay students.

❖ **Summary**

While the ideas presented in this section are not exhaustive, they do provide a useful starting point for developing a comprehensive response to the food access and equity challenges identified by this study. A clear first step would be to hold a series of conversations among those entities on and off campus who provide food assistance to students. This step should also consider ways to ensure that

students are aware of the available food assistance programs and look closely at how these programs might be improved.

Regardless of which actions are taken, we believe this report reveals our collective responsibility to ensure that no student at Virginia Tech goes hungry or is unable to access nutritious foods, and to create a community that nurtures learning and growth for all of its members.

Acknowledgements

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Appendix A: Survey Response Rate

A higher percentage of female undergraduate (13%) and graduate (17%) students responded to the survey than male undergraduate (6%) and graduate (7%) students. Around two thirds (63%) of all respondents were female. A higher percentage of undergraduates with a 3.5-4.0 GPA responded to the survey when compared with students with a lower GPA. While the College of Engineering (COE) - the largest college at Virginia Tech - had among the lowest response rates (8% for undergraduate and graduate students), it had by far the largest absolute number of student responses (698 undergraduates; 154 graduates). The response rate by college ranged from 7% to 20%. Around 8% of undergraduate students receiving a Pell grant responded to the survey. One fifth of undergraduate (22%) and graduate (23%) students who receive a loan from their parents responded to the survey. No data were collected on whether a student's parents were taking out a loan to cover the cost of their education.

Table A1: Comparison of Study Sample with Sample Population

Blacksburg-based students	Undergraduate Sample Percentage (sample / actual)	Graduate Sample Percentage (sample / actual)
Total Students	9% (2,441 / 27,758)	12% (589 / 4,946)
Male Students	6% (903 / 15,754)	7% (203 / 2,755)
Female Students	13% (1505 / 11,938)	17% (376 / 2,182)
In-State Students	9% (1793 / 19,714)	17% (328 / 1,897)
Out-of-State Students	7% (567 / 8,044)	5% (156 / 3,049)
International Students	4% (73 / 1,878)	6% (102 / 1,789)
GPA 3.5 - 4.0	16% (902 / 5,707)	14% (407 / 2,886)
GPA 3.0 - 3.49	10% (818 / 8,070)	12% (68 / 591)
GPA 2.5 - 2.99	7% (320 / 4,658)	15% (8 / 55)
GPA 0.0 - 2.49	5% (111 / 2215)	3% (2 / 66)
College of Agriculture and Life Sciences (CALS)	12% (307 / 2,646)	20% (79 / 401)
College of Architecture and Urban Studies (CAUS)	8% (160 / 1,959)	14% (43 / 310)
Pamplin College of Business (PCOB)	7% (305 / 4,562)	12% (18 / 152)
College of Engineering (COE)	8% (698 / 8,259)	8% (154 / 1,907)

College of Liberal Arts and Human Sciences (CLAHS)	10% (381 / 3,824)	15% (89 / 586)
College of Natural Resources and Environment (CNRE)	13% (130 / 991)	14% (22 / 158)
College of Science (COS)	9% (411 / 4,538)	12% (71 / 581)
Virginia-Maryland College of Veterinary Medicine (CVM)	-	14% (89 / 621)
InterCollege	4% (38 / 979)	0% (0 / 230)
Receiving a Scholarship	16% (930 / 5,808)	29% (121 / 413)
Receiving a Student Loan	9% (989 / 11,058)	18% (149 / 837)
Receiving a Parent Loan	22% (463 / 2,123)	23% (37 / 163)
Receiving a VT Assistantship/Stipend	17% (21 / 123)	11% (416 / 3,683)
Receiving a Pell Grant	8% (327 / 4,204)	Insufficient data
Receiving a Grant	10% (371 / 3,743)	Insufficient data
Freshmen students	11% (727 / 6,899)	-
Sophomore students	10% (570 / 5,766)	-
Junior students	8% (519 / 6,499)	-
Senior students	7% (607 / 8,516)	-

Note: All university data is from the Fall 2018 semester. The student data were obtained from the SPRIDEN and SGBSTDN databases at Virginia Tech. The financial aid data were obtained from the RFRBASE, RORSTAT, and RPRAWRD databases. The payroll data were obtained from the PYVPYFA and RJRPAYL databases. Not all student financial assistance/aid information is contained in the databases, so the financial assistance/aid percentages should be treated as a guide.

Appendix B: The USDA Food Security Instrument Questions

Question *(The number counts towards the metric)*	Response *(The blue text is an affirmative response)*
In the last 12 months, which of the statements best describes the food eaten by you or your household	"I have enough to eat and the kinds of food I want" "I have enough to eat but not always the kinds of food I want", "Sometimes I don't have enough to eat", "Often, I don't have enough to eat"
In the last 12 months, … [up to three points] I worried whether my food would run out before I got money to buy more (1) The food I bought didn't last and I didn't have money to buy more (1) I couldn't afford to eat balanced meals (1)	"Often true", "Sometimes true" "Never true", "Don't know"
In the last 12 months, … [up to two points] Did you ever eat less than you felt you should because there wasn't enough money for food? (1) Were you ever hungry but didn't eat because there wasn't enough money for food? (1) [CUT] Did you lose weight because there wasn't enough money for food? (1)	"Yes, almost every month" "Yes, some months but not every month" "Yes, only 1 or 2 months" "No", "Don't know"
In the last 12 months, … [up to four points] Did you ever cut the size of your meals, or skip meals because there wasn't enough money for food? (1 or 2) Did you or any other adults in your household (not including roommates) ever not eat for a whole day because there wasn't enough money for food? (1 or 2)	"Yes, almost every month" (2) "Yes, some months but not every month" (2) "Yes, only 1 or 2 months" (1) "No", "Don't know"

Appendix C: Diet Diversity Score Construction

Following the procedures laid out by the Food and Agriculture Organization of the UN, a portion of the VT Food Access and Security study was used to construct a diet diversity score (DDS) for each respondent. This score measures the quality of an individual's diet, specifically, the micronutrient adequacy. The score should be interpreted as a proxy for diet quality while also acknowledging that diets are complex and vary from day to day and week to week, especially among college students.

Students were asked to report if they had consumed at least one serving of foods in the following groups in the previous 24-hr period:

1. Starchy staples (bread, rice, potatoes, etc.)
2. Legumes and nuts (lentils, beans, peas, peanuts, etc.)
3. Dairy (milk, cheese, yogurt, etc.)
4. Organ meat (liver, kidney, gizzards)
5. Eggs (hen, fish, other)
6. Flesh foods or other small animal protein (beef, pork, lamb, veal, goat, poultry)
7. Fish (including shrimp/prawns)
8. Dark green leafy vegetables
9. Vitamin C rich fruits (strawberry, citrus, pineapple, mango, lychee, guava)
10. Red/orange/yellow fruits (mango, papaya, oranges, etc.)
11. Red/orange/yellow vegetables (sweet potato, pumpkin, carrots, peppers)
12. Vitamin C rich vegetables (broccoli, squash, cauliflower, tomatoes, green cabbage)
13. Other fruits and vegetables (turnips, bananas, apples)
14. Edible oil (including butter and margarine)
15. Condiments and spices
16. Miscellaneous (tea, soft drinks, juice, coffee)

The score is then calculated by aggregating food groups into nine categories. An individual scores one point for each category with reported consumption of an associated food group. The nine categories are:

1. Starchy staples (1)
2. Dark green leafy vegetables (8)
3. Vitamin A rich fruits and vegetables (10, 11)
4. Other fruits and vegetables (9, 12, 13)
5. Organ meat (4)
6. Meat and fish (6, 7)
7. Eggs (5)
8. Legumes, nuts, and seeds (2)
9. Milk and milk products (3)

Appendix D: Additional Figures
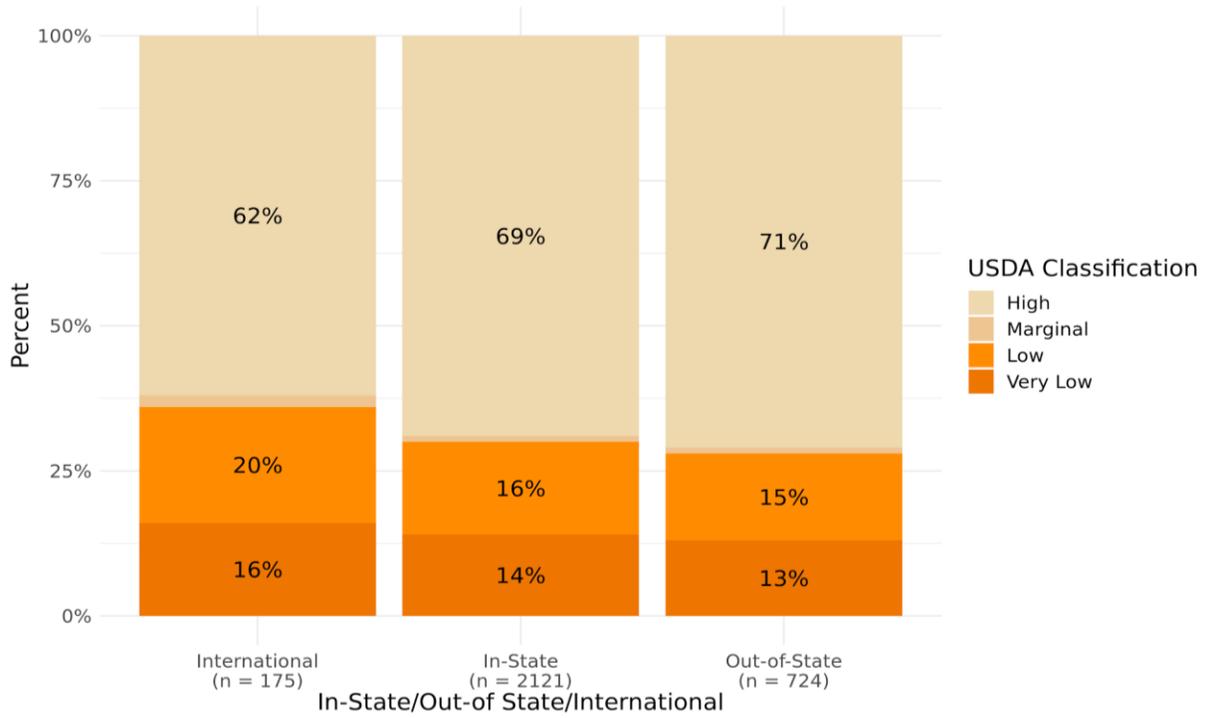
Figure D1: Food Security - In-State/Out-of-State/International
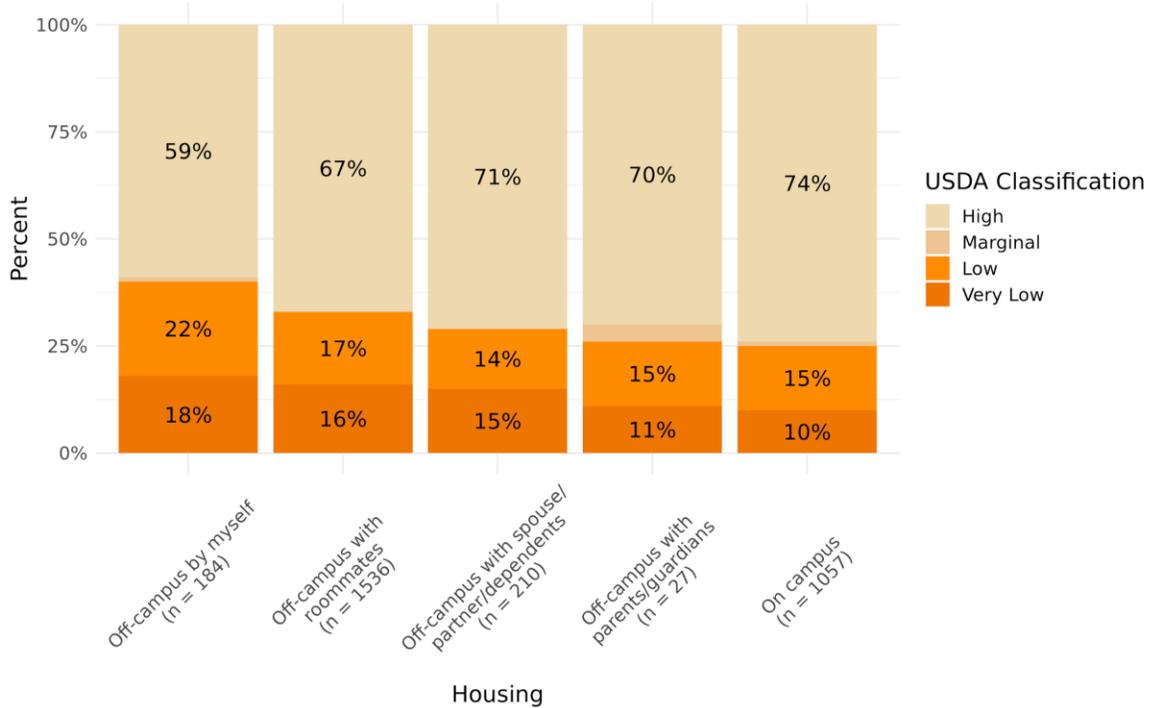
Figure D2: Food Security by Accommodation
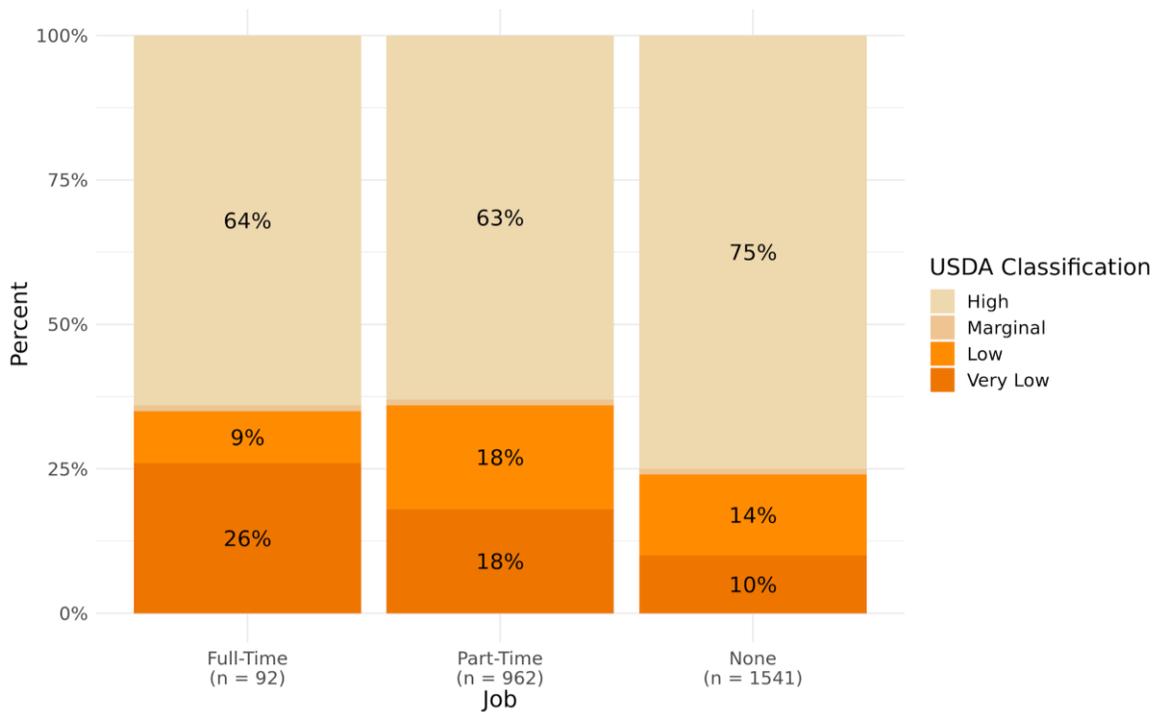
Figure D3: Food Security by Job
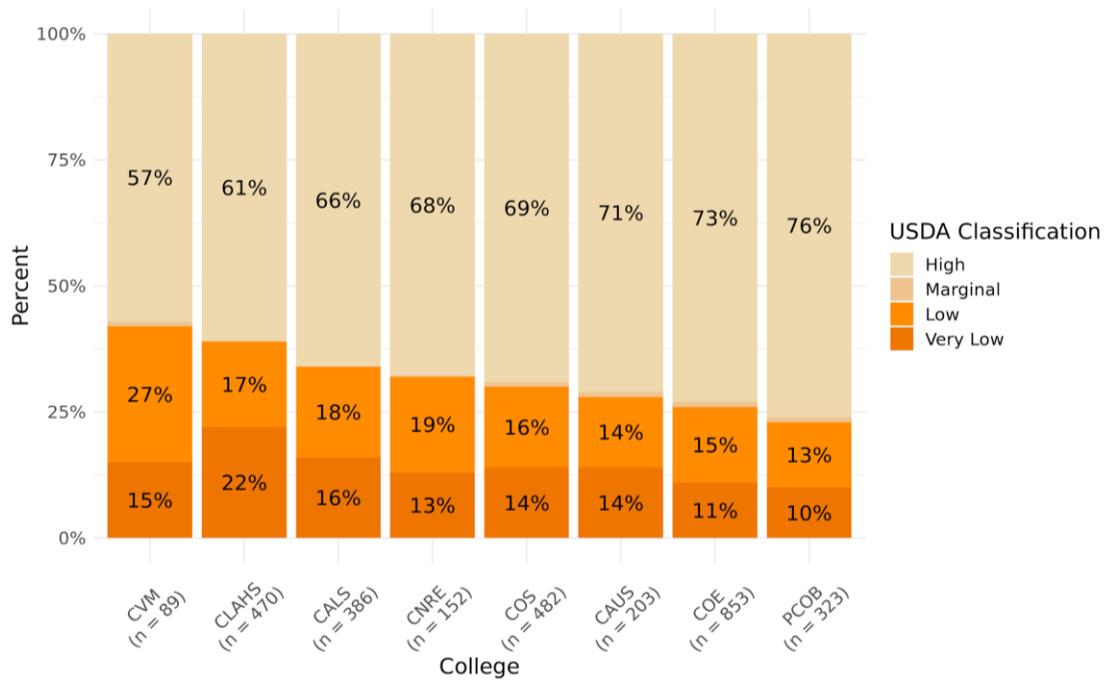
Figure D4: Food Security by College[10]

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[10] CVM = College of Veterinary Medicine, CLAHS = College of Liberal Arts and Human Sciences, CALS = College of Agriculture and Life Sciences, CNRE = College of Natural Resources and Environment, COS = College of Science, CAUS = College of Architecture and Urban Studies, COE = College of Engineering, and PCOB = Pamplin College of Business.
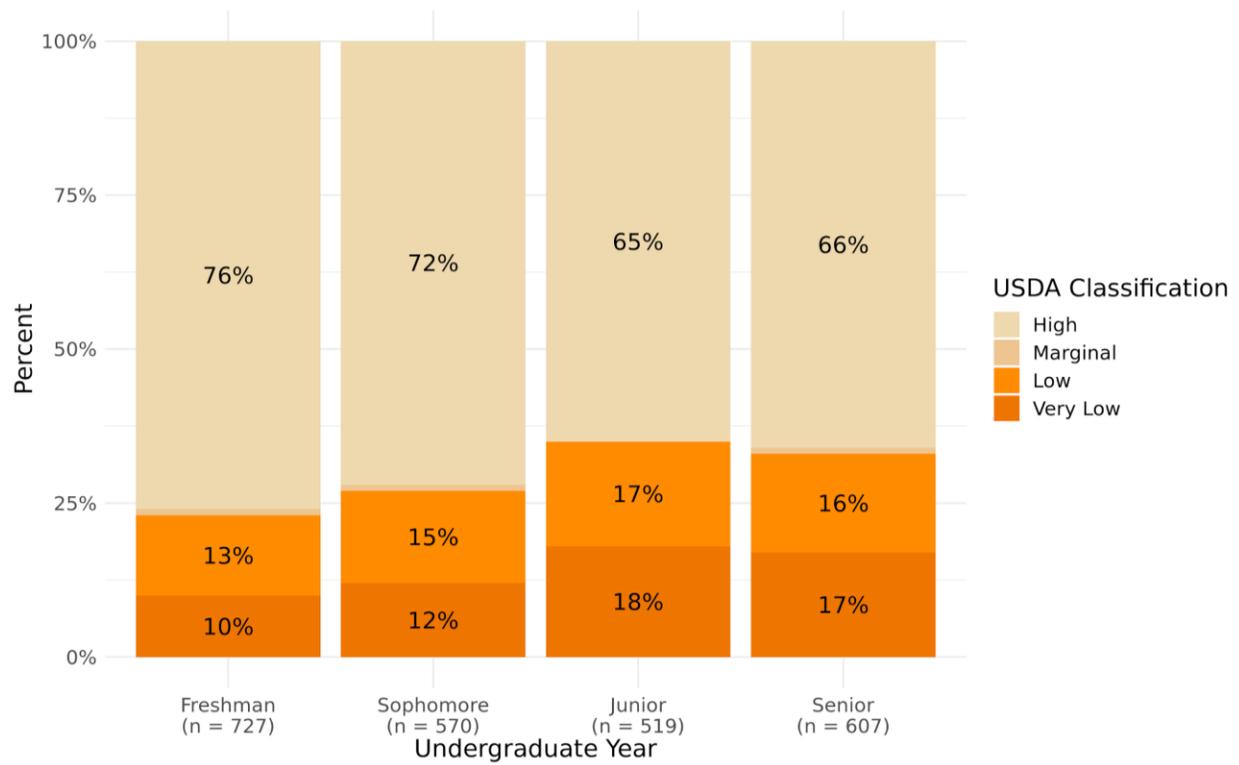
Figure D5: Food Security by Undergraduate Year

Appendix E: Food Assistance Resources

	Service	Serves Students?
VIRGINIA TECH RESOURCES		
VT's Dean Of Students (DOS) Office https://www.dos.vt.edu/	Students experiencing need can contact the DOS Office for review of their situation. Qualifying students can be given small emergency grants through this office.	Yes
VT's Cook Counseling Center https://www.ucc.vt.edu/	The Cook Counseling Center directs students to the DOS Office when food access issues are identified.	Yes
Student Food Justice Club https://gobblerconnect.vt.edu/organization/foodjustice	The Student Food Justice Club is run by students interested in responsible consumer behavior and food security on campus. The organization focuses on plant-based diets, food education, responsible consumer behavior, and food and environmental justice. No food assistance services are provided.	Yes
CAMPUS-OFF CAMPUS PARTNERSHIPS		
Flex Out Hunger Program	The Flex Out Hunger Program is a partnership between Virginia Tech's Sigma Phi Epsilon Chapter and Virginia Tech Dining Services. The program holds a fundraiser to collect extra dining dollars from students to donate to the Montgomery County Emergency Assistance Program (MCEAP). Dining Services then uses the donations to purchase gift cards from local grocery stores. The gift cards are then donated to MCEAP, which uses them to purchase food for local families in need.	No
VT Engage - Campus Kitchen https://www.engage.vt.edu/programs/campus_kitchen.html	Campus Kitchen is a VT Engage program that combats hunger and food waste by redirecting quality, unserved food from Virginia Tech Dining Services to area hunger relief agencies. The program has diverted over 132,377 pounds of quality, unserved food from campus dining halls to the community. In addition, Campus Kitchen works with food assistance relief agencies in the area to support their services.	No
SELECT OFF-CAMPUS RESOURCES		
209 Manna Ministries http://www.209mannaministries.org/	209 Manna Ministries is a nonprofit, volunteer-run food pantry that has been serving Virginia Tech students since the fall of 2013. The pantry is located	Yes

	Service	Serves Students?
	in the Wesley Foundation building on the corner of West Roanoke Street and Otey Street.	
New River Community Action (NRCA) Emergency Assistance Program (EAP) http://newrivercommunityaction.org/emergency-assistance-program/	The New River Community Action (NRCA) Emergency Assistance Program (EAP) offers a variety of temporary assistance for residents or transients who have an income that is not more than 200% of the federal poverty income guidelines and are experiencing financial crises. Households may receive food each month from an NRCA food pantry (see below).	If a student meets the eligibility requirements
The Interfaith Food Pantry http://newrivercommunityaction.org/IFP/	The Interfaith Food Pantry is a joint ministry of over twenty-five churches in Blacksburg of varying denominations that was established in 1987. The volunteer-run food pantry serves residents of Blacksburg and McCoy who have been screened by New River Community Action (NRCA) as being eligible for food assistance.	If a student meets the eligibility requirements
Food Access for Students https://www.gofundme.com/f/foodaccess4students foodaccess4students@gmail.com	Food Access for Students is a new student-run fundraising effort to improve food security among all students at Virginia Tech. The volunteer group provides prepaid grocery cards to referred students. All undergraduate, graduate, and professional students in need at all locations of Virginia Tech can apply for a prepaid grocery.	Yes
Radford-Fairlawn Daily Bread (RFDB) http://www.radfordfairlawndailybread.org/	The Radford-Fairlawn Daily Bread (RFDB) provides meals at no cost for people in need in Radford and Fairlawn, VA, through two programs: [1] Dining Room - where meals are provided at a facility in Radford; and [2] Meals on Wheels - where meals are provided for homebound individuals.	Yes, if they live in Radford or Fairlawn, VA
Giving Tree Food Pantry http://www.thegivingtreefoodpantry.org/	The Giving Tree Food Pantry is a Christiansburg Mennonite Fellowship, nonprofit, volunteer food pantry that serves families in the New River Valley. No patrons need to prove their need for food assistance.	Yes, if they live in Christiansburg, VA
Plenty! Farm and Food Bank https://plentylocal.org/food-bank/	The Plenty! food pantry serves families in Floyd, VA. Families can visit the food pantry once a week to pick up staples and, when available, fresh produce, eggs, or meat. No patrons need to prove their need for food assistance.	Yes, if they live in Floyd, VA
Hale Community Garden https://blacksburgcommunitygardens.com/	The Hale Community Garden is a five-acre site located in Blacksburg that has 70 garden plots, a solar greenhouse, beehives, food forest project, small apple orchard, asparagus patch, herb garden,	Yes

	Service	Serves Students?
	and flowers. Any resident in Blacksburg can apply to rent a plot.	
RESOURCE REFERRAL SERVICES		
The NRV Food Assistance Directory 2019-2020 https://cfnrv.org/partnerships-initiatives/fund-for-the-nrv/thrive/	The NRV Food Assistance Directory provides information on over 40 food assistance services available regionally and in Floyd, Giles, Montgomery, Pulaski, and Radford counties.	Indirectly
211 Get Connected – Get Answers www.211virginia.org/	211 Get Connected – Get Answers is a database of health and human services in Virginia. 2-1-1 connects people with free information on available community services, including food access.	Indirectly
Feeding America SWVA https://www.faswva.org/	Feeding America SWVA is a regional food bank providing free and discounted food in bulk to its partner food assistance relief organizations.	Indirectly