

# **Food Insecurity among Rowan University Undergraduate Students**

by the

**“Student Hunger On Campus” (SHOC) Research Team**

Rebecca Hall, Student, Health and Exercise Science  
Sean Hendricks, Director of Academic Transition and Support Programs  
Qian Jia, Assistant Professor, Nutrition (Immaculata University)  
Sandra Ludewig, Health and Exercise Science Student Alumna  
Penny McPherson-Myers, AVP for Diversity and Organizational Effectiveness  
Kevin Rescigno, Nutrition Student, Health and Exercise Science  
Nicole Vaughn, Assistant Professor, Health and Exercise Science  
Robert R. Weaver, Professor, Health and Exercise Science  
Shari Willis, Associate Professor, Health and Exercise Science

April, 2018

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## EXECUTIVE SUMMARY

*"It's become almost a badge of honor to wear, just like not sleeping is seen as a good trait of strength in a college student. We all need to eat, we need nutrition, we are human. Not taking care of ourselves and stringing ourselves thin to make ends meet is not honorable - it's a sign that something is wrong and needs to change. Malnourished people do not make good workers nor do they make happy people. This is a crisis and tests our morality and humanity. No one deserves to starve in the attempt to get an education, no one deserves to starve ever."* [21 year-old female, senior]

*"Institutions often reflect the inequities present in society. We hope ours does not merely reproduce them."*  
[SHOC research team]

According to our online survey of Rowan University undergraduate students distributed in November, 2017 nearly **one in two** (48%) students is considered to be "food insecure". This means, for instance, that every other student reduces portion sizes so food will last longer, skips meals, or will not eat for an entire day or days because they cannot afford food.

While about half of all students are food insecure, the prevalence in some groups is considerably higher than in others. In view of broader inequities in society it is unsurprising that it affects students from African American and Hispanic backgrounds more than Whites, and "first-generation" college students more than students whose parents attended college.

Apart from collecting numbers of who is and is not food insecure, our survey captured students' points of view on the issue of food insecurity, inquiring about what it *means* to them to be food insecure – e.g., "It sucks being hungry", as one 20 year-old junior male succinctly put it. Students were candid in expressing their views. While the numbers show that roughly 3 in 10 students considered whether to purchase of food versus books and school supplies, for at least one student this meant that "I would just buy more pasta since it's a dollar a box and I just cut my meal rations and drank more water" [22 year-old male, junior]. Hearing directly from students adds a dimension to our understanding of the issue not fully conveyed by the numbers alone.

### Highlights

1. About one in two (48%) Rowan undergraduate students experiences food insecurity; almost one in three (31%) score "very low" on the USDA food security measure;
2. Almost one in ten students reported that they "did not eat for a whole day" because money was short, some several times over the last 30 days;
3. African Americans and Hispanics are over 70% more likely to be food insecure than non-Hispanic Whites, and over twice as likely to be **very** food insecure.
4. 55% of food insecure students report having to choose between buying food or paying for educational supplies such as books; two of three students who are **very** food insecure face this choice;
5. Food insecurity significantly relates to GPA – the mean GPA for the most food secure students is 3.43 compared to 2.91 for the least food secure.

This Report summarizes data from our survey, and the survey offers summary indicators of underlying realities that many students endure. We hope it begins a wider discussion of the issue of student food insecurity at Rowan University, along with ideas to help address it. We invite all readers to engage.

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Weaver RR, McPherson-Myers P, Hendricks S, Vaughn N, Willis S, Jia Q, Rescigno K, Ludewig S, Hall, R.. *Food Insecurity among Rowan University Undergraduate Students*. Student Hunger on Campus (SHOC) Research Team. Glassboro, NJ: Rowan University, 2018.



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### Acknowledgments

We wish to acknowledge several people who helped make this project more successful than it would otherwise have been. Jeffrey Lenz, our contact in the Office of Research Compliance, smoothed the often tedious process of navigating ethics review by reliably and patiently receiving and answering our many questions. June Ragone, from the Office of IRT coached us in identifying information that was available and useful for this project, providing that information, and administering the delivery of our survey to respondents. Finally, Rbrey Singleton and Lauren Bitzer from Student Government were invaluable in drumming up student support for student participation in the survey. They also orchestrated the development of “SHOCHunger” t-shirts used to advertise and incentivize response to the survey.

# THE SHOC STUDY: Food Insecurity among Rowan Undergraduate Students

## Background of the SHOC survey

The Student Hunger on Campus (“SHOC”) survey was distributed during November, 2017 to the population of Rowan University undergraduate students 18 years of age or older (n=13,897). Some 2,055 (15%) responded. Rowan’s Information Resources & Technology office provided information about the undergraduate population, enabling us to determine the extent to which sample statistics reflect population parameters with respect to: age, GPA, gender, class standing, commuter status, full-time/part-time status, college and school affiliation, and mothers’ and fathers’ education. Appendix A compares the sample and population and concludes that the differences between the two are minor and that we can safely extrapolate findings from the sample to the larger undergraduate population. Our analyses takes advantage of the significant number of respondents, and the SHOC team is confident that the outcomes reported largely reflect the real status of food security among population of Rowan University undergraduates.

**Food security (FS) defined and assessed.** While food security is variously defined, the USDA captures the central notion:

*“Access by all people at all times to enough food for an active, healthy life. Food security includes at a minimum: (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)”* (USDA, Guide 2000: 6).

Food security exists on a continuum that ranges from very low to high, and may divide into four groups:

1. **High food security:** no reported indications of food-access problems or limitations.
2. **Marginal food security:** one or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake.
3. **Low food security:** reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake.
4. **Very low food security:** Reports of multiple indications of disrupted eating patterns and reduced food intake.

Groups 1 and 2 are considered food *secure*, whereas groups 3 and 4 are considered food *insecure*. We initially used the USDA’s Six-Item Short Form (USDA, 2012) to assess the extent of students’ food security (FS), but adopted a more robust measure that incorporated nine items from the USDA survey (USDA, 2017). Indications of food insecurity include affirmative responses to questions about whether, for instance, a respondent reduced meal portions, skipped meals, could not afford balanced meals, or went hungry due to lack of monetary resources. The nine items produce a FS raw score ranging from 0 to 9. Affirmative responses to these questions would suggest higher levels of food insecurity (see Appendix B for specifics on constructing FS scores and FS categories).

## Food security and insecurity at Rowan University

*“Not being able to feed yourself is terrifying.”* [28 year-old female, junior]

Table 1 shows the assessment of students’ food security based on affirmative responses to nine food security questions. The numbers are alarming -- almost half (48%) the students experience food insecurity, and over 3 in 10 score “very low” on the food security measure, often missing meals, cutting portions, and sometimes

not eating for an entire day. Students who are very food insecure face disrupted eating patterns and reduced intake due to money shortages.

**Table 1: Food Insecurity among Rowan University students\***

Food Security	Percent	Frequency
High	34.8	532
Marginal	17.2	263
<b>Low</b>	<b>17.1</b>	262
<b>Very low</b>	<b>30.9</b>	472
<b>Total</b>	100.0	1529

\* **NOTE:** The 526 missing values resulted from non-responses to one or more of the six items used to construct the FS score.

These figures correspond with other data we collected on student food insecurity. Half of the respondents indicate that they know other students who struggle to afford basic food needs; 14% acquired food from the café for a friend “specifically because they could not afford to have a meal”. Writes a 20 year-old female junior: “I have had friends who cannot afford to add the meal plan onto their tuition payment plans, and they have to rummage for food throughout the week. I think that this ultimately has a negative effect on students, causing stress and eventually affecting academic success.” A 20 year-old male sophomore remarked: “One of my close friends is affected by this. She has trouble with money and was recently debating on whether or not she needed to drop out of school just so that she could afford basic necessities.” Half the students report that they often or sometimes must borrow from family members to help satisfy basic needs. Over one in four report having to borrow money for food from friends, despite potential embarrassment, status deprivation, or loss of social capital associated with borrowing money. About 1 in 10 students reported that they “did not eat for a whole day” because money was short, some several times over the last 30 days. A 19 year-old female sophomore attributes her weight loss to food insecurity: “...I have lost over 20 pounds because I haven't been able to eat since the start of the semester. Sometimes I skip meals so that my roommate can eat or so I can pay for school books or rides to work.”

### **Some are more likely to be food insecure than others**

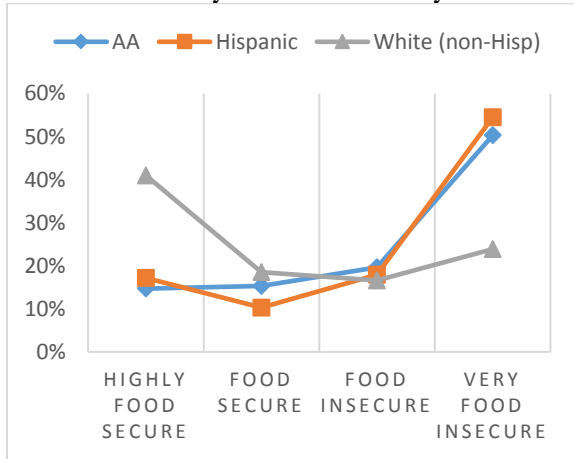
*“My best friend struggles with meals because she feels this is something she can forgo when money is tight. It breaks my heart for her to tell me she's hungry.” [21 year-old male, senior]*

On average, one of two students we see entering the campus Student Center will be food insecure. While any student may have skipped a meal or two yesterday due a money shortage, chances are higher for some than for others. The male student registering for class might have “had sleep for dinner”, but his female counterpart is more likely to have dreamt her hunger away. While the White student lounging in the Science Building might have chugged water for lunch, if she is African American or Hispanic the chance she did is over 50% higher. A classroom of juniors or seniors will have more food insecure students, on average, than one of freshman and sophomores who are more likely to carry meal plans that allow for a regular and varied diet. Charts 1-6 show how more or less likely various students are to be food insecure.

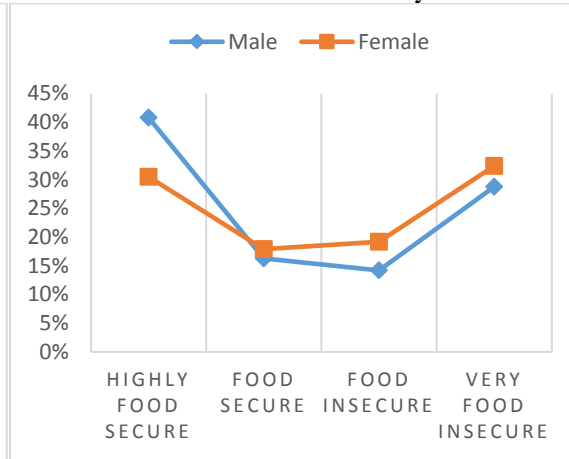
Chart 1 shows a discrepancy in food insecurity for African Americans (AA) and Hispanics on the one hand, and non-Hispanic Whites on the other: more non-Hispanic Whites are “highly food secure”, whereas as a

higher portion of African Americans and Hispanics are “very food *in*secure”. This implies that the lines cross somewhere in the middle. The left- and right-most categories in the charts best depict the discrepancies.

**Chart 1: Ethnicity and food security**

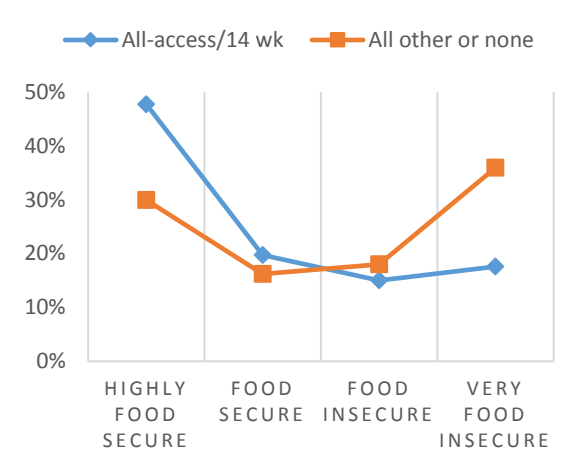


**Chart 2: Gender and food security**

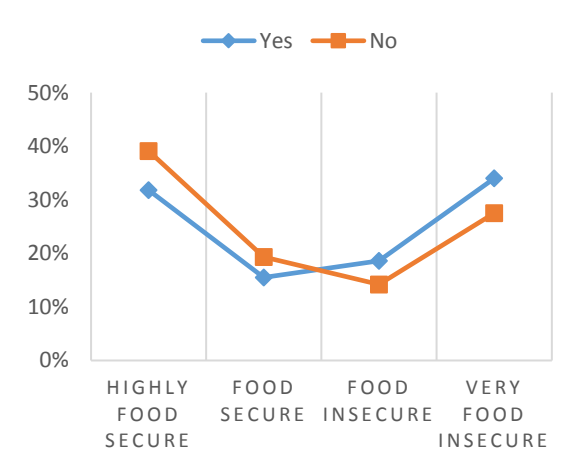


Charts 2 through 6 display a similar pattern, some less pronounced, for other student attributes. Women (chart 2), those without significant meal plans (chart 3), who are employed (chart 4), who receive financial assistance of some sort (chart 5), or whose parents never attended college (chart 6) all show similar patterns of food insecurity.

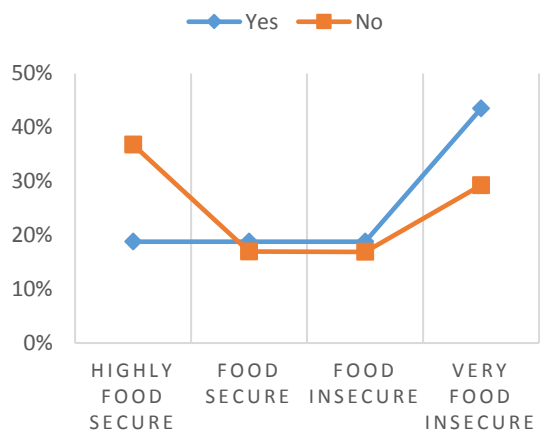
**Chart 3: All-access or 14/week meal plan and Food security**



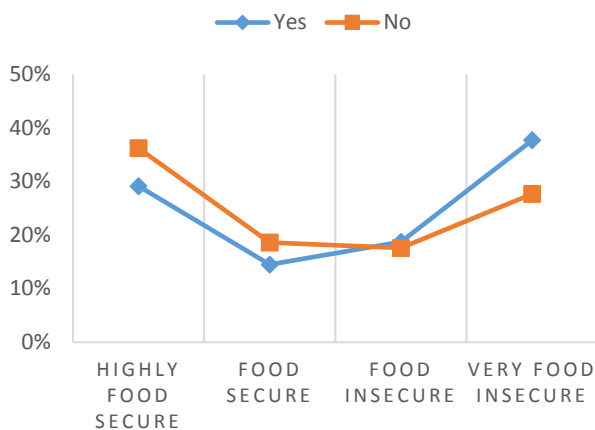
**Chart 4: Employed and food security**



**Chart 5: Receives financial assistance and food security**



**Chart 6: First-generation university student<sup>1</sup> and food security**



Appendix C provides the percentages associated with each attribute in a table, along with a prevalence ratio – a summary figure that compares the frequency of food insecurity among various groups.

### Adapting to food insecurity

*“You’ll often hear the term, ‘eating sleep for dinner’, or you’ll hear about chugging water to feel full temporarily. It works until you can eat again.” [22 year-old female, senior]*

The survey posed several questions associated with how students access food. About half (52%) report possessing a Rowan meal plan of some sort during the Fall 2017 term. Of the plans available only the “all-access” and “any 14” meal plans significantly affected food insecurity -- those holding such plans are more food secure – but just 23% of undergraduates carry either. The majority possess either no meal plan or hold plans that have limited impact on food security. Moreover, of those who possess “all-access” or “any-14” meal plans, 78.5% are freshman or sophomores. This helps us understand why juniors and seniors tend to be more food insecure (see Appendix C, Charts 8 and 9).

What other options are available to food insecure students? Only a few (5%) know about and use the University’s SHOP food pantry. Instead, most borrow money, use credit cards, take food from the café, or attend events that offer food (Table 2). On a routine basis these strategies are unsustainable and are likely used only when the need is great. Although almost half of the food insecure students report that they borrow money from friends, doing so with any regularity diminishes one’s relative standing and honor among them: “...many students who struggle with hunger are ashamed to admit it to friends or classmates” [19 year-old male, junior]. Borrowing from family is more common, but the request means the family’s additional sacrifice. As discussed below, the least costly way to access healthy meals may require purchases from the grocer and the skills and facilities to prepare them. For many, this is impractical.

<sup>1</sup> First-Generation students are students where both parents were listed as having a high school degree or less. If one or both parents were identified as “college or beyond”, then the student was listed as “not First Generation”.



**Table 2: Strategies used to access food by food insecure and very food insecure students**

Food-seeking behaviors “due to lack of money” for food insecure students	Food insecure	Very food insecure
Borrowed money from family	70%	72%
Borrowed money from a friend	46%	51%
Used credit card to pay for food	51%	56%
Taken food from cafe for later	48%	54%
Attended event because of food	59%	62%
Received food from SHOP pantry	12%%	16%

### Obstacles to healthy eating

*“I ate Burger King almost every day once a day as my meal last semester because they have a dollar menu and 20% off for students.” [21 year old male, senior]*

Hungry students receive the same messages we all do about the importance of balanced meals for maintaining energy, mental health, and overall well-being. Yet when pacifying hunger becomes the priority, consuming foods that fortifies the body and mind becomes secondary. Affordability was the major obstacle to eating healthy foods students reported: “If you don't have a meal swipe, then meals are very expensive on campus. Junk food tends to be cheaper and more filling. I feel gross when eating it, but I tend to only eat one meal a day on some days so I need to go for the most bang for my buck.” [21 year-old female, senior].

Factors other than affordability come into play, however. The student’s daily routine is less routine than that characterized by the typical “9:00 to 5:00” workday sandwiched between breakfast and dinner, with a lunchbreak in the middle. Class schedules vary from one day to the next, and the workload of each course ebbs and flows over the term. The student often studies well into the evening and on some days may socialize into the early morning. Part- or full-time work, commuting, and family responsibilities complicate schedules for many as well -- just over half the students reported being employed during the Fall, and one quarter work 20 hours a week or more. Mostly students “eat when they can” which typically means purchasing something in a rush to satisfy hunger rather than nutritional needs. “Cheap and fast is what most college kids go for so a lot of us will go to unhealthy fast food chains instead of making a budget and finding the cheap healthy foods at the grocery store” [21 year-old female, junior]. “Between studying and classes it’s usually easier to just eat something quick to be able to fit everything in one day rather than make sure I got all of my nutrition” [21 year-old male, senior].

Planning, preparing, and packing healthy meals challenges the dorm-living and apartment-dwelling student alike. Even students with the time, money, and transportation to enable the purchase of produce and other wholesome groceries often lack the knowledge and skill required to efficiently plan, prepare, and package daily meals. Moreover, food storage for a long day on campus is difficult without refrigeration, and warming food is impossible without a microwave. “I commute and I try to bring food from home if possible, but not everything travels well, and I don't have a place for food storage on campus.” [26 year-old male, senior] A 22 year-old male senior remarked: “As far of my knowledge there is not a place where I can heat my homemade food and, as a result, I can't take my food to school during the long days of classes.”

## The impact of food insecurity

*“There are many requirements for classes, such as expensive textbooks.*

*If you do not have the textbook for homework, you will fall behind and your grade will drop” [21 year-old female, senior].*

*“It’s bad enough that I am \$20k in debt already so it would be no surprise to me if there were other students who have had to choose between eating a meal or buying class supplies” [18 year-old female, freshman].*

**Trade-offs: School Supplies or Food?** Students defer university tuition payment and fees well into their future, but the costs of school do not end there. The textbooks and other supplies required to perform well represent a major additional expense incurred. Among food insecure students, 55% reported having to choose between food and paying for educational expenses during the past semester. As one 22 year-old male junior learned, grades can suffer if you choose food over supplies: “I’ve had to buy groceries over buying textbooks which caused me to get the textbook later than needed which caused my grade in that class to go down.” In many cases, however, students choose to go without food: “I’m already paying thousands for school and if a book is required for a class I must get that book over food” [20 year-old male, sophomore]. As one 21 year-old male freshman put it: “If I have to buy a textbook or buy food I choose school because that’s why I’m here.” Many others share that notion.

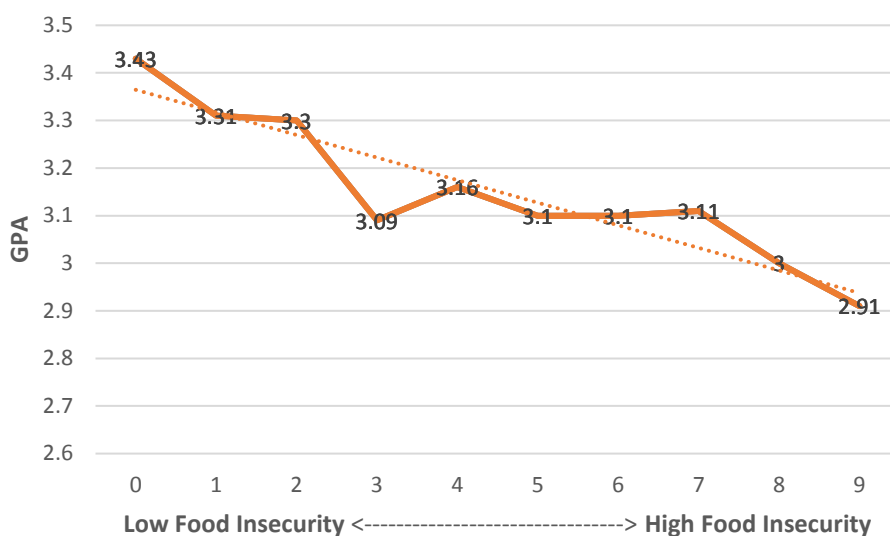
The beginning of each term when the costs of textbooks, rent, and other supplies come due is particularly challenging for food insecure students. This may be a time when students have “sleep for dinner”: “The first week of the semester is usually the hardest financially, because of all the books for classes, writes a 23 year-old male senior. “One class had a \$120 textbook that I just never got, because I had to stay afloat with credit card bills, rent and utilities, and groceries. If I absolutely have to buy or rent a textbook, I’ll usually just have sleep for dinner.” Although the start of the term may be difficult, the ill-effects of food insecurity may be problematic throughout: “more often I always find myself starving in classes and outside to study and this takes away all my energy to cook healthy food for myself, or starve for the day and binge cheap junk food, if I can even afford it” [20 year-old male, sophomore].

While for many respondents the choice to purchase school supplies over food was straightforward, some hedged, arguing that often an expensive textbook is “required” for a course, but seldom, if ever, actually used: “Books are ridiculously expensive and half of the professors who require it don’t even use it. Books average \$150” [20 year-old female, junior]. Hence, some “skip” the purchase of textbooks, figuring that attending classes will be enough to pass the course: “That’s around \$400 I can use to help make living easier” [21 year-old male, senior]. Some simply purchase the necessary supplies, and make due on a very inexpensive diet: “I will eat packs of noodles and use the money for educational expenses” [23 year-old female, senior].

**Health and Performance.** When faced with a choice between purchasing food or the books and supplies required for classes, many choose “education over food.” But foregoing a diet required to rejuvenate the body and mind takes a toll on the physical and cognitive energy students must muster to remain attentive in classes, focus on their studies, and perform well on exams. “It certainly makes it very hard to focus when you feel like you’re about to pass out” [21 year-old male, sophomore]. A 27 year-old female junior writes: “Being hungry while trying to take a test or sit in class is very hard.” Ultimately, this affects grades.

Students who sacrifice nutritious food just to purchase educational supplies pay a price in terms of the energy and focus needed for the extensive study that underpins academic achievement. Such effects become manifest in the GPA scores associated with food insecurity (Chart 8). From the most to least food secure the average GPA declines from 3.43 to 2.91.

**Chart 7: GPA and Food Security Score\***



**\*NOTE:** Spearman Rho between GPA and FS score is  $-.260$ ,  $p < .000$ .

Food insecurity stems from other factors that likely affect GPA as well, so one should take care about imputing causality here. Nonetheless, food insecurity signals a number of financial and other resource challenges food insecure students face. These challenges likely re-direct students' efforts away from the academic activities that are the primary reason any student matriculates. But there are direct effects too, as suggested by the trade-offs students make to afford university, and the challenges being hungry pose to studying, concentration, and exam performance. Students understand that higher education offers a chance for upward mobility, but success at the university is additionally challenging for those who struggle financially: "Honestly it's exhausting. And you want to do well in school but your brain just clocks out, and your stomach hurts, and it's just this whole catch-22 where if you're hungry you can't do well, and if you can't do well, you can't earn money, and if you can't earn money you can't eat. It just feels like I'm trapped" [33 year-old female, senior].

### **Implications and recommendations**

*It's a struggle that is hard to describe...There has to be a change to that because it is hard to survive with the food struggle."* [21 year-old male junior]

While more and more students with various means seek to achieve the successes that universities promise, more and more face difficulties affording basics required for such achievement. It is not a *scarcity* of food that underlies food insecurity – clearly there is plenty to go around. Rather, how food is produced and *distributed* lies at the heart of the food insecurity problem. Economic inequalities have risen virtually unabated for several decades, as reflected in the distribution of choices available to people across society. And while tackling these broader structural disparities is necessary for lasting solutions, we suggest some modest strategies that might provide immediate relief to Rowan University students to enhance their prospects of success. While bandages won't repair the problem, they can at least stop some of the bleeding.

**Consult the "Profcents" resource library:** Rowan University's *Affordability Task Force* has developed a "Profcents" website designed to help students navigate certain financial choices they face Rowan. It includes

information regarding food, housing, health, legal, transportation, and more. The link to the webpage can be found here: <https://www.rowan.edu/home/profcents>.

**Instructors should be aware of the expenses a class requires.** We all know that textbooks are expensive, and some classes require additional supplies. The average estimated cost of books and supplies for full-time students attending four-year public institutions has reached \$2,100 (Baum and Ma, 2014). While most instructors are aware that instructional materials are not cheap, they may not fully appreciate the burden the costs place on many students. There are ways to lighten this burden:

- **Where possible, use older editions.** Often, newer editions cover essentially the same material as older ones, but at a much higher cost. Most instructors are mindful of many of these costs associated with textbooks and supplies, but much less aware of what the higher costs mean with respect to food trade-offs many students must make. Insofar as older textbook editions are available and their content effectively up-to-date, instructors might consider assigning the less expensive version.
- **Place one or more copies on reserve.** One or more textbook should be placed on reserve in the library as an alternative for students otherwise unable to afford them.
- **When not needed, don't assign.** Textbooks remain the standard “go-to” resource used in the university classroom, yet there are cases where they are required but rarely used. Obviously, where expensive textbooks are not essential to the success of a class, instructors should consider assigning alternative information resources available in abundance online and in the library.
- **Consider applying for a TAP grant.** Rowan University's Affordability Task Force is issuing five \$2,000 grants to faculty members seeking to redesign their teaching with the use of library, free, and open resources that would lower the cost of course materials for Rowan students. This plan could save students thousands of dollars during their tenure at Rowan.
- **Add a syllabus statement about available resources:** Consider adding the following statement about resources available to students: “Rowan University students who face difficulties obtaining adequate food or housing are encouraged to visit the “Profcents” website containing numerous academic and financial resources available to Rowan students: (<https://www.rowan.edu/home/profcents>). Additionally, feel free to contact the *University Advising Center* regarding any financially related questions.

**SGA and specific student organizations should take the lead in organizing the following initiatives.**

Student government possesses the resources, energy, and motivation to organize and lead activities oriented toward providing some relief to food insecure students. Here are some ideas:

- **Make available “snack boxes”, particularly at the beginning of each term when major school expenses come due.** Many students must choose between purchasing decent food *and* the school supplies required at the start of each term. Providing snacks – e.g., granola bars, nuts, fruits, popcorn -- at no charge will elevate energy and concentration for hungry students. “Snack boxes” that include such items could be strategically located in areas where students study. Tired and hungry students should feel free to grab a snack as needed, while students who can afford it may donate one or two dollars for future snack boxes.
- **Donate can openers and refillable water bottles.** A decent refillable water bottle costs \$10 or more. Students may prefer water over soda, but bottles of water from stores kiosks or vending machines are often more expensive. On campus there are water filling stations so students may hydrate. SGA could launch a campaign to obtain water bottles – either through mass-purchase or donation -- to provide

students in need or at a reduced cost. Likewise, can-openers may assist students who purchase canned foods, or that are available at the SHOP.

- **Explore developing a small “kitchen” so students from off campus can prepare food.** Food options for commuting students are limited to what they can purchase (which is usually expensive and less healthy) or what they might pack and bring with them and which must keep for several hours. A small kitchen or food preparation area with a cutting board and microwave would significantly the dietary options available for commuters, allowing healthier, less expensive options. A refrigeration stations would enable students to keep their food secure and refrigerated. Student government would be responsible for ensuring the facility remained clean and well maintained.
- **Instruction on planning for and preparing quick and convenient meals.** Many students, often living on their own for the first time, understandably lack skills in planning for and preparing their own meals. With the help of Student Government, the SHOP might offer a series of instructional sessions on meal planning and preparation. These might take on an “ethnic” flavor as well, attracting certain populations of students and friends willing to expand their culinary skills. Ideally, organizers could recruit local area chefs for this instruction. One outcome of the instructional series might be a SHOP Cookbook with the various recipes, with the ingredients for these meals available at the SHOP.
- **Make feminine products available at the SHOP.** Food insecure female students most likely are challenged to afford needed feminine products. It seems feasible that these be included in requests for donations to Rowan’s SHOP food pantry, and provided along with foods.
- **School supply “Drop at the SHOP”.** The cost of school supplies such as notebooks, index cards, pens and pencils are comparatively small (compared to tuition and books), but they can add up. A school supply drop-off bin could be available to collect donations, and for SHOP patrons to borrow from to defray some educational costs.
- **Publicize and encourage the use of the *Share Meals* app,** an app that connects users to a campus website that matches food secure with food insecure students to enable sharing of food.

**Dining services might offer more halal, kosher, vegetarian and vegan food options.** Several students identified the lack of halal and vegetarian options available. Such restrictions are not uncommon in an increasingly diverse student population, and their lack of recognition seems to limit not only the quantity but the variety of food options available to a large number of students. Recognition of these restrictions when Rowan food services plans for, purchases, and prepares foods they make available to students will help accommodate these limitations.

**Request that dining services allow students to share unused meals with food insecure students.** When choosing a meal plan students may specify an opt-in meal plan option that allows unused meals to be distributed to food insecure students.

**Financial Wellness Course:** The Division of Student Success is exploring ways to introduce a two-credit Financial Wellness course that would be accessible to all students. The course would introduce students to practical tools used to navigate the complexities of personal finance -- budgeting, setting financial goals, understanding debt, and implementing strategies to prepare for their future.

## POSTSCRIPT

Sadly, when it comes to student food insecurity Rowan University falls within the mainstream of universities across the country. The issue of student food insecurity is systemic, not institution-specific. Over the years state and federal support for higher education has receded, along with programs that provide aid to financially strapped families. As university tuitions rise to compensate for the shortfall, families pay the higher price. Meanwhile inflation-adjusted incomes have remained stagnant or have declined for all but the population's top twenty percent (Baum & Ma, 2014; Goldrick-Rab, 2016). Unsurprisingly, then, many struggle to meet their most basic needs -- student food insecurity is an obvious, albeit regrettable, result.

Meanwhile, university education provides the main pathway for social mobility in the US and few investments yield a higher return. Over a lifetime a college degree will generate well over twice the income as that of comparable investments in stocks, bonds, gold, or housing (Greenstone, et al., 2013). Rowan University shows laudable success in providing many with an economic opportunity. It is critical, therefore, that readers remain mindful that the serious problem of food insecurity among Rowan University students occurs within the broader context of rising social inequality and economic poverty in New Jersey and the US. We hope this Report will broaden this awareness and elevate the discussion of this fundamental, albeit largely-overlooked, problem at Rowan, and will motivate those with the wherewithal to help address it.

## REFERENCES

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## APPENDIX A: Comparing the sample with the population

To what extent does our sample align with the overall population and how might this affect our estimates of food insecurity? Of course, one should not expect an exact match between responders and non-responders. But are these differences practically significant? Table 3 compares sample statistics with known population parameters from which the sample was drawn.

**Table 3: Demographic attributes of the sample and population**

Variable	Sample	Population
<b>Age</b>	n= 2055	n= 13897
Mean	20.9	21.6
Min-Max	18-56	18-67
<b>GPA</b>	n= 1480	n= 10469*
Mean	3.22	3.08
Min-Max	0.08-4.0	0.08-4.0
<b>Gender</b>	n= 2055	n= 13876
Male	43.5%	54.1
Female	56.5%	45.9
<b>Ethnicity</b>	n= 1978	n= 13194
African American	10.9%	11.6%
American Indian	1.4%	1.1%
Native Hawaiian	0.2%	0.2%
Asian	7.1%	5.9%
Hispanic	10.7%	10.6%
White, non-Hispanic	68.8%	69.9%
International Student*	0.9%	0.8%
<b>Class</b>	n= 2055	n= 13897
Freshman	21.5%	14.9%
Sophomore	22.9%	22.0%
Junior	28.2%	30.7
Senior	27.4%	32.3%
<b>Father's Highest Grade</b>	n= 1824	n= 12003
Middle School	4.1%	3.4%
High School	38.8%	41.8%
College or beyond	57.1%	54.8%
<b>Mother's Highest Grade</b>	n= 1689	n= 11042
Middle School	4.9%	4.2%
High School	41.6%	45.9%
College or beyond	53.5%	49.9%

**\*NOTE:** GPAs of 0.0 were considered missing.

Although the sample statistics and population parameters match reasonably well, one may ask how the differences that are found would affect the results. For instance, it might be that the more food insecure are more apt to respond to a survey about food insecurity than those who are not. Our comparison suggests that if this is the case the effects were minor. For instance, both African Americans and Hispanics were more likely to experience food insecurity, yet the portion of African Americans and Hispanics who responded to our survey was about the same as that in larger population. When we weighted the statistic to accommodate



the slight differences in ethnicity between the sample and the population, the number of food insecure remained virtually unchanged.

Notable in our view are the differences shown along class levels -- compared to what we would otherwise predict, substantially more freshman and sophomores replied to the survey than juniors and seniors. Yet, according to our study, food insecurity among freshman and sophomores is *lower* than among juniors and seniors. Hence, a proportionate distribution of juniors and seniors in the sample likely would have increased, not decreased, our estimate of food insecurity.

Students in our sample averaged a substantially higher GPA than the overall population. Our data suggests, however, that those with higher GPAs are *less* likely to be food secure. Again, this suggests that our sample might under-estimate, rather than over-estimate, the extent of food insecurity. Similarly, parents' education was higher in our sample than in the population, while students whose parents' educational attainment is higher tend to be more food secure. This too suggests that, if anything, our data under-estimates the level of food insecurity among Rowan undergraduates.

In contrast to some other findings, we found that females were more likely to encounter food insecurity than were males in our sample -- 51.6% compared with 43.0%. They were also much more likely to respond -- 56.5% of our sample were women, while they constitute just 43.5% of the undergraduate population. A proportionate number of females and males in our sample would reduce the number found to be of food insecure. Still, when we adjust the figures to accommodate the smaller number of females in the larger population, the effect is small -- the number of food insecure only declines from 48% to 46.7%.

Readers may examine the table on their own to determine which differences between sample statistics and population parameters appear meaningful. It is possible that the number of student who are food insecure is significantly exaggerated, but then again, anything is possible. The data from our study provides us no reason to believe our estimates of student food insecurity are skewed in any significant way, and they might just as well under-estimate the extent of food insecurity among Rowan students.

## APPENDIX B: Food Security Measure

### USDA’s Food Security Scores

There are various ways to assess food security. This study used the USDA’s food security measure (USDA, 2017). The tool has been used widely and for some time, and its use enhances the ability to compare our findings to those of others. The measure is often used to assess household food security, inquiring about food security over the last 12 months. It also allows for questions to be oriented toward individuals, and that use a timeframe of “the last 30 days”. Since our survey was directed toward students, most of whom have spent time within the last year as non-students, we used the last-30-day timeframe for our survey questions. Finally, we omitted the USDA question inquiring about weight loss, since the timeframe was limited and the responses might tend to be unreliable. If the exclusion of this item has any effect it would be to depress, not inflate, the number of food insecure this study identifies.

**Nine questions:** The assessment is based on responses to nine questions (Table 4). For the last three questions, a response of “often” or “sometimes” was coded as “Yes”. An FS score was computed by summing affirmative responses to all nine questions. A raw score of nine (9) would indicate the highest level of food insecurity, whereas a score of zero (0) would indicate high food security.

**Table 4: Portion of affirmative responses to questions used to construct the FS score\*:**

Question	% “Yes”	Total N
Q4a, 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?	46.8	2055
Q5_aa, How many days in the last 30 days did you cut the size of your meals or skip meals because there wasn't enough money for food? (>=3 times = “Yes”)	35.9	2055
Q6a, In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money for food?	40.6	1799
Q7a, In the last 30 days, were you ever hungry but didn't eat because there wasn't enough money for food?	36.2	1814
Q8 In the last 30 days, did you ever <b>not eat for a whole day</b> because there wasn't enough money for food?	9.8	1829
Q9 For how many of the last 30 days did you not eat for a whole day because there wasn't enough money for food? (>=3 times = “Yes”)	6.3	1818
Q10_1a, The food that I bought just didn’t last, and I didn’t have money to get more. (often, sometimes = “Yes”)	50.3	1731
Q10_2a, I couldn't afford to eat balanced meals. (often, sometimes = “Yes”)	54.0	1731
Q10_3a, I was worried whether my food would run out before I had money to buy more. (often, sometimes = “Yes”)	44.8	1664

\* **NOTE:** In accord with the USDA definitions, responses of either “often” or “sometimes” to questions 10\_1 to 10\_3 were coded as “YES”. Likewise, responses of 3 or more times in the last month for questions 5 and 9 were coded as “YES”.

**Reliability.** We would expect responses to these items to be highly correlated, and that the index shows a high level of reliability. A frequently-used indicator of reliability – Cronbach’s Alpha -- affirmed this:  $\alpha=.907$ .

**FS Status:** Scores ranging from zero to nine were collapsed into four categories of food security:

1. FS scores of 0 are classified as “high” food security.
2. FS scores of 1-2 are classified as “marginal” food security.
3. FS scores of 3-6 are classified as “low” food security.
4. FS scores of 7-9 are classified as “very low” food security.

### APPENDIX C: Variation in food insecurity among students

Table 5 shows the percentage of food secure and insecure students in various group, and were used to construct Charts 1-6.

**Table 5: Food Security and Insecurity among Different Groups of Students**

	Highly food secure %	Food secure %	Food insecure %	Very Food Insecure %	Total
<b>Ethnicity*</b>					
AA	14.7	15.3	19.6	50.3	n=163
Hispanic	17.2	10.3	17.9	54.5	n=145
White (non-Hisp)	41.0	18.5	16.6	23.9	n=1029
<b>Gender*</b>					
Male	40.8	16.3	14.2	28.8	n=640
Female	30.5	17.9	19.2	32.4	n=889
<b>Class*</b>					
Fr-So	39.6	19.3	15.1	26.0	n=649
Jr-Sr	31.3	15.7	18.6	34.4	n=880
<b>Meal-plan*</b>					
All-access/14 wk	47.7	19.7	15.0	17.6	n=421
All other or none	29.9	16.2	18.0	35.9	n=1108
<b>Employed?*</b>					
Yes	31.8	15.5	18.6	34.0	n=790
No	39.1	19.3	14.2	27.5	n=739
<b>Assistance?*</b>					
Yes	18.8	18.8	18.8	43.5	n=170
No	36.8	17.0	16.9	29.3	n=1359
<b>First-Gen**</b>					
Yes	29.1	14.5	18.7	37.7	n=358
No	36.2	18.6	17.6	27.7	n=957
<b>Mean GPA</b>	3.423	3.306	3.11	3.06	n=1108
* chi-square, p<.000					
** chi-square, p=.002					

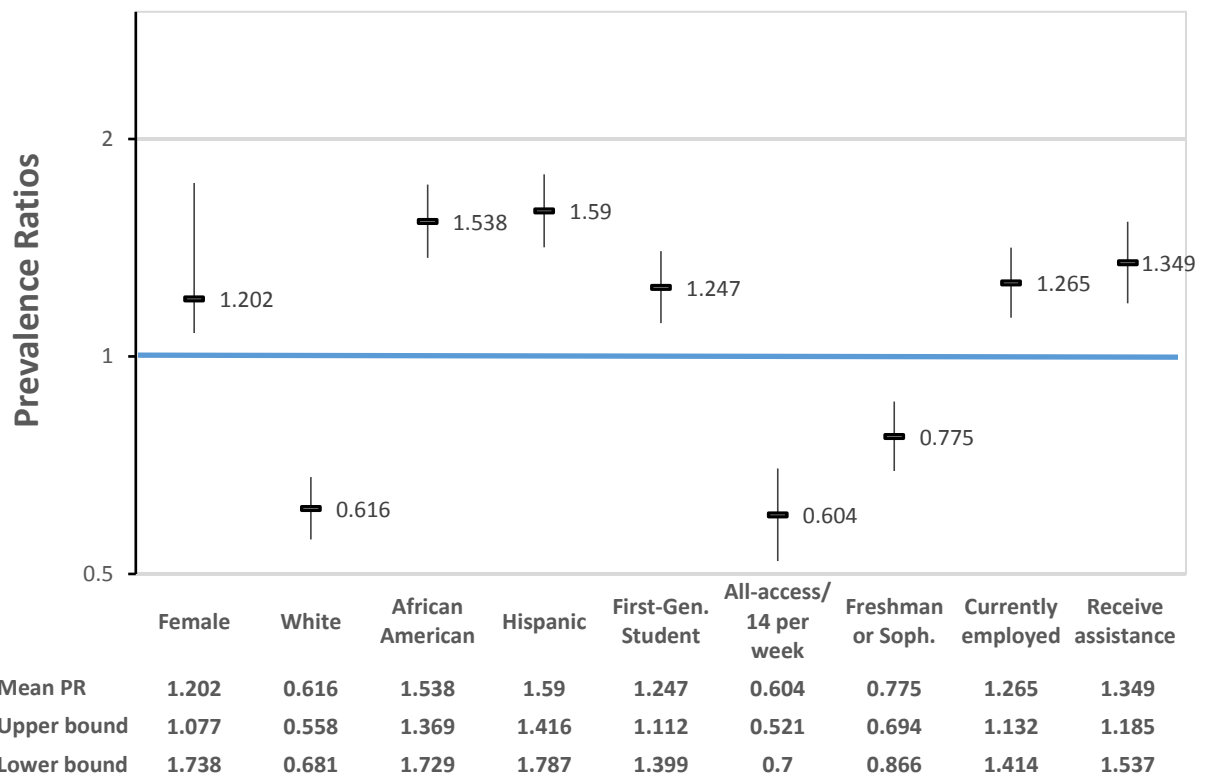
We also examined the *prevalence ratio* (PR) for several of the attributes associated with food insecurity to ascertain who might be more vulnerable to food insecurity than others. The PR shows the frequency of an outcome – in this case, food insecurity -- in one group with a certain attribute compared to those without the attribute.<sup>2</sup> The PR offers a comparative number rather than an absolute number. A PR ratio of 1:1 would

<sup>22</sup> See, for instance, Viera (2008).

indicate that the reference group experiences the same frequency of food insecurity as its comparator. PRs greater than 1:1 suggest a prevalence that is greater in the reference group compared to another group; a figure below 1:1 indicates the opposite. The greater the departure from a PR of 1:1, the stronger the link between the reference group and food insecurity.

Chart 8 shows the PR for various reference groups (compared to all others in the sample), along with the 95% confidence interval (the lower and upper bounds). The PR for female students is 1.16, indicating that female students are 16% more likely to be food insecure than male students. More strikingly, African Americans are 54% more likely to experience food insecurity than all others, while Hispanics are 59% more likely. Taken separately, father’s and mother’s education are associated with food insecurity, but when combined the PR for “parents’ education” is more substantial. “First-generation” university students – students from families where neither parent attended college – are 25% more likely to encounter food insecurity. Inasmuch as educational background is associated with financial status, this finding is unsurprising. Attributes directly linked to financial resources – holding robust meal plans, freshman and sophomore status, outside employment, receipt of assistance from other sources – are all associated lower or higher food insecurity. Although not shown in this chart, the student who is homeless, on food stamps, or receives assistance from one or more public sources is much more likely to be food insecure than her more financially secure counterpart.

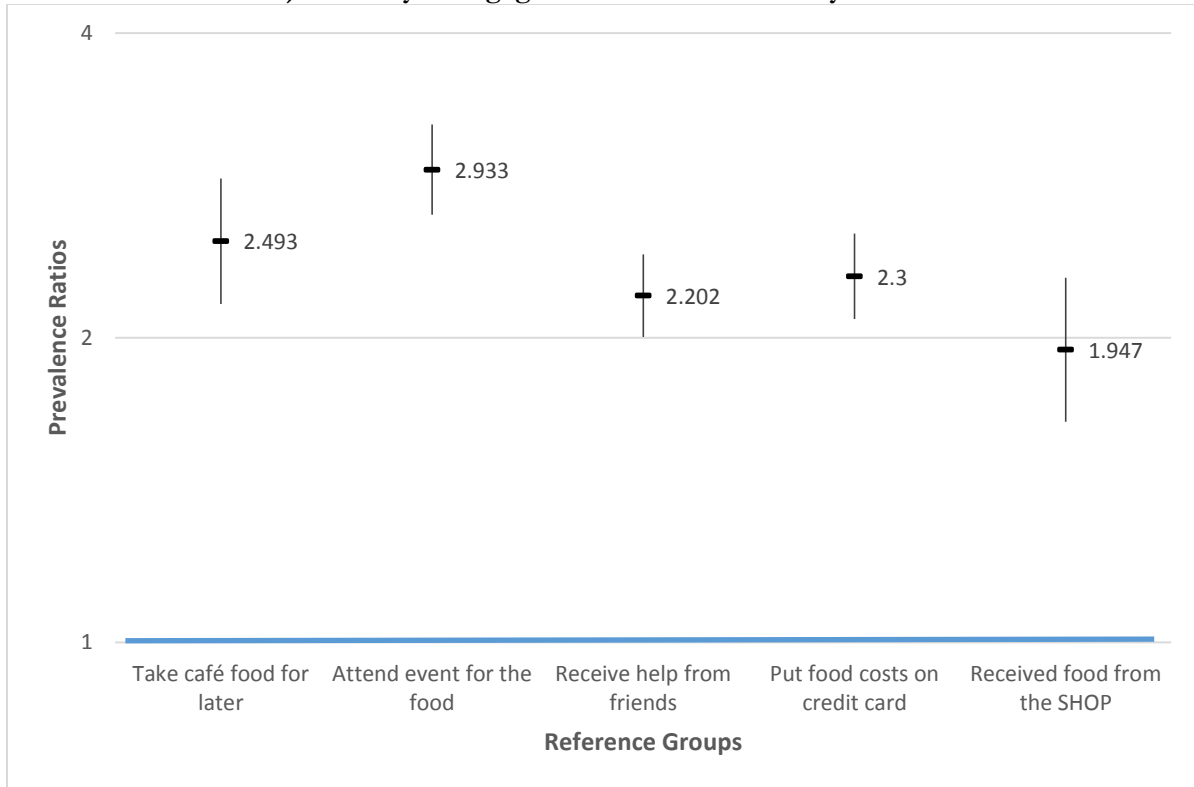
**Chart 8: Prevalence Ratios for various reference groups, along with the 95% confidence interval.\***



\* **NOTE:** All values are significant at or below  $p=.001$  level. Also, as with all other referents presented, PRs for African American, Hispanic, and non-Hispanic White students compare each reference with all other students.

Chart 9 shows various strategies students employ to access food, and the greater frequency with which food insecure students pursue them due to a lack of money. As the chart indicates, food insecure students are four or more times more likely to 1) take food from the café to consume later; 2) attend events because of food; 3) receive help from friends; 4) put food expenses on credit cards; and 5) receive food from the SHOP food pantry.

**Chart 9: Prevalence Ratios of food-seeking behaviors among food insecure students (compared to food insecure students) are likely to engage in due to lack of money.\***



\* **NOTE:** All values are significant at  $p < .000$ .