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► To cite this version:

Jessica Denila Villanueva, Jonathan D. Austria, Kendrick Mico Faronilo, Aywin Rosette Sunga-Lim, Enrico L. Replan, et al.. Effect of Lockdown on Food Security during the COVID-19 Pandemic in the Philippines: Two Months after Implementation. *Philippine Journal of Science*, 2022, 151 (4), pp.1419-1430. hal-03775378

HAL Id: hal-03775378

<https://hal.science/hal-03775378>

Submitted on 12 Sep 2022

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Effect of Lockdown on Food Security during the COVID-19 Pandemic in the Philippines: Two Months after Implementation

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The alarming presence of COVID-19 challenged the United Nations' (UN) Sustainable Development Goal 2 and made the World Health Organization (WHO) declare a public health emergency of international concern. Imposed lockdowns disrupted the supply and demand chain of the food systems, hence affecting food security. This research would like to know and assess the early effect (two months after the lockdown) of the enhanced community quarantine on food security in the Philippines. An online survey was employed participated by 331 household representatives using a survey instrument containing food security assessment, household socio-demographic characteristics, behavioral responses covering food purchase and consumption behavior, and emergency measure adoption. Statistical tests were applied: Mann-Whitney U test to know the behavioral response of the food secure vs. food insecure households, as well as the phi coefficient and Cramer's V test to determine and assess the parameters that plays important role in food security during this period. Results showed that 73% of the respondents were food insecure. The early effect of the lockdown was seen in the behavioral responses, significant differences between food secure and insecure households were found in age, income, and food purchase behavior. Parameters associated with food security are age, income, food allocation, expectations on the livelihood impact and change in expenditure, and the adoption motivations in practicing backyard gardening. The stress evaluation revealed that while Filipinos tried to cope, an increased level of anxiety was experienced. The need for clear measures in terms of preparedness in any pandemic situation was heightened. These findings are significant in providing benchmark information on food security during a pandemic.

Keywords: backyard gardening, COVID-19 pandemic, food security, Philippines, purchase behavior, stress evaluation

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INTRODUCTION

The UN Food and Agriculture Organization (UN FAO 2020) reported that the Philippines recorded the greatest number of insecure people in Southeast Asia. Around 59 million Filipinos are suffering from moderate to severe lack of consistent access to food. Based on the EIU Global Food Security Index (GFSI), the Philippines has an index of 55.7 and is ranked 74th globally. The GFSI considers the issue of food availability, affordability, and quality and safety indices. Currently, food security is brought to a higher level of difficulty.

The presence of the virus called Severe Acute Respiratory Syndrome Coronavirus 2 or SARS-CoV-2 brought the Coronavirus Disease, globally known as COVID-19. Following the declaration of State of Public Health Emergency in the Philippines on 08 Mar 2020, a community quarantine was imposed to contain the spread of the COVID-19 disease. Movement restriction caused by strict lockdown implementation – locally known as Enhanced Community Quarantine or ECQ – had affected the transport and production of goods and services, which also had a significant impact on food security. In this study, the main objective is to examine the early effect

of lockdown on food security caused by the COVID-19 pandemic. The timeframe of early effect or early stage is two months after the implementation of the lockdown. Specifically, at this early lockdown implementation, this study would like to know and examine how Filipinos managed all the restrictions in terms of acquiring food and food-related products. The study also [1] determined if there is a significant difference between food secure and insecure households in terms of behavioral responses and [2] identified the important parameters that contribute to the promotion of food security in times of this pandemic.

MATERIALS AND METHODS

Conceptual Framework

Figure 1 presents the conceptual framework used in this study. Containment and management of the spread of the COVID-19 pandemic entailed institutional responses in the Philippines and all over the world. In the Philippines, with the Proclamation Nos. 929 and 992 (s. 2020) RA 11332, ECQ – meaning in a complete lockdown – started in Luzon but then eventually implemented as well in some areas of

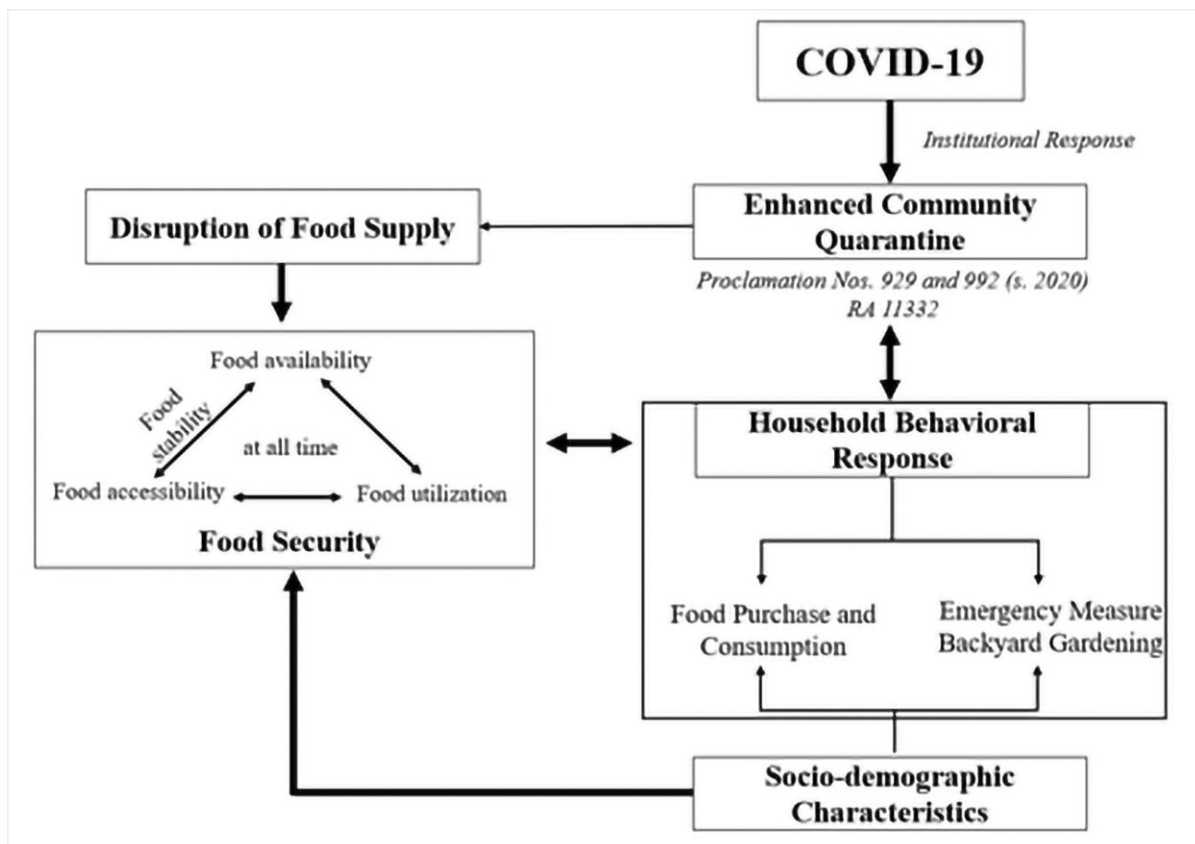


Figure 1. Research study framework: food security under the challenge of COVID-19 restrictions and the people's behavioral responses.

Visayas and Mindanao. This complete lockdown resulted in food supply system disruption. It then heightened the issue of food security. According to FAO, to promote the food security of a nation, food availability, food accessibility, food utilization, and stability should be present at all times. The dimensions of food security are described in Appendix I.

Socio-demographic characteristics are important in order to know the background of the household population, *e.g.* age, income, gender, *etc.* Different household behavioral responses to manage the mobility restrictions and food supply disruptions resulted due to this lockdown. These can be observed through the food purchase and consumption and adopting an emergency measure, which is backyard gardening. For food purchase and consumption, the focus is on how they coped up with the imposed lockdown with respect to acquiring and utilizing food and food-related products. On adopting backyard gardening, this study would like to know if this was adopted at this early stage of lockdown implementation. If yes, what is/are the motivation(s) and how did they operationalize it?

Research Design

Survey instrument. The survey instrument is structured and made use of close-ended questions. This contains four parts. The first part targeted gathering the socio-demographic information of the respondents. It has six items – including age, gender, residence, household size, and monthly income. The second part is designed following the household food insecurity access scale (HFIAS) by Coates *et al.* (2007). In assessing food security, the HFIAS measurement tool of FAO was adopted. The standard HFIAS survey instrument was generally categorized into four levels: food secure, mildly, moderately, and severely food insecure. For the considered modification and for the purpose of this study, mildly, moderately, and severely food insecure were simplified and were all categorized as food insecure, as seen in Appendix II. This led to having two categories only: food secure and food insecure.

The HFIAS consists of nine occurrence questions aiming to assess the household's food consumption during the two months since the ECQ started. Appendix Table II-2 shows the standard scoring system for HFIAS. The total HFIAS score for each household can range from 0 (food security) to 27 (maximum food insecurity); the higher the score, the more food insecure the household becomes. Based on the computed score, a household could then be classified as food secure or insecure. The household increases their level of food insecurity when they experience adverse conditions more severely or more frequently.

The third part is for collecting information about factors that could affect availability of food, as well as the

preference and access to food during the early months of ECQ implementation – as identified as well in related studies (Shim *et al.* 2019; Yuan *et al.* 2009). It is composed of 23 items – including questions related to the households' purchasing behavior, food preference, perceptions on the availability, accessibility, and affordability of food, as well as awareness of food-related programs by government and private institutions.

Lastly, Part 4 has 11 items, which was designed to determine the awareness and willingness of the respondents in adopting backyard gardening as a measure to address food insecurity during pandemic.

Participants and data gathering. There were four main activities in doing the data gathering: [1] taking all the considerations in planning and structuring the survey conduct and the survey instruments, [2] pre-testing of the survey instrument, [3] revising the survey instrument, and [4] data collection. To examine the effect of ECQ on the food security of households across the country in the early months of its implementation, an online survey was conducted. An online survey was done as mobility was restricted, and any face-to-face interactions were prohibited. More details can be found in Appendix III.

To ensure that there will be no multiple responses from the same household participating in the survey, e-mail address and place of residence were required to be answered in the questionnaire. Appendix Figure III-2 presents the location map of the respondents from Luzon, Visayas, and Mindanao. The date covered the period of 29 May–07 Jun 2020. A total of 341 responses were recorded, which were filtered to identify duplication and incomplete responses (*e.g.* incomplete responses such as address, *etc.*). Three hundred thirty-one (331; 97.07%), of these responses were considered and used for the analysis in the study.

Statistical analysis. The profile of the respondents (*i.e.* socio-demographic) were expressed using frequency counts. The statistical analyses made use of SPSS version 20.0. The Mann-Whitney U test was used to compare differences between two independent groups when the dependent variable is either ordinal or continuous but not normally distributed. Unlike the independent-samples t-test, the Mann-Whitney U test allows you to draw different conclusions about the data depending on the assumptions made about the data's distribution. Figure 2 shows the operational framework in determining the significant difference between food secure and food insecure. The Mann-Whitney U test uses the following formula:

$$U_1 = R_1 - \frac{n_1(n_1+1)}{2} \quad \text{or} \quad U_2 = R_2 - \frac{n_2(n_2+1)}{2} \quad (1)$$

where R is the sum of the ranks and n is the number of samples in the item. To examine the association of food

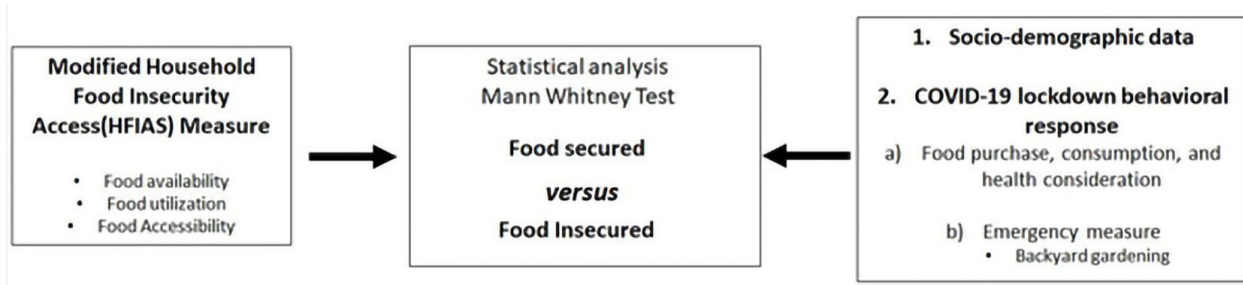


Figure 2. Operational framework: comparing the difference between food secure and food insecure using the Man-Whitney U test.

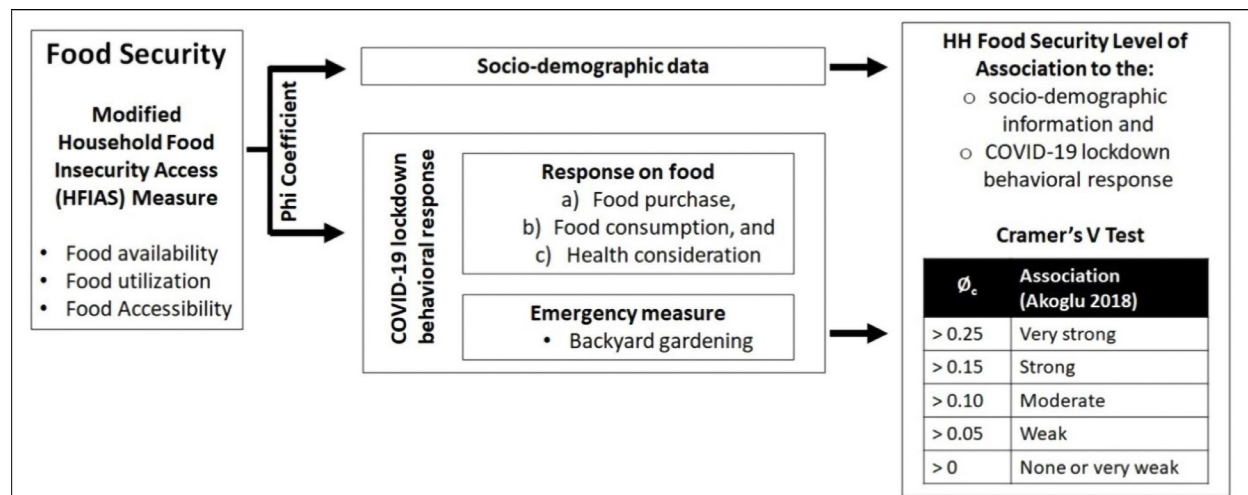


Figure 3. Operational framework: food security association to the household socio-demographic profile and COVID-19 behavioral responses to food security. The strength of association was also determined by looking at the phi and using the Cramer's V test.

security to variables under socio-economic factors, food purchase and consumption behavior, and adaptation of backyard gardening, the phi coefficient was used. Figure 3 illustrates the operational framework in determining the parameters that are associated with food security. This figure also contains weights that will be used in assessing the parameters' level of association to food security.

Phi is a chi-square-based measure of association involving nominal data (food security). Phi is a measure that adjusts the chi-square statistics by the sample size by dividing chi-square by n (the sample size) and taking the square root, expressed using the following formula:

$$\phi = \sqrt{\frac{\chi^2}{n}}$$

To indicate the strength of the association (Figure 3), Cramer's V test was employed using the following formula:

$$\phi_c = \sqrt{\frac{\chi^2}{N(k-1)}} \quad (2)$$

where ϕ_c denotes Cramer's V, χ^2 is the Pearson chi-square statistic from the aforementioned test, N is the sample size involved in the test, and k is the lesser number of categories of either variable.

RESULTS

General Characteristics of the Households (Socio-demographic)

Appendix Table IV shows the demographic characteristics of the respondents. This was depicted in the income of the respondents. The table shows the socio-economic profile of the households surveyed. Fifty-eight (58%) of the households were headed by males, whereas 41% were female-headed. Most of the household residences were owned (61%) and being rented (24%). The household size, on the other hand, greatly varies based on the result of the survey. Moreover, the majority of households belong to the middle class (33%).

Responses to COVID-19 Lockdown

Food purchase and consumption behavior. Table 1 shows the different factors related to food purchase and consumption behavior of the respondents. Generally, 317 of the households (96%) changed their purchasing behavior. Seventy-three percent (73%) bought larger quantities than usual, whereas some said that they chose to buy cheaper items and went to different stores to buy what they need. On the preference for fresh food, almost all of the households (97%) said that they preferred eating fresh food items such as meat, vegetables, and eggs. Also, the majority of the households (97%) perceived that

fresh items were still available in the market during the community quarantine.

Consequently, 71% said that markets were accessible. Most of the households' means of transportation to the stores were driving (52%) and walking (36%). Most of the households surveyed experienced impacts on their livelihood during the community quarantine, 79% of which said that they experienced moderate to severe impacts. Most of them (71%) also said that they spent higher on groceries during the community quarantine as compared to normal conditions, whereas 10% said that

Table 1. Food purchase and consumption behavior during the Enhanced Community Quarantine.

Variables	Percent, %	Food secure, n	Food insecure, n
Change in shopping behavior (changed behavior)	96	80	237
Mode of food acquisition			
Purchasing/buying food	41	53	84
Farming or home gardening	0.7	1	1
Food assistance	0.3	0	1
Others (mix of choices)	58	37	154
Type of store			
Wet market	29	28	69
Retail store	9.0	11	19
Supermarket	43	38	104
Others	19	14	48
Preference for fresh food (preferred fresh food)	97	85	235
Availability of fresh food (fresh food available)	97	90	232
Accessibility of market (market is accessible)	71	50	184
Mode of transportation			
Walking	36	27	93
Driving	52	55	118
Service vehicles (free rides)	7.0	4	19
Others	5.0	5	10
Proximity to market*		18	19
Livelihood impact perception (with impact)	79	62	201
Change in groceries expenditure			
Higher	71	62	174
Lower	19	12	50
No change	10	17	16
Frequency of meal preparation			
More often	59	56	139
Less often	17	10	46
No change	24	25	55
Awareness of food recipes/meal suggestions (aware)	49	41	121

*Average time in minutes

their expenditure remained the same. Lastly, in terms of the frequency of food preparation, 59% of the households said that they prepared meals more frequently during the community quarantine. Forty-nine percent (49%) of the households were aware of food recipes or meal suggestions being promoted by government and private institutions.

Backyard gardening as an emergency measure. The gradual rise of backyard gardening emerged as a feasible strategy to address the issue of food insecurity. It is thought that it can provide communities with a nutritious, cost-effective, and high-quality food supply. Eighty-five percent (84%) of the households were familiar with backyard gardening, but only 74% really practiced backyard gardening (Table 2). Some respondents (26%) did not have space to practice backyard gardening. Sixty-six percent (67%) knew how to do vegetable and fruit gardening. Forty-two percent (42%) of the households opted to put up their backyard garden during the lockdown period. And from those who created backyard garden

farms, 45% were female and 62% were aged 31–64 yr old. It appeared that the main objective of putting up a backyard garden is for household consumption. Backyard gardening was promoted by the different institutional agencies by giving seeds and other gardening inputs. From the institutional programs to support this activity, 79% did not receive any support. Eight percent (8%) received seeds from the Department of Agriculture, and 7% got something from their respective municipality, city, or *barangay*.

Food security during the early stage of COVID-19 lockdown. From the results, these show that 73% of the households were food insecure at the early stage of implementation of lockdown or community quarantine. Only 27% were found to be food secure. Under food insecure, 25% were worried about not having enough food, around 44% were not able to eat preferred food, 48% had to eat a limited variety of food due to lack of resources, 42% ate some foods that are not really wanted because of a lack of resources to obtain other types of

Table 2. Backyard gardening under the early stage of imposed lockdown or community quarantine.

Variables	Food secure		Food insecure	
	n	%	n	%
Familiarity with urban backyard gardening				
Yes	84	92	212	88
No	7	8	28	12
Has experience in planting vegetables and fruits				
Yes	67	74	152	63
No	24	26	88	37
Size of backyard garden				
Container gardening	32	35	61	25
Small patch of land (< 20 sq. m)	20	22	56	23
Big patch of land (> 21 sq. m)	11	12	38	16
I don't have backyard garden	28	31	85	35
Increased gardening activity to harvest more produce fruits and vegetables				
	20	33	40	67
Created a backyard garden during the quarantine period				
Yes	43	31	96	69
No	48	26	139	74
Reasons for putting up a backyard garden during the quarantine period				
For household consumption	15	35	28	65
For emergency food resources	2	40	3	60
For recreation	4	36	7	64
Encouraged to create an urban backyard garden farm if I have neighbors who do the same				
	52	34	215	66
Intention to create own urban backyard garden farm to be able to eat nutritious and healthy foods				
	77	27	208	73

food, 23% needed to eat a smaller meal than felt needed because there was not enough food, 17% ate fewer meals in a day because there was not enough food, 9% had no food to eat of any kind in the household because of lack of resources to get food, 5% went to sleep at night hungry because there was not enough food, and 2% experienced a whole day and night without eating anything because there was not enough food. Specifically, among the food insecure households, 31% were mild food insecure, 29% were moderately food insecure, and 12% were severely food insecure.

From the results of the survey, 92% of the food secure households were familiar with the concept of backyard gardening (Table 2). Furthermore, 74% of the respondents who were food secure were knowledgeable in planting vegetables and fruits; they did it in container gardening (35%), a small patch of land less than 20 m², (22%), and a big patch of land greater than 20 m² (12%). Interestingly, 1% of the respondents that were food secure stated that the creation of backyard gardens was their response to reduce stress and anxiety. The 34% of the food secure households agreed that they will be more encouraged in creating their own backyard garden farm if their neighbors will do the same. Results also disclosed that 27% of the respondents that were food secure will create backyard garden farms to have access to fresh and healthy food.

Food Security Statistical Analyses

Parameters that have a significant difference between food secure and insecure households. The dependence test result presented information on the significant difference between the food secure and insecure households. For socio-demographics, statistical differences were found with variables age ($p = 0.000$) and family income ($p = 0.003$). For the food purchase and consumption behavior, statistical difference was found with variables: change in buying behavior ($p = 0.000$), manner of food acquisition ($p = 0.004$), accessing food stores ($p = 0.000$), limiting factors in accessing the food stores ($p = 0.002$), expected livelihood impact ($p = 0.000$), and preference on fresh ($p = 0.041$) and healthy food ($p = 0.009$). No significant difference in between food secure and insecure households was found in the factor of backyard gardening as an emergency measure. This means the same behavioral responses were seen when this factor is to be considered.

Demographics: age. For the following age range 15–30, 31–64, and > 64 yr old, food insecure were higher 5, 2, and 2 times, respectively.

Demographics: income. The conversion rate used was US Dollar (USD) 1 to ~ Philippine Pesos (PHP) 48.00. Approximately, the highest number of households that were food secure were in the income range of USD

979–1,708 USD with 7% and the income range of USD 1,708.1–2,938 with also 7%. For the food insecure, the highest number (27%) came from the income range of USD 500–980, followed by the income range of USD 979.1–1,708 USD (16%). The average monthly family income in the country is USD 479, considered the start of the middle-income class. The poverty threshold was USD 208. At the poverty threshold and less, less than 1% were food secure, whereas 4% were food insecure. Remarkably, with an income of more than USD 2,938, food insecurity was higher than food security with percentages of 5 and 3%, respectively. This is as food security factored in in the food preferences, which had been limited during the lockdown period.

Changes: buying/shopping behavior. Twenty-four percent (24%) of the households that were food secure stated that their shopping and purchasing behavior changed under the lockdown or community quarantine period. A higher percentage (72%), which was under food insecure, had the same experience. At the moment of lockdown, buying in larger quantities was preferred by the food secure (15%). The percentage was double for the food insecure households at 30%. Ninety-six percent (96%) of the households stated that their buying behavior changed. The fear of not having enough supply due to food accessibility brought the people to buy in bigger volumes (74%).

Changes: manner of food acquisition. From the normal buying of food from the market or grocery stores, things changed during the lockdown. Apart from buying food, some also depended on the government food assistance program, farming and home gardening, and a combination of all of these to acquire food. Reaching or going to the market or grocery stores became a limiting factor in acquiring food and food-related products. A significant number of households at 71% (food secure: 15%; food insecure: 56%) experienced difficulties in accessing these places to buy food and food-related products. Limitations on accessing the market and grocery stores were because of lacking public transportation and curfews, which in terms of percentage (with respect to response) was higher by at least 2% for the food insecure. Aside from these, the fear of getting infected also prevented people from getting out of their residences.

Changes: expected livelihood impact. The households stated that they experienced a decrease in income during the ECQ. Forty-three percent (43%) of the households that were food insecure stated that they were expecting low to moderate impact. Twenty-one percent (21%) answered that they were expecting no change or impact on their livelihood, of which 12% were food insecure.

Changes: preference for fresh and healthy food. Even though lockdown was present, there was still the preference and buying of fresh food items, *e.g.* meat, eggs, and vegetables (food secure: 26%; food insecure: 71%).

Food security association to socio-demography and COVID-19 lockdown responses. Relationships with food security and socio-demographics, consumption or food purchase behavior, and backyard gardening as an emergency measure were assessed. The strength of association was determined using a table by Akoglu (2018) in Figure 5. Result showed that food security is strongly associated with socio-demographic component such as gender and family income; for the behavioral responses, food security is: moderately associated to the change in the allocation of food cost, strongly associated with the expectations on the impact on the livelihood and change in expenditure, and strongly associated to the backyard gardening motivations brought by the neighbor practicing backyard gardening and on the idea of having increase household income.

DISCUSSION

Stress Evaluation, Food Insecurity, and Its Implication in the Philippines

The COVID-19 pandemic posed emerging environmental risks, as it entails an infectious disease that called for important attention and actions. If infected, both asymptomatic and symptomatic individuals become carriers of the virus. COVID-19 is globally widespread, resulting in an outbreak. Symptomatic individuals can experience respiratory problems and severe complications. The WHO and country-specific government institutions put actions to contain and manage the spread of the virus. Lockdowns were implemented bringing in a lot of restrictions affecting the food supply and demand. This lockdown gave limitations to the conduct of the study as mobility and physical interactions were restricted. Nevertheless, the survey was still employed through an online platform. From the results, most of the respondents belong to the middle class; households belonging to the middle to higher income classes are generally the ones with the capacity to buy gadgets and avail of Internet connections, allowing the accessibility to online surveys.

Figure 4 shows the environmental stress evaluation on food security in this time of the COVID-19 pandemic. Environmental stress due to COVID-19 pandemic can be characterized into four levels: catastrophe, ambient stress, significant life change, and daily hassle. The catastrophic

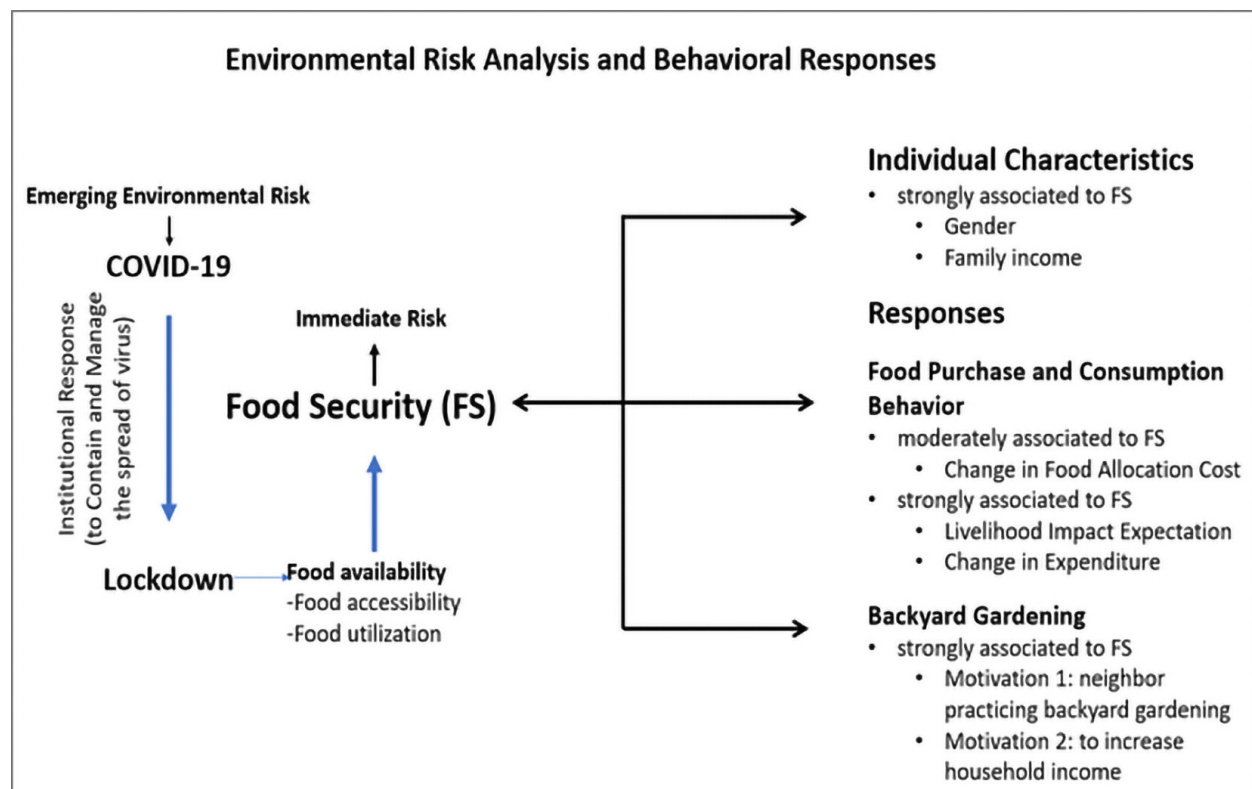


Figure 5. Environmental risk analysis: COVID-19 and food security household association to demographic and behavioral responses.

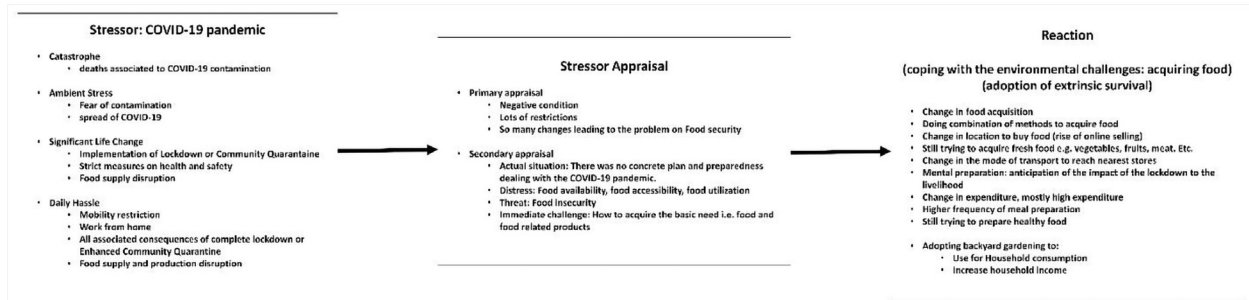


Figure 4. Stress evaluation: COVID-19 and its restrictions and food security in the Philippines.

event is from the fact that COVID-19 contamination brought deaths all over the world, and the world was unprepared for this event. The continued spreading of the COVID-19 virus and the fear of contamination caused great ambient stress. With the current situation, significant events triggered changes in everyday lives, as strict health and safety measures (wearing of face masks, *etc.*) and lockdown or community quarantine were implemented. Then led to daily hassles – as the restriction in mobility was imposed, sudden work-from-home arrangements were made necessary, and a lot of associated consequences were brought by the lockdown or community quarantine. As part of the daily hassle, food supply and production were disrupted.

From these, primary and secondary appraisals of the stressor can be made. Primary appraisal, a negative or unfavorable condition, was felt during this COVID-19 pandemic. There were a lot of restrictions that each household is not used to. There were problems in acquiring food leading to the problem of food security. These brought to the secondary appraisal: the real problem dwelled on the existence of COVID-19 and unpreparedness in this situation. The distress put weight on food availability, food accessibility, and food utilization. Hence, the threat to food security was magnified. The immediate challenge remained in the acquisition of the basic need, *i.e.* food and food-related products. The United States Food and Drug Administration explained that empty shelves in the grocery stores were caused by consumers buying more than usual.

From the results of the study, it is shown that each household tried to cope with the challenging environmental conditions. A sudden adoption of extrinsic survival prevailed and headed to a different behavior that is not of common practice to continue on with their lives. Households needed to do a lot of changes including changing the manner they acquire food, doing combinations of methods and visiting different stores to complete their grocery list, consideration of walking even with a heavy load of grocery bags as public transportation was not available, and acceptance of changes in their expenditure, *e.g.* higher than their usual budget. They prepared themselves mentally by anticipating the magnitude

of the impact of the lockdown on their livelihood. Even though there were difficulties in acquiring food, there was still a preference for fresh products and trying to prepare healthy food in terms of practice. As work-from-home and stay-at-home were the common arrangements for all ages, there was a need to prepare meals more often than usual. As lockdown augmented the sedentary behavior followed (Husain and Ashkani 2020), people then searched more for healthy food (Mayasari *et al.* 2020).

Another response was having an emergency measure, which was adopting backyard gardening for household consumption and additional household income. Despite the coping strategies of the households, 73% of the respondents still encountered food insecurity. The emergency measure, *i.e.* backyard gardening, showed no significant difference between the food secure and insecure, meaning that the same response and practices were employed. Putting up a backyard garden gave the hope of having an additional food source for household consumption (4% for food secure and 36% for food insecure). The fruit of backyard gardening is also expected to serve as a source of emergency food will there be food scarcity in the country (22% for food secure and 19% for food insecure). The practice of backyard gardening started increasing only within the period of lockdown in the country. Hence, this as a source of food cannot be expected as of this moment. Moreover, lockdowns brought stress and a feeling of isolation. At this point, backyard gardening aids in caring for mental health as occupational therapy.

Food Security and the Associated Socio-demographic and Behavioral Responses to COVID-19 Lockdown

Figure 5 presents the environmental risk and behavioral responses of households under the early stage of imposed lockdown or community quarantine due to the newly discovered virus (COVID-19). Due to the consequences of the lockdowns, immediate risks in food security were experienced. The primary difficulty is the food availability on the national scale. The fear of not having enough items to buy as [a] the item is not available in the market or [b]

Table 3. Identified food security association and policy implication/recommendation.

Food security association	Lockdown implications	Food security related-recommendations
Socio-demographics		
<i>Strongly associated</i>		
Age	Mobility restrictions of some ages to buy food-related products.	Provide support, <i>e.g.</i> senior citizen Enhance internet network capacity Supporting the mobile markets
Family income	Decrease in the purchasing power	Encourage individuals to practice and have a culture of setting aside for unforeseen expenses Companies can help the employees save (automatic deduction of a certain amount monthly; this is apart from the calamity/emergency fund)
Behavioral response		
<i>Strongly associated</i>		
Change in the cost of food allocation	Decrease in the purchasing capacity Lesser food on the table Decreased choices	Increase the anticipated budget margin and save the difference Provide food alternatives
<i>Strongly associated</i>		
Livelihood impact expectation	Decrease in the purchasing power	Encourage individuals to practice setting aside for unforeseen expenses
Change in expenditure	Limited choices Buying in bulk	Securing income in times of pandemic for emergency food allotment Food source plants as part of the backyard gardening
Emergency measure_backyard gardening		
<i>Strongly associated</i>		
Motivation 1: neighbors practicing backyard gardening	Information dissemination is mostly through neighbors and close relatives	Intensify IEC programs on backyard farming and related programs from the LGUs, social networks, and public broadcastings like TV and radio
Motivation 2: to increase household income	Needs supply of seeds, know-how on the proper planting of plants	Identification of the seed/seedlings supplier LGUs and networks campaign on proper planting and related management LGUs identifying potential markets for the plants Construction of community gardens that will serve as a pilot site

an individual cannot afford the item due to the sudden food price surges, inaccessibility to the market because of [a] mobility restrictions and [b] temporary or indefinite closure of the store, and [c] the anxiety that the items are contaminated by the virus. Table 3 presents the parameters that are found to have an association with food security, the implications brought by lockdown, and the responses and recommendations. In general, support systems that will make use of online services and mobile markets are necessary. Since the lockdown implementation was prolonged, the greatest challenge is on having savings dedicated to pandemics. This is apart from the typical emergency savings already being practiced.

For the emergency measure, *i.e.* backyard gardening motivations such as being encouraged to practice backyard gardening due to neighbor's influence and bearing the idea of having a potential increase in the household income, are strongly associated with food security. Neighbor's influence created a sort of an informal group forming a community gardening that gave social benefits like sharing of seeds and knowledge (He and Zhu 2018). This kind of activity gives a social cohesion. This behavior portrays a good level of neighbor satisfaction (Dassopoulos and Minnat 2011). As for the motivation to increase income, respondents not only anticipated getting a harvest for food but also thought of having an additional source of

income to buy food (Chandra and Diehl 2019; McDougall *et al.* 2020; Nova *et al.* 2020). In these cases, the local government units (LGUs) can intensify the support and give assistance to the communities in promoting and adapting backyard gardening.

CONCLUSION

The main objective of this study is to know and examine how the Filipinos coped up during the first two months of the enhanced community quarantine to acquire food and food-related products. Specifically, this research tried to [1] know if there is a significant difference in between food secure *vs.* insecure when looking at the household socio-demographic profile, food buying and consumption behavior, and adopting an emergency measure, *i.e.* backyard gardening, all as parameters of assessments and [2] determine the association level of food security to the abovementioned parameters.

There were strict mobility restrictions, so an online survey was employed. Simplified HFIAS was used to assess food security, *i.e.* food insecure *vs.* secure. HFIAS results were cross-examined with the socio-demographic factors, consumption and purchase behavior, and emergency measures, *i.e.* backyard gardening. Assessments on how the people responded to the food security problem were done. Statistical analyses were employed to look at the significant difference between food secure and insecure, as well as to identify and weigh the parameters that are associated to food security. Stress evaluation was also applied

At the early stage of the community quarantine implementation, the majority (73%) of the respondents were food insecure. The effects on consumption behavior and adaptation of backyard gardening were observed. For the significant difference in terms of responses between food secure and insecure households, the following parameters were found to have a significant difference – for the socio-demographic, age and family income; for the purchase/consumer behavior, change in buying/shopping behavior (mostly on buying bulks and setting aside original preferences), food acquisition, preference for fresh food, reaching/going to the market or grocery stores, limiting factors in going to the market or grocery stores, expectation on the livelihood impact, and eating healthier. In terms of the emergency measure, *i.e.* backyard gardening, the same responses were observed whether food secure or insecure. For the parameter associated with food security, *i.e.* socio-demographics, the strongly associated parameters to food security were age and family income. On the behavioral response, the change in the cost of food allocation was moderately associated, whereas expectations on the livelihood impact and the

change in expenditure were strongly associated with food security. As for the emergency measure focusing on the practice of backyard gardening, food security was strongly associated with the influence of the neighbor and driven by the motivation to have some additional source of income. The stress evaluation showed that significant perturbation in the daily routine for acquiring food and food-related products was experienced, causing not only increased problems in food security but on the level of anxiety of the people to secure their daily living. Follow-up studies are needed to assess food security after the early stage of enhanced community quarantine or strict lockdown further.

ACKNOWLEDGMENTS

The authors would like to thank Mr. Dan Yema, RPsy for his significant technical contribution and the School of Environmental Science and Management of the University of the Philippines Los Baños for its assistance in the conduct of the survey.

NOTE ON APPENDICES

The complete appendices section of the study is accessible at <https://philjournsci.dost.gov.ph>

STATEMENT ON CONFLICT OF INTEREST

The authors declared that they have no conflict of interest.

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APPENDICES

Table I-1. Food security dimensions (FAO 2006).

Food availability	The availability of sufficient quantities of food of appropriate quality supplied through domestic production or imports (including food aid).
Food accessibility	Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic, and social arrangements of the community in which they live (including traditional rights such as access to common resources).
Food utilization	Utilization of food through adequate diet, clean water, sanitation, and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.
Stability	To be food secure, a population, household, or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (<i>e.g.</i> an economic or climatic crisis) or cyclical events (<i>e.g.</i> seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

Table II-1. Modified household food insecurity access scale (HFIAS) measurement tool (Coates 2007).

Questions*	Food secure	Food insecure
1. In the past weeks, did you worry that your household would not have enough food?	No	Yes
2. In the past weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	No	Yes
3. In the past weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	No	Yes
4. In the past weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	No	Yes
5. In the past weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	No	Yes
6. In the past weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	No	Yes
7. In the past weeks, was there ever no food to eat of any kind in your household because of a lack of resources to get food?	No	Yes
8. In the past weeks, did you or any household member go to sleep at night hungry because there was not enough food?	No	Yes
9. In the past weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	No	Yes

*During the lockdown

Table II-2. HFIAS standing scoring system.

Frequency of occurrence	Scoring (pts.)
Never occurred (0 times)	0
Rarely (1–2 times)	1
Sometimes (3–10 times)	2
Often (> 10 times)	3

PARTICIPANTS AND DATA GATHERING

Considerations in Planning and Structuring

The first part is on focusing on the objectives and determining the most feasible methodology, especially under an important matter of lockdown and strict mobility restrictions. To address the limitation of the study, social media was used as a platform to administer the developed survey questionnaire using Google Form. Through convenience sampling, individuals who can be contacted *via* Facebook, Twitter, and Instagram through personal and professional networks of the authors were asked about their willingness to participate in the survey. Willing individuals served as convenience samples in the study representing their households. A “snowball” dissemination strategy (Rapisarda *et al.* 2020) was also employed to encourage each respondent to send the survey questionnaire link to their colleagues.

Survey Instrument Pre-testing

According to the objectives of the study, the survey instrument was tested first. This was placed in the Google Form. The survey instrument was pre-tested with a group of experts consisting of environmental scientists, food and nutrition experts, social scientists, students, a psychologist, a development communication expert, and a statistician. The invitation was made through Facebook messenger. Feedback and assessments of each participant were considered such as if a question is inappropriate, if a question is vague, if a question needs more choices, if there are any grammatical or typographical errors, *etc.* The data were generated in the Google Sheet. The answers

were then assessed by the authors to make sure that the responses gathered are within the expected answers. Each question was checked to see if it was answered by the participants properly.

Survey Instrument Modification

From the gathered feedback and assessments from the participants’ questions and answers and authors’ review and examination, modification to the survey instrument was made. It was again placed in a Google Form. The authors tested the revised survey questionnaire and rechecked if all the assessments made were integrated. Validation of all the authors was ensured before proceeding to the next steps. For the reliability of the survey questionnaire, a coefficient of 0.794 was obtained using Cronbach’s alpha. This means that the questionnaire is at an acceptable level with high internal consistency and reliability.

Participants, Data Gathering, and Filtering

After the authors’ validation, the survey instrument was posted online on Facebook. Since mobility restriction is strictly implemented during the conduct of the study, dissemination of the survey instruments was made possible through the authors’ family, friends, colleagues, network, *etc.* The data was generated using the Google Sheet. The study aimed to assess food insecurity at the household level; thus, only one representative per household, preferably the head, was required to participate in the survey.

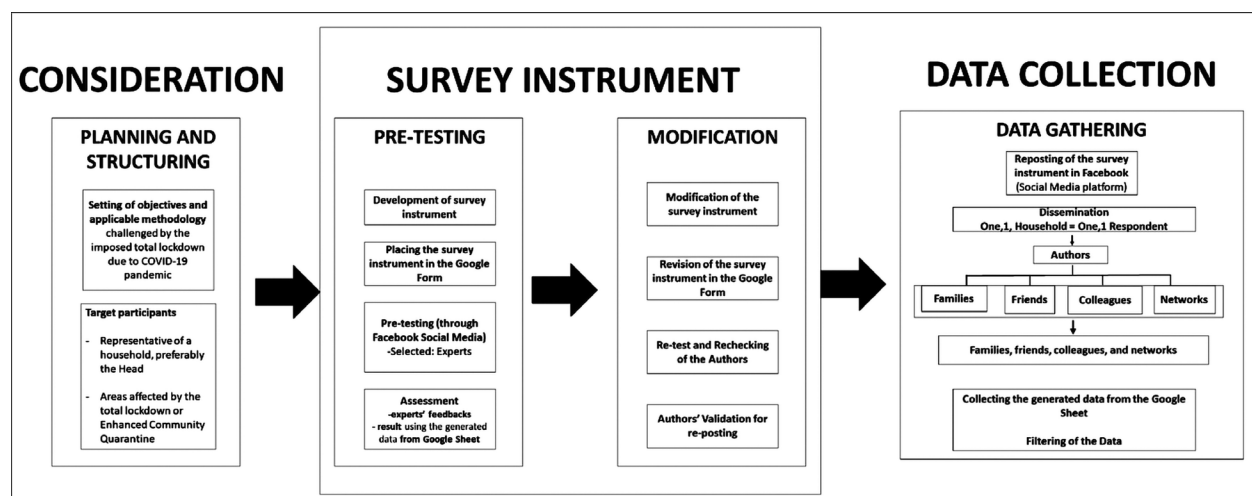


Figure III-1. Data gathering flow chart.

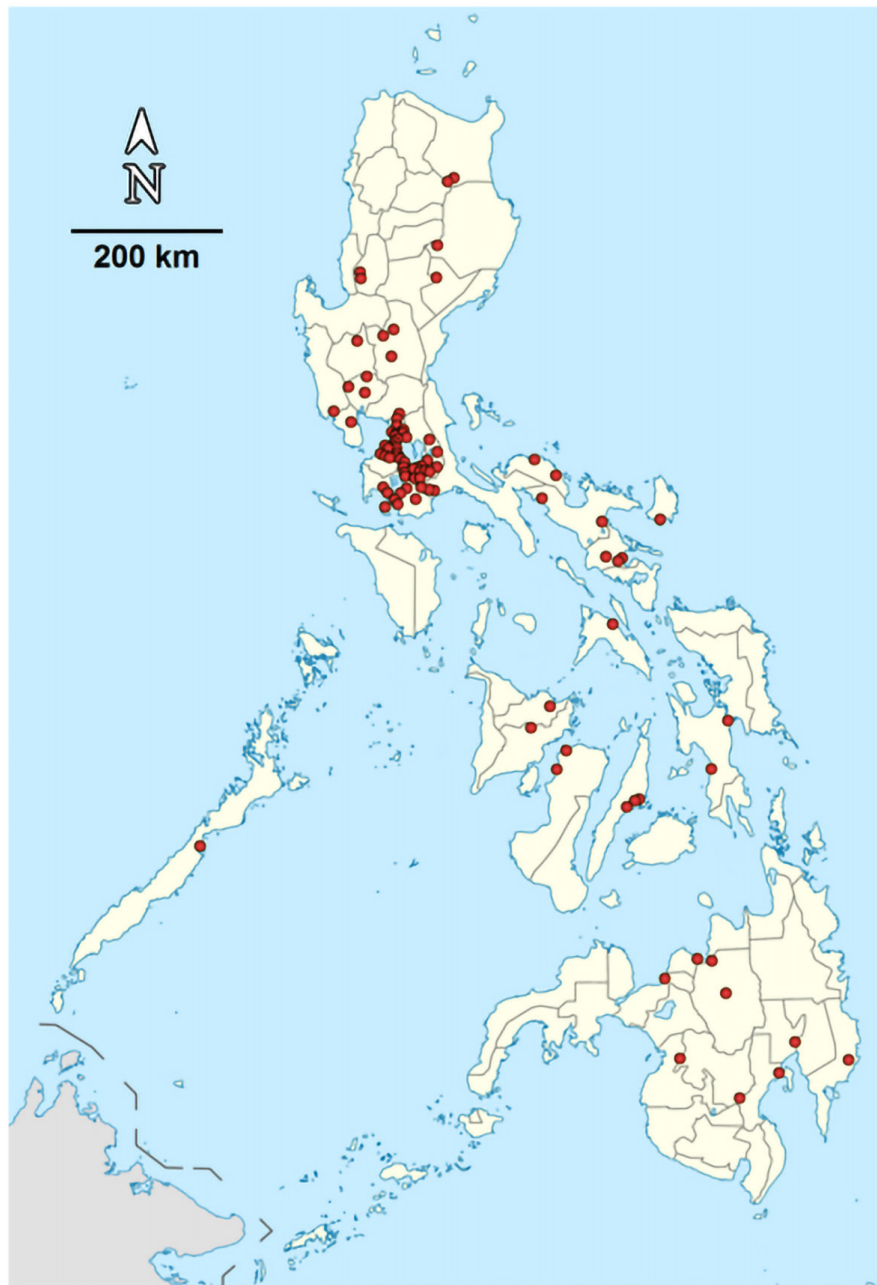


Figure III-2. Location map of the respondents.

Table IV. Socio-economic profile of the households.

Variables	*Frequency, n	*Percent, %	Food secure (n = 91)	Food insecure (n = 240)
Age				
15–30	160	48	28	132
31–64	168	51	62	106
65 and above	3	1	1	2
Gender				
Male	192	58	25	167
Female	137	41	66	71
Others	2	1	0	2
Residence type**				
Owned	202	61	56	146
Rented	81	24	20	61
Living with parents	34	10	12	22
Others	14	4	3	11
Household size				
1	23	7	3	20
2	30	9	11	19
3	60	18	16	44
4	72	22	21	51
5	60	18	18	42
6–10	76	23	22	54
More than 10	10	3	0	10
Household income (USD)				
Less than 244	19	6	3	16
244–487	41	12	10	31
488–974	108	33	20	88
975–1,705	78	24	25	53
1,706–2,923	59	18	24	35
2,924–4,871	14	4	6	8
At least 2,925	12	4	3	9