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FOOD SECURITY PROGRAM

Enabling Food and Nutrition Security

Are the Existing Food Environments Capable?

Julieta A. Delos Reyes and Lady Litz M. Aquino

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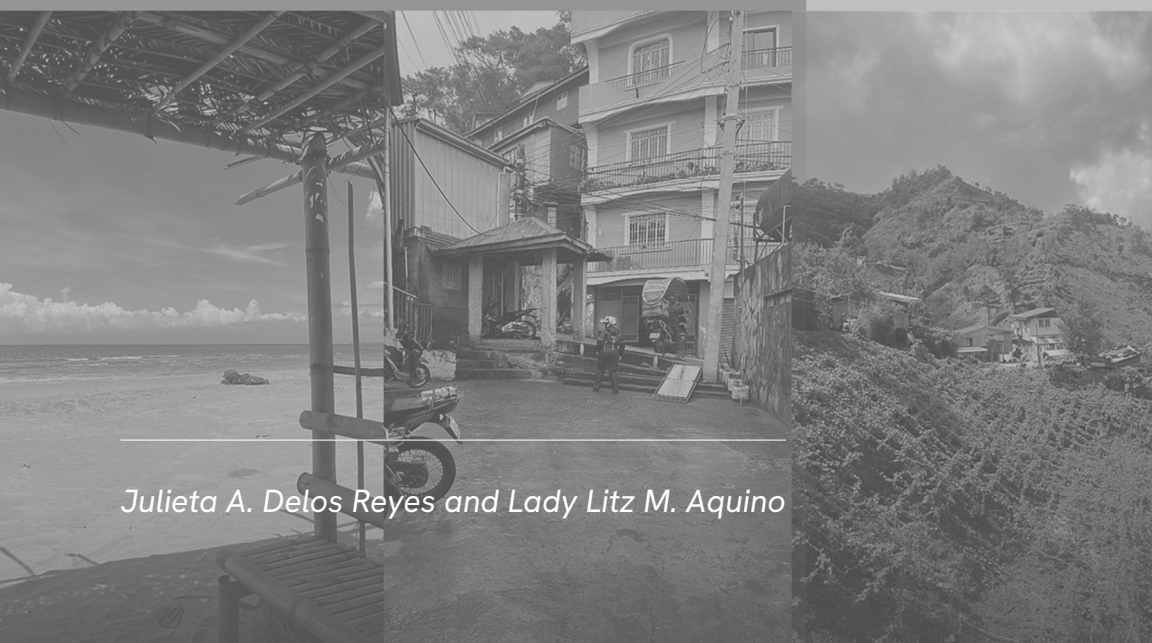

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"Coastal, urban, and upland food environments in the Northern Philippines (captured during field visits for the Food and Nutrition Security Program)."

Image Details (from left to right): Coastal community in Barangay Laois, Labrador, Pangasinan; Urban community in Barangay Balsigan, Baguio City; and Upland community in Barangay Topdac, Atok, Benguet.

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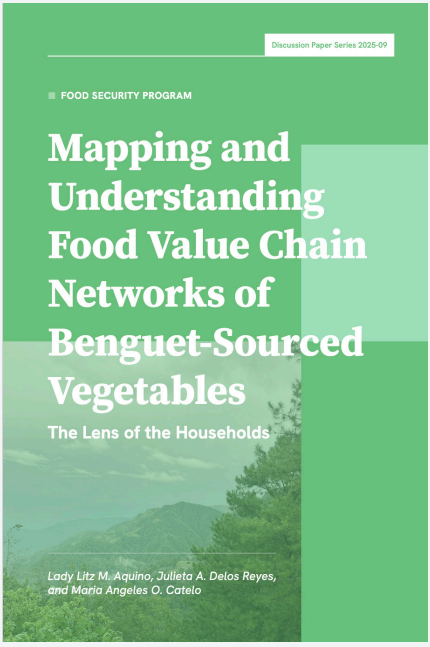

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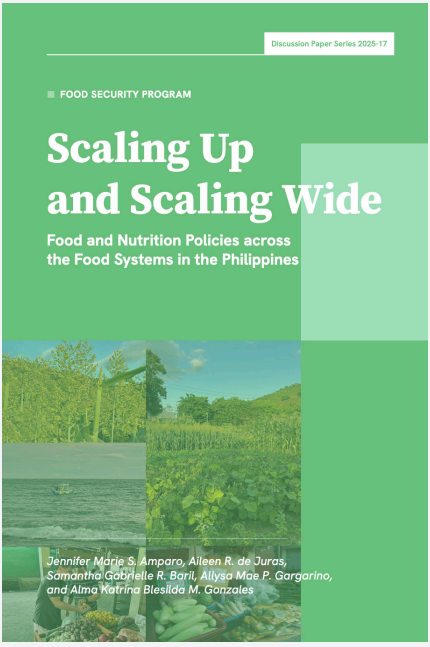

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ENABLING FOOD NUTRITION AND SECURITY

Are the Existing Food Environments Capable?

Julieta A. Delos Reyes[1] and Lady Litz M. Aquino[2]

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ABSTRACT

This paper examines the capability of different food environments to achieve food and nutrition security in selected areas in the Northern Philippines. A total of 180 households, 60 each from coastal, urban, and upland areas were personally interviewed using the Food Insecurity Experience Scale (FAO 2013) survey questionnaire. Health records of children aged 0–59 months old were obtained from the barangay nutrition scholars (BNS) and barangay health workers (BHW). Key findings include: (1) food and nutrition security conditions vary across communities with urban areas having the most severely food insecure; (2) food insecurity does not always correlate with malnutrition, suggesting inconsistencies in malnutrition reporting and assessment systems on the ground; (3) economic accessibility is more problematic than physical availability among urban households; (4) households are not entirely compliant to the recommended nutritional guidelines, of the Pinggang Pinoy meal model with protein-rich foods more favored; and (5) food environments and household income are the strongest predictors of food security, underscoring the need for policies that enhance both food availability and affordability. The study calls for a multisectoral approach, policy reforms, localized interventions, and public education that should be based on community needs that are specific to a certain food environment.

Keywords: food insecurity, malnutrition, food environment, nutritional guidelines, Pinggang Pinoy

INTRODUCTION

The European Public Health Alliance (EPHA 2019) defines food environments as the various contexts related to physical, economic, political, and sociocultural—where individuals interact with the food system to decide how they acquire, prepare, and consume food. These environments consist of both the "spaces" where food-related decisions are made and the types of foods and beverages that are available, affordable, accessible, and appealing within those spaces. The High-Level Panel of Experts on Food Security and Nutrition (HLPE 2017, 11) was more explicit as it specified the key elements of the food environment that affect food choices, food acceptability, and eventually, diets. These are: "physical and economic access to food (proximity and affordability); food promotion, advertising and information; and food quality and safety."

The importance of this study is based on the EPHA (2019) statement that "creating enabling food environments means ensuring that foods, beverages, and meals that contribute to sustainable healthy diets are the most available, affordable, convenient, and widely promoted." In the Philippines, the Magna Carta of the Poor Act (Republic Act No. 11291) stated that "It is the declared policy of the State to uplift the standard of living and quality of life of the poor and provide them with sustained opportunities for growth and development (§2). Section 4 on the scope of the fundamental rights of the poor provides the rights of the poor, which include, among others, the "right to adequate food." This right ensures that individuals and families have both "physical and economic access to sufficient and healthy food," or the means to obtain it (§4[a]). It likewise emphasizes the need to guarantee food "availability, accessibility, and sustainability" in adequate quantity and quality to meet the dietary needs of impoverished individuals and families (§4[c]). It also advocates for actively involving the poor in initiatives that promote self-sufficiency and improve their access to resources for ensuring long-term food security (§4[d]).

Given the above, the focus of this paper is on the physical and economic access to food or proximity to and affordability of food as a key element of food environment. This study was conducted in three distinct communities: an urban area (Barangay Balsigan, Baguio City), a coastal area (Barangay Laois, Labrador, Pangasinan), and an upland community (Barangay Topdac, Atok, Benguet). These areas were selected for their ecological diversity and therefore food environments, and unique food systems, providing a comparative framework to analyze how varying environments influence food and nutrition security through empirical evidence on food availability, access, utilization, and stability. Each community presents specific opportunities and challenges based on geography, economic conditions, and food sources, offering insight into how location-based factors impact food security.

REVIEW OF RELATED LITERATURE

FAO's Food Insecurity Experience Scale (FIES)

Food security is a critical global issue viewed from the perspective of food availability, access, utilization, and stability (FAO 2020). Among the various food security assessments at the individual or household level, the Food Insecurity Experience Scale (FIES) developed by the Food and Agriculture

Organization (FAO) has become a useful tool. By considering people's perceptions of food insecurity, the FIES is easy, accessible, inexpensive, and relevant around the world in assessing people's hunger and food insecurity. Introduced by the FAO, FIES is part of its global efforts to measure food security using the same people in a consistent manner (Ballard et al. 2013). Based on item response theory (IRT), it is built from previous food security scales such as the US Household Food Security Survey Module (HFSSM) and the Latin American and Caribbean Food Security Scale (ELCSA) (Cafiero et al. 2016). The eight-item scale assesses food insecurity at different levels (mild, moderate, and severe) by asking respondents about their experiences related to food access.

FIES is a subjective but standardized method of assessing food security based on people's firsthand experiences of being food insecure. It provides direct insights into people's lived experiences on things such as food supply and economic indicators and it has been found to have a good correlation with other food security measures. Based on studies, for dietary diversity and caloric intake, it is easier to administer in resource-poor settings (Frongillo,1999). Likewise, FIES has widely been used in global and regional food security assessments such as FAO's annual *State of Food Security and Nutrition in the World* (SOFI) report (FAO 2021). Indeed, FIES has become a part of governments', NGOs', and humanitarian organizations' food assistance programs and policymaking processes.

Food Environments and Their Determinants

Food setting plays a very important role in what people eat and their nutritional outcomes. Physical, economic, political, and sociocultural factors exert influence on food environments (HLPE 2017). They determine what food is available, accessible, affordable, and consumed from around the world. The physical determinants of food environments are very important in deciding how easy it is to get food and how much there is. Physical accessibility to food, including proximity to supermarkets and food stores, is a commonly used metric in food environment research. Factors such as infrastructure quality and geographical distribution play a key role in determining food access and availability (Turner et al. 2018). Urbanization also reshapes food environments, such that more supermarkets are now in urban food settings, replacing fresh/wet market stores and removing traditional food settings in low-income areas

(Gómez and Ricketts 2013). Transportation infrastructure also affects access to food as longer distances to markets may limit the quantity and quality of foods that are available, especially in rural areas (HLPE 2017).

In terms of the economic aspect, the amount of money and food costs have a big effect on food environments (Darmon and Drewnowski 2015). Darmon and Drewnowski (2015) conducted a systematic literature review highlighting that healthier diets are often associated with higher costs, which can contribute to socioeconomic disparities in diet quality and health. Income, work, and fluctuating prices of food in the market also directly affect people's capability to buy healthy food. In analyzing global food prices, Headey and Alderman (2019) found that in lower-income countries, healthy foods are generally more expensive, impacting their consumption among children and contributing to undernutrition. Drewnowski and Rehm (2013) found out in their study that in order to save costs, low-income families consume less healthy and higher-calorie foods, all of which result in bad nutrition.

However, the government promotes the consumption of healthier foods by subsidizing food prices. The report of the FAO in 2020 discussed various policy measures, including subsidies and price interventions, aimed at improving access to healthy diets. The High-Level Panel of Experts on Food Security and Nutrition (HLPE 2017) report also emphasized that policies and trade agreements play a crucial role in shaping food environments by altering the availability, accessibility, and affordability of food. There are policies such as taxation on sugar-sweetened beverages and subsidies for fresh produce which have been implemented in several countries to promote healthier diets. These policies aim to reshape food environments by making healthier food choices more accessible and reducing the consumption of unhealthy alternatives.

A manual was made for sugar-sweetened beverage taxation policies by the World Health Organization (WHO) in 2022 to encourage healthy diets to reduce noncommunicable diseases (NCDs) like obesity and diabetes. According to WHO (2022), fiscal policies can relieve the burden of diet-related diseases like obesity, diabetes, and cardiovascular diseases that are sometimes associated with poor dietary choices. In 2014, Mexico introduced an SSB tax, which had a 6–12 percent decline in consumption in its first year (Colchero et al. 2016). In the United Kingdom, the Soft Drinks Industry Levy (SDIL), encouraged sector

reformulation to reduce the amount of sugar in beverages while keeping the consumer prices relatively unchanged (Pell et al. 2020). Also, under the Tax Reform for Acceleration and Inclusion (TRAIN) Law, effective 1 January 2018, the Philippines adopted a tax on sugar-sweetened beverages (SSBs) to fully gain from SSB tax revenues while leveraging it as an additional health protection measure that positively impacts public health. The implementation of the Philippines's TRAIN Law in particular, with the sugar-sweetened beverage (SSB) tax, has been very useful in protecting public health and government revenue generation (Onagan et al. 2019). Twenty months after this law was passed, sweetened beverages and high fructose corn syrup decreased sales for a week as prices rose from as much as 16.6 percent to 20.6 percent in sari-sari stores (Onagan et al. 2019). This ties in with global research that showed that fiscal measures can lead to a decrease in the consumption of unhealthy drinks and thereby, reduce obesity, diabetes, and other health problems. Moreover, the government's pledges on universal health coverage and nutrition programs were reinforced by the revenues from the taxes collected. It also served as a model for using taxes to promote healthy consumption through economic benefits (Onagan et al. 2019).

Despite these successes, the effectiveness of SSB taxation is highly dependent on socio-economic contexts. SSB taxes disproportionately affect lower-income populations, potentially exacerbating economic disparities if not paired with supportive policies such as fresh food subsidies or other healthy foods to ensure that SSB taxes do not inadvertently exacerbate economic disparities (WHO 2022). In addition, a 2022 University of Washington study also found that SSB taxes can provide net economic benefit to communities with lower incomes (Kirschman 2022). These taxes were seen to decrease the consumption of unhealthy products and thus generate health benefits and financial savings for these populations. Subsidies on fresh produce are designed to reduce their cost such that they can be more accessible to consumers. There is evidence that the reduction in the prices of fruits and vegetables leads to a rise in consumption. According to Afshin et al. (2017), a 10 percent reduction in fruit and vegetable prices leads to a 14 percent increase in consumption. In the Philippines, there are also programs like the Kadiwa which has been shown to improve food affordability in low-income households (Merle 2022).

Despite a number of efforts, food accessibility challenges persist. This discussion paper identifies disparities in food access across urban, coastal, and upland communities. For example, while coastal and upland households benefit from subsistence farming and fishing, urban residents face financial constraints. These discrepancies suggest the need for more localized studies on the ground for more strategic and targeted improvement imperatives.

METHODOLOGY

A total of 180 households[3] in three different communities (and also different food environments) consisting of 60 each from coastal, urban, and upland areas were personally interviewed beginning 18 August until 17 September 2024. For food insecurity, the Food Insecurity Experience Scale (FIES) of the Food and Agriculture Organization of the United Nations (FAO, 2013) was included in the survey questionnaire. In addition, health records of children 0–59 months old were obtained from the respective barangay nutrition scholars (BNS) and barangay health workers (BHW). Data on food security dimensions were collected through formulated indicator statements per dimension. For rating food availability, accessibility, and utilization ratings, respondents were asked to choose from a five-point Likert agreement/disagreement scale (1 = strongly disagree to 5 = strongly agree). For food stability, respondents had to indicate the frequency per week of experiencing those mentioned in the indicator statements (1 = 1–2 times/week; 2 = 3 times/week; 3 = 5 times/week; 4 = 6 times/week; 5 = 7 times/week). Mean ratings per indicator and per dimension were computed. Socioeconomic data collected were subjected to descriptive analysis and value chain mapping, and graphs/radar charting for visualization of food security and its dimensions were performed. For statistical analysis, multinomial logistic regression using food security/insecurity as the dependent variable and severely food-insecure as the reference variable was also done to determine the factors affecting the different levels of food insecurity. The following model was used:

3 All respondents provided consent in taking part in the completion of the survey. They were assured of their anonymity in the outputs and confidentiality of the data that they will provide for this study.

$$Y = a + \beta 1Xi1 + \beta 2Xi2 + \beta 3Xi3 + \beta 4Xi4 + \beta 5Xi5 + \beta 6Xi6 + \beta 7Xi7 + \beta 8Xi8 + \beta 9Xi9 + \varepsilon$$

where

Y = level of food insecurity (severely insecure as reference level)

Xi_1 = food availability score

Xi_2 = food access score

Xi_3 = food utilization score

Xi_4 = food stability score

Xi_5 = age

Xi_6 = household size

Xi_7 = household income

Xi_8 = household diet diversity score

Xi_9 = food environment

a = constant

ε = error term

CHARACTERISTICS OF RESPONDENTS

The respondents, who are household food decision-makers, are dominated by females at 74 percent on average with the highest percentage (82 percent) found in the coastal community and the lowest (68 percent) in the urban community. In the coastal community, more men have a higher tendency to be always away on a fishing trip hence, they are not inclined to plan and decide on household meals.

On average, they are 49 years old with the oldest (59) found in the coastal community while the youngest (41) are in the upland. In general, the highest proportion (19 percent) of them were able to graduate from senior high school and some were able to enter college but did not finish. All of the three communities had an average household size of five members. Income-wise, the average monthly income of all the respondents was ₱13,948, which is slightly higher than the poverty threshold in the Philippines of ₱13,873 in 2023 (PSA, n.d.). Those in the urban community reported the highest average income at ₱16,478 per month while the lowest average was for those in the coastal community at ₱11,516 per month. Both the upland and coastal communities were found to have average household monthly incomes that were below the country's poverty line (see table 1).

FOOD SECURITY STATUS

Food Insecurity Experience Survey (FIES)

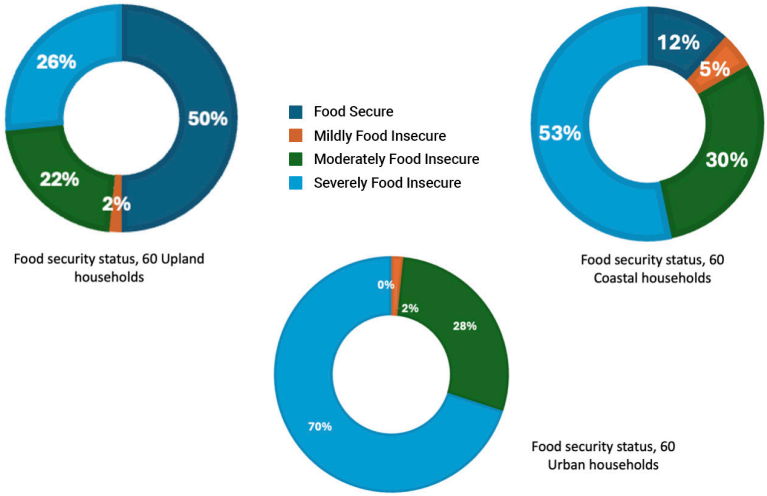
Based on the Food Insecurity Experience Scale of the Food and Agriculture Organization (FAO 2021), the highest proportion of food-secure (50 percent) household respondents can be found in the upland community, represented in this study by Topdac, Atok, Benguet. Meanwhile, there were no food-secure households in Balsigan, Baguio City, an urban community. The coastal community (Laois, Labrador, Pangasinan) was found to have only 12 percent of household respondents who are food-secure, but 53 percent were severely food-insecure. The proportion of severely food-insecure households was highest in the urban community at 70 percent (see figure 1). According to the respondents, in the urban area, while food commodities are easily available and could have been within their reach, accessibility in terms of affordability has been the biggest challenge in their day-to-day effort to secure the food needs of their families. The very high prices of food items kept them worried that they may not have enough money to pay for the consumption needs of their family. On the other hand, in the upland community, those who were found to be food secure are able to produce their own food, particularly vegetables, corn, and some root crops. In the coastal community, people tend to have more food sources other than buying them since they can catch fish and grow their own vegetables as well. The proportion of mildly food insecure was highest in this community with five percent reporting. Similarly, it had the highest proportion of moderately food insecure (30 percent) (see figure 1).

Food Insecurity Through Assessment of its Dimensions

Food security is a comprehensive concept that measures the ability of people and households to feed themselves adequately with good-quality food. In this study, four key dimensions were assessed: the adequate and diversified amount of food that is available in the market (availability), the economic and physical accessibility of that food by the surveyed households (accessibility), the ability of households to consume a diverse range of food products that meet dietary needs while ensuring proper storage and preparation (utilization), and the consistency of food access over time without facing intermittent shortages (stability).

Table 1. Socioeconomic characteristics, 180 household-respondents, by type of food environment, Northern Philippines, 2024

SOCIOECONOMIC CHARACTERISTICS	COASTAL (N = 60)	UPLAND (N = 60)	URBAN (N = 60)	TOTAL (N = 180)
Sex				
Male	18	28	32	26
Female	82	72	68	74
Age (years)				
≤ 30	10	30	18	19
31–40	25	17	15	18
41–50	22	32	28	27
51–60	28	15	18	21
61–70	13	7	15	12
≥ 71	2	0	5	2
Average (years)	59	41	47	49
Educational Attainment				
Elementary Level	7	0	2	3
Elementary Graduate	15	17	5	12
Junior High School Level	12	3	8	8
Junior High School Graduate	10	8	23	14
Senior High School Level	10	3	0	4
Senior High School Graduate	27	20	10	19
College Level	7	18	32	19
College Graduate	7	18	17	14
Post-Graduate	0	0	0	0
Vocational	7	12	3	7
Household Size				
1–3	27	30	23	27
4–6	57	45	63	55
7–9	15	20	10	15
≥ 9	2	5	2	3
Average	5	5	5	5
Household Monthly Income				
≤ ₱10,000	50	48	33	44
₱10,001–20,000	40	38	40	39
₱20,001–30,000	8	7	17	11
₱30,001–40,000	0	7	7	4
₱40,001–50,000	2	0	3	2
₱50,001–60,000	0	0	0	0
≥ ₱60,001	0	0	0	0
Average	11,516	13,725	16,478	13,948



■ **Figure 1.** Food security/insecurity level by type of food environment based on FIES (FAO 2024)

The findings revealed that the average scores for all the food security dimensions ranged from a low of 3.445 (upland food environment) to a high of only 3.862 (urban food environment), all of which fall under the category of being neutral. This implies that the respondents are neither food-secure nor food-insecure. Among the four dimensions of food security, utilization or consumption of a variety of food products had the highest rating at an average of 4.220 for all three environments with the urban area rating the highest at 4.423 and the upland the lowest (3.967) (Table 2). These ratings indicate that they tend to agree that there is a variety of food items and the urban households' highest rating on this is because they are nearest to the markets where they can buy a wide array of food if they want to. Those in the upland claimed that they have fewer food choices even among vegetables because they can only plant those that are suited to their area. Also, they only have a few variety stores which are distantly located.

Among the four dimensions, stability was rated the highest (3.724) although it is still within the "neutral" level. The coastal households gave the highest (3.873) and the upland the lowest (3.440). Meanwhile, accessibility has the lowest rating at 3.138 with the upland registering the lowest rating at 2.850 and the urban with 3.400 is the highest (see table 2 and figure 2). Again, the

physical availability of more food facilitated this high rating by the urban households.

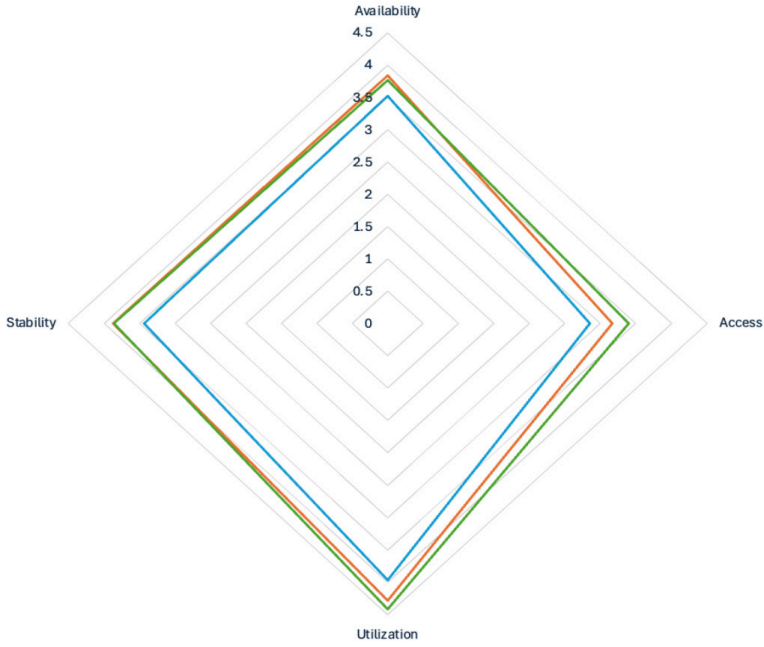
Table 2. Scores by food security dimension and by type of food environment, 180 households, selected areas, Northern Philippines, 2024

FOOD ENVIRONMENT	AVAILABILITY	ACCESS	UTILIZATION	STABILITY	AVERAGE SCORE
Coastal (Laois, Labrador, Pangasinan)	3.833	3.163	4.280	3.873	3.787
Upland (Topdac, Atok, Benguet)	3.523	2.850	3.967	3.440	3.445
Urban (Balsigan, Baguio City)	3.767	3.400	4.423	3.860	3.862
Average	3.708	3.138	4.220	3.724	3.698

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

Determinants of the Food Insecurity Dimensions

For food availability, five indicator statements were formulated for the respondents to specify their level of agreement/disagreement (1 = Strongly Disagree and 5 = Strongly Agree). It can be seen in figure 3 that the dominant factors differ per food environment. For instance, in terms of the diversity of food items in local markets, the coastal area had the highest agreement rating while the lowest was for the upland community. However, in terms of food production, the latter had the highest. When it comes to experiencing the negative impacts of rising food prices, all three types of communities had almost the same rating level ranging from neutral to almost agree. Those in the urban community had the highest agreement for the availability of good quality food items while those in the coastal area had the lowest. When asked about resilience to food shortages, households in both the coastal and upland areas disagreed that they are resilient while those in the urban areas are more neutral.



Barangay	Availability	Access	Utilization	Stability
Laois, Labrador (coastal)	3.833	3.163	4.28	3.873
Topdac, Atok (upland)	3.523	2.85	3.967	3.44
Balsigan, Baguio City (urban)	3.767	3.4	4.423	3.86

■ **Figure 2.** Food security dimension score by food environment[4]

Accessibility for this study is focused on four indicator statements with the following themes covering both physical and financial access: enough household income to buy food needs, availability of food sellers and food sources, reliance on food aid or "ayuda," and access to institutionalized assistance. Access to institutionalized assistance mainly from the local government units (LGUs) was given the highest rating of almost "strongly agree" in the urban food environment and almost "agree" for the upland and coastal communities. This aligns with the findings of delos Reyes and Padrid (2024), which highlight that local government units (LGUs) emerged as the third-largest food suppliers during the pandemic, increasing their contribution from 6 percent pre-pandemic to 39 percent during the crisis. Initially, LGUs distributed rice, canned goods, and noodles, but later expanded

4 The results were standardized on a 1–5 scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree).

to sourcing fresh produce directly from farmers through the Kadiwa ni Ani at Kita Program. However, noninstitutionalized assistance was rarely relied upon in all three types of food environments because according to them, these are not consistently provided. The respondents in the urban and coastal communities rated the presence of food sellers and food sources as "neutral" but those in the upland environment "disagreed." All the respondents claimed that their household income is not enough to cover their family needs (see figure 4).

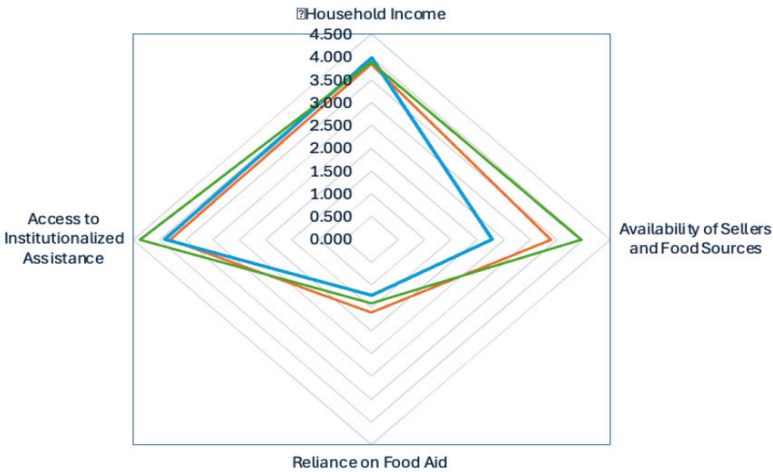
Barangay	Diversity	Production	Quality	Impact	Resilience
Laois, Labrador (coastal)	4.767	4	3.583	4.267	2.517
Topdac, Atok (upland)	2.933	4.133	3.75	4.283	2.517
Balsigan, Baguio City (urban)	4.583	2.8	4.25	4.15	3.05

■ **Figure 3.** Factors affecting food availability by food environment[5]

Food utilization was analyzed not only in terms of the variety of foods being utilized but also in those who should have been able to prepare healthy and nutritious food combinations for the family. This is related to clean living such as having safe and clean food and water and affordability of healthcare and nutrition services. The latter is supposed to have been for the provision of supplements because, in reality, food items do not have micronutrients enough to meet the needs of a healthy body. This was rated the lowest in all three food environments. In contrast, access to clean food and water,

5 The results were standardized on a 1–5 scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree).

maintenance of sanitation, and a clean living environment were rated the highest. For knowledge on food preparation, the areas varied with those in the uplands having the lowest while those in the coastal area have the highest. Likewise, variations were noted for the ratings on consumption of diverse types of food but such were also low with those in the urban environment giving the greatest and again, households in the upland registering the least (see figure 5).



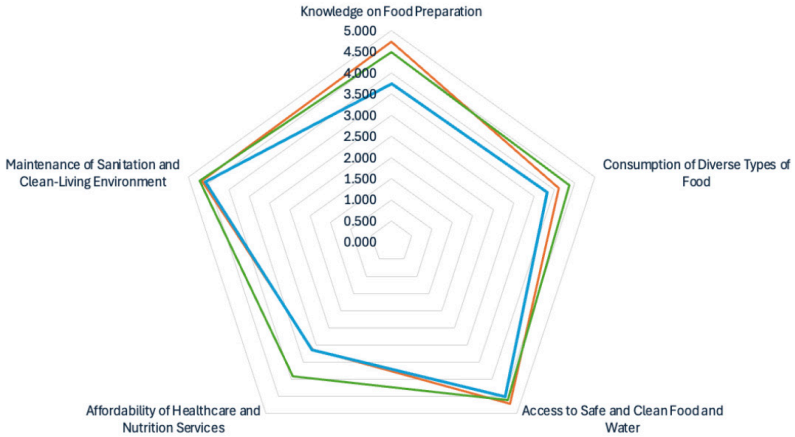
Barangay	Household Income	Availability of Sellers and Food Sources	Reliance on Food Aid	Access to Institutionalized Assistance
Laois, Labrador (coastal)	3.85	3.383	1.600	3.800
Topdac, Atok (upland)	3.983	2.283	1.233	3.9
Balsigan, Baguio City (urban)	3.883	3.95	1.4	4.367

■ **Figure 4.** Factors affecting food access in each food environment[6]

For food stability, household respondents had to indicate the frequency per week of their experiences for the following: availability of food; access to safe and clean food and water; consumption of diverse types of food; maintenance of sanitation and a clean living environment; and affordability of healthcare and nutrition services. Access to safe and clean food and water proved the highest rated which is equivalent to seven times a week for all the food environments. The lowest and therefore the least stable was for affordability

6 The results were standardized on a 1-5 scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree).

of healthcare and nutrition services equivalent to only two times a week. Consumption of diverse food items was at five to six times per week for all types of food environments. Consistent availability of food was most frequent for those in the coastal and least for the upland (see figure 6).



Barangay	Knowledge	Consumption	Water	Healthcare	Sanitaton
Laois, Labrador (coastal)	4.733	4.117	4.717	3.15	4.667
Topdac, Atok (upland)	3.75	3.833	4.517	3.15	4.583
Balsigan, Baguio City (urban)	4.483	4.367	4.617	3.933	4.717

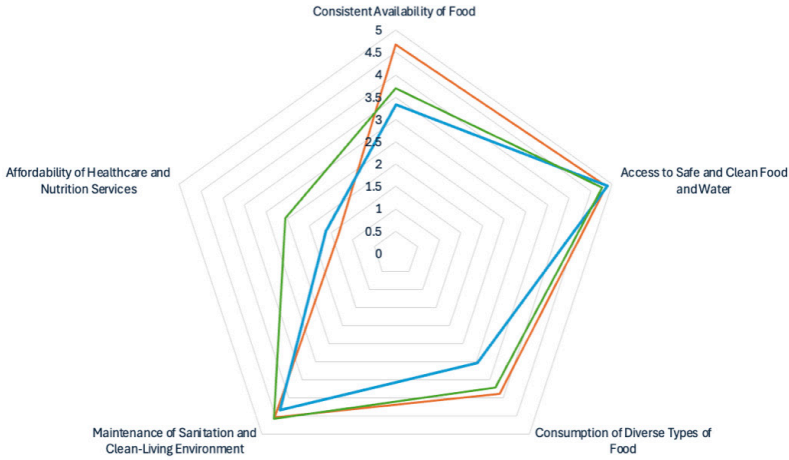
■ **Figure 5.** Factors affecting food utilization by food environment[7]

The Pinggang Pinoy Meal Model

The household-respondents in all the study areas have not been compliant with the meal recommendations of Pinggang Pinoy of having 33 percent Go foods, 17 percent Grow, and 50 percent Glow (33 percent vegetables and 17 percent fruits). In particular, Grow foods are the most favored with the coastal and upland communities having 35 percent and urban areas with 43 percent consumption share. Glow foods are the least consumed with 27 (upland) and 29 percent share each for coastal and urban communities. Go foods are lacking in the urban community at only 30 percent, but they are in excess in upland and coastal communities because they can grow their own rice, rootcrops, and corn. In the urban community, there is no available area to grow these crops

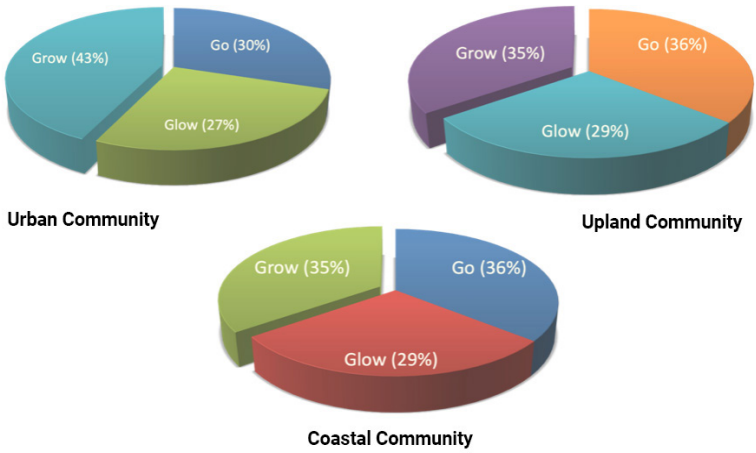
7 The results were standardized on a 1-5 scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree).

and according to the respondents, rice is expensive. Thus, they are unable to meet the 33 percent recommendation per meal (see figure 7).



Barangay	Consistent	Water	Consumption	Sanitation	Health
Laois, Labrador (coastal)	4.683	4.867	3.881	4.533	1.333
Topdac, Atok (upland)	3.333	4.883	3.033	4.333	1.617
Balsigan, Baguio City (urban)	3.7	4.767	3.717	4.567	2.55

■ **Figure 6.** Factors affecting food stability by food environment[8]



■ **Figure 7.** Share of the different food groups in the Pinggang Pinoy meal model by food environment

8 The scale was defined as follows: 1 = 1–2 times/week, 2 = 3 times/week, 3 = 5 times/week, 4 = 6 times/week, 5 = 7 times/week.

Table 3 reveals that drinking water, which as recommended by Pinggang Pinoy meal model to be taken at least a glass for every meal, has been reported to be bought by 76 percent of all the respondents. Only one percent (two respondents) claimed to have their own deep wells while some of those in the urban areas are tapping from the piped-in faucet. In the upland community, households tend to source from natural springs.

Table 3. Source of drinking water by food environment, Northern Philippines, 2024

SOURCE OF DRINKING WATER	COASTAL	UPLAND	URBAN	ALL
	Percent			
Deep Well	0	2	0	1
Bought (Containerized)	100	55	72	76
Others	0	43	28	23

Nutritional Status of Children 0–5 Years Old

It is interesting to note that despite the low level of food security (maximum of 50 percent), very minimal malnourishment can be noted in all three communities. This is also despite all three of them were found to be noncompliant with the Pinggang Pinoy Meal Model. According to the National Nutrition Council, Pinggang Pinoy promotes healthy eating and therefore good nutritional status. Table 4 shows that on average, the three different communities were found to have 98.46 percent of their children 0–5 years old as having normal nutritional status and only 1.54 percent were either wasted (0.14 percent), stunted (1.26 percent), and underweight (0.14 percent).

Table 4. Nutritional status of children 0–5 years old by food environment, Northern Provinces, Philippines, 2024

COMMUNITY	NORMAL	WASTED	STUNTED	UNDERWEIGHT
	Percent			
Coastal	97.89	0.42	1.27	0.42
Urban	98.26	0.00	1.74	0.00
Upland	98.22	0.00	0.78	0.00
Average	98.46	0.14	1.26	0.14

- Source: Records as of 2024 of the respective LGUs

Inconsistency Between FIES Food Insecurity Findings and Reports of Malnourishment

Almost always food and nutrition security are taken together, especially in systematic assessments of what causes each of them. According to Hwalla et al. (2016), the relationship between food security and nutrition security is complex and in fact "food security cannot be achieved without nutrition security, and vice versa." Thus, the findings of this study that food security is only up to a maximum of 50 percent (upland community) and even none in the urban community while malnourishment is almost nil in all the communities is highly contentious and should not be taken at face value. When presented with these results, a nutrition expert posits that the current system of operationalizing the Operation Timbang Program (OPT) and OPT Plus and the utilization of their outputs seems to be problematic and would need a revisit. In fact, a group of experts from the Institute of Human Nutrition and Food (IHNF–UPLB) is already pilot-testing a possible alternative. In addition, among the criteria for giving a "nutrition" award to a certain local government unit (LGU) is a successful implementation of nutrition programs, one of the indicators of which is low levels of malnourishment. Under this scenario, the incentive to under-report malnourishment among LGUs is always there.

Factors Affecting Food Security/Insecurity

To determine the likely factors of food security/insecurity, multinomial logistic regression analysis was performed with the "severely food-insecure" as the reference level. Data from the 180 respondents who were classified into food-secure, mildly food-insecure, moderately food-insecure, and severely food-insecure were used in the analysis.

The likelihood ratio (LR) chi-square test result was found to be 118.81, implying that for the three equations (food secure relative to severely food insecure, mildly food insecure relative to severely food insecure, and moderately food insecure relative to severely food insecure) at least one of the predictors' regression coefficient is not equal to zero. Also, the Prob > $\chi 2$ value of 0.00 denotes the probability of obtaining the chi-square statistic (118.81) if there is in fact no effect of the predictor variables, suggesting the significance of the model.

Table 5 reveals that using severely food-insecure as the reference versus food-secure, two variables in the model, availability score and food environment, were found significant at a five percent level of significance. For the availability score, the coefficient −0.373 means that if the availability score is to increase by one unit, the multinomial log-odds to move to being food-secure tend to increase by 0.373 units while holding all other variables in the model constant. It should be noted that by nature, being severely food insecure is on the negative side such that a negative coefficient will result in a positive outcome.

For the food environment, the uncoded response (reference) is urban. Hence, the coefficient of 2.469 implies that the likelihood of those severely food-insecure to become food-secure decreases if the food environment moves towards being urban. Based on the interviews conducted, in urban areas, even if food items are abundant and readily available, they are priced so high that the households are finding them unaffordable given their average monthly household income of only slightly above the poverty threshold.

On the other hand, for mildly food insecure with severely food insecure as the reference, only the utilization score with a coefficient of −0.632 was found significant at five percent level of significance. This indicates that if the utilization score is to increase by one point, the multinomial log-odds to move to being mildly food insecure tend to increase by 0.632 units while holding all other variables in the model constant.

When severely food insecure was paired with moderately food insecure only household income was found significant at a five percent level of significance. The coefficient of −0.0000528 implies that a very slight increase in the level of household income will enable the severely food insecure to become moderately food insecure, all other variables in the model held constant (Table 5).

Table 5. Results of multinomial logistic regression analysis for factors affecting food insecurity using severely food insecure as reference, 180 respondents, Northern Philippines, 2024

VARIABLE	COEFFICIENT (LOG-ODDS)	*P* > |*z*|
Severely Food-Insecure Relative to Food Secure		
Availability Score	−0.3732937**	0.002
Access score	−0.0928567	0.506
Utilization Score	−0.0040036	0.829
Stability Score	−0.1398470	0.142
Age	0.0312284	0.187
Household Size	−0.0709901	0.598
Household Income	−0.0000304	0.420
Household Diet Diversity Score	0.2548072	0.166
Food Environment	2.4694200**	0.000
Constant	3.8021940	0.233
Severely Food-Insecure Relative to Mildly Food-Insecure		
Availability Score	0.0310253	0.896
Access score	0.2775447	0.308
Utilization Score	−0.6322979**	0.044
Stability Score	−0.1651422	0.419
Age	0.0037288	0.935
Household Size	−0.229574	0.448
Household Income	−0.0001868	0.102
Household Diet Diversity Score	−0.1139412	0.745
Food Environment	0.7233061	0.362
Constant	9.342588	0.142
Severely Food-Insecure Relative to Moderately Food-Insecure		
Availability Score	−0.0580041	0.509
Access score	0.0930391	0.314
Utilization Score	−0.0835597	0.419
Stability Score	−0.0118664	0.864
Age	0.0101719	0.514
Household Size	−0.007191	0.941
Household Income	−0.0000528**	0.043
Household Diet Diversity Score	0.0243566	0.839
Food Environment	0.4175652	0.168
Constant	1.015289	0.644
Number of Obs	180	
LR χ^2 (27)	118.81	
Prob > χ^2	0.0000	
Pseudo R_2	0.2937	

**Significant at 5% probability level

CONCLUSIONS

Based on the results of the FIES and on the assessment of the respondents on the four dimensions of food security, it can be concluded that food and nutrition security are not fully enabled in different food environments. Household-respondents in the urban areas are among the most food insecure due to the high price of food commodities even if they are in abundant supply. The households in the three food environments had to buy drinking water, a basic human need. All of them do not satisfy the Pinggang Pinoy meal model recommendations with Grow foods having the highest share (35–43 percent).

Given the low intake of Glow foods which are the more common sources of micronutrients, if the status quo remains, there is a high tendency for the members of these communities to be nutrition insecure. This is aggravated by the fact that the affordability of healthcare and nutrition services has been problematic as well. Food security elements vary by food environment and therefore affect the level of household food security. The food environment significantly affects food security. In addition, availability, utilization, and household income are positive determinants of food security. Interestingly, data on the nutritional status revealed that less than three percent of children 0–59 months old in all three areas are of different malnourishment status with the coastal community (Laois) having the highest at 2.11 percent. There is thus, a glaring inconsistency between what the households reported on their food insecurity experience and measured malnourishment levels among children 0–5 years old in each local government unit.

RECOMMENDATIONS

Accounting for the above conclusions, the following are therefore recommended for a more effective facilitation of food and nutrition security in all three food environments:

Food environment-focused policy support should be implemented to address food insecurity. This means that courses of action should be targeted or kept attuned to the actual food environment focusing on food security dimensions that the households are most vulnerable to. For instance, in the urban area represented by Balsigan, Baguio City, the majority (70 percent) of the respondents were found to be severely food insecure using FIES due mainly

to their fear of being unable to buy their food needs resulting from very high prices. This is despite that according to them, while a wide variety of foods are available physically, they are financially inaccessible. Food inflation has been a big problem. In Topdac, Atoc, Benguet which is an upland area, and also in coastal Laois, Labrador, Pangasinan, access to more diverse food items should be facilitated. According to the reviews done by Hansen et al. (2021), policies like subsidies have been shown to effectively influence the consumption and purchase of specific foods and beverages. Additionally, interventions targeting food environments, such as altering the availability of items in retail and dining settings, improving food provision in schools, reformulating products, and adjusting portion sizes, packaging, or tableware, also appear to be successful. Given these positive results, justifying the pouring of more resources for programs and projects in support of these is aligned with the Magna Carta of the Poor Act (Republic Act No. 11291) which emphasized, among others, the rights of the poor to adequate food.

Provision of potable water sources should also be among the priorities per food environment because this is a basic human need.

The provision of healthcare and nutrition services should be improved. Reyes and Delos Reyes (2024) recommended that for improved and targeted provisions of nutrition and healthcare, discounted/subsidized services be offered. They also recommended the implementation of mobile clinics and telemedicine, whenever internet connectivity could make this possible. The same could be done in the studied communities. However, in the upland community, mobile clinics can be implemented on a regular and consistent schedule so that even those in far-flung mountainous areas can make an extra effort to prepare for regular consultation.

Educational campaign and popularization of the Pinggang Pinoy meal model among the residents of the areas including schoolchildren is highly recommended. The meal model is visual and can be easily understood even by children.

For further discussion and possibly research is the fact that even in the selected communities where food insecurity exists (dominant in urban areas), reported malnourishment is very minimal. The connection between food security and nutrition security has been established and in view of the

inconsistent findings of this study, it is essential that further verification and validation of the recorded malnourishment data should be performed.

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