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BY

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Abstract

Poverty plays a large role in childhood undernutrition; however, the interplay between context-specific economic, environmental, and social factors and food decisions of Philippine low-income households has yet to be fully explored, especially given wide variation between the characteristics of the country's rural and urban areas. This paper aimed to identify and compare pathways of childhood undernutrition among 308 rural and 310 urban children from low-income households in the Philippines. Multidisciplinary analyses based on 24-hour dietary recalls, household surveys, focus-group discussions, field data, and secondary literature revealed that while the poor are more vulnerable to undernutrition, poor urban and rural children faced unique constraints that accounted for differing nutritional outcomes. Urban families utilized cheap processed-foods that shaped children's dietary preferences towards sugars and fats, leading to vegetable avoidance and poor micronutrient adequacy. Rural households generally relied on home food production. However, rather than mitigate threats to undernutrition, agriculture heightened rural households' risk to food insecurity, as the Philippines is vulnerable to crop-destroying tropical storms. Geographically-isolated rural communities were particularly disadvantaged because members had limited livelihood opportunities and could not access most social protection programs. Our findings suggest the need to strengthen local governance institutions to implement context-specific multisectoral interventions.

Keywords: Philippines; child nutrition; urbanization; food security; poverty; health inequalities

JEL Classifications: I14, I38, R23

1 Introduction

Improving children's nutrition is a pressing concern in the Philippines, where one-third of children-under-five are stunted (Laguna, 2015) one-fifth are underweight,(National Nutrition Council, 2017), and improvements have been slow. Inability to maintain adequate nutrition increases risk to infectious and chronic diseases (Centers for Disease Control and Prevention, 2021), stymies cognitive development (Ampaabeng & Tan, 2013), and is linked to decreased productivity (Martins et al., 2011), all of which reduce an individual's well-being and impede the country's medium-term development agenda (National Nutrition Council, 2017). Poor Filipino children are particularly vulnerable,(Laguna, 2015) as their households' income is insufficient for food security.

The relationship between poverty and childhood undernutrition is well-established in literature (Nelson, 2000; Siddiqui et al., 2020; Waibel & Hohfeld, 2016); however, poverty is not monolithic. Rather, poverty is exacerbated or mitigated by economic, environmental, and social factors (Rodgers & Weiher, 1988) Even within one country, the poor face distinct challenges to maintaining food security depending on a community's population density, access to social services, land ownership, and local governance institutions (The Borgen Project, n.d.). These local factors (Ndaguba et al., 2018) must be considered when identifying and addressing pathways of poverty and malnutrition.

A focus on local communities' conditions is especially relevant to the Philippines, as the country has a decentralized government (Local Government Code of 1991, 1991), with national-level agenda and programs realized by local government units (LGUs). LGUs are able to choose priorities, allocate human and financial resources, and adapt policies according to the needs of their local constituents. Local leaders may be in an optimal position to lower the barriers to nutrition of low-income members of their communities.

However, LGU capacity and household resources alike vary broadly depending on level of urbanization. Urban areas are marked by dense populations, at least one establishment with one-hundred employees, and multiple facilities easily accessed from the LGU office (Adoption of the Operational Definition of Urban Areas in the Philippines, 2003); all others are considered rural. Urbanization is exemplified by the National Capital Region (Philippine Department of Trade and Industry, 2021) (NCR), composed of highly-urbanized cities (HUCs), centers of business and commerce, and the seat of national government. In contrast, dispersed agricultural populations in rural provinces outside NCR struggle to access distant public facilities while the majority (Food and Agriculture Organization of the United Nations, 2021) do not own the land they cultivate. These structural differences limit the means the poor in each area have to cope with food insecurity and the reach of LGU-initiated programs to promote income generation, health, and social development.

2 Rationale and Objectives

The study is part of a national evaluation of a centralized-kitchen school-feeding model. It aimed to identify and compare differences in nutrition of children from low-income urban and rural households. Multidisciplinary analyses focused on tracing the ways geographic, household, and individual differences influenced children's dietary intake and households' food security.

While most nutrition research conclude that poverty and rurality predispose individuals to malnutrition (Dowler & Dobson, 1997; Jha et al., 2009; Nelson, 2000), this paper extends the literature with a comparison of the conditions faced by the poor in different levels of urbanization and how these contribute to nutritional intake. Beyond adding data on nutritional outcomes in low-and-middle-income countries (LMICs), the study provides in-depth information on the structural challenges faced by the urban and rural poor in the Philippines using economic, social, environmental, and governance-related

perspectives. This is important as pathways to health and nutrition in communities are complex and interconnected.(Gaihre et al., 2016) Finally, the paper presents pragmatic multi-level policy solutions relevant to bridging nutrition disparities.

3 Methods

Conceptual Framework. The study was guided by an existing conceptual framework(Aurino & Morrow, 2018) linking household food security with individual nutrition and health. Consistent with the World Health Organization’s(World Health Organization, 2010) declaration that structural context should be prioritized to reduce health inequalities, we included geographic-level characteristics to encompass the broader environment in which the household exists (**Figure 1**), including urbanization and the presence of social protection.

The multifactorial approach to understanding food security and children’s nutritional status is warranted. Previous analyses (Abad-Santos et al., 2010) from Philippine households established sociodemographic and economic factors (bigger households, more dependents, lower household-head education, agricultural-sector employment) were at most risk of hunger. Other research (Navarro et al., 2018) using measures of food security such as the Household Food Insecurity Access Scale (HFIAS) and Food Consumption Score, found that a child’s undernutrition risk is increased by both mother’s and child’s chronic energy deficiency. While these factors have been studied separately, relatively few studies have combined such elements with households’ access to various food and income augmentation programs. The study explored this relationship in an urban pilot site with a comparison rural pilot site.

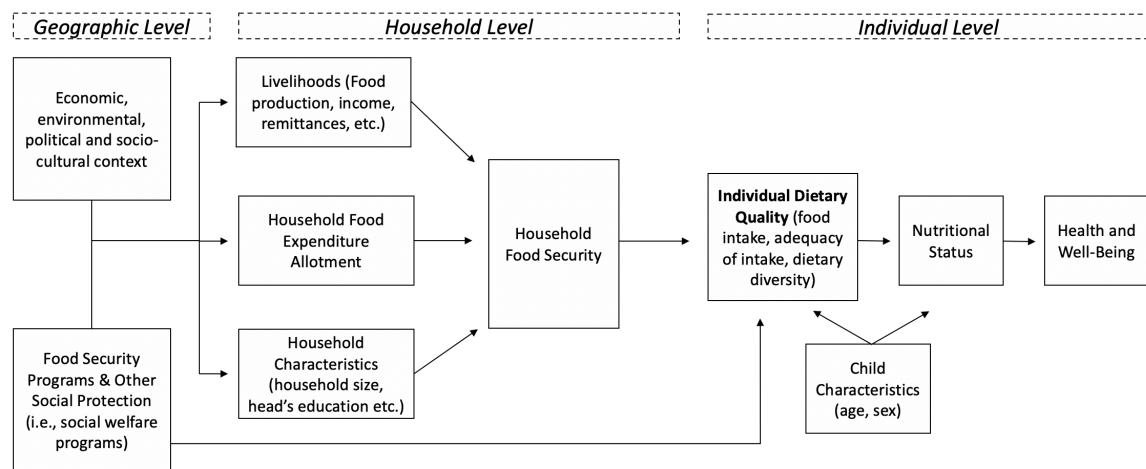


Figure 1. Study Framework Linking Multilevel Determinants of Nutrition

Sampling and Data Collection. The study employed a mixed-methods approach to understand the interplay of trans-disciplinary and multi-level factors influencing low-income families’ nutrition. One HUC in NCR and one rural province in Mindanao were chosen as the study setting. Both sites had active LGUs with close ties to all public schools in the area. Since public education is free in the Philippines, it is usually availed of by low-income families. Both sites also implemented the same city- or province-wide centralized-kitchen school-feeding program (SFP); hence, all students in the sample received the same meal, and the food transfers were comparable.

Elementary-school students were randomly sampled from the 39 and 60 public schools of the HUC and province, respectively (**Table 1**), using a list of SFP beneficiaries provided by the Department of

Education (DepEd). Schools matched sampled beneficiaries with a random non-beneficiary of the same grade level. However, the HUC list was two years outdated, with most beneficiaries being rehabilitated and taken off the SFP, leading to a decreased number of urban beneficiary-respondents.

Data collection began in February 2018. Twenty-four-hour dietary recalls (24HRs) were conducted thrice (two weekdays, one weekend), the optimal number of visits for accurate estimation (Ma et al., 2009). A structured interview recorded all food and beverages consumed by the child the previous day to calculate their individual dietary diversity (IDD) score. Intakes were also converted into nutrient values and compared to Philippine Dietary Energy Reference Intakes (Philippine Food and Nutrition Research Institute, 2021) to determine whether dietary consumption was adequate for a child's age and sex.

Table 1. Characteristics of Rural and Urban Children included in the study

Study Site	Rural (n=308)				Urban (n=310)			
	SFP Beneficiary		SFP Non-Beneficiary		SFP Beneficiary		SFP Non-Beneficiary	
Age/Sex	Female	Male	Female	Male	Female	Male	Female	Male
3 to 5	21	14	13	15	0	0	1	0
6 to 9	30	33	31	42	8	11	61	54
10 to 12	20	26	22	26	16	10	63	56
13 to 18	4	8	1	2	3	8	3	16
Total	75	81	67	85	27	29	128	126

Household surveys were also conducted with each child's caregiver, as the study ensured that no students came from the same household. These asked about households' sociodemographic characteristics, as well as their livelihoods, incomes, expenditures, and education. Households also answered the HFIAS, (Coates et al., 2007) a multilateral-developed tool to measure food insecurity. Data were analyzed using descriptive and inferential statistics, and multivariate analysis, together with the nutritional data.

Focus-group discussions (FGDs) with parents (35), educators (23), city and provincial local government officials (19), government employees (38), and healthcare workers (HCW) (15) provided insight into the lives of the urban and rural poor, and challenges faced by households, schools, and LGUs in maintaining food security in their respective areas. Patterns, trends, similarities, and differences were identified from FGDs and processed using qualitative thematic analysis. In the Findings section, we present translated quotes from KIIs and redact portions of translations that may lead to identification of the respondents.

Field observations supplemented findings by contextualizing answers from the FGDs and surveys. Observations about the respective sites' geography, accessibility, population density, and food environment were recorded, and common themes identified.

These data were corroborated with a review of secondary literature. The review looked at studies that evaluated nutrition and food security among low-income Philippine households. Additional literature verified whether findings from the study were common to the Philippine setting and determined best practices from similar country contexts that may contribute to addressing multi-level determinants of undernutrition.

4 Results

This section presents findings on the nutritional adequacy of children from low-income households from an HUC and a rural province of the Philippines, followed by a comparison of individual, household, and geographic factors contributing to their nutrition. Both rural and urban diets were nutritionally inadequate; however, personal dietary preferences were found to be a significant factor that mediated the consumption of available healthful food, as urban children disliked vegetables, even if these were readily available. However, rural children still had poorer nutritional outcomes due to the economic vulnerability of their agricultural households and geographic challenges to accessing a variety of healthful foods.

Result 1: Low Nutritional Adequacy.

Dietary intake was inadequate for nearly all nutrients across age and sex groups, though rural children generally had lower nutritional adequacy than their urban counterparts. Moreover, nutritional adequacy decreased with age, implying older children's meals do not keep up with their greater nutrition requirements.

Table 2 presents median nutritional adequacy for caloric intake, protein, and selected micronutrients, while

Table 3 presents median nutritional adequacy of selected vitamins.

Table 2. Median Nutritional Adequacy of Rural and Urban Children (Nutrients)

Age-Sex Group	Location	Calories (%)	Protein (%)	Calcium (%)	Phosphorus (%)	Iron (%)
3 to 5 F	Rural	53.57	126.67	51.59	91.60	84.62
	Urban	54.00	84.00	20.00	46.00	50.00
3 to 5 M	Rural	62.19	139.58	48.64	99.75	76.74
	Urban	-	-	-	-	-
6 to 9 F	Rural	66.19	135.42	42.73	105.19	79.49
	Urban	99.46	163.75	69.56	144.20	97.44
6 to 9 M	Rural	66.56	140.83	40.23	100.99	77.91
	Urban	107.50	212.92	77.27	166.42	101.16
10 to 12 F	Rural	48.51	90.44	49.43	37.20	39.39
	Urban	74.75	130.59	70.00	55.55	49.09
10 to 12 M	Rural	50.10	102.57	40.45	38.58	67.16
	Urban	86.36	143.29	72.95	64.98	95.83
13 to 18 F	Rural	40.37	54.57	40.68	29.76	36.36
	Urban	80.62	120.43	74.62	58.20	53.03
13 to 18 M	Rural	37.02	63.40	46.59	43.13	38.12
	Urban	61.65	89.10	59.32	62.75	49.78
All Groups	Rural	57.87	124.58	43.07	81.48	71.79
	Urban	88.50	149.71	71.59	84.36	83.33

Table 3. Median Nutritional Adequacy of Rural and Urban Children (Vitamins)

Age-Sex Group	Location	Vit. A (RE) (%)	Vit. B ₁ (%)	Vit. B ₂ (%)	Vit. B ₃ (%)	Vit. C (%)
3 to 5 F	Rural	73.11	52.00	71.00	147.14	90.91
	Urban	13.00	43.00	47.00	64.00	9.00
3 to 5 M	Rural	90.83	51.67	76.67	190.00	69.57
	Urban	-	-	-	-	-
6 to 9 F	Rural	87.50	52.00	76.00	188.57	54.55
	Urban	72.39	120.00	156.00	218.57	54.55
6 to 9 M	Rural	91.37	46.67	66.67	198.57	52.17
	Urban	90.11	134.51	136.67	272.86	39.13
10 to 12 F	Rural	58.67	37.50	48.13	120.00	52.78
	Urban	58.53	79.58	79.83	182.00	16.67
10 to 12 M	Rural	58.24	39.29	52.50	152.78	42.42
	Urban	65.38	111.43	98.13	232.78	36.36
13 to 18 F	Rural	81.12	40.00	53.75	92.00	88.89
	Urban	60.71	70.63	84.38	212.00	13.33
13 to 18 M	Rural	46.27	31.00	45.91	102.08	46.88
	Urban	44.51	75.50	58.65	139.17	16.67
All Groups	Rural	69.73	46.00	65.00	167.14	53.47
	Urban	68.44	101.00	106.00	207.00	33.33

Two exceptions to these trends were observed: (1) Although median nutrient adequacy was not reached by both groups for nearly all nutrients, most children reached adequate protein consumption. Among rural children, 199 (65%) consumed the daily recommended protein intake for their age and sex, while among urban children, 241 (78%) did. Protein consumption was particularly high among urban children, with a child with the highest protein intake consuming 731.25% of their recommended daily protein intake. (2) Vitamins did not strictly follow the trend of urban children having greater nutrient adequacy than rural children. While median adequacy for Vitamins B₁, B₂, and B₃ were greater for urban than rural children, the inverse was true for Vitamins A and C. This is discussed further in the succeeding sections.

Result 2. Individual-Level Factors: Dietary Preferences and Social Influences.

At the individual level, the consumption of nutritious food from the household or food security programs is mediated by dietary preferences and perceived social attitudes towards food. Selective or picky eating limited children's food intake despite the availability of nutritious food. Despite coming from low-income households with limited resources, urban children had more selective eating habits: they found vegetables undesirable. Though parents were aware of vegetables' nutritional importance, they found it difficult to convince their children to eat them. Teachers also experienced resistance to eating vegetables when observing students at mealtimes.

They really didn't gain [weight]. Because of pickiness... When they get home [they say], "Ma, I don't want vegetables anymore because I'm sick of vegetables. At school, vegetables; at home, vegetables again?" –Parent (Urban)

When they eat at home, they're choosy about the food. They eat vegetables only in soup. –Parent (Urban)

There were veggies in the children’s food. At first, the students wouldn’t eat. I would really watch over them when I was stationed here because they were just close by, outside my office. “Child, it’s good,” I said. I show them that I try the food; I eat the food so they would eat it. –Educator (Urban)

On the other hand, these complaints were not mentioned by rural parents or teachers and there were only single cases of children who refused to eat vegetables. Rural children’s willingness to eat vegetables is reflected in their dietary diversity score (**Table 4**). While rural respondents’ diets were more likely to include fruits, vegetables, legumes, and nuts, urban respondents’ diets rarely incorporated these, instead having more meat and eggs.

Table 4. Proportion of Rural and Urban Children’s Consumption of Various Food Groups

Food Group	Starch (Cereals, Tubers)	Green Leafy Vegetables	Vit. A-rich Fruits and Tubers	Other Fruits and Vegetables	Organ Meats (Iron-rich)	Flesh Meats, Fish	Eggs	Legumes, Nuts, Seeds	Milk, Milk Products	Mean Diet Diversity Score
Rural	1.00	0.39	0.48	0.58	0.02	0.49	0.57	0.65	0.11	4.29
Urban	1.00	0.14	0.13	0.49	0.98	0.65	0.70	0.18	0.36	4.64

Aside from personal preferences, dietary habits were also reinforced by social pressures, such as the attitudes of caregivers. For instance, some urban caregivers took it as a given that children disliked vegetables and felt powerless to convince them otherwise, leading to lesser vegetable consumption.

Because sometimes, isn’t it that children like hotdogs and things like that? Eh, for us, whatever food we have is what we have. [I tell them], “Just make do with it, okay? We don’t have the means to buy those things.” They eat little, because they don’t like the food. –Parent (Urban)

It depends on the children. There are children who don’t like eating things like that, like vegetables. Carrots, some kids don’t eat those. Moringa, some kids don’t eat. Now, for example, kids these days, when it comes to food, are all about spaghetti, hotdog. –Parent (Urban)

Another social pressure comes from peers. Peer attitudes towards the school feeding program affected student recipients’ willingness to participate and finish their meals. In the HUC, beneficiary status had negative connotations. As illustrated by two anecdotes from FGDs, classmates echoed ideas that malnourishment was a sign of personal failure or highlighted existing socioeconomic disparities. Older children, between the ages of 10 and 13, were particularly vulnerable to this, as their age was associated with an awareness of their peer standing and their families’ economic status.

HCW 1 (Urban): Basically, what became my problem is persuading. Because, since they’re already in high school, they feel ashamed already. And they get bullied by their classmates, saying, “Ah, wasted!” Like, “Underweight. Ay, abnormal.” There are things like that. That’s why beneficiaries have a hard time—

HCW 2: Yes, when I was school-based [nurse], [it was] like that.

HCW 1: And we have a hard time persuading, saying, “You don’t want this? Your school meal is free. You can save the money given to you...” before you can totally

convince them. Because, again, there is the stigma. It becomes a stigma on them. Because they'll be called "underweight," "wasted."

HCW 2: They become ashamed to eat.

HCW 3: And also, they kind of... self-pity themselves. It's, like, "I must seem so pitiful. Because I get fed for free." Like that.

Sometimes there are children who are ashamed, that's why, sometimes, we serve them [the food] in their classrooms. My PTA complains to me, "Ma'am, those Grade 6 who are part of feeding, won't come down..." Bring it to their rooms, because of course they're big already, the Grade 6, Grade 5, they get ashamed. [But] you can really see the ones who eat together are the lower grade [levels]. But the higher grade [levels], just so you can feed them, bring it upstairs... –Educator (Urban)

Program facilitators' introducing implementation adjustments mitigated the stigma associated with the program. However, fears of negative social consequences led some urban beneficiaries to hide the food given to them. Others attempted withdrawing during the early stages of implementation.

In contrast, provincial educators observed greater acceptance of the program among both beneficiary and non-beneficiary students. This was done through pre-emptively educating non-beneficiaries, with the assumption that most children did not understand the causes of malnutrition. Though students initially associated beneficiary status with shame, rural facilitators explained that malnourishment was brought about by having nothing to eat. This instilled sensitivity and empathy among all students even before the program was implemented. Thus, no stigma was associated with school feeding early on, leading to both beneficiaries and non-beneficiaries eager to join the program.

Educator (Rural): [If there are absentees], there are students who come to me saying they want to eat [program food]. They say, "I'll replace them. I'll be the replacement..." The non-beneficiaries, they also want to be beneficiaries.

Interviewer: Because in other schools, there are instances of shame, especially when they're already Grade 6. But you said, Ma'am, they don't feel—

Educator: They don't have any shame.

There are pupils who want to be in the group. The others who don't bring lunch, they want to be there, yes. Sometimes they will ask us if "this person's name" is absent, I will replace him or her." –Educator (Rural)

[Non-beneficiaries] say, "I'm thinner than you anyway, I should be there [in the program] too." But it seldomly happens and never in the classroom. It's, like, "Why are you the recipient, eh, I'm thinner than you." But it happens only seldomly, most of the time [non-beneficiaries] don't pay any mind. –Educator (Rural)

Urban children's dislike for vegetables, which feature heavily in the feeding program's menu, and backlash from their peers for participating in the program may diminish the impact of the feeding program. While about 30% of the meals' nutritional content supplemented rural beneficiaries' diets, less than 10% of the meals were additional to the urban beneficiaries' diets, implying lower impact. However, these preferences can also be reshaped. Urban teachers and parents observed that by the end of the 120-day feeding cycle, beneficiaries became accustomed to eating vegetables both from the program and at home. Thus, a child's dietary decisions are critical to how food from the household or from food security transfers contribute to children's nutrition.

Result 3. Household-Level Factors: Livelihoods and Mitigation Strategies.

Both rural and urban households had similar sociodemographic characteristics (**Table 5**) and household expenditures ($t=-0.76$, $p=0.45$). However, respondents' economic vulnerability and their mitigation strategies in times of economic shocks differed. Urban households were generally less vulnerable to food insecurity, and better at maintaining household food intake. Thus, more rural households were food insecure (277, 90.23%) than urban households (189, 60.97%), leading to lower individual nutritional adequacy.

Table 5. Household Characteristics of Rural and Urban Households

Household Characteristics*	Rural Households	Urban Households
Household size	5.54 (2, 13)	5.39 (1, 12)
Children younger than five	1.36 (1, 4)	1.36 (1, 3)
Household head's years of education	8.92 (0, 14)	10.43 (2, 16)
Monthly household expenditure (USD)	364.87 (41, 4484)	387.96 (88, 2735)
Food Security Status**		
Food Secure Households	30 (9.77%)	121 (39.03%)
Mild Food Insecurity	51 (16.61%)	43 (13.87%)
Moderate Food Insecurity	119 (38.76%)	62 (20.00%)
Severe Food Insecurity	107 (34.85%)	84 (27.10%)

*Mean and range of socio demographic characteristics

**Frequency and proportion households based on food insecurity status

One sociodemographic difference between the households was that more heads of rural households were female (262, 85.06%), than those of urban households (56, 18.67%). However, this did not affect decisions regarding household food security as, in both settings, mothers, whether employed or not, decided how often to buy groceries, which items to purchase, and how food would be prepared.

Where households differed was economic vulnerability. While nearly all households lived on a week-to-week basis, livelihoods of rural households were more unpredictable than those of urban households.

Table 6 shows the greatest share of rural livelihoods fell under the agriculture, fishing, and forestry sector, while the greatest share of urban livelihoods reported fell under the “not applicable” option. Probing revealed that these respondents considered themselves unemployed but would engage in some form of informal labor or service to neighbors that generated income, such as washing their clothes, giving massages, or running small errands on their behalf.

Table 6. Livelihoods of Rural and Urban Households

Livelihoods	Rural	Urban
Agriculture, Fishing, and Forestry	114 (37.01%)	1 (0.32%)
Community, Social, and Personal Services	13 (4.22%)	18 (5.81%)
Construction	40 (12.99%)	27 (8.71%)
Education	4 (1.30%)	1 (0.32%)
Electricity, Gas, and Water	5 (1.62%)	3 (0.97%)
Financing, Insurance, Real Estate & Business Services	2 (0.65%)	3 (0.97%)
Government Service	16 (5.19%)	4 (1.29%)
Manufacturing	2 (0.65%)	42 (13.55%)
Military Service	0 (0%)	1 (0.32%)
Mining and Quarrying	13 (4.22%)	0 (0%)
Transportation, Storage, and Communication	39 (12.66%)	23 (7.42%)
Wholesale and Retail Trade	15 (4.87%)	15 (4.84%)
Other Industries	13 (4.22%)	40 (12.90%)
No Industry Applicable	0 (0%)	94 (30.32%)
Missing	32 (10.39%)	41 (12.26%)
Total	308 (100%)	313(100%)

Rural agricultural households were particularly vulnerable to typhoons, as these could destroy crops, cause plantations to close, and halt livelihoods. As most farmers were paid daily wages, several days or weeks without work exhausted their meager savings. One anecdote from the interviews illustrates the relationship between the vulnerability of agricultural workers, household food insecurity, and long-term effects on children's health.

So, since our school is a victim of Typhoon Pablo and there are lots of pupils with poor constitution because of a lack of food brought about by their parents' unemployment. Most of the parents are working in the farm, working in semi-industrial, agri-industrial plants, the banana plantations. There are five plantations here and they really depend on them for their livelihood. So, when they typhoon struck in 2012, many lost their jobs. The farms were really destroyed. [It took] almost one year to produce another crop of bananas. The [compensation] didn't come in... So, by that situation, there are a lot of our pupils who are malnourished or severely wasted and wasted. –Educator (Rural)

Though the typhoon took place in 2012, when interviews were conducted in 2019, schools were still experiencing the deleterious effects of food insecurity on students' nutrition. This example highlights that vulnerability does not only refer to a state of employment or unemployment, but also the stability of one's industry to endure shocks.

Rural and urban households also differed in coping strategies when shocks occurred. Rural strategies were vulnerable to the same tropical storms that threatened household food security and children's nutrition. Most rural households relied on home food production (194, 63%), which was not observed among urban households. Home vegetable gardens lessened or removed the need to purchase vegetables for meals. Vegetables also replaced meats when food prices rose, or budgets were tightened (only 38 [12%] households owned livestock or received meat from family). Moreover, home gardens provided wood for fuel, which was cost saving for 200 (65%) households. In contrast, many urban households (230, 74%) reduced spending on luxuries. They also consumed less fresh meat (130, 42%),

with many opting for processed meats and canned goods. Others borrowed money from friends, relatives, and neighbors (120, 39%). Informal labor was also expanded to supplement household income.

The SFP was utilized by both rural and urban households as a means to reduce labor and spending household resources. Respondent-mothers did not need to prepare lunch at home and could focus on other activities while their children napped or studied.

Parent 1 (Urban): Of course, you don't need to buy lunch for the home anymore.

Parent 2: It's a big help for us... because now, when I pick them up, I just wait for them before I go home. I help out here [with the feeding].

Interviewer: You don't need to prepare food anymore?

Parent 3: When we go home, they just nap.

Parent (Rural): I'm happy that she's included [in the program]. I wonder about [my other child] in Grade 1, whose physique is good, why they're included among the wasted. But in that matter, I guess it's the will of God that [my other child] is included among the wasted so that I don't have to spend on their pocket money for lunch. I got to save money because of the feeding [program]. [My daughter] asks of me only that... I am just here nearby so that I won't be a laundrywoman for others anymore.

Despite their respective livelihoods and mitigation strategies, rural households were more vulnerable to financial and food insecurity. Social protection, such as the government's conditional-cash-transfer or 4Ps (Pantawid Pamilyang Pilipino Program) served more rural (135, 45%) than urban (90, 29%) households. This suggests that rural households have fewer available options to mitigate the effects of shocks to household members' nutrition.

Result 4. Geographic-Level Factors: Geographic Features and Urbanization.

The rural province's physical and socioeconomic characteristics led to unique challenges to children's nutrition and required LGUs to develop different solutions to address them. Low-income rural homes were spread out, separated by lots with natural and cultivated vegetation. Access to infrastructure and dietary options depended on a household's community and their LGUs' public programs, as the province had varying levels of urbanization, presented in

Table 7. In contrast, densely-built low-income households of the HUC could encounter wet markets, grocery stores, and restaurants through concrete roads and public transportation.

Table 7. Household Urbanization in the Province

Población	Non-Población	Geographically Isolated and Disadvantaged Area	Total
131 (42.53%)	136 (43.83%)	42 (13.64%)	309

The urbanization of poblaciones, or towns, was comparable to those of small cities. Residents accessed markets, stores, schools, and healthcare facilities by walking along paved roads. Others owned motorcycles or tricycles (motorcycles with modified sidecars). Electricity was generally available, though residents experienced scheduled power interruptions on weekends, which did not affect classes or most businesses. The available public infrastructure and utilities made poblaciones political and economic centers of the province.

Economically, poblaciones fared best among the three areas. Most población households engaged in business or office work, and could access and afford a variety of food, including fast food and processed food. This has, in turn, shaped dietary preferences into those similar to urban children. Población

children preferred salty and flavor-enhanced food, and disliked healthful food that was blander in comparison.

The place that I'm saying has this kind of cases, those near the city, with many fast foods. Because [the children] have eaten them, they're often fed them. –Government Employee (Urban)

Educator 1 (Rural): But the ones with means, they eat hotdogs, fried foods, junk foods—

Educator 2: Processed foods.

Educator 3: Noodles.

Poblaciones were also the first recipients of government programs, as they housed higher-level LGU offices, such as the provincial governor's office and mayors' offices. The provincial SFP was piloted in poblaciones, since their existing infrastructure required lower capital investments. Only after the cooking and delivery systems were refined was the program expanded to the rest of the province.

Nonetheless, most respondents (178, 58%), lived in non-poblaciones and geographically isolated and disadvantaged areas (GIDAs). Non-poblacion areas were close to town centers but had smaller, more dispersed agricultural populations. Residents walked long distances on dirt roads to access essential services. Compared to poblaciones, residents had fewer food options in small retail stores. Basic health services were delivered through local health units. These constraints challenged policymakers. For instance, rough, uneven roads were an issue for the SFP, since drivers had to significantly slow down deliveries for their safety. This led the LGU to acquire more vehicles to deliver feeding meals on time. Another issue was that some places did not have refrigerators, which impacted their ability to store fresh foods. This led the provincial government to advocate home gardening as a source of fresh vegetables. Food production supplemented trips to the market, which were time-consuming and physically laborious, as most did not own vehicles and needed to carry groceries while walking home.

Other communities were classified as GIDAs, characterized by physical isolation and high poverty incidence. These communities were situated upland where steep inclines and thick vegetation prevented roads from being built. Some were located on small islands, requiring a ferry boat to access goods and services from poblaciones. GIDA households had limited livelihood opportunities and most fell below the poverty line; many were without electricity or indoor plumbing. These challenges led the province to mobilize *barangay* (Philippines' smallest political-administrative unit) officials to coordinate the transfer of goods from specified drop-off points. The province also established satellite offices to provide support functions for provincial programs such as procuring ingredients and providing motorists for the SFP.

Because we have additional tasks, eh. There is a satellite office there. We relieve them [sometimes]. And then I bring other things to the kitchen. I also go with them [to receive] the vegetables. I just call them, ask if there are any problems. Then if there are, we meet immediately so we can get what we need to do right away.

–Government Employee (Rural)

Thus, the rural province faced unique challenges to food security, nutrition, and health that were absent in urban city. These may have contributed to the lower nutritional adequacy among rural children. However, local government programs, such as home gardens and the province's innovations to the SFP, accounted for these socioeconomic differences and were an important social safety net that helped mitigate food security shocks among the low-income households in the study. For instance, a major

benefit of the SFP was that students no longer needed to walk long distances to eat lunch at home and return to school. This greatly improved students' attendance and participation.

5 Discussion

The study aimed to compare and explain differences in the dietary intake of urban and rural children from low-income households in the Philippines. Consistent with previous research (Angeles-Agdeppa et al., 2019; Dela Luna & Bullecer, 2020), rural children had lower dietary adequacy than did their urban counterparts. Food insecurity among the surveyed rural households skewed much higher than the national average of the Philippines (Integrated Food Security Phase Classification, 2021) (64%). However, the study sought to extend existing literature beyond measuring nutritional intake by examining the factors contributing to children's nutrition in low-income settings through a variety of disciplinary lenses.

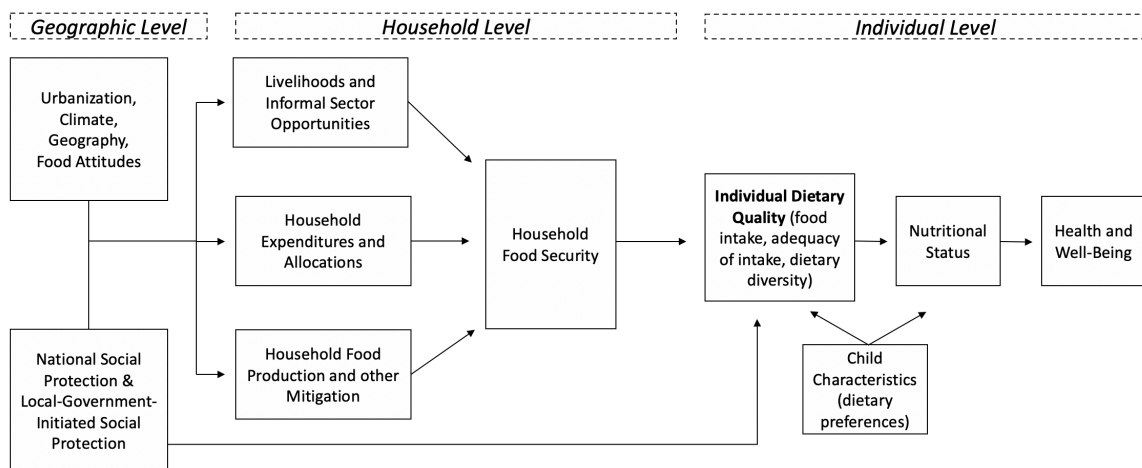


Figure 2. Diagram of Emergent Themes from Analysis

Geographic factors and urbanization determined food availability and variety, which in turn shaped individual and household food consumption (**Figure 2**). Access to meats and processed foods limited urban children's vegetable intake and vitamin adequacy. Contrary to literature, rural children's diets were limited, rather than enhanced, by the vulnerability of their households' crops to tropical storms. Thus, interconnected geographic, household, and individual factors heightened the susceptibility of poor urban and rural children to undernutrition.

The impacts of Philippine urban and rural poverty on children's nutrition have analogues in other countries. Improving food security among low-income households remains a challenge in many LMICs (Food and Agriculture Organization of the United Nations, 2014). Promoting good eating behaviors is an issue that high-income countries (HICs) continue to tackle. Other countries' efforts to understand and address childhood undernutrition may provide possible solutions to improve nutrition outcomes and facilitate holistic human development in the Philippines.

Dietary Preferences and Intake. Child characteristics often considered significant to nutritional status are demographic characteristics (Aurino & Morrow, 2018), with less attention given to personal preferences. However, the study found that urban children generally disliked eating vegetables, while such selective eating was not observed among rural children. Though individual preferences did not

surpass the caloric impact of household and geographical determinants, they limited children's dietary diversity and vitamin adequacy.

Selective eating among urban children may be attributed to the food environment created by caregivers at home. The availability of fast-foods and junk foods in HUCs feeds into children's natural tendency (Scaglioni et al., 2011) to prefer energy-dense and fatty food that has low dietary fiber content. That urban children's nutritional adequacy remained higher implies that vegetables may have been substituted by calorie-dense foods high in sugar and fat (Taylor et al., 2015). Consequently, vegetables are consumed less often, which may exacerbate pickiness, as children find unfamiliar food less acceptable. On the other hand, greater exposure to vegetables and home agriculture among rural households increases children's familiarity through tasting (Nekitsing et al., 2018), family activities (Ahern et al., 2013), and positive associations with gardening (Libman, 2007), all of which have been found to improve nutrition behavior and vegetable consumption. Thus, food environments refer not only to market availability of certain foods, but also dietary habits surrounding eating. As was found in a cross-cultural study (Sorokowska et al., 2017) on the determinants of dietary preferences, a traditional society that had full access to modern markets demonstrated similar taste preferences to a HIC. However, unlike HICs, the society also did not have an aversion to bitter tastes because traditional diets comprise bitter vegetables. Analogous preferences were observed among Philippine población children, who, like children from HUCs, preferred meat-based processed foods but still consumed vegetables, which were a staple part of the rural diet.

As dietary preferences are shaped by the availability of different foods as well as attitudes and behaviors of one's social circles, children can be influenced to eat more vegetables if their caregivers and peers eat vegetables with them (Sharps & Robinson, 2016), as was recounted in the interviews. This social-norm-based approach can improve children's dietary diversity and form good eating habits and may explain student beneficiaries' change in attitudes towards vegetables before and after taking part in the SFP.

However, among low-income households like those of this study, household food insecurity was a tighter constraint on children's dietary intake than was selective eating. This may explain why the impact of the SFP was greater among rural children. In evaluations of welfare programs, like Mexico's PROGRESA (Skoufias, 2005), poorer households and communities experienced greater nutritional impact. Though both rural and urban households used the program as a replacement for one meal at home, the succeeding sections demonstrate that nutritional quality of meals in rural households is likely lower than those of urban households.

Economic Vulnerability and Food Insecurity. Economic vulnerability shaped differences between the food security status of rural and urban poor that could not be explained by household wealth, unemployment, and coping strategies alone. Both urban and rural households were found to engage in informal-sector work; however, the rural informal economy was more natural-resource dependent (Weng, 2015) and disadvantaged by Philippine weather.

As low-income households, respondents were sensitive to food price increases (Cohen, 2012), health expenditures (World Health Organization, 2006), and natural hazards (International Federation of Red Cross and Red Crescent Societies, 2021), employing food-based coping strategies to maintain total consumption; however, while urban households turned to readily-available processed meats, rural households supplemented meals with home-grown vegetables. This may also explain differences in vitamin adequacy among rural and urban children: Dark green leafy vegetables and yellow and orange tubers are rich in Vitamins A and C, while Vitamins B₁, B₂, and B₃ are mainly found in meat, dairy, and nuts (US National Institutes of Health, 2021). While findings from other SEA countries (Horiuchi et al., 2018), attribute the same eating patterns to lower income among rural households, our findings imply that urbanization constrains dietary options even when wealth is controlled.

Geography and climate heighten the economic vulnerability of rural households, which rely on agriculture, fishing, and forestry for both income-generation and food-source. The Philippines is visited by 20 typhoons annually (Asian Disaster Reduction Center, 2019), often bringing floods, landslides, and storm surges that destroy crops. As such, though home food production substantially mitigates food insecurity for the rural poor in other countries (Ruel et al., 2010), the coping strategy is vulnerable to the Philippines' tropical storms. Overall, this has contributed to worse nutritional outcomes among the country's rural poor (Israel & Briones, 2013). In contrast, urban informal economies are large (Brown & McGranahan, 2016), with more income-generating opportunities that the urban poor utilize to maintain food security.

The government has acknowledged the unique challenges faced by the urban and rural poor in the 2017 Philippine Development Plan (National Economic and Development Authority, 2017). Nonetheless, national initiatives can run parallel with augmenting local capacity to plan and act quickly during natural hazards and economic shocks. Haiti is one example of a country implementing multi-level multisectoral policies for food security and nutrition. Since the earthquake of 2010, the Haitian government established *Aba Grangou* (Food and Agriculture Organization of the United Nations, 2014), a coordination framework for national government agencies, LGUs, multilateral donors, and civil-society groups. By strengthening the institutional capacity of LGUs to address issues relating to job growth, natural resource management, and disaster resilience, the government aspires to solve the structural factors contributing to undernutrition.

Community Food Access and Nutrition. Urbanization and physical barriers limit poor households' access to food, particularly in rural areas. However, rural areas are not monolithic; communities faced different obstacles to food security according to their level of urbanization. These challenges mediate the impact of broad social transfers and require local, community-based innovations.

Similar findings were observed in other Southeast-Asian (SEA) countries. Thailand (Rojroongwasinkul et al., 2013), Malaysia (Le Nguyen et al., 2013), and Cambodia (Horiuchi et al., 2018) reported higher prevalence of stunting, undernutrition, and anemia among rural children. In other LMICs, such as Peru (Andrissi et al., 2013), rural children had significantly lower nutritional intake than did urban children, as well as greater prevalence of malnutrition and lower dietary diversity.

Common among these studies was urbanization dictating food availability and accessibility. Urban diets were shaped and supplemented by accessibility to cheap fast food, processed foods, and junk foods (Vilar-Compte et al., 2021). Consequently, urban populations veered away from cereal-based staples towards high-energy, fatty diets replete with sugar and salt (Ruel et al., 2010). For instance, in Peru (Andrissi et al., 2013), higher dietary diversity among urban children was attributed to the availability of fish (from markets) and junk food. On the other hand, rural mothers had limited options for weaning their children, leading to an early introduction to common adult diets, which were rich in tubers and cereals but poor in fats and proteins. Previous research (Florentino et al., 1992) has described this phenomenon as an urban bias of food supply, as HUCs have more food demand than rural areas because of their larger populations and higher mean income.

However, urban-rural differences were not as clear-cut in the Philippines. The descriptions of rural areas from other LMICs resemble those of non-poblaci3n and GIDAs more than they do poblaci3n. The latter are more comparable to rural areas in HICs, which are more developed. For instance, rural areas in the United States and Poland also faced limited availability of healthful food. Unlike in LMICs though, children could easily access convenience stores and fast-food establishments (Findholt et al., 2011; Suliburska et al., 2012). As such, rural children in HICs consumed more calories than did urban children from the same country, were less likely to consume fruits, and were more likely to be overweight or obese (Liu et al., 2012).

The range of urbanization in Philippine rural communities requires health and nutrition interventions that respond to the specific needs of the community. One country that recognized the need

for such an approach is India. An evaluation of rural food insecurity (Athreya et al., 2008) reported varying performance in development and food security indicators across and within states. While broad social protections, like the national public food delivery system, were maintained, local governance and institutions were strengthened to promote community ownership of more targeted local programs. More developed rural states implemented programs specifically for vulnerable populations like women and children. Agricultural districts implemented programs to increase food-grain production and rural incomes. Tribal and isolated communities focused on land development and crop cultivation for food and income. These reforms have ushered India into net food-exporting and away from food-aid dependence (United Nations in India, n.d.).

Given the Philippines' devolved governance system, local programs such as the province-wide and city-wide SFP already supplement national social transfers like 4Ps. However, smaller administrative units should similarly be equipped with the training and resources to spearhead community-level nutrition interventions, such as satellite offices for GIDAs. Urban LGUs should expand food options and employment opportunities targeting the poor, to avoid the pitfalls of relying on fast foods as a coping strategy for food insecurity.

Limitations. The results of this research should be considered in light of several limitations. Because the study aimed to examine determinants of nutrition in depth, study sites were limited to one HUC and one rural province. However, the study was able to include all public schools in both areas and data collection had reached a point of saturation where common themes could be identified. Moreover, additional data collection techniques such as literature searches were employed when necessary, to provide more context for the lives of Filipinos in rural and urban areas.

Survey data, particularly the 24HR, were sensitive to recall bias. To improve accuracy, respondents were asked about only the previous day's meals. To improve precision, each household was visited thrice, nonconsecutively, within the month of data collection. Because urban SFP beneficiaries in the study were limited by the DepEd-provided list, they were those who remained beneficiaries for over two years. Their difficulty rehabilitating may be due to unaccounted health issues that confounded the impact-analysis results.

The instability faced by low-income families led to challenges surveying more vulnerable populations. Some respondents' homes could not be found when data collection took place, as many study participants were informal settlers who reallocated frequently. Future research may specifically focus on the food security challenges of the poor in extreme margins.

Finally, because the study focused on the drivers of undernutrition in low-income populations, beyond measuring nutritional outcomes alone, prior literature from the Philippines was scarce. Thus, the study used parallels of rural and urban poverty from other countries where appropriate.

6. Conclusion

The experiences of other LMICs demonstrate that trans-disciplinary and system-wide perspectives are necessary to break the relationship between low-incomes and childhood undernutrition. While decades of literature have described the vulnerability of the poor in general, studies on how poverty affects different populations remain scarce. This study sought to extend the literature by examining ways by which rural and urban poverty influence Filipino children's diet and nutrition.

An analysis of the geographic, household, and individual determinants of nutrition in a low-income cohort from the Philippines revealed that while the poor are more vulnerable to undernutrition, urban and rural households faced unique challenges to maintaining food security. Urban families utilized cheap fast- and processed-foods that shaped children's dietary preferences towards sugary and fatty foods, leading to vegetable avoidance and poor micronutrient adequacy. With fewer food options, rural

households generally relied on home food production. However, the Philippines' vulnerability to tropical storms heightened rural households' risk of food insecurity, as agriculture was both their source of income and a coping strategy. Geographically-isolated rural communities were particularly disadvantaged because members could not access most social protection programs.

Given the different contexts of these communities, LGU-led initiatives have been a valuable safety net for maintaining children's health. Moving forward, holistic interventions from other LMICs can guide policymakers to address underlying causes of poverty and malnutrition. Strengthening local governance institutions to implement multilevel multisectoral interventions in education, employment, food production, nutrition, and disaster-risk reduction can address socioeconomic disparities across levels of urbanization and ultimately promote better nutrition and health for all.

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