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Houston Food Scholarship Program Report

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January 2020

Food Insecurity Among Community College Students

Food insecurity among American undergraduates, particularly those attending community colleges, is a silent but serious problem. An estimated half of community college students experience food insecurity, meaning that they have difficulty obtaining regular access to healthy food due to insufficient funds.[1] Policymakers have given a great deal of attention to the rising costs of college and the increased enrollment of economically vulnerable students, but until recently the role that students' basic needs security plays in degree completion has not been addressed. This is a significant omission, given that adequate nutrition is a critical condition of learning, and less than 40% of community college students complete degrees, with only 60% persisting from the first to the second year.[2]

The price of attending college, even community college, has grown substantially over the last decade. Even after accounting for grant aid it now amounts to as much as 40% of annual income.[3] Most of this increase comes from living expenses, as the costs of food and housing grow even when tuition does not.[4] This creates pressure for community colleges to develop ways to support students with food insecurity.

Charitable emergency support is the most common response, and the College and University Food Bank Alliance had more than 700 members operating food pantries around the country in 2019. However, while food pantries are an important stop-gap measure, they do little to prevent food insecurity or address root causes.[5] Also, students living off-campus often have difficulty locating and accessing campus food pantries, or are discouraged by the social stigma of accepting aid, limiting their utilization as well.[6] Other approaches, like meal vouchers or "swipe" donation programs that help students eat for free on campus are often less helpful at community colleges, where students more often reside off campus and meal plans are rarely offered.

A new proactive innovation known as "food scholarships" has the potential to become a more effective approach to reducing food insecurity among community college students. Food scholarships aim to support students at risk of food insecurity before they are sidelined by it. Instead of providing cash, food scholarships provide food. Compared to food pantries, food scholarships offer a wider variety and a greater volume of food, providing nutritionally adequate food to boost cognitive performance. They are also awarded at the beginning of a term to help cover a students' unmet financial need. They are called "scholarships" in order to signal respect, communicating the college's support for students' basic needs and affirming that the student is a valued member of the institution. In other words, they are part of a "culture of caring," an approach that is gaining attention at community colleges.[7]

This report describes program implementation and impact of one of the nation's first food scholarship programs: the Houston Food Scholarship (HFS), a partnership between Houston Community College and the Houston Food Bank. The food scholarship was first distributed in January 2018, and this report examines its early stages, as well as rigorously estimating impacts through spring 2019.

Food Scholarships at Houston Community College

Houston Community College (HCC) is one of the nation's largest community college districts, educating more than 100,000 students each year. HCC students are at sizable risk of food insecurity: more than one in three students receive Pell Grants, most are the first in their family to attend college, and the net cost for low-income students amounts to about 20% of their gross income (before taxes). HCC is also a Hispanic-Serving Institution, enrolling large numbers of Latinx, African American, and international students. Only about one in five entering students earns a credential, and almost one-third transfer.

The county surrounding HCC has a high rate of food insecurity: 23.2% of children residing in Harris County are food insecure, compared to the national average of 17% and the overall Texas average of 22.5%.[8] HCC is not a wealthy institution—the foundation for the entire district holds just over $15 million.[9] HCC's three major funding sources are ad valorem taxes (45%), student tuition and fees (33%), and state appropriations (19%).[10] Its annual budget falls well short of the amount necessary to support its students to degree completion, a problem affecting community colleges nationwide.[11]

In an effort to better address its students' basic needs, HCC responded to an opportunity created by the Houston Food Bank (HFB) via its "Food for Change" program. HFB is the largest food bank in the United States and in 2015 was named "Food Bank of the Year" by Feeding America, the largest hunger-relief charity in the nation. HFB serves the greater Houston metropolitan area as well as 18 counties in southeast Texas. Last year, HFB fed 800,000 people and served 104 million nutritious meals.

HFB's Food for Change program re-envisions how food banks do their work, seeking to go beyond emergency food assistance to address the root causes of hunger. The explicit goal is to leverage food as a catalyst to help people achieve their goals, helping them become healthier and succeed economically. This program has inspired other food banks around the nation to rethink their approach as well; for example, Philabundance has recently unveiled a new strategy focused on maximizing impact by supporting Philadelphians in economic mobility programs.[12]

Evaluating the Houston Food Scholarship Program

The HFS supplies students with free groceries in order to facilitate degree completion, promoting economic mobility and potentially reducing future reliance on food banks. Food insecurity is associated with lower grade point averages and greater risk of failing or withdrawing from college courses.[13] Food-insecure college students are more likely to experience depression, feel anxiety, and contemplate suicide compared to their food-secure peers.[14] College students who experience mental health problems, such as depression or anxiety, are at risk for adverse academic outcomes, including lower grade point average, inconsistent enrollment, and dropping out.[15]

Moreover, students struggling to pay for college often feel that they do not belong at their institution, or anywhere in higher education, and this may reduce their motivation to persist.[16] Going without sufficient food or housing engenders feelings of isolation and shame.[17] Students who do not feel a sense of institutional belonging are more likely to leave college, and this is especially true at community colleges where students are frequently pulled in many directions, juggling family and/or work along with school.[18] Support programs buttressed by clear communications between colleges and students may build trust, particularly when those messages acknowledge the need to feel a part of the community, which includes having the ability to provide for basic needs. Programmatic efforts addressing food security may provide similar benefits.[19]

Therefore, food scholarships may have several benefits for students. This evaluation examines that hypothesis by considering the following questions:

1. How does the HFS program operate? What are the logistics of implementation and where are the challenges?

2. How does the HFS program affect students' food security?

3. How does the HFS affect students' stress levels and sense of belonging at their college?

4. How does the HFS affect students' grades, credit accumulation, rates of meeting Satisfactory Academic Progress (SAP), and rates of persistence and graduation?

Assessing Program Implementation and Estimating Impact

For programs to deliver productive supports, they must first conduct effective outreach to the intended students. Those students must have awareness of the available supports and how they can be of use. Finally, the students must utilize the services. None of these conditions are easy to meet, particularly in large urban community colleges where often students live off campus; juggle work, family, and school; and navigate financial constraints that limit the college's capacity to perform the necessary functions. To complicate matters further, basic needs security programs are new to higher education and therefore come with few established best practices.

To examine program implementation for the HFS program, we use a mixed-methods approach, drawing on data from interviews and observations, as well as student surveys and administrative records. Specifically, we repeatedly interviewed program staff—in person, over the phone, and using a questionnaire.

We also conducted three site visits to observe food distributions at various times. We interviewed 20 students, either through one-on-one interviews led by a former HCC student or short in-person conversations during food distributions. We also fielded an implementation survey of food-scholarship recipients, plus three extensive surveys of both recipients and a comparison group. Finally, we collected administrative records from the program and HCC. This report includes information collected from the program's inception in January 2018 through May 2019. Appendix A contains more information on the data used in this report.

The assessment of program impact is based on two cohorts of food scholarship recipients. In 2017 the partners agreed to support 1,000 HCC students in 2018 and 2019. The program was supposed to begin in fall 2017 but was delayed due to Hurricane Harvey. Therefore, 500 students began the food scholarship program in January 2018 (Cohort 1), and another 500 began in August 2018 (Cohort 2).

There is a large pool of HCC students who could potentially benefit from food scholarships—with half of community college students estimated to be experiencing food insecurity in a given month, HCC may have as many as 50,000 students in need of support at any time. For purposes of the initial pilot program, administrators selected a smaller group of students using administrative records to avoid having to turn away qualified students if the program were broadly advertised.

Therefore, at the start of each term the HCC financial aid office identified students who were eligible for the food scholarship. Eligibility was based solely on economic need, with the goal of targeting students at risk for or on the margins of food insecurity, rather than only those already experiencing food insecurity. Since HCC students are not specifically assessed for food insecurity, and such an assessment would have added to program expenses and delayed implementation, eligible students must have completed a Free Application for Federal Student Aid (FAFSA); demonstrated an estimated family contribution of $0 or an income of $25,000 or less; and met financial aid–eligibility requirements based on Satisfactory Academic Progress standards. Both new and continuing students could qualify, but they needed to be enrolled for at least two classes and be at least 18

years old. The program aimed to enroll students registered at HCC Central College–Main campus or HCC Northeast College–Northline campus.

Since more than 5,000 students were eligible for food scholarships, and only 1,000 scholarships were available, administrators selected winners via a lottery. The chosen students were sent an email outlining the program: they needed to pick up a card that they could then redeem for groceries at an on-campus market held every other Friday on select campuses. These markets feature a wide variety of produce, meats, dairy, and other grocery items, and students shop with standard grocery carts and baskets to pick out what they needed. There were no academic or performance requirements associated with the scholarship; students only needed to stay enrolled to continue receiving support.

Eligibility Criteria for Houston Food Scholarship

Students were required to meet all of the following criteria in order to be eligible for the HFS:

- Expected Family Contribution of $0 or income of $25,000 or less
- New or continuing (including part-time) students at HCC Central College–Main campus or HCC Northeast College–Northline campus
- At least 18 years old
- Met Satisfactory Academic Progress standards (for continuing students)

These criteria are risk factors for food insecurity, but that does not mean that at the time of selection these students were food insecure or recognized themselves as such. This is a common challenge facing public health initiatives that do preventative work before individuals are in crisis.

Identifying a Comparison Group

Students who utilize college support programs are systematically different from those who do not. Perhaps most importantly, they are help-seekers, the sort of individuals who come forward to embrace an opportunity. This often means they have more access to information, stronger social networks, and/or a greater sense of self-efficacy. These characteristics promote academic success; thus, it is important to distinguish between the impact of a program's services and the impact of who a program serves.

To identify the independent impacts of adding a food scholarship program to HCC's array of student supports, we needed to identify a proper comparison group—students who would have been offered the program if only more scholarships were available. To do this, HCC administrators

conducted a second lottery of 1,000 students, after the one selecting the 1,000 HFS participants. This comparison group was offered limited support, namely small payments for participating in data collection, as well as access to all of HCC's other services.

Two lotteries took place in 2018—the first in January, the second in August. HCC staff organized the eligible students on a spreadsheet, sorted them by campus and gender-identification per administrative records, and selected groups—HFS recipients, comparison, and waitlist—using a random number generator.

Student Characteristics

Since admission was determined by chance rather than student application, the program and comparison groups should be quite similar prior to the program's start. This was confirmed using a series of statistical analyses. In addition, analyses were conducted to compare students eligible for the program to the full population of HCC students (see Table 1).

With respect to demographics like sex and age, students randomly assigned a program offer are very similar to those that were not assigned an offer. The groups are also similar in life experiences. Both groups report comparable rates of parenthood, employment, and levels of food security prior to bring offered a food scholarship. Just over two-thirds of the students in both the program group and the control group are women, almost three in four are age 24 or older, and their GPA is around a 2.2 (below a C+ and above the bar for Satisfactory Academic Progress). The groups differ a bit with regard to race/ethnicity, as African American or Black students represent 55% of the students assigned to the program and 59% of those assigned to the comparison group. In addition, students assigned to the program had slightly higher levels of perceived stress and were a bit less likely to have multiple adults living in their homes. However, if students assigned to the program had a child, their child was less likely to be food secure. They also live about a half mile closer to the campus markets. We account for differences in student background across groups using regression adjustments when estimating program impacts.

Compared to HCC's student body as a whole, students who were targeted for the food scholarship program are disproportionately female (59% in the HCC population vs. 67% of eligible students), and African American or Black (28% in the HCC population vs. 57% of eligible students). Students over age 24 were also much more likely eligible for the program (71%) compared to the HCC population as a whole (44%). This may reflect higher poverty rates among African American women, higher rates of financial aid–application filing, and/or lower levels of financial support available to older students.

TABLE 1. Student Characteristics by Program Eligibility and Program Assignment

				Program Assignments		
Characteristic		All HCC Students	All Eligible Students	Control Group	HFS Group	ES
Sex (%)	Female	59	67	67	67	0.00
Race/ethnicity (%)	White or Caucasian	12	8	8	8	0.02
	African American / Black	28	57	59	55	-0.10
	Hispanic or Latinx	35	26	25	26	0.05
	Other race / missing race	25	9	8	10	0.15
Age (%)	Age under 24^	56	29	28	29	0.02
	Age: 24 or older^	44	71	72	71	-0.02
	Unknown	1	n/a	n/a	n/a	0.00
Has children (%)		n/a	37	37	38	0.01
Resides with at least one child regardless of relation (%)		n/a	64	62	67	0.11
Resides with at least one other adult (%)		n/a	81	82	80	-0.08
Employed (%)		n/a	61	61	61	0.00
Food security status (%)	High	n/a	31	32	30	-0.05
	Marginal	n/a	16	16	16	0.02
	Low	n/a	21	21	21	0.01
	Very low	n/a	32	31	32	0.03
Child(ren) is food insecure (%)		n/a	30	26	33	0.19
Average sense of belonging (0 to 16 scale)		n/a	12.0	12.0	11.9	-0.04

TABLE 1. Student Characteristics by Program Eligibility and Program Assignment (Cont.)

Characteristic		All HCC Students	All Eligible Students	Program Assignments: Control Group	Program Assignments: HFS Group	ES
Average perceived stress (0 to 16 scale)		n/a	6.7	6.5	6.8	0.11
Average term GPA (on 4.0 scale)		n/a	2.2	2.2	2.2	-0.01
Use of campus food pantry (%)		n/a	6	7	6	-0.16
Use of SNAP benefits (%)		n/a	49	47	52	0.12
Average Distance (in miles)	To HCC Northeast – Northline campus market	n/a	10.0	10.2	9.8	-0.06
	To HCC Central College – Main campus market	n/a	10.1	10.4	9.8	-0.08
	To HCC Central College – South campus market	n/a	12.0	12.3	11.7	-0.08
N		57,200	2,000	1,000	1,000	

^ "Under 24" indicates the percentage of All HCC Students 24 and under, while "24 or older" indicates the percentage of students 25 and older.

Source: IPEDS' College Navigator website, HCC administrative database, HFS Study Baseline Survey

Note: Information on "All HCC Students" comes from the IPEDS College Navigator website and represents data collected in fall 2018, except for information on age which was collected in fall 2017. Student background information on sex, race/ethnicity, age, zip code, and term GPA for study participants comes from HCC administrative data. However, we used survey information on race/ethnicity, when available, for students lacking information on race/ethnicity in the HCC administrative database. Information on whether the student has children, worked for pay, food security status, sense of belonging, perceived stress, number of adults and children in the home, child food security status, use of campus food pantry, and SNAP benefits come from the baseline survey given to all HFS study participants. See Appendix B for details on survey measures used in this report. We used the ZIP Code Tabulation Area Distance Database of the National Bureau of Economic Research to calculate the distance between home and market zip codes (NBER, 2017). The location at HCC Central College–South campus was only available in the spring/summer of 2018. The location at HCC Central College–Main campus was only available from fall 2019 to spring 2019. Estimated HFS differences and effect sizes are regression-adjusted. Tests for baseline equivalence use logistic or Ordinary Least Squares (OLS) models for all of the above characteristics among students with available information and include cohort fixed effects. The column "ES" denotes effect sizes for binary and continuous measures, calculated as recommended by What Works Clearinghouse (2017). Results above do not include students with missing information.

Program Implementation

The HFS program aims to help students in two ways: by providing enough food to eat and by promoting belonging through a message of caring and inclusion. Stress reduction is also a potential by-product. In order to successfully achieve these goals, students needed to do the following things:

1. Receive and internalize information that they were eligible for the program
2. Respond to the invitation by signing up for the program
3. Attend the markets and take food home
4. Use the food to promote their own well-being

We therefore examine program implementation in term of activities related to outreach, awareness, and utilization. Each of these activities is affected by constraints related to staffing, budget, and factors outside the program's control, such as the affordability and accessibility of transportation in Houston. This report addresses the external context, following specifics on outreach, awareness, and utilization.

Program Outreach

HCC employs an experienced communications professional in its financial aid office who was assigned to support the HFS program. Following the selection of eligible students, initial outreach took place. These efforts included emails, an explainer video featuring an HCC student, and a website. Early in the program, HCC staff also held open sessions to discuss the Food Scholarship Program, and called and texted students. Since only a select group of students were allowed to access the program, it was hard to advertise more broadly. Moreover, since there was a designated comparison group who could not access the program, there was the potential for disappointing students. This was an artifact of the evaluation design, and staff report that 220 ineligible students learned about the program via the website. They applied and were turned down.

An implementation survey fielded to eligible students in 2018 revealed that they greatly preferred text messages over email or phone calls. HCC staff also created a video to help students understand the intent of the HFS program, and this appeared to help some students. One student, interviewed at a market, said she did not believe the emails were real until she watched the video and recognized the student appearing in it.

The outreach had to accomplish several objectives: get students' attention, convince them the offer was trustworthy and useful, and inspire them to act. In order to participate in the program, students had to click a button in an email (Figure 1). Most students who did not participate never clicked that button. This could mean that they never received the email, did not open it, or simply did not click the link. Interviews reveal that some students thought that the email, which they received directly from HCC, was spam.

FIGURE 1. Sample Email about the HFS Program

Subject Line: FREE GROCERIES for being a HCC student

Dear [fill student's first name],

Paying bills while attending college can be difficult. We get it and we want to help.

We'd like to offer you a FOOD SCHOLARSHIP to reduce your need to buy groceries and other meals while you attend HCC.

You're being offered this opportunity because of a special pilot program we are trying out with the Houston Food Bank. All you need to do in order to participate is respond to this invitation and accept our offer.

Yes, I want a food scholarship <<CLICK HERE

The details on how you will be able to get the free food is here: (LINK to WEBSITE).

If you'd rather not participate in this special opportunity, we understand. CLICK HERE to decline.

Program Awareness

About half (51%) of the students offered the HFS program accepted the offer (Table 2). The participation rate was substantially higher for students selected in January 2018 (Cohort 1: 55%) compared to students selected in August (Cohort 2: 46%).

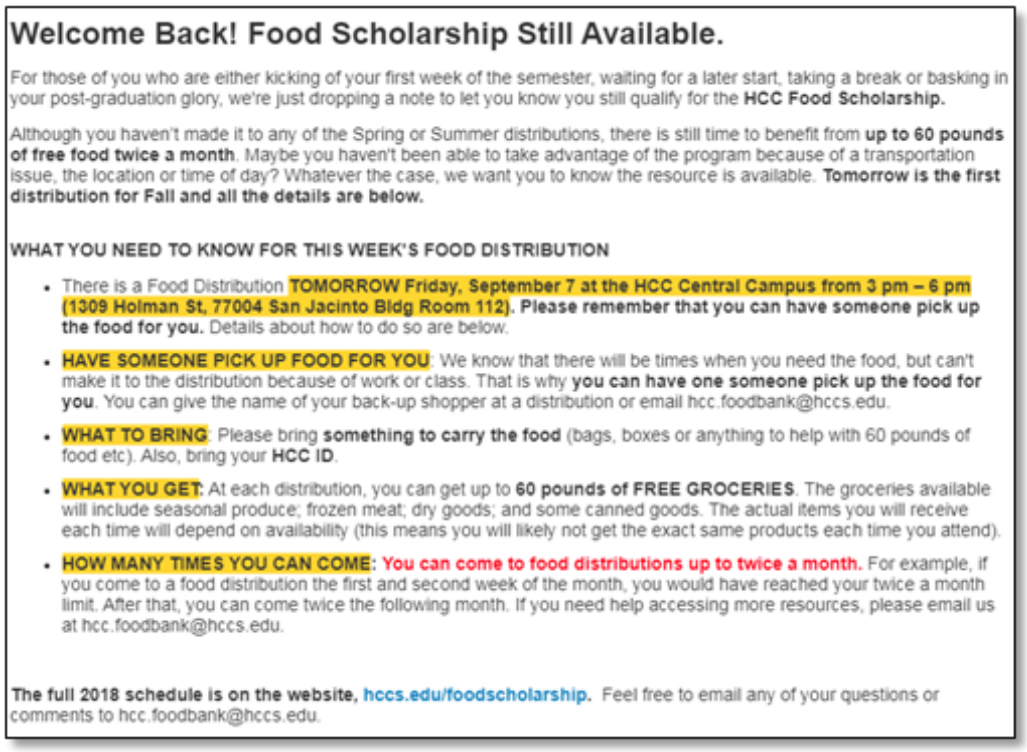
Students were selected for the program based on their risk factors for food insecurity, but that did not necessarily mean that they were food insecure, or recognized themselves as such, at the time they were selected. Engaging people at risk before they are in crisis is a familiar challenge in public health initiatives focused on prevention. (Consider, for example, the lengths that cancer prevention campaigns must go to in order to promote screening.) Some students who received

the program's emails indicated that they did not think they needed the program. In some cases, this meant that they felt they were not in such bad shape with regard to food and did not expect to be, while in other cases students felt that the program was best reserved for those who needed it more than they did.

One woman interviewed said, "I'm not struggling at all when it comes to food…I'm able to eat when I want to eat because [I have the Pell Grant]." But she went on to say that she had classmates who were homeless and clearly much worse off. "I get emails about the HCC food distribution and I feel bad because I'm like 'I don't need this.' But there are some people that do."

Many college programs employ a "use it or lose it" approach, offering students a limited window in which to participate. Some need-based financial aid programs do this too; since they are under-funded, they are often first come, first served. This can put students facing greater financial or time constraints at a distinct disadvantage, reducing equity. The HFS program staff made a different decision, allowing for rolling enrollment over the course of the year. They continued to message students who had not opted into the program (Figure 2). Despite this flexibility, the vast majority of HCC students who used the program did so in the first term that they were offered it.

FIGURE 2. Sample Follow-up Email about HFS Program



Welcome Back! Food Scholarship Still Available.

For those of you who are either kicking of your first week of the semester, waiting for a later start, taking a break or basking in your post-graduation glory, we're just dropping a note to let you know you still qualify for the **HCC Food Scholarship.**

Although you haven't made it to any of the Spring or Summer distributions, there is still time to benefit from **up to 60 pounds of free food twice a month**. Maybe you haven't been able to take advantage of the program because of a transportation issue, the location or time of day? Whatever the case, we want you to know the resource is available. **Tomorrow is the first distribution for Fall and all the details are below.**

WHAT YOU NEED TO KNOW FOR THIS WEEK'S FOOD DISTRIBUTION

- There is a Food Distribution **TOMORROW Friday, September 7 at the HCC Central Campus from 3 pm – 6 pm (1309 Holman St, 77004 San Jacinto Bldg Room 112). Please remember that you can have someone pick up the food for you.** Details about how to do so are below.
- **HAVE SOMEONE PICK UP FOOD FOR YOU**: We know that there will be times when you need the food, but can't make it to the distribution because of work or class. That is why **you can have one someone pick up the food for you**. You can give the name of your back-up shopper at a distribution or email hcc.foodbank@hccs.edu.
- **WHAT TO BRING**: Please bring **something to carry the food** (bags, boxes or anything to help with 60 pounds of food etc). Also, bring your **HCC ID**.
- **WHAT YOU GET**: At each distribution, you can get up to **60 pounds of FREE GROCERIES**. The groceries available will include seasonal produce; frozen meat; dry goods; and some canned goods. The actual items you will receive each time will depend on availability (this means you will likely not get the exact same products each time you attend).
- **HOW MANY TIMES YOU CAN COME: You can come to food distributions up to twice a month.** For example, if you come to a food distribution the first and second week of the month, you would have reached your twice a month limit. After that, you can come twice the following month. If you need help accessing more resources, please email us at hcc.foodbank@hccs.edu.

The full 2018 schedule is on the website, hccs.edu/foodscholarship. Feel free to email any of your questions or comments to hcc.foodbank@hccs.edu.

Program Utilization

Among students offered the HFS, 37% attended a market at least once (Table 2). Market attendance rates lagged as the program went on and were lower for the second cohort (29%) compared to the first cohort (45%). Overall, students in the first cohort attended about three markets, while students in the second cohort attended two.

Students faced several obstacles to attending the markets, which were held one day per week, every other week, at a designated place and time. HFB delivered food and HCC staff hosted the market. Students indicated that timing, transportation, and a lack of social support were critical barriers to going to the market and accessing the food.

Many eligible students were balancing classes, jobs (60% were employed), and family (more than one in three have children), making it difficult to find the time to attend markets during the week. Staff tried to adapt, adjusting the times and locations of markets. Students reported that it would have been easier to attend late afternoon markets that were not during class time, so markets were held on Fridays from 2 p.m. to 6 p.m.

Transportation was a persistent challenge. HCC campuses are spread across 600 square miles, and the HFS program was offered to students initially enrolled at just two of those campuses: HCC Central College–Main campus and HCC Northeast College–Northline campus. Both campuses are located near what the U.S. Department of Agriculture (USDA) classifies as "food deserts," low-income census tracts where residents have limited access (within a one-mile radius) to grocery stores or other sources of healthy and affordable food. HCC Central College–Main campus is served by Metrorail. HCC Northeast College–Northline campus is on a bus line and surrounded by low vehicle availability. In other words, individuals in that census track report having no vehicle available and are living more than 0.5 miles from the nearest supermarket.

It is common to register for classes at a community college campus based on course and program availability, despite that college not being located near your home. For those who use public transit in Houston the average cost per trip is just under $6.00 for a ride that averages about five miles and take around 25 minutes.[20] Just 75% of local bus trips operate on schedule. Advocates also report that access to public transit is inequitably distributed and that limited operating hours make it especially challenging for low-income workers to use.[21] Students also struggled to transport groceries home on the bus (they could receive up to 60 pounds of food), especially during bad weather, which staff report often occurred on market days.

TABLE 2. Program Utilization by Period and Cohort

Time period		Both Cohorts	Cohort 1	Cohort 2
Total	Ever accepted offer (%)	51	55	46
	Ever attended market (%)	37	45	29
	Median number of markets attended (#)	3	3	2
	Median weight of total goods collected (lbs)	134	179	82
Term 1	Ever accepted offer (%)	48	53	42
	Attended market in period (%)	32	39	25
	Median number of markets attended in period (#)	2	2	1
	Median weight of total goods collected in period (lbs)	99	110	72
Term 2	Ever accepted offer (%)	50	55	46
	Attended market in period (%)	15	15	15
	Median number of markets attended in period (#)	3	3	2
	Median weight of total goods collected in period (lbs)	114	171	107
Term 3	Ever accepted offer (%)	n/a	55	n/a
	Attended market in period (%)	n/a	13	n/a
	Median number of markets attended in period (#)	n/a	3	n/a
	Median weight of total goods collected in period (lbs)	n/a	121	n/a
N		1,000	500	500

Data source: Program data

Note: Information on "Median number of markets attended" and "Median weight of total goods collected" are reported only for students who attended a market in given period(s). Term 1 includes activity in the spring or summer of 2018 for Cohort 1 and fall 2018 activity for Cohort 2. Term 2 includes activity from fall 2018 for Cohort 1 and activity fromm spring 2019 for Cohohort 2. Term 3 includes activity from spring 2019 for Cohort 1.

To help overcome time and transportation challenges, students were allowed to designate up to two individuals to shop on their behalf ("substitute shoppers"). But many students either did not know about or want to use this alternative, stating that they lacked sufficient social support. Some substitute shoppers also lacked social support, and often cared for disabled and special-needs individuals. The students with designated substitute shoppers (whether or not they actually used them) shopped more regularly at the sites.

The markets were held in visible locations on campus, and this had some benefits as well as some drawbacks. One student, who did not use the market because she felt she did not need it, said:

"I kind of have an issue with how they are distributing it, [the market is] in front of everybody else and you know there's some people like even though they are really hungry they won't do it. It's just so hard for some people to accept the fact that [students] don't want to look like they're poor."

On the other hand, having the markets visible to students may have attracted them. Students who were not offered the HFS also noticed the markets. One student, the mother of a nine-year-old boy, said that while she was struggling to afford food, she did not receive SNAP. She said, "There's a big old gathering near the bookstore, and you see nice looking food. Healthy food too. The meat looks good. And I'm like well, how can I sign up for that?"

Markets were carefully structured to maximize students' choices. Some items were limited in supply, so students could only take a specified amount, while others were plentiful. Carts were provided to make shopping easier, and many students brought family members along. At one market, a two-year-old stood on her tip-toes, pushing the shopping cart through the market while her mom filled it. HCC faculty volunteered to staff the market handing out food. Shoppers were overwhelmingly female, but later in the afternoon men and children also arrived. Bringing family members to markets was common.

At the end of the market, students lined up to proceed through a check-out. Staff recorded their name and weighed the food. Students were encouraged to take no more than 60 pounds per visit, and few took more. In general, they received about 50 pounds of food per visit. Most of this was dry goods, followed by meat.

The quantity and quality of the food varied by the market. Sometimes HCC staff had to return an unused item to the truck and other times they ran out before the market ended. Sometimes food was expired or moldy, sometimes there was not much produce, sometimes all the meat was beef. Other days there was abundant fruit and vegetables and tons of pork, but not much else. At one market there were roses, but no milk or eggs. Frozen jalapeño poppers made an appearance, along with sliced pineapple and trays of sliced veggies. Thus, shopping at the market could reduce the need for a conventional grocery store, but probably not eliminate it entirely.

Every student we interviewed who used the HFS regularly said that it was very helpful. A homeless student who was also dealing with depression offered, "I've been getting the food scholarship and that's a huge help…It's been a struggle to stay focused on school and it feels like every second counts…but the food scholarships have been a real blessing." She attended markets at both HCC Northeast College–Northline campus and HCC Central College–Main campus.

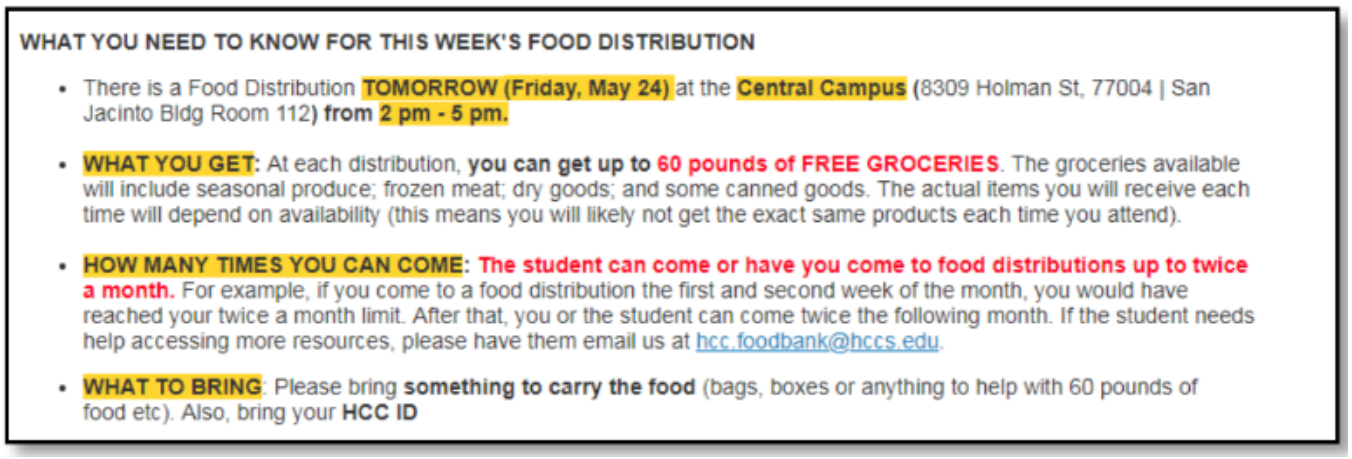
Another woman, interviewed at a market towards the end of 2018, said that she was happy to see the markets had an increasing amount of fresh products. It was helping her entire house eat healthier, she reported. There was a pair of African American sisters in their fifties at one market because one of them was selected for the program. "I'm very appreciative of the food," she said. When asked how she was chosen for the food scholarship, she said "Well, I got good grades—two A's and a B—so I think that's why." She especially appreciated the fresh fruit and vegetables and loved how organized the market layout was. It was her first term in college, and she said, "this is a big help."

On the other hand, a woman who moved to Houston from Vietnam said that even though she did not have enough money to eat every day, when she visited the markets she did not see the sort of food she was seeking. "I took a look around, but never got anything." Another student visited the market but saw that one of her professors was volunteering and left, while another hid the food she received from the professors.

To encourage continued market attendance, HCC program staff sent emails to students, reminding them of how to participate (Figure 3). Students received those reminders, which often included an encouraging video, the day before each market. Flyers were emailed to students. Staff crafted special videos around holidays like Thanksgiving. Before the winter holidays in 2018, when the market would be closed, they offered students the option of taking twice as much food and shared a special

video to explain that option. From April to June 2018 staff tried to entice students to come to the food distribution by sending emails with pictures of the food. This somewhat increased attendance, but it also led to conflicts when students were unable to receive the food advertised because they came on a different date.

FIGURE 3. Sample Email about HFS Distribution



WHAT YOU NEED TO KNOW FOR THIS WEEK'S FOOD DISTRIBUTION

- There is a Food Distribution **TOMORROW (Friday, May 24)** at the **Central Campus** (8309 Holman St, 77004 | San Jacinto Bldg Room 112) **from 2 pm - 5 pm.**
- **WHAT YOU GET**: At each distribution, **you can get up to 60 pounds of FREE GROCERIES**. The groceries available will include seasonal produce; frozen meat; dry goods; and some canned goods. The actual items you will receive each time will depend on availability (this means you will likely not get the exact same products each time you attend).
- **HOW MANY TIMES YOU CAN COME**: **The student can come or have you come to food distributions up to twice a month.** For example, if you come to a food distribution the first and second week of the month, you would have reached your twice a month limit. After that, you or the student can come twice the following month. If the student needs help accessing more resources, please have them email us at hcc.foodbank@hccs.edu.
- **WHAT TO BRING**: Please bring **something to carry the food** (bags, boxes or anything to help with 60 pounds of food etc). Also, bring your **HCC ID**

Program Resources

HCC staff performed the following functions to ensure the program operated effectively:

1. Application processing—if a student opted in for the program, their eligibility was manually reconfirmed by a financial aid assistant and an IT professional. This was done once during the initial program selection for each cohort and weekly throughout the duration of the scholarship.

2. Communications—this included program recruitment, market information and reminders (the day before), flyers and videos, website maintenance, volunteer recruitment for the markets, and media relations. When a new cohort of students was brought into the program, a call center team was used to conduct outreach. All other work, which generally took place biweekly, was handled by the financial aid communications staff and social media coordinator.

3. Markets—each food distribution utilized several HCC staff and 4–10 volunteers in various capacities, included unloading and displaying food from the HFB truck, sorting unusable produce, operating check-in and check-out processes, breaking down the market, cleaning up, and loading unused food back into the truck. These activities took 5–6 hours every other week.

4. Security, space, and storage—several HCC staff spent 3–10 hours per month working on these needs.

The level of program staffing varied over time. When the program began, it was supported by two program leads (financial coaches) with supplemental support from four other coaches. That number was reduced to a total of two coaches by the time the second cohort of students was brought on. A single communications coordinator and the financial aid director of operations supported the program on a part-time basis throughout. Between two and five work-study students also provided support, but were often unavailable during markets and had less time toward the ends of terms. Finally, between four and ten volunteers per market helped distribute food; they were recruited and trained by program staff.

While the HFS was a very new practice for HCC, there was no particular professional development provided on how best to operate the program. As in many new situations, staff iterated and adapted as best they could.

Levels of Program Participation

It is clear that some students used the HFS markets more often than others. We examined the characteristics of students who were offered the HFS based on the extent of their participation, classifying them as follows:

- None: Did not sign up for the program
- Low: Signed up but did not attend markets
- Moderate: Signed up and attended one market
- High: Signed up and attended more than one market

Table 3 offers student characteristics according to program utilization. In both cohorts, approximately two-thirds of students offered the program were female, more than half were African American, and over 70% were non-Hispanic. Females were more likely than males to participate in the program (57% vs. 38%). In addition, students age 24 or older were more likely to participate than younger students (55% vs. 40%). There were slight differences evident in program participation by race and ethnicity, with students of color making up a larger proportion of HFS participants. Students with children had higher rates of participation than their peers.

Students experiencing low or very low levels of food security when the program began were more likely to participate in the program. For example, 44% of participating students with very low food security and 47% of those with low food security at the time of program inception attended at least one market, compared to about one-third of those who were not food insecure at that point. Close to one in three students who were food insecure when the program began attended multiple markets, compared to about one in five students who were not food insecure when the program began.

TABLE 3. HFS Utilization by Student Baseline Characteristics

Level of Program Participation							
Baseline Characteristics	None (%)	Low (%)	Moderate (%)	High (%)	sig	Average Total Food Received (lbs)	
HFS group	50	13	13	24		233	
Sex							
Female	43	14	16	27	***	230	***
Male	62	13	9	16		244	
Race/ethnicity							
White or Caucasian (ref)	46	23	10	21		212	
African American or Black	48	13	14	26	*	252	
Hispanic or Latinx	52	13	13	22		226	
Other race or missing race	54	10	17	19	*	157	
Age							
Under 24	60	13	13	14	***	177	***
24 or older	45	13	13	28		248	
Has children?							
Yes	32	21	15	33	**	243	
No	46	13	14	27		244	
Employed?							
Yes	42	17	16	25		215	*
No	46	12	13	29		271	
Food security status							
High (ref)	51	14	13	21		239	
Marginal	46	15	14	25		280	
Low	37	15	14	33	*	223	
Very low	39	16	16	28		226	
Child(ren) is food insecure?							
Yes	33	17	14	36		282	
No	41	18	14	27		229	
Use of food pantry?							
Yes	48	9	18	24		239	
No	41	16	14	29		245	
Use of SNAP benefits?							
Yes	35	15	16	34	***	260	***
No	49	16	13	23		221	

* p<0.1; ** p<0.05; *** p<0.01

Source: HCC administrative database, HFS Study Baseline Survey, and program data

On average, students who attended at least one HFS market received a total of about 233 pounds of food and other goods over the period. However, male attendees, older attendees, and attendees who were not working received more goods on average than their counterparts. Students more likely to attend a market also lived closer to the market distribution sites. We constructed a rough estimate of those distances using the zip codes of the student's registered address and the markets (Table 4). Across all three market locations, students with high participation rates lived closer (0.6–1.1 miles closer) compared to students who were offered the program but did not participate. While some students came to the market from locations other than home (e.g., from class, work, etc.), distance from home to markets appeared to constrain participation.

TABLE 4. Distance to HFS Markets by HFSP Utilization

		Average Distance to Location (in miles)		
Level of Program Participation	N	HCC Northeast – Northline campus	HCC Central College – Main campus	HCC Central College – South campus
None	495	10.1	10.1	11.9
Low	134	10.0	9.7	11.6
Moderate	134	9.6	10.0	11.8
High	237	9.1*	9.2*	11.3*

* p<0.1; ** p<0.05; *** p<0.01

Source: Program data and HCC administration data

Note: We used the ZIP Code Tabulation Area Distance Database of the National Bureau of Economic Research to calculate the distance between home and market zip codes (NBER, 2017). The location at HCC Central College–South campus was only available in the spring/summer of 2018. The location at HCC Central College–Main campus was only available from fall 2019 to spring 2019. Asterisks indicate results of a test for whether there are statistically significant differences in average distance from home to market location between Low, Moderate, or High program participation in comparison to students with no participation. Significance testing was conducted using a regression model with cohort fixed effects.

Given the relatively low program utilization rates, which declined over time, it is reasonable to ask if students needed the food that the HFS program offers. Table 5 descriptively examines the food security of the students and their children, along with their use of alternative food programs (pantries and SNAP) when the program began and over time. There are four surprising trends:

- Over the 6 to 9 month period that elapsed between program initiation and the second follow-up survey, rates of food insecurity increased for students in the program group. At baseline, 54% of HFS students were food insecure (with just under one in three at the very lowest level), but by the first follow-up the rate rose to 59%, and by the second follow-up it was 61%. There was not a corresponding increase in food insecurity for the control group.

- However, during that same period, the rate of food insecurity among the students' children deepened for the control group, growing from 23% at baseline to 30% at the second follow-up. Rates of food insecurity among students' children were higher at baseline for the program group, at 35%, and remained about the same at the second follow-up.

- Very few students in the control group reported using non-HFS food pantries (6% at baseline, 7% at the second follow-up), but food pantry usage among the program group grew substantially over time. At baseline just 6% of the program group used food pantries, but that grew to 21% by the first follow-up and 29% at the second follow-up. This suggests that students in the program were made more aware of campus food pantries. Some may have decided to use them instead of markets, perhaps due to greater convenience of their locations or hours.

- SNAP usage was common among all students, with about half using it at the baseline assessment. However, SNAP usage fell for both the program and control groups over time—by the second follow-up just 37% of control group students had that support, compared to 44% of the program group. The HFS program did not include outreach about public benefits, including SNAP. During the period of program implementation, information distributed via popular media emphasized potential risks to immigrants when using public benefits; this may have depressed usage for a subset of study participants.[22]

These trends are reported for the sample of students who responded to repeated surveys. In addition to the hypotheses offered above, it may be when students are asked repeatedly to reflect on their food security, they make become more comfortable disclosing their challenges. They may change how they view their circumstances, or feel that they are being prompted to answer in a specific way. Alternatively, they may come to view more negatively a situation that previously they had thought was normal. If so, these changes in responses on surveys may not reflect real shifts in students' material circumstances, but rather how they assess those circumstances.

TABLE 5. Food Security Status and Utilization of Food Supports by Program Assignment and Survey Period

	Control Group				HFS Group			
	N	Baseline	Follow-up 1	Follow-up 2	N	Baseline	Follow-up 1	Follow-up 2
Food Security: High (%)	379	28	32	29	402	29	24	23
Food Security: Marginal (%)	379	18	15	18	402	17	18	17
Food Security: Low (%)	379	24	20	22	402	23	27	24
Food Security: Very low (%)	379	31	33	30	402	31	32	37
Child(ren) is food insecure (%)	117	23	26	30	143	35	38	34
Use of campus food pantry (%)	346	6	8	7	359	6	21	29
Use of SNAP benefits (%)	339	50	40	37	347	55	47	44

Source: HFS Study survey data

Note: Numbers above indicate results for individuals that had information in all three survey periods.

Impacts of Offering the Houston Food Scholarship

The primary intent of the HFS program is to reduce food insecurity and this section examines whether the descriptive trends described in the last section hold up in multivariate analysis. Food security was measured using the USDA 18-item set of questions and was administered via survey to all study participants. For more information on survey response rates, see Appendix A. Table 6 shows results of analyses that consider whether offering the HFS had a direct impact on students' food insecurity, student experiences, and academic outcomes.

While the program aimed to reduce food insecurity, instead, being offered the HFS appears to have increased the odds that students would report being food insecure at follow-up 2. At that point, half of the control group students were food insecure, compared to almost 59% of the program group. There is also some indication that the children of students in the program group were more food insecure in the short-term.

There are no other apparent changes as a result of the program. Students reported similar feelings of belonging and levels of stress regardless of whether they were offered the HFS. In addition, students offered the HFS were not more likely to report better academic outcomes over time. Students' term GPA, term credits, credit completion ratio, likelihood of meeting Satisfactory Academic Progress (SAP), and persistence were not impacted by HFS.

TABLE 6. Impacts of HFS Offer on Food Security, Other Student Experiences, and Academic Outcomes

	Control Group Mean	HFS Group Mean	HFS Impact	Standard Error
Follow-up 1 Outcomes				
Food Security: High (%)	30.8	25.7	-5.0	(3.15)
Food Security: High or Marginal (%)	45.7	43.1	-2.6	(3.37)
Food Security: High, Marginal, or Low (%)	67.3	68.8	1.5	(3.26)
Child is food secure (%)	69.7	61.1	-8.6*	(4.95)
Sense of belonging	11.4	11.8	0.4*	(0.22)
Perceived stress	6.8	6.9	0.1	(0.18)
Term GPA (4.0 scale)	1.5	1.4	0.0	(0.07)
Term credits attempted	5.7	5.8	0.1	(0.22)
Term credit completion ratio	46.4	44.9	-1.5	(1.99)
Met SAP (%)	63.1	62.5	-0.7	(2.12)
Persistence (%)	65.1	65.1	0.0	(2.09)

TABLE 6. Impacts of HFS Offer on Food Security, Other Student Experiences, and Academic Outcomes (Cont.)

	Control Group Mean	HFS Group Mean	HFS Impact	Standard Error
Follow-up 2 Outcomes (Cohort 1 only)				
Food Security: High (%)	31.0	23.2	-7.8*	(4.43)
Food Security: High or Marginal (%)	50.2	41.5	-8.7*	(5.01)
Food Security: High, Marginal, or Low (%)	71.4	64.8	-6.5	(4.71)
Child is food secure (%)	67.0	65.2	-1.7	(7.71)
Sense of belonging	11.7	11.6	-0.1	(0.29)
Perceived stress	6.9	6.9	-0.1	(0.28)
Term GPA (4.0 scale)	1.1	1.0	-0.1	(0.09)
Term credits attempted	4.1	3.9	-0.2	(0.30)
Term credit completion ratio	33.8	32.7	-1.2	(2.72)
Met SAP (%)	45.4	43.2	-2.3	(3.14)
Persistence (%)	43.4	41.2	-2.1	(3.11)

* p<0.1; ** p<0.05; *** p<0.01

Source: HCC administrative data and HFS Study survey data

Note: All impact estimates are derived from linear regression models with controls for baseline characteristics. Models for survey outcomes include controls for gender, race, age, SNAP use, pantry use, perceived stress, resides with at least one child, resides with at least one other adult, and distance to Central campus as well as cohort fixed. Models with academic outcomes include controls for gender, race, and age as well as cohort fixed effects. Values for term GPA, credits attempted, and completion ratio variables were imputed at 0 for students who were not enrolled at Follow-up 1 or Follow-up 2, and thus appear to be artificially low. Models using survey data as outcomes do not include students with missing information. Credit completion ratio is calculated by dividing the term credits completed by term credits attempted.

Variation in HFS Impacts

In order to better understand how the HFS might differentially impact students of varying backgrounds and experiences, we investigated its potential heterogeneous impacts (see Appendix C for more details on the research design). For example, in Tables 7 and 8 we explore interactions by gender, race, food security at baseline, use of other food supports, etc. The HFS program appears to have positively affected Hispanic students, greatly reducing the odds that they were at the very lowest level of food security. Those gains did not translate into improvements in academic performance, however. On the other hand, it appears to have negatively affected the odds that female students and students residing with at least one child were at the very highest level of food security. Those gains did not appear to boost academic performance, however.

Students who report using food pantries were also negatively impacted in terms of food security. Moreover, students using food pantries were much more likely to be negatively impacted by the HFS offer in terms of worse academic outcomes at follow-up 2. Coupled with Table 5, the results may indicate that some students offered the HFS did not attend markets, and instead turned to campus food pantries. (Alternatively, they may have mistaken markets for pantries.) Rather than promoting food security, reporting that one used food pantries seems to have somewhat reduced it.

TABLE 7. Variation in Impact of HFS Offer on Food Security, Sense of Belonging, and Perceived Stress by Follow-up Period

Interaction Model	Food Security			Sense of Belonging	Perceived Stress
	High	High or Marginal	High, Marginal or Low		
Follow-up 1 Outcomes					
HFS impact by race/ethnicity					
HFS impact x White (ref)	-3.38	-17.72	-13.57	1.28	-0.11
HFS impact x Black	-4.30	14.41	12.61	-0.80	0.29
HFS impact x Hispanic	3.70	21.37	25.86*	-1.50*	0.19
HFS impact x other	-3.22	8.69	5.76	-0.26	-0.05
HFS impact by gender					
HFS impact x male (ref)	10.09	4.70	1.65	0.89**	-0.28
HFS impact x female	-20.34***	-9.86	-0.15	-0.72	0.53
HFS impact by food security					
HFS impact x food secure (ref)	-8.96*	-4.22	0.28	0.31	0.02
HFS impact x food insecure	5.95	1.18	1.20	0.09	0.18
HFS impact by food pantry usage					
HFS impact x no food pantry use (ref)	-4.88	-2.90	0.42	0.28	0.10
HFS impact x uses food pantry	-2.73	4.60	19.81	1.26	0.13
HFS impact by SNAP usage					
HFS impact x no SNAP use (ref)	-1.37	1.99	5.03	0.30	0.14
HFS impact x uses SNAP	-6.96	-8.79	-6.62	0.11	-0.07
HFS impact by resides with child(ren)					
HFS impact x no child(ren) (ref)	2.62	2.63	3.54	0.83**	-0.04
HFS impact x 1 or more children	-11.78*	-8.09	-3.08	-0.73*	0.23
HFS impact by resides with other adult(s)					
HFS impact x no other adult(s) (ref)	-8.42	-3.31	4.09	0.54	-0.12
HFS impact x 1 or more other adults	4.12	0.82	-3.11	-0.22	0.28

TABLE 7. Variation in Impact of HFS Offer on Food Security, Sense of Belonging, and Perceived Stress by Follow-up Period (Cont.)

Interaction Model	Food Security			Sense of Belonging	Perceived Stress
	High	High or Marginal	High, Marginal or Low		
Follow-up 2 Outcomes (Cohort 1 Only)					
HFS impact by race/ethnicity					
HFS impact x White (ref)	2.85	12.71	4.27	-0.94	-2.15**
HFS impact x Black	-16.16	-26.97	-19.69	1.08	2.27**
HFS impact x Hispanic	-10.04	-22.13	0.74	0.71	2.46**
HFS impact x other	14.79	-2.03	-0.09	0.06	1.31
HFS impact by gender					
HFS impact x male (ref)	-1.74	-0.83	1.62	-0.29	-0.28
HFS impact x female	-8.54	-11.12	-11.48	0.23	0.29
HFS impact by food security					
HFS impact x food secure (ref)	-14.17*	-7.98	-2.94	0.13	-0.28
HFS impact x food insecure	11.66	-2.56	-8.05	-0.52	0.40
HFS impact by food pantry usage					
HFS impact x no food pantry use (ref)	-5.56	-7.89	-6.26	-0.19	-0.13
HFS impact x uses food pantry	-36.09**	-13.71	-4.59	0.94	0.85
HFS impact by SNAP usage					
HFS impact x no SNAP use (ref)	-17.86***	-14.17*	-1.18	-0.49	-0.18
HFS impact x uses SNAP	18.60**	10.04	-9.95	0.65	0.20
HFS impact by resides with child(ren)					
HFS impact x no child(ren) (ref)	-10.26	-12.65	-9.43	0.05	0.22
HFS impact x 1 or more children	3.74	6.00	4.43	-0.27	-0.45
HFS impact by resides with other adult(s)					
HFS impact x no other adult(s) (ref)	-4.09	-11.19	-16.98	-0.34	-0.13
HFS impact x 1 or more other adults	-4.52	2.96	12.66	0.26	0.07

* p<0.1; ** p<0.05; *** p<0.01

Source: HCC administrative data and HFS Study survey data

Note: "Food Security" status indicates the student's level of food security at baseline. Impact estimates are derived from linear regression models with interactions for each subgroup run separately. Models for survey outcomes include controls for gender, race, age, SNAP use, pantry use, perceived stress, resides with at least one child, resides with at least one other adult, and distance to Central campus as well as cohort fixed effects. Models do not include students with missing information on those survey variables. Groups with (ref) indicate the HFS impacts for the reference group in the model. For information on standard errors for the above models, see the web appendices.

TABLE 8. Variation in Impacts of HFS Offer on Academic Outcomes by Follow-Up Period

Interaction Model	Term GPA	Cred. Att.	Cmp. Ratio	Meet SAP	Persist
Follow-up 1 Outcomes					
HFS impact by race/ethnicity					
HFS impact x White (ref)	0.10	0.73	4.04	1.02	3.99
HFS impact x Black	-0.12	-0.83	-6.10	-3.54	-5.95
HFS impact x Hispanic	-0.06	-0.22	-4.29	2.02	-0.89
HFS impact x other	-0.45	-0.76	-10.11	-2.19	-4.42
HFS impact by gender					
HFS impact x male (ref)	-0.09	-0.02	-3.82	-1.23	0.59
HFS impact x female	0.10	0.22	3.50	0.82	-0.94
HFS impact by food security					
HFS impact x food secure (ref)	-0.07	0.55	-2.95	3.17	4.51
HFS impact x food insecure	0.02	-0.64	1.85	-8.49*	-9.00*
HFS impact by food pantry usage					
HFS impact x no food pantry use (ref)	-0.01	0.25	-1.45	-1.05	-0.19
HFS impact x uses food pantry	-0.28	-0.23	-5.67	-8.91	-6.02
HFS impact by SNAP usage					
HFS impact x no SNAP use (ref)	-0.15	0.07	-3.41	-3.69	-2.63
HFS impact x uses SNAP	0.28	0.41	4.36	4.30	4.50
HFS impact by resides with child(ren)					
HFS impact x no child(ren) (ref)	0.02	0.07	-0.72	-7.56*	-3.66
HFS impact x 1 or more children	-0.06	0.23	-0.98	9.20	5.15
HFS impact by resides with other adult(s)					
HFS impact x no other adult(s) (ref)	0.04	1.06*	-1.88	5.05	7.74
HFS impact x 1 or more other adults	-0.08	-1.05	0.17	-8.62	-10.36

TABLE 8. Variation in Impacts of HFS Offer on Academic Outcomes by Follow-Up Period (Cont.)

Interaction Model	Term GPA	Cred. Att.	Cmp. Ratio	Meet SAP	Persist
Follow-up 2 Outcomes (Cohort 1 Only)					
HFS impact by race/ethnicity					
HFS impact x White (ref)	0.08	0.34	1.60	0.63	1.51
HFS impact x Black	-0.10	-0.23	-1.78	-2.14	-3.75
HFS impact x Hispanic	-0.21	-0.92	-4.04	-3.87	-3.10
HFS impact x other	-0.26	-1.83	-7.95	-7.79	-7.36
HFS impact by gender					
HFS impact x male (ref)	-0.19	-0.43	-2.98	-6.05	-4.18
HFS impact x female	0.20	0.37	2.75	5.68	3.11
HFS impact by food security					
HFS impact x food secure (ref)	0.04	-0.03	0.19	-2.20	0.61
HFS impact x food insecure	-0.09	-0.21	-1.56	0.60	-6.60
HFS impact by food pantry usage					
HFS impact x no food pantry use (ref)	-0.01	-0.21	-0.70	-3.11	-3.47
HFS impact x uses food pantry	-0.98**	-1.17	-27.02*	-14.61	-28.38*
HFS impact by SNAP usage					
HFS impact x no SNAP use (ref)	-0.24	-1.05*	-7.27	-12.92**	-13.15**
HFS impact x uses SNAP	0.23	1.16	6.22	13.54	12.83
HFS impact by resides with child(ren)					
HFS impact x no child(ren) (ref)	-0.13	-0.95	-6.78	-12.50*	-13.44*
HFS impact x 1 or more children	0.05	0.87	5.28	11.54	12.02
HFS impact by resides with other adult(s)					
HFS impact x no other adult(s) (ref)	0.07	0.54	0.60	-2.50	4.48
HFS impact x 1 or more other adults	-0.16	-1.03	-3.76	-1.88	-12.48

* p<0.1; ** p<0.05; *** p<0.01

Source: HCC administrative data and HFS Study survey data

Note: Impact estimates are derived from linear regression models with interactions for each subgroup run separately. Each model includes controls for gender, race, and age as well as cohort fixed effects. Groups with (ref) indicate the HFS impacts for the reference group in the model. For information on standard errors for the above models, see web appendices. The completion ratio variable is calculated by diving the term credits completed by term credits attempted.

Impacts of Using the Houston Food Scholarship and Attending Markets

Although 1,000 students over two cohorts were offered food scholarships, take-up and market attendance rates were low, as has been shown. We therefore conducted an additional exploratory analysis to test whether attending markets had an impact on student outcomes (Table 9). See Appendix C for more details on the research design.

The results indicate that using the program slightly improved students' sense of belonging. But students who used the program were more likely to be food insecure, as were their children.

TABLE 9. Participating in HFS Program on Academic and Survey Outcomes by Follow-up Period

	Accepted Offer Prior to Current Term	(SE)	Attended Market Prior to Current Term	(SE)
Follow-up 1 Outcomes				
Food Security: High (%)	-7.94	(4.87)	-11.94	(7.35)
Food Security: High or Marginal (%)	-4.15	(5.25)	-6.25	(7.89)
Food Security: High, Marginal, or Low (%)	2.43	(5.10)	3.66	(7.68)
Child(ren) is food secure (%)	-12.86*	(7.19)	-19.61*	(10.93)
Sense of belonging	0.55*	(0.33)	0.82*	(0.49)
Perceived stress	0.17	(0.27)	0.25	(0.41)
Term GPA	-0.04	(0.14)	-0.07	(0.21)
Term credits attempted	0.27	(0.46)	0.40	(0.70)
Term credit completion ratio	-3.11	(4.18)	-4.70	(6.32)
Met SAP (%)	-1.45	(4.45)	-2.18	(6.72)
Persistence (%)	-0.10	(4.39)	-0.14	(6.62)

TABLE 9. Participating in HFS Program on Academic and Survey Outcomes by Follow-up Period (Cont.)

	Accepted Offer Prior to Current Term	(SE)	Attended Market Prior to Current Term	(SE)
Follow-up 2 Outcomes (Cohort 1 Only)				
Food Security: High (%)	-10.79*	(6.08)	-13.49*	(7.60)
Food Security: High or Marginal (%)	-12.07*	(6.78)	-15.09*	(8.49)
Food Security: High, Marginal, or Low (%)	-9.03	(6.37)	-11.30	(7.98)
Child(ren) is food secure (%)	-2.14	(9.20)	-2.67	(11.44)
Sense of belonging	-0.17	(0.39)	-0.21	(0.48)
Perceived stress	-0.10	(0.37)	-0.13	(0.46)
Term GPA	-0.10	(0.16)	-0.13	(0.22)
Term credits attempted	-0.35	(0.55)	-0.47	(0.74)
Term credit completion ratio	-2.12	(4.97)	-2.85	(6.69)
Met SAP (%)	-4.18	(5.76)	-5.62	(7.76)
Persistence (%)	-3.89	(5.70)	-5.24	(7.68)

* p<0.1; ** p<0.05; *** p<0.01

Source: HCC administrative data, HFS Study survey data, and program data

Note: All impact estimates are derived from linear regression models with controls for baseline characteristics. Models for survey outcomes include controls for gender, race, age, SNAP use, pantry use, perceived stress, resides with at least one child, resides with at least one other adult, and distance to Central campus as well cohort fixed effects. Models with academic outcomes include controls for gender, race, and age as well as fixed effects for cohort. Values for term GPA, credits attempted, and completion ratio variables were imputed at 0 for students who were not enrolled at Follow-up 1 or Follow-up 2, and thus appear to be artificially low. Models using survey data as outcomes do not include students with missing information. Credit completion ratio is calculated by dividing the term credits completed by term credits attempted.

Conclusions and Recommendations

Efforts to address food insecurity among community college students are just beginning, and there is little sense yet of what works and why. This paper examines the early stages of an innovative program, the Houston Food Scholarship, using a rigorous research design.

Food insecurity was widespread among students deemed eligible for the program, and many of their children were also facing food insecurity. Even so, few students offered the food scholarship actually used it. We do not find clear evidence that the program reduced food insecurity or improved students' academic performance or well-being, though it does appear to have somewhat helped Hispanic students. Given that the intervention is aligned with the clear need for food, it seems most likely that problems with program implementation drive the null findings. In particular, we find that about half of the eligible students did not engage with the program at all, and those who did only attended a few markets. Transportation is an evident barrier, as students who lived closer to the food distribution sites were more likely to make use of them.

There is some indication that students who were not food insecure when the program began may have been adversely impacted. The reasons are unclear. Their financial circumstances put them at risk for food insecurity, though they may not have been aware of it. It may be that surveying students about their food security repeatedly over time changes how they assess their circumstances. Relatedly, it is possible that messaging students about their potential risk for food insecurity—in an effort to get them to use the support—may have changed their perceptions of their situation. These are all important areas for future research.

Finally, it seems that some students offered the HFS program instead increased their utilization of campus food pantries. The pantries may have been more convenient in terms of time or location, but do not offer the variety and quantity of fresh food available with the HFS program. It may be that adverse impacts occurred because students tried to use the pantries, but still fell short on needed food. Alternatively, students may have reported that they used campus food pantries when they were actually using markets. Regardless, market utilization is not clearly associated with improved outcomes.

This is a complicated pattern of results, typical of early efforts to intervene in an area that previously went unexamined. Greater exploration of the findings and their implications is needed and should be centered in future evaluation studies. Given the evident levels of food insecurity and the program's benefits at least for some students, the Houston Community College and the Houston Food Bank will continue to refine the program, iterating toward a more viable, effective, and sustainable model. The following recommendations are intended to support program implementation as it evolves.

1. Reduce the time and transportation barriers to market usage. Since HCC recently signed a new memorandum of understanding with HFB, it is now possible to increase access to the markets using HFB's new network of Food for Change markets. There are 15 locations across Houston as well as a mobile trailer. This will make it more convenient for students to shop at the markets and reduce HCC staff burden.

2. Refine the program eligibility criteria. Eliminate the use of a lottery in program selection and instead use other criteria to target the program. Aim to reach students who are less likely to have other supports, including SNAP. For example, target the program to students who did not complete the FAFSA, those who declined student loans, and those in developmental education. While it is important to include students who self-disclose their food insecurity, it is still necessary to go beyond that group to reach students at risk of food insecurity who might not readily come forward to receive support.

3. Work with the HCC Student Basic Needs Committee to revise the program's communications strategy to clearly communicate to students their risk of food insecurity, the impacts on their ability to succeed academically, and the ways the HFS can help them. Include information about the program on the basic needs syllabus statement that the HCC Faculty Senate adopted.

4. Develop personalized, targeted outreach from financial coaches and deliver it via both email and text to students on a weekly basis. Offer students the opportunity to receive virtual coaching to help them strategically use the food scholarship to relieve pressure on their budgets.

5. Develop strategic partnerships that create opportunities to address remaining transportation gaps.

Following a period of strengthened program implementation, the HFB program should be re-evaluated. We recommend the use of a randomized encouragement design, randomizing program outreach rather than the awarding of the food scholarship itself. This will ease program implementation and provide useful feedback to the staff. The Hope Center looks forward to supporting both the upcoming implementation period and the next evaluation.

Appendix A. Data Used in This Report

All quantitative analyses conducted for this report are based on the following data:

- HFS program data. Information on program use was collected by HFS staff for all students who were assigned to participate in the HFS program and accepted the offer of food scholarship.

- HFS Survey data. All students in the HFS and control groups received three surveys during the pilot period—a baseline survey and two follow-up surveys. Table A-1 (below) provides the fielding periods and the response rate according to cohort and treatment status (control vs. HFS groups). We aimed to avoid any substantive differences in response rates by treatment status, which is quite difficult, and achieved that goal. In addition, the response rates for the surveys are quite high for community college students. For more detail on measures used in this report see Appendix B.

- HCC administrative data. Background characteristics (gender, race/ethnicity, and date of birth) and academic records (term GPA, total credits attempted, total credits completed, met Standard Academic Performance, and term enrollment) of all students in the experimental study were provided by HCC through a data-use agreement so that academic achievement could be examined at three academic terms for Cohort 1 (spring 2018, fall 2018, and spring 2019) and two academic terms (fall 2018 and spring 2019) for Cohort 2. The credit completion ratio variable is calculated by dividing the term credits completed by term credits attempted.

- National Student Clearinghouse data. These data were also provided by HCC and served as supplemental information for rates of enrollment.

TABLE A-1. Survey Fielding Periods and Response Rates by Cohort

	Baseline (Term 1)	Follow-up 1 (Term 2)	Follow-up 2 (Term 3)
Cohort 1	1/18/18–2/18/18	4/13/18–5/13/18	10/16/18–12/06/18
Response rate for control group (%)	62	55	57
Response rate for HFS group (%)	61	56	56
Invited to take the survey (#)	1,000	1,000	1,000
Cohort 2	8/18/18–10/01/18	1/14/19–2/23/19	4/17/19–5/29/19
Response rate for control group (%)	71	58	55
Response rate for HFS group (%)	71	57	56
Invited to take the survey (#)	1,000	1,000	1,000

Appendix B. Measures Used in This Report

Food security

To assess food security in this report, we used questions from the 18-item Household Food Security Survey Module (shown below) from the U.S. Department of Agriculture (USDA). It is important to note that while we mainly discuss insecurity, the standard is to measure the level of security, referring to those with low or very low security as "food insecure." To calculate a raw score for food security, we counted the number of questions (listed below) to which a student answered affirmatively.

- Over the last 30 days, how true would you say the following statements are?
- I worried whether food would run out before I got money to buy more.
- The food that I bought just didn't last and I didn't have money to get more.
- I couldn't afford to eat balanced meals.
- Did you ever cut the size of your meals or skip meals because there wasn't enough money for food?
- How often did you ever cut the size of your meals or skip meals because there wasn't enough money for food?
- Did you ever eat less than you felt you should because there wasn't enough money for food?
- Were you ever hungry, but didn't eat, because there wasn't enough money for food?
- Did you lose weight because there wasn't enough money for food?
- Did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?
- How often did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?

Defining Levels of Food Security by Number of USDA Questions Used

Raw Score				Food Security Level
18 questions (children present)	18 questions (no children present)	10 questions	6 questions	Instrument-Type
0	0	0	0	High
1–2	1–2	1–2	1	Marginal
3–7	3–5	3–5	2–4	Low
8–18	6–10	6–10	5–6	Very Low

Child food insecurity/security measure

To assess child food security in this report, we used a subset of questions from the 18-item Household Food Security Survey Module (shown below) from the U.S. Department of Agriculture (USDA). A child was considered food insecure if the respondent answered affirmatively to any of the following questions (listed below).

- In the last 30 days, how true are the following statements? We couldn't feed the child/children a balanced meal, because we couldn't afford that.
- In the last 30 days, how true are the following statements? The child/children was/were not eating enough because we just couldn't afford enough food.
- In the last 30 days, did you ever cut the size of your child's/children's meals because there wasn't enough money for food?
- In the last 30 days, did your child/children ever skip meals because there wasn't enough money for food?
- In the past 30 days, how often did your child/children ever skip meals because there wasn't enough money for food?
- In the last 30 days, was your child/children ever hungry but you just could not afford more food?
- In the last 30 days, did your child/children ever not eat for a whole day because there wasn't enough money for food?

Perceived stress (PSSSQR)

To assess perceived stress in this report, we created a continuous scale ranging from 0 to 16 based on the sum of responses (Never, Almost Never, Sometimes, Fairly Often, Very Often) to the following questions:

- In the last month, how often have you felt that you were unable to control the important things in your life?
- In the last month, how often have you felt confident about your ability to handle your personal problems?
- In the last month, how often have you felt that things were going your way?
- In the last month how often have you felt difficulties were piling up so high that you could not overcome them?

Sense of belonging

To assess sense of belonging in this report, we created a continuous scale ranging from 0 to 16 based on the sum of responses (Strongly Disagree; Disagree; Neither agree, nor disagree; Agree; Strongly disagree) to the following statements:

- People at HCC accept me
- I feel like an outsider at HCC
- I feel comfortable at HCC
- I feel like I belong at HCC

Appendix C. Research Design

Intent to Treat (ITT) Impact Analysis

In order to estimate the short-term and long-term impacts of food scholarships, Equation (1) is estimated using generalized linear models, which incorporate linear and logistic regressions in a single framework and thus permit consistency of analytical approach across all analyses:

$$(1) \qquad g(Y_i) = \beta_0 + \beta_{1i}(HFS_i) + \sum^{m}_{(j=1)}(\beta_j X_{ij}) + \varepsilon_i$$

The Y_i represents an outcome for student i (i = 1...n) at the end of the fall 2018 (short-term outcome) or spring 2019 (long-term outcome) semester; HFS_i is an indicator variable for whether a student was assigned to the treatment group; X_{ij} is a vector of j = 1...m additional student-level covariates such as age, race/ethnicity, and gender; and ε_i is a term for student-specific random error. The $g(Y_i)$ represents a link function for relating the linear predictor (i.e., the right-hand side of the equation excluding ε_i) to the outcome variable.

The effect of the Treatment is quantified by $\beta_{Treatment,}$ the average improvement in outcome Y_i for the treament group relative to the control. If food scholarships are effective, estimates of $\beta_{Treatment}$ are expected to be positive and statistically significant for outcomes with exception of the survey outcome, perceived stress.

Analysis of Heterogenous Effects

Equation (2) is used to estimate the heterogenous impacts of food scholarships:

$$(2) \qquad Y_i = \beta_0 + \beta_1 S_i + \beta_2 HFS_i + \beta_3 HFS_i * S_i + \sum^{m}_{j=1} \beta j X_{ij} + \varepsilon_i$$

where S_i represents a moderating baseline characteristic of the student i. The direct effect of a one unit increase in the characteristic S_i on the outcome Y_i is $\beta_1 S_i$. β_0 represents the treatment effect of students with the characteristic, $S_i=0$, whereas β_3 is the differential treatment effect of students without the characteristic, $S_i=1$ in the case of binary variables and a one unit increase in the characteristic S_i in the case of continuous variables.

Treatment on the Treated Analysis

We estimate the effects of taking up the HFS, the complier average causal effect (CACE), using two-stage least squares (TSLS) and an instrumental variables (IV) estimator. The first-stage, Equation (3), is estimated using OLS. We predict take-up and include the baseline covariates in the regression model, X_i. In the second-stage, Equation (4), the endogenous take-up variable is replaced by its predicted values, T_i, which is then estimated by OLS. The π_1 represents the "first-stage effect" of the instrument.

$$(3) \qquad T_i = X_i' \pi_0 + \pi_1 HFS_i + u_i$$

$$(4) \qquad Y_i = X_i' \beta + \beta^1 T^i + \varepsilon^i$$

Endnotes

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This report is possible thanks to the hard work and commitment of staff and administrators at the Houston Community College and the Houston Food Bank. Shar-day Campbell, Armando Galvan-Cruces, and Bianca Matlock provided especially critical support throughout the life of the project. We thank The Kresge Foundation and the William T. Grant Foundation for generous financial support, and Christine Baker-Smith, Justice Butler, Jimmieka Mills, Daniel O'Connor, and M. Davis and Company for valuable research assistance.