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The hunger report: An in-depth look at food insecurity in Singapore

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THE HUNGER REPORT

An In-Depth Look at Food
Insecurity in Singapore

Lien Centre for Social Innovation

Supported by
The Food Bank Singapore

Tania Nagpaul, PhD
Dalvin Sidhu, PhD
Jinwen Chen, MSSc

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LIEN Centre for
Social Innovation



ABOUT THIS REPORT



This report provides a detailed account of the first nationally representative study on the largely hidden problem of food insecurity in Singapore.

While there are previous reports that have delved into food insecurity in Singapore (Tan, Kaur-Gill, Dutta & Venkataraman, 2017; Glendinning, Shee, Nagpaul & Chen, 2018) via small-scale investigations, the current report takes a countrywide perspective on the issue and furnishes nationally representative data on the prevalence, causes and consequences of food insecurity in the island nation. The fundamental aim of the report is to help readers understand the profiles of individuals/households that experience food insecurity and the socio-psychological impact it has on their lives. The survey identified 10.4% resident households that had experienced food insecurity in the 12 months prior to the data collection period of July to December 2019.

This report will serve as a reference for household food insecurity in Singapore and may be of practical value to policymakers, researchers, academic faculty, students and food support organisations that are interested in understanding food insecurity in developed nations such as Singapore. It provides detailed statistical analyses of several factors governing food insecurity. Core findings are bolded and italicised for easy reference.

The production of this report would not have been possible without the untiring support of our field interviewers (Akshit Kariwala, Anastasia Hoon, Brendan Hoe, Daniel Wong, Edwin Goh, Gabrielle See, Lynn Yan, Madeleine Tan, Peck Lin Huin, Remeo Ocampo, Richie Tan, Subhradip Sikdar, Wan Yun Tan, Wendy Gan, Wei Ching Ong and Xin Yuan Lim), who knocked on the doors of close to 1,700 households in Singapore. We would like to express our gratitude to each of them.

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ABOUT THE FOOD BANK SINGAPORE

Established in 2012, the Food Bank Singapore (FBSG) (<https://foodbank.sg/>) is Singapore's first food bank, and it aims to be the prevailing centralised coordinating organisation for all food donations in Singapore.

Driven by its mission to eradicate food insecurity of all forms in Singapore by 2025, the registered charity bridges potential donors and member beneficiaries by collecting and redistributing donated food. Its members are registered charity or non-profit organisations with a designated meal programme for low-income and underprivileged individuals and families.

Through a network of more than 360 such organisations of all sizes, the food bank serves more than 100,000 families and 300,000 people with all kinds of food—from fresh to cooked.

Among its many programmes are the following:

- Bank Boxes, which are placed in buildings across Singapore for people to drop in food donations;
- The Fresh Food Truck, which collects dented and bruised fruits and vegetables from Pasir Panjang Wholesale Centre to be redistributed to people in need;
- Food drives for corporations to generate food donations as well as raise awareness about food insecurity and wastage;
- The Food Pantry 2.0 in Toa Payoh, which features vending machines that stock food items with a relatively short shelf life—four weeks or less—at just \$2 each; and
- The Feed the City community engagement initiative, which provides meals to the needy.

FBSG has become the voice of food resource planning and management, including working closely with government agencies to address issues on the ground. As a leader, it helps food banks around the region to collectively combat food insecurity. This is something that its founders—Nichol Ng and Nicholas Ng—are passionate about.

Thanks to its network and its experience in the food industry, FBSG can provide insights and better access to sources of excess food. Backing them is a team that shares the same vision and passion.



EXECUTIVE SUMMARY

The reality is that about 10% of Singaporean households (citizens and/or permanent residents) in this nationally representative study of close to 1,200 surveyed households experienced food insecurity at least once in the last 12 months, with two out of five of these households experiencing food insecurity at least once a month. This is not a percentage that can be overlooked.

Despite Singapore being ranked by the Economist Intelligence Unit as the most food-secure nation in the world on the Global Food Security Index in 2019, this study reveals a paradox. Singapore has done well in terms of achieving sufficiency of food supply through a strategic diversification of food sources, but this progress has not prevented the island nation from reporting severe levels of food insecurity in close to 3.5% of the individuals participating in this nationally representative study.

As expected, the current study found that food-insecure households were more likely than food-secure households to reside in 1- or 2-room HDB flats. However, food insecurity was spread across larger housing type configurations as well. Household heads of food-insecure families tended to have lower educational attainment compared to their food-secure counterparts. Low income is typically positively correlated with the experience of food insecurity; this report reiterates that income is a persistent factor in food insecurity, with 79% of the reasons cited for food insecurity being centred on financial constraints. Non-monetary concerns such as time constraints, restricted mobility, incarceration, spouse bereavement and family breakdown were also reported.

Food insecurity is associated with both physical and mental health detriments. Food-insecure participants were more likely to be in the high-risk body mass index (BMI) category compared to food-secure participants and also more likely to eat only one main meal a day. Psychologically, food-insecure participants reported a slew of negative emotions such as sadness, embarrassment and hopelessness.

In terms of food assistance, only 22% of food-insecure households were receiving food support from an organisation at the time of being interviewed. Despite the inadequate outreach, a small proportion (20%) of those receiving help reported that food relief made a lasting impact on their lives. Even so, there was significant disenchantment with food support, perhaps because food assistance cannot be a long-term solution to food insecurity if the root cause is income-related.

Recommendations discussed in the report include the following.

Tackle misalignment of food support: This study finds that the majority of food-insecure households are not receiving adequate food support. There needs to be more strategic coordination of food support to these households. Geographical mapping of areas where vulnerable households reside can aid in identifying food-insecure neighbourhoods and informing food aid organisations. At the national level, more strategic coordination of food support should involve multi-sector partnerships that encompass the relevant and

diverse stakeholders in the food support ecosystem. These include the government and non-profit and private sectors.

Prioritise nutritious and healthy eating among Singapore households: Only 40% of the individuals who participated in the survey had a BMI in the healthy range, regardless of their food security status. Rigorous national campaigns to encourage healthy eating should continue and be further amplified. As cost was listed as a major deterrent to choosing healthier food options, this aspect should be further explored. If healthier food options do not necessarily mean higher costs, this message should be incorporated into healthy eating campaigns.

Increase the level of awareness about food insecurity in Singapore: Only 28% of food-secure participants reported having personal affiliations with food-insecure families. The lack of awareness about food insecurity in Singapore, especially among food-secure households, warrants attention and action. Information and education on food insecurity is required in order to cultivate empathy and awareness that this is a pertinent issue in Singapore.



01

WHAT IS
FOOD INSECURITY?

As defined in an earlier report by the Lien Centre for Social Innovation (Glendinning *et al.*, 2018), food security is achieved ‘when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life’. In contrast, household food insecurity comes about when a household does not have, or is not confident of having, ‘economic and physical access to sufficient, acceptable food for healthy life’. Further, the absence of hunger is not seen as a sign of food security. Limited access to adequate nutritious food for a stretch of time (weeks or months) may deem a household to be food insecure. According to Anderson (1990), food insecurity occurs whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain.

The current study utilised the Household Food Security Survey Module to determine food security status (see ‘Methodology’ section on page 18 for details). According to McKay, Haines and Dunn (2019), in order to achieve food security four dimensions need to be taken into account. The first, availability, refers to the reliable and consistent provision of quality food for an active and healthy life and may include home food production, transportation and exchange systems for food. The second, access, refers to sufficient economic and physical resources to acquire food. The third, utilisation, refers to the ability to transform food into meals; and the last, the dimension of stability, recognises that food insecurity may be transient, cyclical or chronic.

Severity levels of food insecurity may range from concerns and adjustments in household food management—including reduced quality of diet—to households with children who have reduced children’s food intake to an extent where children might experience hunger. In the middle of the range lie households where the intake of food is reduced for the adults but is not observed among the children.

While enough attention has been paid to the problem of hunger and food insecurity in developing nations, the prevalence of food scarcity and food deprivation among the poor in many affluent nations is now gaining recognition. National reports from a host of developed countries such as the US, UK, Canada, Netherlands and Australia are available. However, there is no report or study in Singapore from which a national prevalence rate of food insecurity can be derived. The current study aims to make a novel attempt in generating such insights through the use of validated food insecurity measures.



As defined in an earlier report by the Lien Centre for Social Innovation (Glendinning *et al.*, 2018), food security is achieved ‘when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life’.

THE CURRENT STUDY



Study Sample

In order to ensure that the survey sample was nationally representative, participants were recruited via two customised random samples of residential addresses from the Department of Statistics, Singapore. While our target sample size was 1,000 participants, we sampled 2,500 addresses due to an expected non-response rate of 40%. The actual response rate of the current study was 56.7%. The field interviewers collected survey data between July and December 2019. The sampling process was based on the following criteria.

Sample 1: 1,500 addresses

This customised frame comprised addresses that had at least one Singaporean or permanent resident (PR) residing within, and was divided into detailed housing types: HDB 1- to 2-room, HDB 3-room, HDB 4-room, HDB 5 rooms and Larger, Landed Properties, Condominiums and Other Private Flats, and Others. The number of addresses to be selected from each detailed housing type was proportionate to the housing type distribution in Singapore. Within each detailed housing type, the addresses were further distributed proportionately by planning region (Central, East, North, North-East, West). The required number of addresses were then randomly selected from each planning region.

Sample 2: 1,000 addresses

This customised frame consisted of only HDB 1- to 3-room flats that had at least one Singaporean or PR residing within, and was divided into their detailed housing types: HDB 1- to 2-room and HDB 3-room. Similar to sample 1, the number of addresses to be selected from each detailed housing type was proportionate to the housing type distribution of the frame. Within each detailed housing type, the addresses were further distributed proportionately by planning region (Central, East, North, North-East, West). The required number of addresses were then randomly selected from each planning region.

This oversampling of HDB 1- to 3-room flats was done to cover a substantial number of low-income households that would be likely to experience food insecurity. Adequate coverage of such households and their views and insights would enable us to better understand the food insecurity situation. Due to this oversampling, weighting was done for the analysis.



Rationale behind Weighted and Unweighted Distribution

This study is guided by a two-fold objective: first, it aims to provide a representative statistic of food insecurity in Singapore, and second, it aims to closely examine a representative sample of food-insecure households in Singapore and zoom in on their socio-demographic profile as well as the extent, causes and consequences of the food insecurity experienced. In order to address this dual purpose, analysis is done in two ways: weighted and unweighted distribution analysis.








Importance of Weighted Distribution: Despite our best efforts to ensure the representativeness of the study sample using the above random sample frames, the sample statistics matched the national distributions only in some categories of demographic variables, but not all. This was also because we over-sampled the HDB 1- to 3-room households. Hence, we decided to weight the sample distribution in order for it to be closely matched to the national distribution on the demographic variables that we were interested in. If the sample data is not representative of the larger population, the ability to make inferences about the population based on analysis of the sample data is reduced. Weighting some observations more than others can be thought of as rebalancing the sample data so that any subsequent analysis better reflects what we would expect if we could analyse the entire population. Thus, the weighting process enabled us to make some generalised conclusions about food insecurity in Singapore.

We weighted our sample distribution to match the national distribution on three main variables: housing type, ethnicity and highest educational level attained. Due to large amounts of incomplete data on the variable of

income, we did not include it in our analysis and instead used the housing type as a proxy for income level. In Singapore, housing type is correlated with income and can be used as a proxy measurement for socioeconomic status (Ng, Tan, Gunapal, Wong & Heng, 2014; Lwin, Malik, Kang & Chen, 2018). Following the weighting process, the sample distributions were statistically similar to the latest (2018–19) general population distributions retrieved from the Singapore Department of Statistics (DOS) website (<https://www.singstat.gov.sg/>), thus giving us confidence



Exhibit 2.1. Example of the Weighting Sample Distribution per Population Distribution

Housing Type Singapore Population Stats vs. Current Study Sample Stats			
	SG Percent	Sample Percent	Weight Assigned = Population % Divided by Sample %
 HDB 1- & 2-room flats	6.1	32.6	0.187
 HDB 3-room flats	17.6	15.9	1.106
 HDB 4-room flats	31.7	27.1	1.160
 HDB 5-room flats/executive flats	23.2	19.9	1.160
 Private condominiums /other private flats	15.9	4.6	3.456
 Landed property	5.1	0.9	5.666
 Total	100.0	100.0	

Note: SG Percent = percentage of that housing type configuration in the Singapore national distribution.

in the representativeness of our findings. We chose the above three variables as they have been shown in previous studies to strongly influence food insecurity (Hernandez, Reesor & Murillo, 2017; Tabrizi, Nikniaz, Sadeghi-Bazargani, Farahbakhsh & Nikniaz, 2018; McKay, Haines & Dunn, 2019). As an example, the weighting process for the housing type distribution is shown in Exhibit 2.1. The national level statistics for housing type were retrieved from the DOS website. These statistics were then compared to the sample statistics, and corresponding weights were assigned in order to balance the sample distribution and map it closely to the national distribution.

Importance of Unweighted Distribution: In line with our intent to get deep insights into food-insecure households in Singapore, we over-sampled the HDB 1- to 3-room flats. As expected, we found that the majority of food-insecure households resided in such flats. While the weighted distribution above enabled us to compare food-secure and food-insecure households, the unweighted distribution of food-insecure households facilitated a closer examination of the experiences of food-insecure households. Hence, some sections of our analysis below use the unweighted sample of food-insecure households to apprise readers of what this group looks like.

Methodology

Data was gathered in two distinct phases for this research project:

Phase 1 Survey of Singapore citizens and PRs

Phase 2 Qualitative interviews with food-insecure Singapore citizens and PRs

Phase 1: Survey of Singapore Citizens and PRs

Doors of all addresses were knocked on, and the participants' consent were obtained before the survey was carried out. The surveys were conducted face to face by a trained field interviewer, and all participants received either \$10 or \$30 in NTUC vouchers as a token of appreciation for their participation. The field interviewers requested to speak to a household member who was at least 18 years old and able to speak about the food situation in the household. The amount of incentive depended upon the survey length (it was longer for food-insecure and shorter for food-secure participants). A total of 1,206 usable surveys were collected.

Survey Tool: The Household Food Security Survey Module (HFSSM) previously used in the 2004 Canadian national report on income-related household food insecurity in Canada was used to determine the food security status. This module is composed of 18 items—a ten-question Adult Food Security Scale to measure food security among adults in the household and an eight-question Child Food Security Scale to measure food security among children in the household. Children

and adults were defined as 'food secure', 'moderately food insecure' or 'severely food insecure' depending on the number of affirmative responses given to the scale questions (Collins, 2009). Exhibit 2.2 shows the definitions of food security, moderate food insecurity and severe food insecurity, and how they correspond to the questions on the HFSSM. The HFSSM is a household measure that assesses the food security situation of adults and children as a group within a household, but not the food security status of each member residing in the household. Therefore, it is possible that all members of a household may not share the same food security status.

In addition to the above classification, we also computed a composite food insecurity score by summing the raw scores on each of the adult items of the HFSSM. Under this computation, scores ranged from 7 (lowest) to 21 (highest). Higher scores indicated greater food insecurity. The derivation of the overall food insecurity score for each household facilitated analyses of food insecurity with some of our continuous variables such as mental well-being and level of awareness of food insecurity.

While the HFSSM measures food insecurity due to a lack of money or resources, we were interested in understanding other factors that may predispose households to food insecurity. Hence, we added more questions to cover the non-monetary reasons behind food insecurity. Further, we asked questions about food assistance (frequency, benefits, adequacy), consequences of food insecurity, perceptions about food insecurity, and psychological well-


being. Specifically for psychological well-being, we used Kessler *et al.*'s (2002) six-item non-specific Psychological Distress Scale. Sample questions include, 'In the last 30 days, how often did you feel... restless and fidgety, worthless, etc.?'

Phase 2: Qualitative Interviews with Food-Insecure Singaporeans and PRs

Following the surveys in Phase 1, qualitative interviews were carried out to delve into the lived experiences of individuals identified as food insecure in Phase 1. Twenty participants were randomly selected from a list of food-insecure participants who had indicated during the survey that they were willing to be contacted for this phase. The interviews were semi-structured, and interviewees were asked questions regarding the challenges faced in obtaining food, psychological and physical health impacts of food insecurity, the kind of support that was available, quality of food support received, how food support might be improved, etc. The interviews were audio-recorded and transcribed with the consent of interviewees and were used in the 'Real Stories' section to capture a snapshot of the lived experiences of food-insecure households.

Following the surveys in Phase 1, qualitative interviews were carried out to delve into the lived experiences of individuals identified as food insecure in Phase 1.

Exhibit 2.2. Food Security Status Determined by the Number of HFSSM Questions Answered Affirmatively by the Respondent on Behalf of the Household

 Food Security Status		
Category Labels	Category Description	
	10-Item Adult Food Security Scale	8-Item Child Food Security Scale
Food-Secure	Zero or one, indication of difficulty with income-related food access 0 or 1 affirmative response	Zero or one, indication of difficulty with income-related food access 0 or 1 affirmative response
Food-Insecure, Moderate	Indication of compromise in quality and/or quantity of food consumed 2 to 5 affirmative responses	Indication of compromise in quality and/or quantity of food consumed 2 to 4 affirmative responses
Food-Insecure, Severe	Indication of reduced food intake and disrupted eating patterns ≥6 affirmative responses	Indication of reduced food intake and disrupted eating patterns ≥5 affirmative responses



RESULTS



Descriptive Results

The results are divided into seven subsections. The ‘Descriptive Results’ section provides a glimpse of the unweighted sample distributions with regard to socio-demographic variables. The ‘Inferential Results’ section reports the findings from the weighted distributions in order to draw some generalised conclusions about food insecurity in Singapore. The subsequent five sections take a closer look at food-insecure households, covering the causes of food insecurity, the impact of food insecurity, findings on food assistance, awareness of food insecurity, and finally some real stories of food-insecure households.

The demographic characteristics of our study sample are presented in Table 3.1, split by food security status. Note that the table represents the unweighted distribution and allows for a closer look at the food-insecure group’s socio-demographic profile. The percentages should **not** be used to generalise the Singapore population as they are merely descriptive of our sample. Generalisable statistics are found in the inferential results.

Table 3.1. Food Security Status According to Socio-demographic Status

Demographic Variable	Food Security Status	
	Food-Secure N (% of total)	Food-Insecure N (% of total)
Total	997.0 (82.7)	209.0 (17.3)
Age (years)		
18-35	202.0 (16.7)	58.0 (4.8)
36-50	227.0 (18.8)	44.0 (3.6)
51-65	275.0 (22.8)	45.0 (3.7)
66-80	243.0 (20.1)	53.0 (4.4)
> 80	50.0 (4.1)	9.0 (0.7)
Family Size		
1-4 persons	795.0 (66.0)	168.0 (13.9)
5 or more persons	201.0 (16.7)	41.0 (3.4)
Gender		
Male	432.0 (35.9)	100.0 (8.3)
Female	563.0 (46.8)	109.0 (9.1)
Marital Status		
Married	613.0 (50.8)	97.0 (8.0)
Single	250.0 (20.7)	65.0 (5.4)
Divorced/Separated	56.0 (4.7)	25.0 (2.1)
Widowed	78.0 (6.5)	22.0 (1.8)
Employment Status		
Employed full-time	375.0 (31.1)	46.0 (3.8)
Employed part-time	100.0 (8.3)	27.0 (2.2)
Self-employed	65.0 (5.4)	7.0 (0.6)
Unemployed	457.0 (37.9)	129.0 (10.7)

Demographic Variable	Food Security Status	
	Food-Secure N (% of total)	Food-Insecure N (% of total)
Total	997.0 (82.7)	209.0 (17.3)
Ethnicity		
Chinese	713.0 (59.1)	107.0 (8.9)
Malay	119.0 (9.9)	73.0 (6.1)
Indian	130.0 (10.8)	23.0 (1.9)
Others	35.0 (2.9)	6.0 (0.5)
Housing Type		
1- & 2-room HDB flats	248.0 (20.5)	133.0 (11.0)
3-room HDB flats	161.0 (13.3)	31.0 (2.6)
4-room HDB flats	296.0 (24.5)	31.0 (2.6)
5-room HDB flats	232.0 (19.2)	8.0 (0.7)
Private condominiums /other private flats	49.0 (4.1)	6.0 (0.5)
Landed property	11 (0.9)	0.0
Educational Qualifications		
Below secondary	272.0 (22.6)	73.0 (6.1)
Secondary	284.0 (23.5)	71.0 (5.9)
Post-secondary	144.0 (11.9)	38.0 (3.2)
Diploma	70.0 (5.8)	10.0 (0.8)
University and above	227.0 (18.8)	17.0 (1.4)

Next, we move on to the inferential results, which will help to unpack some of the descriptive results and enable us to determine whether the differences/associations are real.

Inferential Results

Who Experiences Food Insecurity in Singapore?

In order to answer the question of who experiences food insecurity in Singapore, we present the food security distribution vis-à-vis three main demographic variables: housing type, ethnicity and educational attainment.

First, we derived an overall percentage of food-insecure households in Singapore. Our sample distribution was not representative of the 2019 national housing type distribution, so we weighted the distribution such that the chi-square goodness of fit test¹ indicated that the number of participants from different housing types in the analysis was not statistically different from proportions found in the general population, $\chi^2(5) = 0.23, p = .999$.

After establishing the representativeness of the weighted spread, we computed the percentage of resident households that experienced food insecurity in the last 12 months.

Figure 3.1 shows the nationally representative overall percentage of food insecurity in Singapore. A total of 10.4% (95%CI: 8.7–12.3) of resident households experienced food insecurity in the last 12 months. Of these households, 3.5% (95%CI: 2.5–4.6) experienced severe food insecurity, while the remaining 6.9% (95%CI: 5.6–8.6) were moderately food insecure.

With respect to households that experienced both adult and child food insecurity, they made up 3.5% of the overall sample (N = 1194). However, within food-insecure households only (N = 125), 33% (N = 42) experienced both adult and child food insecurity. Table 3.2 shows the cross-tabulation of food security status and whether the households had children or not.

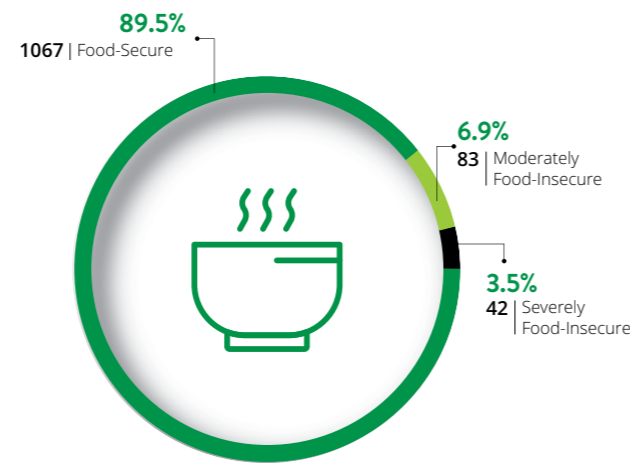


Figure 3.1. Percentage of Sample Resident Households Experiencing Food Insecurity

Table 3.2. Households With or Without Children and Food Security Status

Food Security Category	Households	
	Without Children	With Children
Food-Secure	720.0	346.0
Food-Insecure	83.0	42.0

In sum, we can state that food-insecure households are more likely to reside in 1- and 2-room HDB homes compared to food-secure households.

Next, we examined the prevalence of food insecurity by housing type. For that, we constructed a cross-tabulation of housing types with food insecurity categories inclusive of observed frequencies, expected frequencies as well as adjusted standardised residuals (see Table 3.3). A chi-square test for association² was run to determine how these two categorical variables (i.e., housing type and food security status) relate to one another. There was a statistically significant association between the two, $\chi^2(10) = 84.12, p < .001$. However, the association between housing type and food security was small, Cramer's V = 0.188, $p < .001$. While the chi-square test for association determines whether there is an association between two variables, it does not provide further details of this association (e.g., which cells deviate from independence). A recommended approach is

to do a cell-by-cell comparison of the adjusted standardised residuals.³ As seen in Table 3.3, the largest adjusted residuals are found in the 1- and 2-room HDB flats and food security grouping cells. While for the food-secure category a negative residual indicates that the observed number of food-secure 1- and 2-room HDB dwellers was lower than the expected frequency, the converse is true for the food-insecure groups. There were far more food-insecure households (observed N = 25, expected N = 7) than would be expected if there was no association between housing type and food insecurity status.⁴

In sum, we can state that food-insecure households are more likely to reside in 1- and 2-room HDB homes compared to food-secure households.

Table 3.3. Housing Type Distribution and Food Security Category Cross-tabulation

Housing Type		Count	Food-Secure	Moderately Food-Insecure	Severely Food-Insecure	Total
			Expected Count	Adjusted Residual		
1- & 2- room HDB	Count	46.0	15.0	10.0	71.0	
	Expected Count	63.6	4.9	2.4	71.0	
	Adjusted Residual	-7.1	4.8	5.1		
3-room HDB	Count	178.0	24.0	10.0	212.0	
	Expected Count	189.9	14.8	7.3	212.0	
	Adjusted Residual	-3.0	2.7	1.1		
4-room HDB	Count	343.0	20.0	16.0	379.0	
	Expected Count	339.5	26.6	13.0	379.0	
	Adjusted Residual	0.7	-1.6	1.0		
5-room HDB	Count	269.0	7.0	2.0	278.0	
	Expected Count	249.1	19.4	9.6	278.0	
	Adjusted Residual	4.5	-3.3	-2.8		
Pvt Condo	Count	169.0	17.0	3.0	189.0	
	Expected Count	169.3	13.2	6.5	189.0	
	Adjusted Residual	-0.1	1.2	-1.5		
Landed	Count	62.0	0.0	0.0	62.0	
	Expected Count	55.5	4.3	2.1	62.0	
	Adjusted Residual	2.8	-2.2	-1.5		

The second demographic variable that was used for drawing comparative conclusions was ethnicity. In terms of ethnicity, our study sample was seemingly close to the population level distribution of the ethnic groups published in 2018 but still did not meet the chi-square test of goodness of fit. Hence, the ethnic distribution was weighted in order to map it to the national distribution. The weighted distribution passed the chi-square test of goodness of fit, indicating that ethnicity was similarly distributed in the participants as in the general population ($\chi^2(3) = 3.92, p = .270$). In order to determine which ethnic groups experience more food insecurity than others, we looked at the percentages of food-secure and food-insecure individuals in each ethnic community. Figure 3.2 shows that four out of every ten individuals from the Malay community sample experienced food insecurity. We wanted to check whether this seemingly apparent association between food insecurity and membership of a certain ethnic group was

statistically significant. A chi-square test for association was conducted between ethnicity and food security. There was a statistically significant association between the two, $\chi^2(6) = 63.50, p < .001$. The association between ethnicity and food security was small, Cramer's V = 0.162, $p < .001$. However, we were interested in knowing which ethnic group contributed the most to this small yet significant association. In order to ascertain that, we examined the adjusted standardised residuals for each cross-tabulation cell. As shown in Table 3.4, the three largest adjusted standardised residuals were for the Malay ethnic group. For instance, the observed number of Malay families who were food-secure was 30% lower than the expected number (observed N = 90, expected N = 129). Conversely, more than double the number of Malay families fell into the food-insecure category (observed N = 59, expected N = 25) than would be expected if there was no association between ethnicity and food security.

Table 3.4. Ethnic Distribution and Food Security Category Cross-tabulation

Ethnicity			Moderately		Severely	Total
			Food-Secure	Food-Insecure	Food-Insecure	
Chinese	Count	784.0	75.0	43.0	902.0	
	Expected Count	752.9	92.1	56.9	902.0	
	Adjusted Residual	5.6	-3.8	-3.8		
Malay	Count	95.0	33.0	26.0	154.0	
	Expected Count	128.5	15.7	9.7	154.0	
	Adjusted Residual	-7.8	4.9	5.8		
Indian	Count	91.0	11.0	5.0	107.0	
	Expected Count	89.3	10.9	6.8	107.0	
	Adjusted Residual	0.5	0.0	-0.7		
Others	Count	35.0	4.0	2.0	41.0	
	Expected Count	34.2	4.2	2.6	41.0	
	Adjusted Residual	0.3	-0.1	-0.4		

Another set of residuals that was larger than 3 was for the Chinese ethnic group, indicating that they may have a role to play in the association between ethnicity and food insecurity. However, this was not cause for concern because the negative valence of the residuals indicated that the observed count for food insecurity (N = 118) among the Chinese was less than the number of families expected to report food insecurity (expected count N = 143).

Taken together, the above findings indicate that while **food insecurity is prevalent in all ethnic communities in Singapore, the gap between food security and insecurity is smallest for the Malay community**. This finding has important implications for food assistance being culturally appropriate and sensitive.

Next, we looked at the educational attainment reported by participants who were also the heads of their household and presumably one of the earning members or the sole earning member of the household. A total of 595 participants reported themselves to be the head of the household. In terms of highest educational qualification achieved by the head of the household, our study sample did not match closely to the population level distribution published in 2019 and did not meet the chi-square test of goodness of fit. Hence, the educational achievement spread was weighted in order to map it to the 2019 national distribution. The weighted distribution passed the chi-square test of goodness of fit, indicating that ethnicity was similarly distributed in the weighted distribution as in the general population ($\chi^2(4) = 0.37, p = .989$).

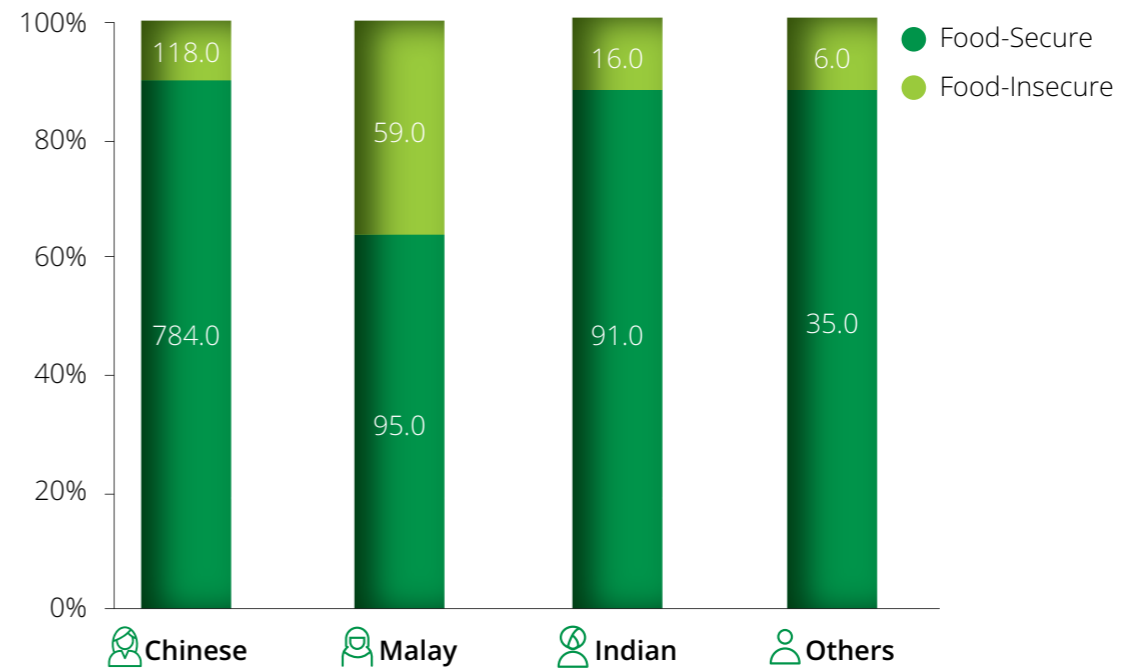


Figure 3.2. Ethnic Distribution of Food Security

This implies that food-insecure families tended to have heads of household with lower educational qualifications (much less likely to have a university-level education) than food-secure families.

Figure 3.3 shows that the educational level of food-insecure heads of household was markedly lower than that of food-secure heads of household participants, with 36% of food-insecure participants having 'below secondary' as their highest attained educational qualification.

Additionally, we ran the chi-square test for association to decipher whether there was a statistically significant association between educational level attained and food insecurity. There was a statistically significant association between the two, $\chi^2(8) = 21.7, p < .001$. However, this statistically significant association between educational level and food security was small, Cramer's $V = 0.14, p < .001$. In order to understand which

educational category made the largest contribution to this overall small yet significant association, we again examined the adjusted residuals. As shown in Table 3.5, the two largest residuals (absolute value above 3) were found for university-educated participants. The observed counts for food-insecure participants were markedly lower than the expected counts for this category (observed $N = 13$, expected $N = 33$).

This implies that food-insecure families tended to have heads of household with lower educational qualifications (much less likely to have a university-level education) than food-secure families.

Table 3.5. Educational Level of Head of Household and Food Security Category Cross-tabulation

Educational Level		Food-Secure	Moderately Food-Insecure	Severely Food-Insecure	Total
Below Secondary	Count	120.0	22.0	15.0	157.0
	Expected Count	129.8	17.7	9.5	157.0
	Adjusted Residual	-2.4	1.3	2.1	
Secondary	Count	77.0	13.0	7.0	97.0
	Expected Count	80.2	10.9	5.9	97.0
	Adjusted Residual	-0.9	0.7	0.5	
Post-secondary	Count	41.0	7.0	5.0	53.0
	Expected Count	43.8	6.0	3.2	53.0
	Adjusted Residual	-1.1	0.5	1.1	
Diploma	Count	79.0	13.0	7.0	99.0
	Expected Count	81.9	11.1	6.0	99.0
	Adjusted Residual	-0.8	0.6	0.5	
University	Count	175.0	12.0	2.0	189.0
	Expected Count	156.3	21.3	11.4	189.0
	Adjusted Residual	4.4	-2.6	-3.5	

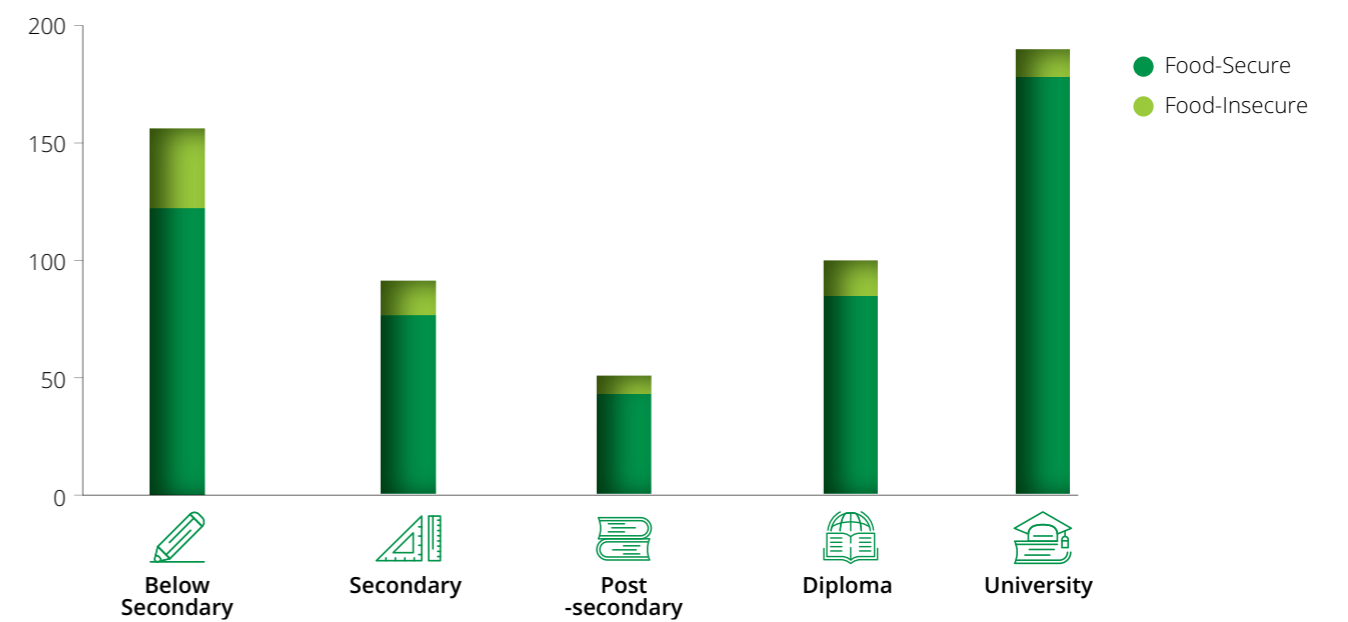


Figure 3.3. Educational Level Distribution of Food Security



Causes of Food Insecurity

The subsequent subsections pertain specifically to the food-insecure households in our sample and represent analysis done with the unweighted sample distributions. While income seems to be a plausible etiological factor in explaining the existence of food insecurity, we explored both monetary and non-monetary reasons that may predispose individuals/households to struggle with having their food needs met. However, the top five reasons for not having enough food pointed towards financial constraints as pertinent factors (see Figure 3.4), with mortgage/rental payments and job loss being the most frequently cited reasons.

Other non-monetary reasons for food insecurity seemed to centre around restricted mobility, incarceration, spouse bereavement, family breakdown, and the inability to cook due to a lack of time.

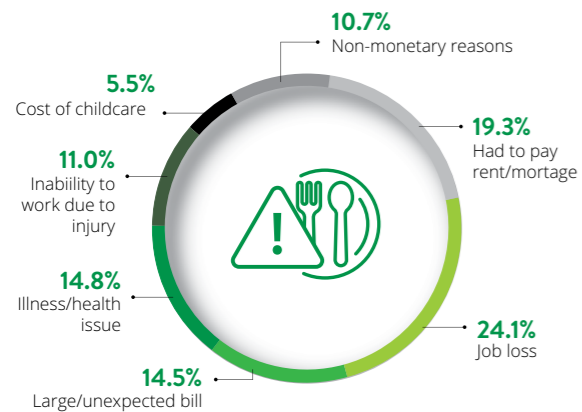


Figure 3.4. Common Reasons Cited by Food-Insecure Participants for Their Food Insecurity

Impact of Food Insecurity

Physical Health

Food insecurity seems to have a negative impact on an individual's physical health. In the current study, we used BMI as an indicator of physical health. While BMI is only one of many useful indicators of physical health, it has the benefits of being quick and easy to calculate by a simple formula requiring the weight and height of a person (Ministry of Health, Singapore, n.d.). A healthy BMI is between 18.5 and 25; a score outside this range is considered to be high risk. A person with a BMI between 25 and 30 is considered overweight, and a person with a BMI over 30 is considered obese. A person is considered underweight if the BMI is less than 18.5. A closer inspection of the food-insecure groups revealed that 60% of the food-insecure participants were in the moderate to high-risk BMI range.

Table 3.6 shows the counts and percentages of participants from food security categories and their respective BMI ranges. It is evident that a substantial percentage of moderately (37.2%, 47 of 126) and severely (32.9%, 26 of 79) food-insecure participants are in the high-risk categories, while this percentage is lower (24.5%, 238 of 971) in the case of food-secure participants. Follow-up tests for association between BMI and food insecurity revealed that there was a significant association between BMI and whether or not participants were food insecure ($\chi^2(6) = 13.61, p = .034$). There was a highly strong association between BMI and food insecurity, Cramer's V = 0.076, $p = .034$. This implies that **food-insecure participants are more likely to be in the high-risk BMI category compared to food-secure participants.**

It is interesting to note that the percentages of individuals in the healthy range were not starkly different across the three categories (40.6%, 35.7% and 39.2% for food-secure, moderately food-insecure and severely food-insecure, respectively). Perhaps this implies that an overall impetus for healthy eating is required to encourage all individuals (irrespective of their food security status) towards optimal physical health.

Table 3.6. BMI Ranges of Food-Insecure Participants

BMI Range	Food Security Category		
	Food-Secure	Moderately Food-Insecure	Severely Food-Insecure
Healthy Range	394.0 (40.6%)	45.0 (35.7%)	31.0 (39.2%)
Moderate Risk	339.0 (34.9%)	34.0 (26.9%)	22.0 (27.8%)
High Risk—Overweight	176.0 (18.1%)	36.0 (28.5%)	22.0 (27.8%)
High Risk—Underweight	62.0 (6.4%)	11.0 (8.7%)	4.0 (5.1%)
Total	971.0 (100%)	126.0 (100%)	79.0 (100%)



However, the food-insecure participants' responses to other survey questions about their subjective experiences, factors determining food choices, and daily food intake help to throw light on their general trend towards poorer physical health. For instance, they were asked to indicate the **experiences** they had because of not having enough food for themselves or other family members. Nearly 50% of food-insecure participants **reported feeling unwell and becoming lethargic (among other issues) due to a lack of access to food** (see Figure 3.5).

Nearly 50% of food-insecure participants reported feeling unwell and becoming lethargic (among other issues) due to a lack of access to food.

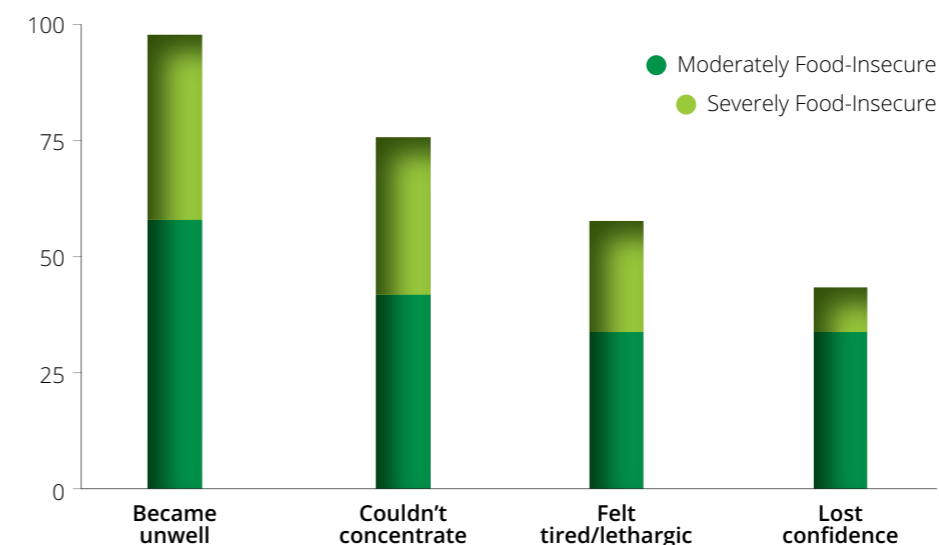


Figure 3.5. Experiences Accompanying Food Insecurity

Further, in order to investigate how factors such as nutritional value, affordability, easy availability, safety and taste affect participants' food choices, we asked participants to rank them from the most important to least important. Figure 3.6 shows a comparison between food-secure and food-insecure households on how they differed in ranking each of these factors as their number one (most important) factor determining their food choices. It is evident that affordability was the most important choice for food-insecure participants, while nutritional value was endorsed as the most important factor only 13% of the time. This emphasis on affordability and reduced attention to nutritional value among food-insecure households sheds light on the possible link between income and food insecurity, as well as the reasons why food-insecure participants reported poorer physical health (BMI).

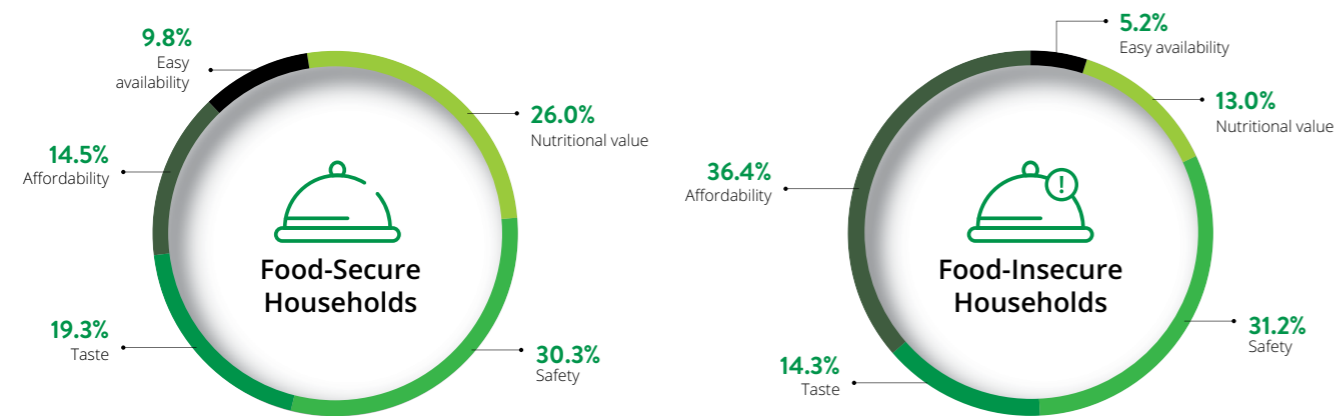


Figure 3.6. Factors Determining Food Choices

It is evident that affordability was the most important choice for food-insecure participants, while nutritional value was endorsed as the most important factor only 13% of the time.

Another survey question examined whether or not participants paid attention to healthier-choice options while buying groceries and food items (see Figures 3.7a and 3.7b). It is clear that there was a significantly larger proportion of individuals in the food-secure group who always looked for healthier choices (22.3%) compared to those in the food-insecure group (15.3%). The top reasons cited for not looking for healthier choices were: 'Healthier options are costly', 'Healthier options are not easily available', and 'I don't care/bother about these options'.

In order to ensure that this difference was statistically significant, we ran the independent-samples t-test.⁵ Attention to the food choices required for a healthy body was significantly lower among the food-insecure participants ($M = 4.36$, $SD = 1.18$) compared to the food-secure participants ($M = 4.65$, $SD = 1.03$), $t(1203) = 3.66$, $p < .001$.

In other words, **food-insecure participants were much less likely to pay attention to healthier food choices compared to food-secure participants. The main reasons given by food-insecure participants for this were cost as well as availability.**

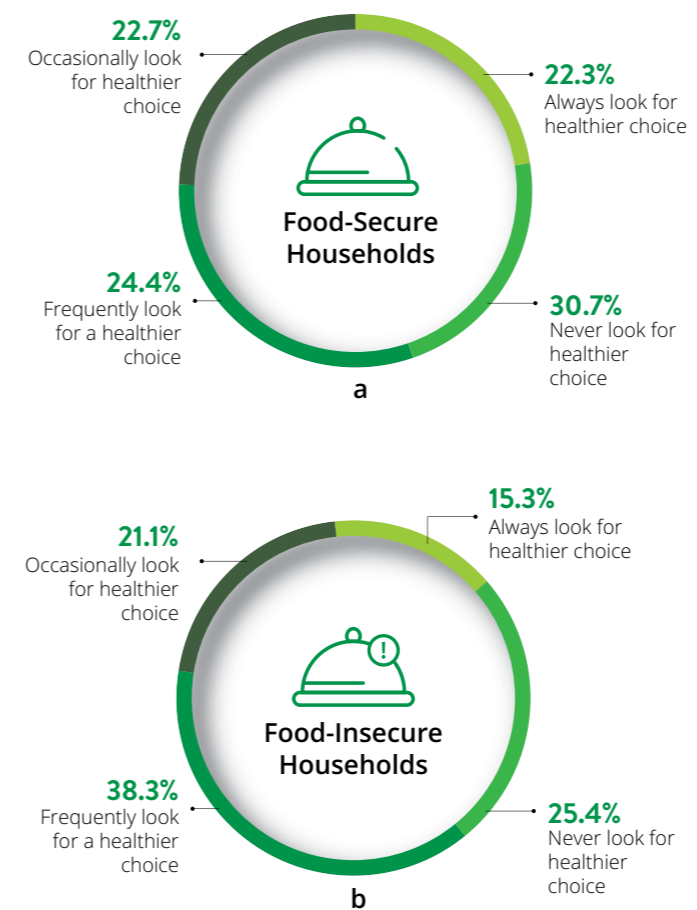


Figure 3.7. a. Attention Paid to Healthier Food Choices by Food-Secure Participants, and b. Attention Paid to Healthier Food Choices by Food-Insecure Participants

In other words, food-insecure participants were much less likely to pay attention to healthier food choices compared to food-secure participants. The main reasons given by food-insecure participants for this were cost as well as availability.

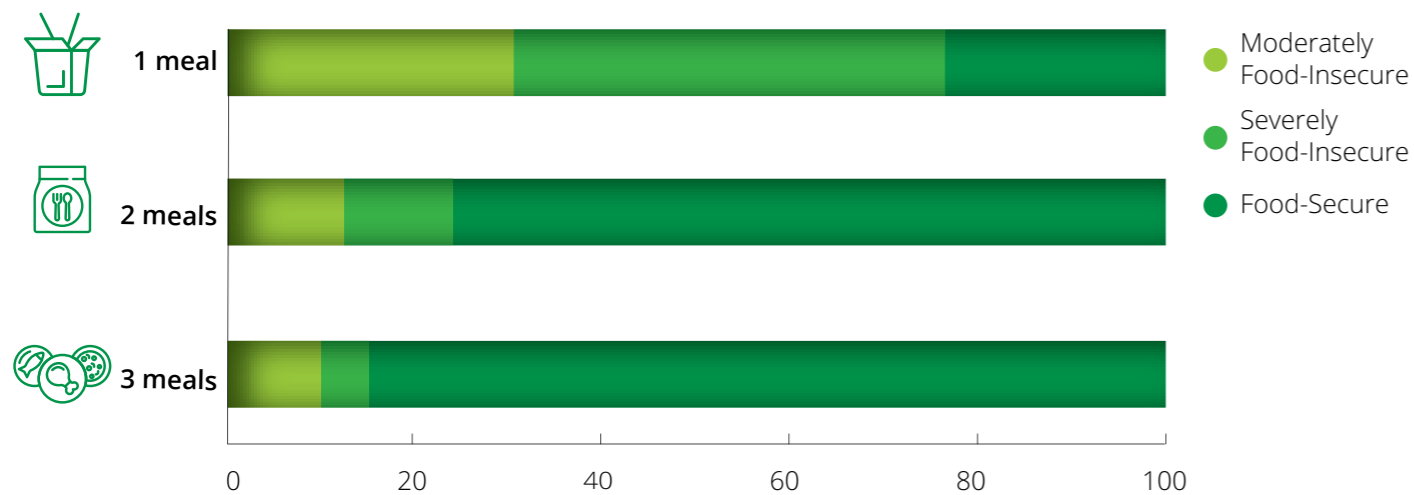


Figure 3.8. Number of Main Meals Eaten by the Three Food Security Groups

In addition, the optimal number of main meals consumed in a day (three meals) was not a given for moderately and severely food-insecure households. Of the 13 participants who said that they ate just one meal a day, 10 (77%) were from food-insecure households. Figure 3.8 shows a comparison of the number of main meals eaten by food-secure and food-insecure participants. In order to ensure that this difference was statistically significant, we ran the chi-square test of independence. The test revealed that there was a significant difference between the main meals eaten by food-secure and -insecure participants ($\chi^2(3) = 48.39, p = .001$). This implies that **food-insecure participants are more likely to eat only one main meal a day compared to food-secure participants.**

This implies that food-insecure participants are more likely to eat only one main meal a day compared to food-secure participants.



Mental Health

The negative effects of food insecurity are not limited to physical health. Stress and depression were commonly experienced by those who did not have adequate food. Such participants also reported feeling sad, embarrassed and hopeless, among other negative emotions. Figure 3.9 shows that food-insecure participants experienced a range of negative emotions that had a likelihood of being deleterious to their mental well-being.

For this analysis, we computed a composite food insecurity score by adding the raw scores obtained by participants on the items of the HFSSM. Higher scores indicate greater food insecurity.

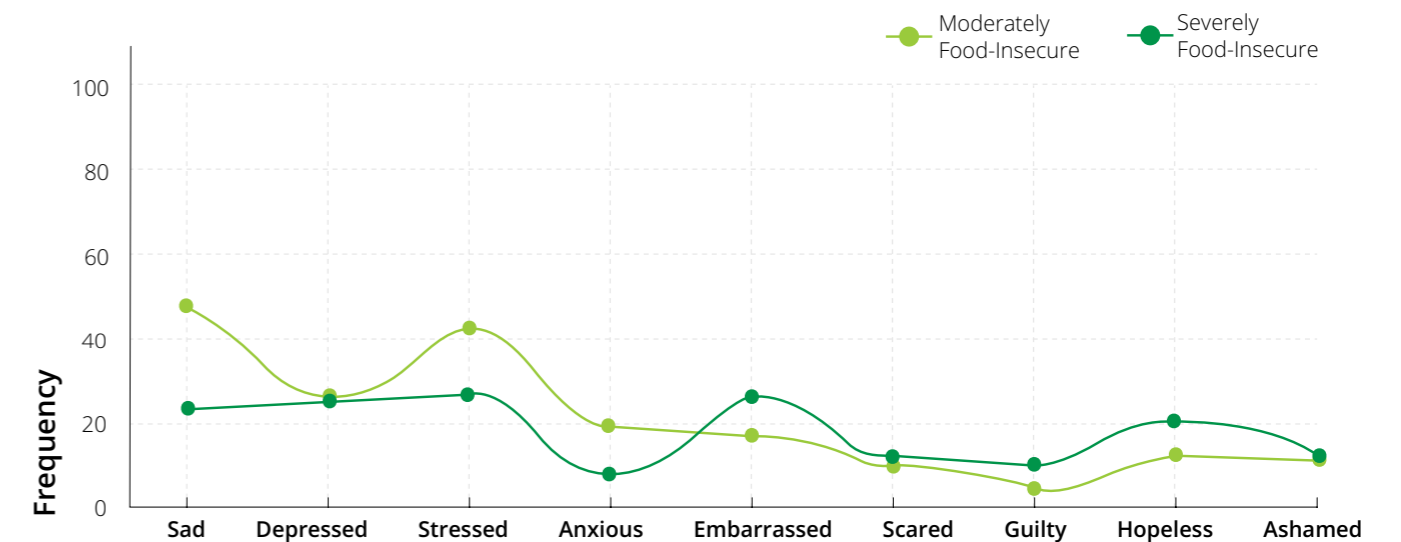


Figure 3.9. Emotions Experienced by Food-Insecure Participants

We ran a linear regression⁶ analysis to confirm whether the association between food insecurity and psychological distress was statistically significant and had predictive power. For this analysis, we computed a composite food insecurity score by adding the raw scores obtained by participants on the items of the HFSSM. Higher scores indicate greater food insecurity. When psychological distress was regressed on the composite food insecurity score, the results indicated that food insecurity explained 16.6% of the variance ($R^2 = .166, F(1, 1204) = 238.91, p < .01$) in psychological distress. The analysis revealed that food insecurity ($\beta = .41, t(1204) = 15.45, p < .01$) positively predicts psychological distress.

In order to compare the level of psychological distress experienced by food-secure versus food-insecure participants, we ran an independent-samples t-test. This analysis found that food-insecure participants had statistically significantly higher psychological distress ($M = 11.27, SD = 4.76$) compared to food-secure participants ($M = 7.55, SD = 3.40$), $t(1204) = 13.31, p < .001$.

Taken together, the above findings indicate that **food insecurity could predict poor mental well-being and that food-insecure individuals are more likely to report being psychologically distressed compared to food-secure individuals.**

Food Assistance

As shown in Table 3.7, only 22% (45 of 205) of food-insecure households were receiving food support from an organisation at the time of being interviewed. With close to 78% of those in need being left out from the food support supply chain, there is an urgent need to align this mismatch.

In a nearly ideal situation, we would expect that the association between food support received and level of food insecurity should be a positive one such that food-insecure families should receive food support, and families that experience greater food insecurity should receive greater support. A chi-square test for association was conducted between receiving food support and food insecurity status. The association between receiving food support and food insecurity status was not significant ($\chi^2(2) = 5.55, p = .062$). The effect size of this association measured via the Cramer's V coefficient was also not significant, $\phi = 0.148, p = .062$. **This means that food insecurity status and the likelihood of receiving food support were quite independent of each other, indicating no real relationship between the two.**

Table 3.7. Frequency of Food Support Received by Food-Insecure Households

	Food Security Category			
	Moderately Food-Insecure	Severely Food-Insecure	Total	
"Are you currently receiving food support from an organisation?"	Yes	30.0	15.0	45.0
	No	96.0	64.0	160.0
Total	126.0	79.0	205.0	

This means that food insecurity status and the likelihood of receiving food support were quite independent of each other, indicating no real relationship between the two.

The overall distribution of food-insecure households that sought food assistance versus those that did not seek help is shown in Figure 3.10. Of the total 209 food-insecure households, 130 did not seek food assistance. A substantial percentage of those that did not seek help were severely food insecure (42%, N = 53/130).



Figure 3.10. Percentage of Food-Insecure Households that Sought Food Support

Expanding on the reasons that prevented members of food-insecure households from seeking food support, the top three reasons given were:

- Embarrassment;
- Being unaware of food support; and
- A belief that others are in greater need.

Table 3.8 shows the percentages of food-insecure individuals who gave various reasons for not seeking food support.

Clearly, the data points towards the need to address the issue of social embarrassment and awareness about the availability of food support in order to better align the food distribution to where it is most needed.

A closer examination of the reasons given by respondents in the 'Others' category for not seeking food support revealed some insights that echo the disenchantment of a few people with the food support system. Some of the responses were:

"MPs were reluctant to help as respondents are young."

"Sometimes we end up not getting help but getting more trouble when we seek out an organisation."

"Sought help from charity, but they told me not to dream about getting monetary help."

"They rejected me, vegetarian food restricted."

Table 3.8. Reasons Cited by Food-Insecure Participants for Not Seeking Support

Reason for Not Seeking Food Support	Moderately Food-Insecure Group	Severely Food-Insecure Group
Embarrassment (afraid of what people will think)	12.6% (25)	10.5% (21)
Unaware of food support availability	13.1% (26)	14.1% (28)
Belief that others need it more	12.6% (25)	6.5% (13)
Lack of time and reduced personal mobility	4.5% (9)	3.5% (7)
Prefer to ask for help from close family and friends	3.5% (7)	4.0% (8)
Food provided will not suit needs/preferences	3.0% (6)	0.5% (1)
Shame (afraid of feeling inadequate)	1.5% (3)	4.0% (8)
Others	2.0% (4)	4.0% (8)

Figure 3.11 highlights the frequency of food support received by food-insecure households. Monthly support seems to be the most frequent form of food support given out to families.

More importantly, the light green bars in the figure highlight the fact that severely food-insecure families receive food support at a substantially low frequency, with negligible food support on a daily or weekly basis.



Figure 3.11. Frequency of Intervals at which Food Support was Received

Benefits and Limitations of Food Relief

Among those who accessed food support, many enumerated the benefits that accrued to them because of the support received. Recipients of food support (N = 45) suggested that they were able to spend on other necessities (78%) and felt less hungry (73%) because of the assistance received. Other commonly reported benefits included being able to concentrate/focus better and improvements in physical health

(see Table 3.9a). Emotional experiences associated with food support were also quite positive (see Table 3.9b). However, when we tried to assess the longevity of these core benefits (see Table 3.9c), we found that significantly, 20% (9 out of 45) of those receiving food support believed that the benefits made a long-term/lasting improvement in their lives. However, a whopping 80% believed that the relief was temporary, often lasting no more than a month or two (51%) or a couple of weeks (47%).

Table 3.9. a. Benefits of Receiving Food Support, **b.** Emotional Experiences of Receiving Help, and **c.** Longevity of Benefits Received

a		N/45
Felt less hungry		33.0
Felt less nauseous		2.0
Physical health improved		19.0
Work performance improved		26.0
Child(ren)'s school attendance improved		1.0
Child(ren)'s school performance improved		2.0
Able to afford small luxuries (e.g., toiletries, tea or coffee)		2.0
Able to spend on other necessities		35.0
Able to better plan for the future		3.0
More able to work look for work/get a job		2.0

b		N/45
Emotional experience of receiving help	Hopeful	36.0
	Relieved	42.0
	Hopeless	2.0
	Embarrassed	4.0
	Confident	5.0
	In control	1.0
	Ashamed	1.0
	Humiliated	1.0
	Calmer/less stressed	22.0
	Worried/more stressed	3.0

c		Moderately Food-Insecure	Severely Food-Insecure
"Approximately how long do you think these benefits lasted or made a difference in you life?"	Just for the day(s) I received assistance	9.0	4.0
	For about a week	13.0	5.0
	For a couple of weeks	17.0	4.0
	For a month or two	10.0	13.0
	Helped me make a long-term, lasting improvement to my life	5.0	4.0
Total		30.0	15.0



Further, when asked how satisfied they were (on a scale of 1 = 'extremely satisfied' to 5 = 'extremely dissatisfied') with the food support they received, 88.8% indicated being dissatisfied (see Figure 3.12). We suspect that this may have been in part due to the sporadic nature of food assistance in addition to the feeling of embarrassment that households face when receiving help.

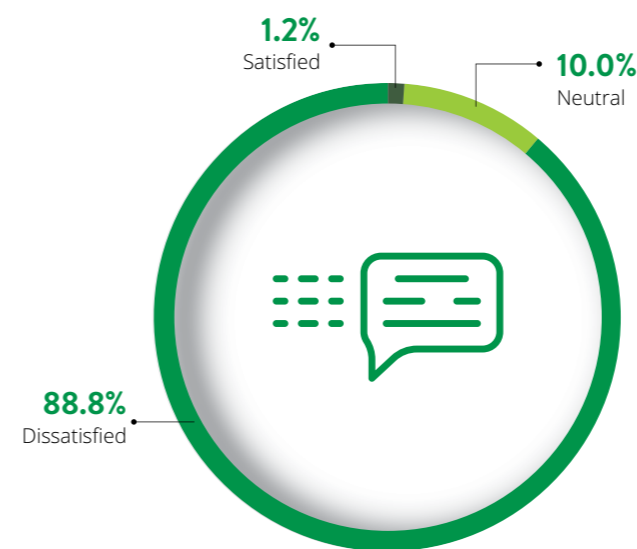


Figure 3.12. Level of Satisfaction with Food Support Received

Awareness and Perceptions about Food Insecurity in Singapore

In order to investigate the level of awareness surrounding food insecurity in Singapore, we asked participants whether they personally knew of families/households that did not get nutritious/healthy food on a regular basis. Figure 3.13 shows that food-secure participants had fewer affiliations with food-insecure families and households (21.9%, 219 of 996) compared to those who were food insecure (49.3%, 103 of 209).

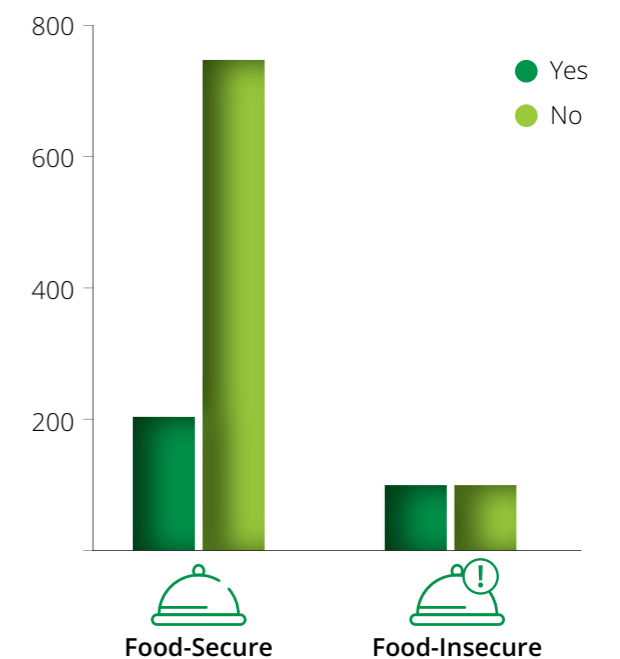


Figure 3.13. Counts of Responses to Question on Personal Affiliation with Food-Insecure Families

We observed that this affiliation also differed by housing type. As shown in Table 3.10, participants living in HDB housing reported more affiliations with food-insecure families compared to condominium, private apartment and landed housing dwellers.

Tables 3.11 and 3.12 reveal that food-secure participants were much less likely than food-insecure participants to believe that there were families in Singapore who could not get two nutritious meals a day. They were also more likely than their food-insecure counterparts to perceive that there was enough food support available.

While descriptively it may seem that the gap between the perceptions of food-secure versus food-insecure participants is not that wide, advanced statistical analysis revealed that the difference is significant. Findings from an independent-samples t-test revealed that food-secure participants were significantly less aware of the existence of food insecurity in Singapore ($M = 6.06, SD = 1.36$) compared to their food-insecure counterparts ($M = 6.45, SD = 1.10$), $t(1204) = -3.89, p < .001$.

Table 3.10. Personal Affiliation with Food-Insecure Families by Housing Type






Housing Type	Personal Affiliation with Food-Insecure Families
 HDB 1- & 2-room flats	138.0 (42.9%)
 HDB 3- & 4-room flats	122.0 (37.8%)
 HDB 5-room flats	47.0 (14.6%)
 Private condominiums / other private flats	11.0 (3.4%)
 Landed housing	4.0 (1.2%)
Total	322.0 (100.0%)

Table 3.11. Percentage of Participants Who Believe that Food Insecurity Exists in Singapore

	Food-Secure	Food-Insecure	Total	
There are families/households in Singapore who cannot get two nutritious meals a day.	Strong disagree	14.0	1.0	15.0
	Disagree	154.0	8.0	162.0
	Slightly disagree	87.0	11.0	98.0
	Slightly agree	176.0	32.0	208.0
	Agree	510.0	133.0	643.0
	Strong agree	55.0	24.0	79.0
Total	996.0	209.0	1205.0	

Table 3.12. Percentage of Participants Who Believe that Enough Food Support Is Available in Singapore

	Food-Secure	Food-Insecure	Total	
There is enough food support available for those families/households who cannot meet their food needs.	Strong disagree	8.0	6.0	14.0
	Disagree	212.0	64.0	276.0
	Slightly disagree	171.0	29.0	200.0
	Slightly agree	263.0	57.0	320.0
	Agree	310.0	44.0	354.0
	Strong agree	32.0	9.0	41.0
Total	996.0	209.0	1205.0	

Real Stories

In Phase 2, we conducted in-depth interviews with 20 food-insecure participants randomly selected from Phase 1 food-insecure respondents. This was done in order to get deeper insights into the face of food insecurity in Singapore. As each story is unique, we present below three stories that help to deconstruct the lived experiences of households and individuals with food insecurity. While these stories are not representative of all food-insecure households in Singapore, they do throw light on how food insecurity plays out in the lives of these individuals.

MR. TAN

Age: 70 years

Mr. Tan lives alone in a 1-room HDB flat. On average, he spends about \$5-7 per meal. He has studied only up to primary school, and in his younger days, he would get by with cleaning jobs here and there. However, since he fell sick about ten years ago, life has been tough.

"I was not always like this. My deteriorating health and colorectal cancer have restricted my mobility and diet. My legs feel numb, and I find it difficult to walk and cook."

"I feel depressed, but I do not talk to anyone about it, just suffer alone, stay quiet and sleep."

Mr. Tan speaks very fondly about his Member of Parliament (MP) and expresses his gratitude openly. He praises the MP for all the help that this person has personally rendered to him by writing recommendation letters and getting his social service allowance increased from \$500 to \$600 per month. However, Mr. Tan still ends up borrowing from his older sister sometimes. His water and electricity bills cost more than \$100 every month. He gets food support once a month from the Taoist temple and seems to be satisfied with it.

"I dare not ask for more as I don't want to be greedy. I feel embarrassed to ask for more, even though the supplies are not enough. I do not want to ask for more and just live day by day. I feel that with regular food support, I can save up to \$100 a month and use that money to buy a fan."

MS. CHEN

Age: 36 years

Ms. Chen has been living in a 1-room HDB flat with her infant son after her child's father left her. She works part time in a coffee shop, earning \$650 monthly to afford daily essentials such as rent, utilities and milk powder. Half her income goes on rent and utilities. With a limited income, she feels she has to prioritise what she needs to pay for monthly. Even though she receives \$200 in support from the government, she worries about her bills and feels financially stretched every month.

"Sometimes the nursery teacher called to buy something for the baby to take shower, the baby is so small, and we don't want people to say that he is wearing broken clothes and pants."

Ms. Chen's son attends the neighbourhood nursery. Her neighbours pitch in to help watch over her son whenever she goes to work. As she does not have the time to cook at home because of caregiving responsibilities, she depends on canned food, noodles and cereal. At times, she saves the food available at home for her child instead of consuming it herself, leaving her hungry. She highlighted feeling embarrassed and ashamed as a result of having inadequate food for herself. She perceives her physical and mental health to have suffered as a result of her lack of access to adequate and nutritious food. At times, she highlighted having difficulty concentrating or focusing on tasks.

"Sometimes I don't eat for the whole day and will leave the food for the baby. He is more important [than me]."

She is relieved to be currently receiving some form of support from various sources. She is grateful to have received support from her MP in the form of milk powder and diapers. Once a year, she receives food support in the form of cookies, Milo and nuts from a church organisation.

MDM. FATIMA

Age: 47 years

Mdm. Fatima is divorced and lives in a 2-room HDB rental together with her two younger daughters (ages 17 and 14) and a granddaughter (age 12). Since her eldest daughter (age 30) has had a history of incarceration, Mdm. Fatima prefers to keep her grandchild with her. She works as a cleaner in a private condominium, earning \$1,300 per month. She often ends up working overtime to supplement her income as it is not enough to meet the needs of her family. She budgets for monthly rental (\$153), school pocket money for the three girls, EZ-Link top-ups, utility bills and groceries, among other expenses, to support the family of four. She has no family support. Her elder brother used to support her with a monthly allowance, but he has stopped as he has financial problems of his own. Mdm. Fatima did get some monthly support (\$300/month) from Majlis Ugama Islam Singapura when she was out of work, but that has stopped.

"The only way I can better my family's situation is to work hard so that the girls can get a good education and good job. I only study till Primary 3, so I'm a cleaner. I don't want the girls to do the same. One day they will get a good job and earn, and I can rest."

Her second daughter is studying business at the Institute of Technical Education, and Mdm. Fatima has high hopes for her. She is happy that the government pays the fees from her daughter's Edusave account. Mdm. Fatima is an astute woman who makes precise and accurate assessments of her food expenditure.

"I spend a minimum of \$30 per month per person on food and groceries."

When asked what would be the most immediate need that she would like fulfilled, she said:

"Is there a way that I can get a fridge by donation?"

She is currently receiving no form of food support and prefers to cook for herself and the girls, due to doubts about outside food being halal.



04 REFLECTIONS AND RECOMMENDATIONS



This section highlights the profile of food-insecure households in Singapore, showing that they are most likely to be drawn from certain demographic segments. The current study found that housing type and educational attainment are two important indicators of food insecurity. It is to be noted that the profile of food-insecure households is by no means limited to these segments, and there are other factors that might predispose a household to be food insecure. Further, apart from the obvious physical health implications of food insecurity, mental health implications require public attention; these are discussed below as well.

Housing Type

Food-insecure households were more likely to reside in 1- and 2-room HDB flats compared to food-secure households. In Singapore, housing type is correlated with income and can be used as a **proxy measurement** for socioeconomic status (Ng et al., 2014; Lwin et al., 2018). Hence, it can be argued that households with a lower socioeconomic status were more likely to experience food insecurity. In the current study, 69.3% of households residing in 1- and 2-room HDB flats had a monthly household income of less than \$2,000. These included households with no income. An additional 12.9% of households residing in 1- and 2-room HDB flats declined to furnish their income details. According to SingStat (2019), the median monthly household income of employed resident households was \$9,425 in 2019. In our sample, a majority of households living in 1- and 2-room HDBs were earning less than \$2,000 a month, therefore representing households with a lower socioeconomic status. This supports the finding that food-insecure households that experience intermittent food insecurity and hunger are more likely to be found in specific



housing types where the 'poor' tend to reside (Tan et al., 2017). Those with lower socioeconomic means in Singapore find it more challenging to meet their food needs. In light of COVID-19, the global pandemic that has ravaged the world since early 2020, this finding has been further strengthened. Nichol Ng, co-founder of the Food Bank Singapore, shed light on how the loss of family income has plunged many into food insecurity:

"COVID-19 has brought many to the brink of food insecurity. This is not only due to the loss of part-time and freelancing job opportunities, but also because of having to live from pay cheque to pay cheque in the first place. At the Food Bank Singapore, we see food as the common defining denominator to gauge how severe someone's situation is. However, we have also seen increasing number of cases and requests from people residing in landed private property, which contradicts the usual statistics of what we assume food insecurity to be like."

– Nichol Ng, co-founder of the Food Bank Singapore

It is clear from this study that educational attainment is linked to food insecurity, and this can be related to one's earning power.



Educational Attainment and Food Insecurity

This study found that food insecurity was also associated with lower educational attainment. More specifically, families that were food insecure were more likely to have heads of households with lower educational attainment compared to their food-secure counterparts. This finding is consistent with other studies that found university-educated respondents less likely to be food insecure than all the other respondents (Tingay et al., 2003; McIntyre, Bartoo & Emery, 2012).

Educational attainment, unsurprisingly, is related to income and employment status. There is evidence that higher educational attainment is linked to higher earnings (Douglas-Hall & Chau, 2007). Children whose parents are employed full time are increasingly likely to be classified as 'low income' if they do not possess a university education (Douglas-Hall & Chau, 2007). A study conducted by McIntyre, Bartoo and Emery (2012) found that 4% of **working** households in Canada were food insecure. The households that were likely to be food insecure were those reliant on primary earners with lower educational attainment and income.

It is clear from this study that educational attainment is linked to food insecurity and this can be related to one's earning power.

Impact on Mental Health

Using Kessler et al.'s (2002) non-specific Psychological Distress Scale and examining feelings associated with seeking food support as measures for mental health, it was found that food insecurity can predict poor mental well-being, as evidenced by the number of negative emotions experienced by food-insecure individuals. This finding is not surprising: previous studies have documented the detrimental effects of food insecurity on psychological well-being (Olson, 1999; Wolfe, Frongillo & Valois, 2003; Stuff et al., 2004). In fact, the psychological effects are more pronounced among food-insecure children in terms of greater internal and external behaviour problems (Reid, 2001;

Jyoti, Frongillo & Jones, 2005). Food insecurity is not simply hunger but a lack of choice and/or a lack of access to socially acceptable means of securing adequate food (e.g., a reliance on food aid rather than being able to access food through markets and food shops). This lack of options and choices fosters a sense of exclusion among food-insecure individuals (Lorenz, 2012). It is reported that when individuals are deprived of access to food or lack the ability to afford the food they would like (or need) for themselves and their family, they feel excluded or alienated from general society (Hamelin, Beaudry & Habicht, 2002). Feelings of shame, anger, frustration, powerlessness, helplessness, embarrassment and alienation are all associated with food insecurity. These feelings develop as coping mechanisms kick in: from varying diets and eating affordable food items that would not usually go together, to having to turn to others (whether family members or more formal options) in order to secure enough food to eat; choice and independence are taken away from households at the point of them becoming food insecure.

It is clear from the current and previous studies that food plays an integral role in an individual's psychological well-being. Hence, any attempts to close the food insecurity gap would inevitably have salutary effects in enhancing the mental well-being of the food-insecure sections of society.

Misalignment in the Provision of Food Assistance

The current study revealed a stark misalignment in the provision of food assistance: the majority of food-insecure households are not receiving help. Further, among those that were not receiving help, a large majority were severely food-insecure households. This suggests that food support is not being strategically targeted to those most in need. Embarrassment and the lack of awareness about the existence of food aid were the most pertinent reasons cited for not seeking help. Earlier studies have shown that the hierarchy between the volunteer giver and in-need receiver, plus the expectancy of gratitude by volunteers, further exacerbate the negative emotions and sense of exclusion already felt by those reaching out for help and assistance (Lorenz, 2012). Understanding the negative effects of such food aid provision is essential to make food support more accessible to those in need. Despite the untargeted support revealed in the current study, the emotional experiences of those who received food support bear testimony to the fact that the food support provided did have a positive effect on the households receiving it. Many participants reported feeling calmer, hopeful and relieved after receiving support.

Food assistance is a vital part of the solution to food insecurity but is often burdened by operational barriers. To help address these barriers and other pressing legal questions, the Harvard Law School Food Law and Policy Clinic and the Global FoodBanking Network collaborated to launch the Global Food Donation Policy Atlas in February 2019. This provides a first-of-its-kind look at the current state of food donation laws and policies in participating countries along with country-specific policy recommendations for strengthening food recovery efforts. Fortunately, Singapore is one of the 15 participating countries and will be mapped in the second year of the project.

Awareness about Food Insecurity

A novel investigation into the current study was the examination of the level of awareness about food insecurity in Singapore. This report found that food-secure individuals were much less aware of the existence of food insecurity in Singapore compared to food-insecure individuals. Personal affiliations with food-insecure households were also less common amongst those who were financially better off. This finding is important as it points towards an apparent disconnect between the food-secure community and those who are food insecure. While civil society (food support organisations, family service centres and voluntary welfare organisations) may be acutely aware of the issue of food insecurity, the majority of Singaporeans continue to remain inadequately informed about it.

Inadequate Attention Paid to Healthier Eating Options

Since food security is not limited to economic and physical access to food but also includes consuming safe and nutritious food, examining the predominant eating habits/food choices of individual households became imperative in this study. It was seen that across the three food security categories—food secure, moderately food insecure and severely food insecure—no more than 40% of individuals had a healthy BMI, indicating that a majority of the participants did not have a good height-weight balance. In fact, 30% of food-secure participants in the current study sample 'never looked for healthier food options'. This calls for an intentional focus on promoting healthy eating among Singapore residents regardless of food security status.



Recommendations

Backed by substantive evidence from the current study, we reinforce the following recommendations that were first put forth in the Lien Centre for Social Innovation's previous report on food insecurity in Singapore, "Hunger in a Food Lover's Paradise: Understanding Food Insecurity in Singapore":

1. On a national level, there needs to be greater impetus towards recognising food insecurity as a real issue. Awareness may be seen as the first integral step towards getting communities together to resolve the problem of food insecurity. The current study may prove to be an important action lever to promote education and raise awareness about food insecurity. An accurate perception of need may then increase empathy for food-insecure individuals and households. In the long term, education may contribute to creating a less stigmatised food support environment and generate more support to tackle food insecurity in Singapore.
2. To more effectively support food-insecure households and individuals, food support organisations can benefit from a geographical mapping of areas that enables them to see neighbourhoods of greater need. Adequate attention needs to be paid to the specific circumstances of food-insecure households so that the right type of support reaches the right people. For example, ration packs should be given to those with the means or health to cook, stay-alone seniors with mobility issues must be provided with cooked meals, and vouchers should be given to those who are physically able to purchase food. Such matching helps to create a less stigmatised food aid environment and mitigates the embarrassment experienced by those reaching out for help. On a national level, the food support ecosystem needs better coordination and collaboration. This requires a multi-sector partnership between relevant government

bodies, social service organisations (that provide food as their primary or secondary aim) and private sector companies. Such a multi-sector partnership can take the form of a collective network or consortium where each relevant player can share information and pool resources on needs assessments, households reached, fundraising for food and monetary donations, food distribution, and volunteer mobilisation. Recently, the Food Bank Singapore launched an initiative in this direction.

3. As a bottom-up approach towards tackling food insecurity, it is important to launch more rigorous national campaigns that promote healthy eating and educate people about healthier food choices. While the government has launched educational campaigns such as 'My Healthy Plate' and 'Eat, Drink, Shop Healthy' in the past, such efforts need to be supported by reasonable and affordable pricing of healthier food options. Many participants in the current study indicated the cost of healthier food as a deterrent to choosing those options. Therefore, the actual and perceived cost of healthy foods needs to be tackled first in order to ensure that these educational campaigns create a real impact on the ground. Apart from physical exercise and mental well-being, food is an integral avenue for achieving optimal health. Hence, it is recommended that efforts continue to be ramped up to make Singaporeans discerning consumers of food, so as to enhance the overall food security status of the nation.

"The virtual food banking app strives to get the ball rolling to enable more big data to be collated. We are looking for more players in the ecosystem to collaborate on a common platform."

– Nichol Ng, co-founder of the Food Bank Singapore

NOTES

1. The chi-square goodness-of-fit test is used to determine whether the distribution of cases (e.g., participants) in a single categorical variable (e.g., 'housing type', consisting of five categories) follows a known distribution (e.g., a distribution that is 'known', such as the proportion of different housing types in a country).
2. The chi-square test for association tests whether two categorical variables are associated. The test determines whether two variables are statistically independent. It does this by comparing the observed frequencies in the cells to the frequencies that would be expected if there was no association between the two nominal variables. Cramer's V is a measure that provides an estimate of the strength of the association between the two variables.
3. The larger the absolute value of the adjusted standardised residual (i.e., the value regardless of sign: positive or negative), the greater its considered contribution to the chi-square value, and the more that cell provides evidence towards association. Stated another way, cells with a large absolute adjusted standardised residual indicate where the lack of independence is occurring within the cross-tabulation (i.e., the cells that are mostly responsible for the rejection of the null hypothesis) (Kateri, 2014). A common guideline to determine when a cell deviates significantly from independence (i.e., towards association) is when the absolute adjusted standardised residual is greater than 3.
4. Another residual that was particularly high was for the cell consisting of the 5-room HDB flat and food-secure group cross-tab. However, this is a welcome sign as it would not be cause for concern to see more and more households falling into the food-secure category.
5. The independent-samples t-test is used to determine whether a difference exists between the means of two independent groups on a continuous dependent variable. More specifically, it determines whether the difference between the two groups is statistically significant.
6. A simple linear regression assesses the linear relationship between two continuous variables to predict the value of a dependent variable based on the value of an independent variable. More specifically, it (a) determines whether the linear regression between these two variables is statistically significant, (b) determines how much of the variation in the dependent variable is explained by the independent variable, (c) understands the direction and magnitude of any relationship, and (d) predicts values of the dependent variable based on different values of the independent variable.

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The Hunger Report: An In-Depth Look at Food Insecurity in Singapore is the first nationally representative study on food insecurity in Singapore that aims to document the extent, severity, causes and consequences of food insecurity in the country. The study also reveals the barriers to effective food assistance and makes recommendations that may help tackle this issue in a systemic way. This study serves as a springboard to change the narrative around food security in Singapore and paves the way for community stakeholders to tackle a socially relevant issue. Further, it may prove instrumental in raising awareness about the lived experiences and profiles of food-insecure households in Singapore.

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