

guelph lab

Hungry for Knowledge

Assessing the Prevalence of Food Insecurity at the University of Guelph

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Executive Summary

There is growing evidence that significant numbers of university students in Canada experience food insecurity, potentially undermining the health, well-being and educational success of students. The University of Guelph has joined a handful of other Canadian universities in responding to this issue. The Community Engaged Scholarship Institute (CESI), Meal Exchange (MX), Universities Fighting World Hunger (UFWH) and graduate students working with Dr. Laura Forbes partnered on research to better understand the experiences and prevalence of food insecurity amongst students at the University of Guelph. The goal of this research was to contribute to and foster action locally and nationally, in part by bringing attention to this important issue.

This report summarizes the data from our survey of students at the University of Guelph. It reveals risk factors for food insecurity and exposes some of the realities many students experience. We hope it begins a wider discussion of the issue of student food insecurity and guides further action to address the issue. Addressing this issue on campus will involve both short-term action (e.g. supports for food provision) as well as exploring wider questions related to income, costs of living, work (on and off campus), financial aid, access to culturally appropriate foods and deeply held cultural ideas about the student experience.

Highlights

1. A total of 986 students completed the survey (139 graduate students and 847 undergraduate students) giving an overall response rate of approximately 11% of students at the University of Guelph.
2. 77% of student respondents were classified as food secure and 23% were classified as food insecure.
3. 61% of respondents were categorized as highly food secure and 15% were categorized as marginally food secure. 13% were categorized as moderately food insecure (low food security) and 11% were categorized as severely food insecure (very low food security).
4. Students who worked and students relying on loans were more likely to be food insecure.
5. Students who participated in a campus meal plan were less likely to be food insecure.
6. Year of study did not affect the prevalence of food insecurity among students.
7. Approximately one third of all respondents reported that they have had to sacrifice buying healthy foods in order to pay for essential expenses such as rent, tuition, textbooks, etc. The vast majority (78.2%) of food insecure students reported making these sacrifices.

Introduction

What is Food Insecurity?

Food insecurity is defined as limited or uncertain access to nutritionally adequate and safe foods, or limited or uncertain ability to acquire acceptable foods in socially acceptable ways (Murthy, 2013). Food insecurity is often linked to income – individuals experience inadequate or insecure access to food due to limited money or other resources – and it can lead to serious health and nutrition problems (Gundersen and Ziliak, 2015).

Food Insecurity and Post-secondary Students

There is a growing concern that the rising cost of post-secondary education combined with the increasing number of low-income and non-traditional students¹ attending universities will result in increased rates of food insecurity among university students (Davidson and Morrell, 2020). Several studies have already demonstrated that food insecurity is a significant issue at Canadian universities. For example, 38.5% of undergraduate respondents to a study at the University of British Columbia reported low to very low food security (Roberts et al., 2012) and approximately 40% of participating students at Memorial University experienced food insecurity (Blundell et al., 2019). A 2015 study of students at five different universities across Canada found that 30.7% of students were moderately food insecure and 8.3% experienced severe food insecurity (Silverthorn, 2016)..

Food insecurity among university students likely has a negative impact on physical health and social and emotional well-being. Research has shown links between food insecurity and increased risk of obesity (Pan et al., 2012), cardiovascular risk factors, hypertension and hyperlipidemia (Seligman et al., 2010). A study of 1,030 primarily undergraduate students at a university in rural Nova Scotia showed that rates of poor overall health, poor mental health, high stress and poor academic performance were significantly higher for food-insecure students (Frank, 2018).

Food insecurity is also likely to affect students' academic performance. One study found that children who lived in households with very low food security were 0.65 times less likely (OR=0.65; 95% CI 0.44, 0.96) of meeting expectations for reading and 0.62 times less likely (OR=0.62; 95% CI 0.45, 0.86) of meeting expectations for mathematics (Faught et al., 2017). One study examining how food insecurity is associated with university students' academic performance showed that food-insecure students had a significantly lower GPA than food-secure students. Furthermore, food-insecure students were less likely to be enrolled in the next semester than food-secure students (OR = 0.72, 95% CI [0.41, 1.27]) (van Woerden et al., 2019).

¹ Refers to students who are “classified as independent students, defined as students who were married, 24 years or older, orphan or ward of the court until 18 years old, veteran of the US armed service, or homeless or at risk of homelessness” (Davidson and Morrell, 2020).



The Hungry for Knowledge Project

Prompted by research emerging from other Canadian universities, the Hungry for Knowledge project aimed to better understand and address food insecurity among students at the University of Guelph. The research was conducted in partnership with Meal Exchange (MX), a national student organization working towards a more just food system on Canadian university campuses. MX launched the first “Hungry for Knowledge” research project in 2015 and it remains the largest cross-campus study on student food insecurity in Canada.

This report highlights the findings from an exploratory study examining the prevalence of food insecurity among University of Guelph students. The study considers specific factors associated with food insecurity among this population. Report results will help contribute to the emerging research on food insecurity at Canadian universities, support further research to assess this issue on a wider scale and ultimately inform policies to protect the well-being of students by reducing the prevalence of food insecurity.

Summary of Methods

- An online 45-question survey was sent to a random sample of 9,000 undergraduate and graduate students at the University of Guelph
- The survey was conducted between March, 2019 and May, 2019
- Based on responses to five survey questions, respondents were placed into one of three categories of food insecurity
- Descriptive statistics and chi-square tests of statistical significance and logistic regression were used for analyses

Survey Design

The survey was developed by a team of graduate students working under the supervision of Dr. Laura Forbes and in consultation with community partners (Meal Exchange and Universities Fighting World Hunger). The online survey was conducted between March and May 2019 and sent to a random sample of 9,000 University of Guelph students from a list generated by the University’s Office of Institutional Analysis and Research.

The survey included 45 questions and collected various socio-demographic characteristics of respondents including age, gender, race, living situation, employment and use of a university meal plan. Financial resources were evaluated as a checklist with survey respondents indicating whether they received financial support from their family or parents, employment, government/federal grants, scholarships, loans and/or other sources.

Rates of student food insecurity were assessed using five questions adapted from previous studies designed for Canadian post-secondary student populations (Silverthorn, 2016). These questions are listed in Table 1.

Table 1: Questions used to assess food insecurity

Were the following statements often true, sometimes true, or never true in the past 12 months?
1) I/we worried whether my/our food would run out before I/we got money to buy more.
2) The food that I/we bought just did not last, and I/we did not have money to buy more.
3) I/we could not afford to eat balanced meals.
4) I/we skipped meals because there wasn't enough money to buy food.
5) I/we did not eat for a whole day because there wasn't enough money for food.

Assessing Food Insecurity

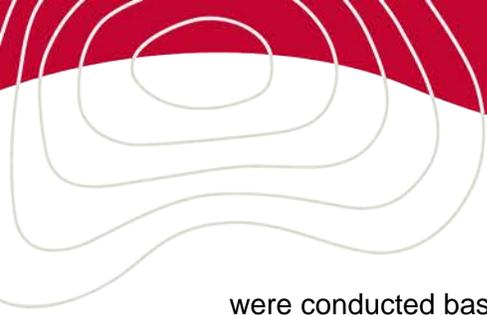
Respondents were classified into one of three categories of food insecurity depending on their answers to the five food insecurity questions. Students who responded positively (by selecting a response of “often” or “sometimes true”) to none or one of the five questions were considered food secure whereas students who responded positively to two or three of the questions were considered to be moderately food insecure. Finally, students who responded positively to four or all five questions were considered to be severely food insecure.

Respondents who responded positively to one of the five questions may be considered to be marginally food insecure. Marginal food security is an important variable but there is no clear consensus on how it should be reported. For the purposes of this study and in keeping with other studies of Canadian university students, we have included these marginal rates of food insecurity within the food secure category. There are several considerations about marginal food insecurity, however, that are worth noting. Marginally food insecure households may share a number of characteristics and health outcomes with food insecure households. Lack of clarity around marginal food security rates increases the potential for researchers and policymakers to underestimate the prevalence of adverse health outcomes associated with unreliable access to food. Research is unclear, however, as to whether these marginally food insecure households have more in common with food insecure households or food secure households (Cook, 2013).

Statistical Analyses

Descriptive statistics and chi-square tests of statistical significance were used to compare various demographic variables with participant’s determined food security status. After testing for potential collinearity, summary statistics were calculated for all variables included in this study.

Logistic regression utilizing SPSS software was used in assessing factors associated with food security status among the study population. A two-step multi-variate logistic regression model was applied to estimate the relationship between variables of interest and food security status. The analysis was then adjusted for socio-demographic factors as potential confounders. Cross-tabulation analyses with χ^2 tests were performed against categorical data. The statistical tests



were conducted based on food secure, moderate food insecurity and severe food insecurity. The total number of students considered to be food insecure was calculated by totaling the number of students evaluated as either moderately or severely food insecure. The reported results interpret the probability of being food insecure because food secure was modelled as the reference group. In addition to controlling for potential confounders prior to model-building it was decided that the potential interaction between year of study and employment would be examined by adding an interaction term into the logistic regression model and testing for statistical significance.

Results

Demographics of Student Respondents

A total of 986 students completed the survey (139 graduate students and 847 undergraduate students) giving an overall response rate of approximately 11%. The demographic characteristics of the student survey respondents can be found in Appendix 1 and can be summarized as follows:

- The majority (75%) of the survey respondents self-described as women, which is reflective of the overall student population at the University of Guelph
- The majority (61% of undergrad students and 69.5% of graduate students) reported their ethnicity as “White / European”
- The majority (90.6% of undergrad students and 70.5% of graduate students) reported their place of origin as “Domestic”
- The majority of survey respondents were single and lived without any children or dependents
- Just under half of student respondents reported living alone or with a spouse while the majority of students were living with roommates in a shared house
- Just over half of respondents (52.5%) reported that they were employed in some capacity, either part-time or “precariously”
- 4.8% of undergraduate student respondents and 14.4% of graduate student respondents reported having full-time employment
- 42.3% of undergraduate student respondents and 36.0% of graduate student respondents reported being unemployed
- 16% of graduate and undergraduate students cited loans as their primary source of income
- 4% of undergraduate student respondents and 45.0% of graduate student respondents reported having grants or scholarships
- 47% of undergraduate students cited employment as their primary source of income vs. only 26% of graduate students

Prevalence of Food Insecurity

Table 2 outlines the prevalence of food insecurity among the students sampled in the study. Of the entire sample of 986 student respondents, 61% of students in the sample were categorized as highly food secure, 15% were categorized as marginally food secure, 13% were categorized

as moderately food insecure (low food security) and 11% were categorized as severely food insecure (very low food security). 77% of students in the overall sample were food secure and 23% were food insecure.

Table 2: Prevalence of food insecurity amongst University of Guelph student survey respondents

Food Security Status	Number of Respondents	% of Respondents
Highly food secure	605	61.4
Marginally food insecure	151	15.3
Moderately food insecure	123	12.5
Severely food insecure	107	10.8
Total	986	100.0 ²

Risk Factors for Food Insecurity

Out of the ten independent variables considered in the model, three were found to have significant association with the prevalence food insecurity: employment status, registration on a meal plan and primary source of income. Findings show that:

- Students who were employed were twice as likely to be food insecure compared to students who were unemployed.
- Students indicating provincial/federal student loans or grants as their primary source of income were nearly three times as likely to be food insecure compared to students using other sources of income.
- Students who were not registered on a meal plan were 1.6 times more likely to be food insecure compared to students who were registered on a meal plan.

Employment status was significantly associated with food security, with respondents who indicated that they were employed more likely to be food insecure compared to unemployed respondents (Table 3). Over 60% of students categorized as food insecure were employed in some capacity (part-time, full-time, or precariously employed) compared to only 49% of food secure students. The results of the regression model (see Table 4) show that students who were employed were twice as likely to be food insecure compared to students who were unemployed (2.014 times more likely; OR=0.468).

Food security status also significantly differed based on students' primary source of income. Slightly less than half of all students relied on employment as their primary source of income regardless of whether they were food secure or not. Food insecure students tended to rely heavily on loans, grants, parental support and less on Registered Education Savings Plans (RESPs), savings or scholarships compared to food secure students. The correlation of food security among students indicating provincial/federal student loans or grants as their primary

² Model fit was assessed using the Hosmer-Lemeshow's Goodness of Fit test, which was not statistically significant ($\chi^2= 1.268$, $p=0.86$), suggesting that this model fits the data

source of income was 2.851 times greater compared to students citing other sources of income (OR=0.378).

Student respondents who were not registered on a meal plan were found to be 1.6 times more likely to be food insecure compared to students who were registered on a meal plan (OR=0.531). Of note, at the University of Guelph meal plans are primarily used by students in their first year of study.

Potential interactions between year of study and employment status on food security were also studied. Model outputs indicate that the interaction effect was not statistically significant, suggesting that there was no interaction effect between the year of study and employment on food security. Year of study was also not indicated as a risk factor for food insecurity.

Table 3: The food security status and demographic variables of students at the University of Guelph.

Demographic Variables	Food Secure	Food Insecure	χ² (P-value)
Employment Status			0.0001
Unemployed	51.4%	35.3%	
Part-time	36.2%	51.7%	
Full-time	7.8%	4.8%	
Precarious employment	4.6%	8.2%	
Use of A Meal Plan			0.002
Yes	23.8%	14.3%	
No	76.2%	85.7%	
Primary source of Income			0.0001
Employment (full or part time)	47.9%	48%	
Provincial/federal student loans and/or grants	13.9%	27.6%	
Scholarship(s) and/or grant(s)	10.9%	6.2%	
Parent(s)/guardians(s)	17.2%	13.3%	
Savings (RESPs or other)	6.4%	0.9%	
Bank loans	0.3%	2.7%	
Third party funding	0.7%	0.0%	
Other	2.6%	1.3%	

Note: Missing data not included in frequencies and percentages in this table. *p<.05=statistically significant.

Table 4: Multivariate logistic regression of factors associated with food insecurity among University of Guelph undergraduate students (n=847)

Variable	B± SE	OR	95% CI	P- value
Employment	-0.759±0.213	0.468	0.308-0.711	0.0001
Source of income	1.048±0.247	2.851	1.755 - 4.630	0.0001
Meal Plan	-0.632±0.298	0.531	0.296 - 0.954	0.0300

Note: CI = confidence interval; OR = odds ratio.

Student Experiences with Food Insecurity

Respondents were asked about their experiences accessing healthy food and accessing important cultural or traditional foods. Overall, approximately one third of respondents reported that they have had to sacrifice buying healthy foods in order to pay for essential expenses such as rent, tuition, textbooks, etc. In addition, 26% of all respondents experienced limited access to important cultural and/or traditional foods. These experiences were particularly common for food insecure students. 34% of food insecure students sacrificed buying healthy foods “often” and a further 44% had to make this sacrifice “sometimes”. Rates were lower for food secure students: it was “sometimes true” for 15% of food secure students and “often true” for 2% (see Figure 1). 35% of students experiencing food insecurity indicated that limited access to important cultural or traditional foods was “often true” or “sometimes true” for them, compared to only 24% of food secure students (see Figure 2).

Figure 1: University of Guelph student responses to the statement “I had to sacrifice buying healthy food in order to pay for essential expenses such as rent, tuition, textbooks, etc.” based on food security status.

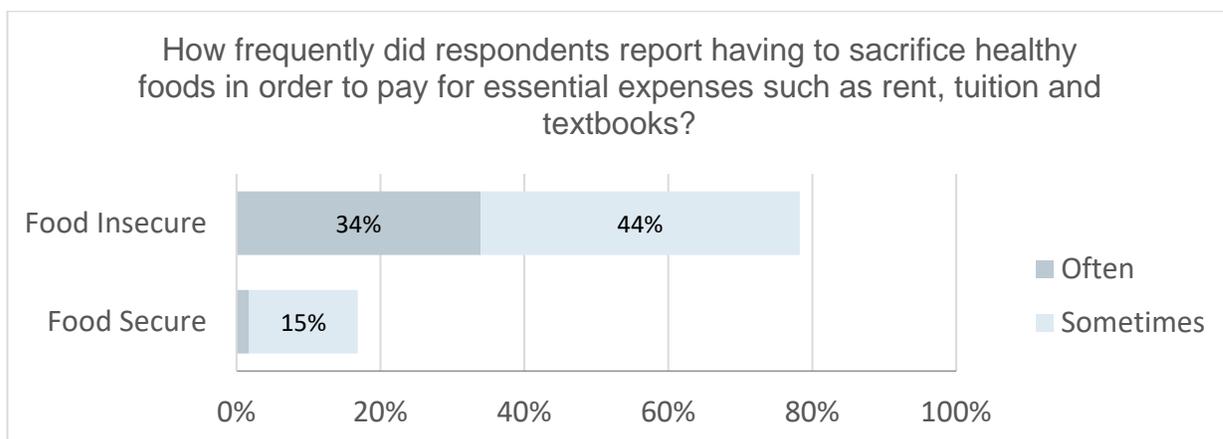
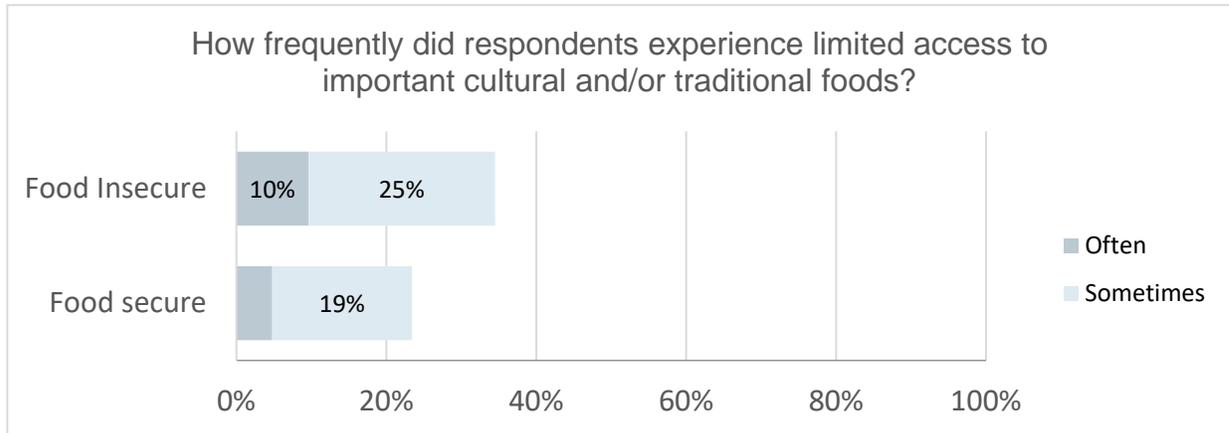


Figure 2: University of Guelph student responses to the statement “I/we have experienced limited access to important cultural and/or traditional foods” based on food security status.



Discussion

The results from this study are comparable to results obtained from similar studies at other Canadian universities. Prevalence rates vary across institutions and studies (Cook et al. 2013) and comparisons between post-secondary institutions should be made with caution. Survey instruments are not yet standardized, particularly in how they assess food insecurity. Researchers have also administered surveys at different times during the academic year and used different sampling methods, both of which can affect response rates and may influence students' responses. Nonetheless, there is a growing body of literature suggesting that food insecurity is particularly prevalent among university students, potentially at higher rates than the general population.

Research on food insecurity in the general population has established clear links between low income and food insecurity (Nikolaus et al., 2019). Similarly, the vast majority of food insecure students in this study struggle to meet all the costs of their education, compromising their food choices in order to pay for other essential expenses such as rent, tuition and textbooks. Our analysis also appears to show that one of the primary ways students can increase their income – through government loans – does not protect them from food insecurity. This raises an important question for public policy makers and university financial aid systems about whether loan and financial aid systems are currently providing enough money to students.

In Ontario student loans are not designed to cover the full costs of education. Instead, loans are intended to supplement rather than replace a student's resources, which includes support from their family. Despite positive increases in access to a university education (Proof, 2016), the prevalence of food insecurity suggests that many families cannot provide students with the additional financial support expected by current policy.

Unsurprisingly, more than half (60%) of food insecure students were in paid employment. This echoes food insecurity research in the general population which finds that 65% of food insecure households in Canada are in the workforce (Usher, 2019). Time may be a factor for students –



studies report that students who are employed are significantly more likely than their non-working counterparts to state that they do not have enough time to eat (Tarasuk and Mitchell, 2020). These students are also likely to be struggling to find decent, living wage positions.

In addition to loans and employment, the use of a university meal plan was found to be associated with food security status. The prevalence of food insecurity was significantly higher for students who were not registered on a university meal plan compared to students registered on a university meal plan. Another study among undergraduate students (Broton et al., 2018) also found that a lower percentage of food insecure students participated in on-campus meal plans, however, this association was not statistically significant after controlling for other variables in the model.

One hypothesis is that meal plans are a form of financial and food planning that protects against food insecurity. By setting aside money for food, students on a meal plan may be better able to budget for the semester. Studies have shown, however, that budgeting and food planning skills do not influence rates of food insecurity in the general population. A more likely explanation is that use of meal plans is linked to income.

The majority of students who purchased a meal plan were food secure. It is likely that students with a meal plan have sufficient income and parental support which allows them to afford the upfront cost of a meal plan (at Guelph, the minimum cost is \$2,000 per semester) and ability to supplement the meal plan when needed. A small proportion of first year students (23 students) on a meal plan were categorized as food insecure. Our survey does not assess overall financial security. One possibility is that these students purchased a meal plan but did not have enough additional income to supplement the meal plan when needed.

Previous research has shown that rates of food insecurity tend to be higher among international students as well as black, Indigenous and other students of colour, reflecting – and indeed driven by – broader racial disparities in Canada (Payne-Sturges et al., 2018; Bascaramurty, 2019). While these findings were not reflected in our study, food insecure students were more likely to experience limited access to important cultural foods and/or traditional foods. Other campus food security studies at the University of Guelph have attributed high international student fees and a lack of culturally appropriate food options as potential factors contributing to this gap (Stewin, 2013).

Limitations of the Study

Firstly, the data from this study are self-reported. The survey was anonymous and while we have no reason to believe that any under- or over-reporting occurred, there are potential sources of bias that may have impacted the results. There is the possibility of selection bias, as a result of potentially missing students in the target population who may have dropped out of school due to economic hardships. Additionally, self-selection bias may have impacted the results of the study. The survey was distributed to 9,000 University of Guelph students, but completion of the survey was voluntary with a small financial incentive. Students experiencing food insecurity may have been more likely to respond to the survey, which could have resulted in an overestimation of the prevalence of food insecurity among our study population.

A second limitation of this study is the method used for assessing food insecurity. An error in the survey design meant a question was missed when the survey was implemented. Consequently,



FI was calculated using five questions rather than six. In calculating FI, we tested the 5-item scale and a 6-item scale which substituted the missing question for another asked in the survey. We checked the reliability of 5-items vs. 6-items with Cronbach's alpha. The 5-items questionnaire has a Cronbach's alpha of 0.831, while after adding question the Cronbach's alpha declined to 0.60, which showed the reliability and consistency of 5-item survey. FI rates are thus calculated using the 5-item scale, however, high reliability and consistency may not necessarily reflect its validity. This value only shows that the measurement items correlate well among themselves.

Since this is an example of typical multi-item scales used in the social sciences where respondents are asked many similar questions, there is no reason why the scale would only work with six items rather than five. This may provide a challenge comparing different study results should future researchers prefer to use the 6-point scale. Several previous studies of Canadian university students have used a common 6-item survey instrument to assess food insecurity. The instrument was developed by Meal Exchange (Silverthorn, 2016) and uses select questions from the Household Food Security Status Module (HFSSM) found in the Canadian Community Health Survey (CCHS) (Health Canada, 2004).

The evaluation of the measurement quality is an important aspect of all studies and is the reason that the measurement process has been and continues to be an issue for scientific researchers (Mellenbergh, 1989). There is as yet no standardized instrument for assessing food insecurity among students, highlighting the need for more research in this area including the development of validated assessment tools that would allow for comparisons between institutions and over time.

Conclusions

This report highlights the key findings from the first exploratory study to establish the prevalence of food insecurity among University of Guelph students. These findings are in line with similar recent studies on other Canadian campuses which suggest that food insecurity warrants considerable attention from university administrators, educational policy makers, researchers and students themselves.

Common existing campus-based responses have focused on the provision of low-cost or free food to students. However, the link between food insecurity and income as shown in this study and further supported by research on food insecurity in the general population suggests that increasing student's income will need to be an explicit element of any strategy aimed at reducing food insecurity.

Off campus, calls for income supports like a Universal Basic Income have grown considerably within the food movement, as have concerns about the increasingly precarious and low-paid work that many food insecure households experience. On campuses, student advocates have long campaigned to Provincial Governments for changes in how their studies are financed. In addition, universities are encouraged to review their own financial aid strategies, including the division between merit and needs-based awards.

While more research is needed to refine the measurement of food insecurity among university students and to better understand the risks and impacts of food insecurity, particularly over the



long term, this study provides further evidence that a considerable number of students are currently faced with food insecurity. Without the deliberate and sustained efforts described above, food insecurity will continue to affect the health and academic success of Canadian students.

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Appendix 1

Socio-demographic characteristics of survey respondents

Gender	N – Graduate Students	% – Graduate Students	N – Undergrad Students	% – Undergrad Students
Female	93	66.9	647	76.4
Male	39	28.1	162	19.1
Others	2	1.4	15	1.8

Employment	N – Graduate Students	% – Graduate Students	N – Undergrad Students	% – Undergrad Students
Unemployed	50	36.0	358	42.3
Part-time	49	35.3	294	34.7
Full-time	20	14.4	41	4.8
Precarious employment	7	5.0	40	4.7

Ethnicity	N – Graduate Students	% – Graduate Students	N – Undergrad Students	% – Undergrad Students
Aboriginal			2	0.2
African	1	0.7	5	0.6
Caribbean	0	0	3	0.4
East south Asia	16	11.5		
Europe	85	61.2	588	69.4
Hispanic	3	2.2	9	1.1
middle east	5	3.6	13	1.5
South Asia	8	5.8	49	5.8
Mixed	1	0.7	9	1.1
other			4	0.5

Meal Plan	N – Graduate Students	% – Graduate Students	N – Undergrad Students	% – Undergrad Students
Yes	7	5.0	198	23.4
No	127	91.4	621	73.3

Place of Origin	N – Graduate Students	% – Graduate Students	N – Undergrad Students	% – Undergrad Students
Domestic - in the province	98	70.5	767	90.6
Domestic - moved to a new province	17	12.2	12	1.4
International	18	12.9	52	6.1

Marital Status	N – Graduate Students	% – Graduate Students	N – Undergrad Students	% – Undergrad Students
Single (never married)	82	59.0	793	93.6
Married or engaged	39	28.1	9	1.1
Common law	10	7.2	10	1.2
Divorced or separated			1	0.1

Living Arrangement	N – Graduate Students	% – Graduate Students	N – Undergrad Students	% – Undergrad Students
Alone	15	10.8	20	2.4
With my parent(s)/guardian	13	9.4	129	15.2
With my spouse/common law/partner with no children	40	28.8	21	2.5
With my spouse/common law/partner with children	12	8.6	4	0.5
With roommates in a shared house/apartment, etc.	49	35.3	495	58.4
In the campus residence or student housing			138	16.3
With extended family (grandparents, aunts/uncles, family friends etc.)	2	1.4	4	0.5

Income	N – Graduate Students	% – Graduate Students	N – Undergrad Students	% – Undergrad Students
\$0-\$ 4,999	11	7.9	207	24.4
\$5,000-\$9,999	5	3.6	246	29.0
\$10,000-\$14,999	21	15.1	167	19.7
\$15,000-\$19,000	17	12.2	66	7.8
\$20,000-\$24,999	31	22.3	31	3.7
\$25,000-\$29,999	12	8.6	11	1.3
\$30,000-\$34,999	7	5.0	6	0.7
more than \$34,999	19	13.7	9	1.1

Primary Source of Income	N – Graduate Students	% – Graduate Students	N – Undergrad Students	% – Undergrad Students
Provincial/federal student loans and/or grants	22	15.8	135	15.9
Scholarship(s) and/or grant(s)	58	41.7	31	3.7
Third party funding	2	1.4	3	0.4
Parent(s)/guardians(s)	1	0.7	147	17.4
Employment (full or part time)	36	25.9	400	47.2
Savings (RESPs or other)			46	5.4
Bank loans			8	0.9
Other	11	7.9	10	1.2