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MORE THAN EMPTY PLATES: ASSESSING THE FACTORS BEHIND FOOD INSECURITY IN THE PHILIPPINES

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ABSTRACT

Food insecurity has been a long-standing challenge in the Philippines, where one must allocate a budget for a decent and sufficient daily meal. This study aims to assess the factors behind food insecurity in the Philippines and their extent using regional data from the years 2015, 2018, and 2021. The panel quantile regression analysis was utilized to determine and assess the economic factors affecting food insecurity. The researcher was also able to gauge which regions have the least, moderate, and high prevalence of food insecurity using the 25th, 50th, and 75th quantiles of the dependent variable, respectively. Using the percentile scores in data distribution, the National Capital Region, Region III (Central Luzon), and Region IVA (CALABARZON) are regions with the least prevalence of food insecurity. The regions with a moderate prevalence of food insecurity are Region IVB (MIMAROPA), Region VI (Western Visayas), and Region XI (Davao). On the other hand, regions with a high prevalence of food insecurity are Region IX (Zamboanga Peninsula) and Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). Other regions were determined to have experienced different levels of prevalence of food insecurity in different years. The quantile regression results revealed that poverty incidence and economic growth have a significant positive relationship, and the minimum wage has a significant negative relationship with food insecurity across all levels of food insecurity prevalence by region. The consumer price index of food was found to be a statistically significant factor and is positively correlated with food insecurity only in regions where food insecurity is highly prevalent. It is also an insignificant factor in regions with the least and moderate prevalence of food insecurity.

Keywords: food insecurity, panel quantile regression, Philippines

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INTRODUCTION

Food is a basic necessity as it provides energy and nutrition for a body to function in everyday life. Access to food is a fundamental right, and while human needs are never-ending, food sources are scarce. Food insecurity is when people do not have adequate physical and economic access to sufficient, safe, and nutritious foods that meet their dietary needs and preferences for an active and healthy life (Food and Agriculture Organization, 1966). Emphasizing economic access, one must allocate a budget for a decent and sufficient daily meal. Concerning this, subsistence incidence refers to the proportion of families or individuals with per capita income that is less than the per capita food threshold to the total number of families or individuals (Philippine Statistics Authority, 2021). This is also known as "Food poverty." Food poverty refers to the inability to acquire or consume suitable quality and sufficient quantities of food in socially acceptable ways or the uncertainty of whether they will be able to do so (Radimer et al., 1990).

Throughout history, food insecurity in the Philippines has long existed. Whether it has been because of extreme weather conditions, political issues, or economic crises, there is much to unpack on why this crisis continues to prevail today. As per economic data, hunger has been a challenge in the Philippines in the last two decades as the country's Global Hunger Index was 25.9, labeling it "serious" in this category. The country received a score of 20.1 from the International Food Policy Research Institute in 2015. Although the rating may have lowered as years passed, it remained a serious problem, with a rating of 20.3 in 2018 and ranked 69th out of 119 countries. When the COVID-19 pandemic hit the country by mid-March 2020, it had taken a heavy toll on Filipinos, wherein unemployment rates rose, income loss was prevalent, and public health was at stake. International organizations also warned about the threat of food insecurity as the pandemic transpires. To elaborate, the lockdowns that have been implemented, along with the negative economic impacts and mobility restrictions that occurred, the pandemic limited household food resources and restrained their ability to acquire food.

Based on the 2021 Family Income and Expenditure Survey results from PSA, around 10% of the poorest sectors in terms of subsistence incidence are fisherfolks and farmers, followed by children at 9.4% and rural residents at 9%. According to the United Nations (UN) Report, nearly 50.9 million Filipinos faced moderate to severe food insecurity from 2020 to 2022, which takes up 44.7% of the country's total population. Up to the second quarter of 2023, 11.3 million households, or 43%, described themselves as food-poor, proven by the survey conducted by OCTA Research. OCTA Research also discussed that the median amount needed for food expenses for food-poor households is 10,000 per month.

In line with the second and third Sustainable Development Goals by the United Nations, which are "Zero Hunger" and "Good Health and Well-being," respectively, the researcher intends to assess the underlying economic factors of food insecurity in the Philippines. This study also aims to examine the relationships between the variables and their extent. With regard to the relevant journal articles and economic theories, the factors present in this paper would be poverty incidence, minimum wage, consumer price index of food, and economic growth. The data on

subsistence incidence will be used as the study's dependent variable. The secondary data collection will be from the Philippine Statistics Authority and the Department of Labor and Employment for the minimum wages across regions. The researcher will then run the observations using different econometric methods, such as quantile regression analysis and diagnostic tests. Since the number of observations is relatively low, the researcher would be able to identify which regions have the least, moderate, and high prevalence of food insecurity using the 25th, 50th, and 75th quantiles of the dependent variable, respectively, through data distribution. Furthermore, comparing and scrutinizing the results of all regression models of different quantiles is crucial to arrive at a conclusion.

This study takes into account the following hypotheses:

H1: There is a significant relationship between poverty incidence and food insecurity.

Scrutinizing the relationship between poverty and food insecurity is still relevant today. For example, the research of Dalaijamts et al. (2008) stated that experiencing hunger accompanied by food insecurity is significantly associated with the poverty status of households. The present economic situation manifested a pattern of widespread starvation among people experiencing poverty (Ann & Nkemdilim, 2020). Poverty and food insecurity are intercorrelated. Therefore, low food security is related to extreme poverty (Khaleque, 2023). Empirical findings presented that poverty among rural farming households was a pivotal contributor to the households' food insecurity in South West Nigeria (Omotayo et al., 2018). In Bauchi state, Mailumo et al. (2016) suggested that enhancing the welfare of the farmers, considering their poverty status will decrease their food insecurity status. The analysis of Opaluwa et al. (2019) indicated that poverty in the same research locale, particularly in Kogi state, was not a pivotal contributor to household food security. Onime and Tamuno (2021) confirmed that poverty and food insecurity in Nigeria have a positive but insignificant relationship through spatial regression analysis.

Nawaz et al. (2022) established that despite agriculture being the profound source of income among rural households in Pakistan, food insecurity was caused by persisting poverty. Food insecurity is highly prevalent in slum areas of southwest Iran, and it worsened when COVID-19 transpired (Joulaei et al., 2021). Because of this disease, the most salient factor affecting food insecurity was poverty, which was strongly significant even from 2015 through 2018 in the United States (Yeboah et al., 2021). Correspondingly, Rauf, Abbas, and Imman (2021) concluded that the primary factor of food insecurity has been poverty since 2015 and 2018, making it worse with the arrival of the COVID-19 pandemic.

Absolute Poverty Theory is the condition described by severe deprivation of basic human needs such as food, potable water, sanitation facilities, shelter, and access to education, health, and information. (United Nations, 1995). It is when their minimum income is not enough to reach the poverty threshold, or they are known as people who live below the poverty line. Hence,

with this theory, income and accessibility to means of survival are both considered to examine the relationship between poverty and food insecurity.

H2: There is a significant relationship between minimum wage and food insecurity.

The prevalence of food insecurity exists in households at the minimum wage threshold or lower set by the United Kingdom (Tingay et al., 2003). The dynamic changes in income and employment status among low-income households in Toronto, Canada, reflect the changes in food insecurity (Loopstra & Tarasuk, 2013). The lower the minimum wage, the higher the chances that households will be food insecure (Dodd & Nyabvudzi, 2014). In Nova Scotia, Canada, low-wage earners are not only prone to food insecurity but are also at risk in terms of health issues (Newell et al., 2014). Minimum wage increases promote higher food consumption and the purchase of healthier meals (Palazzolo & Pattabhiramaiah, 2021). With that being said, low-wage workers would prefer to have their pay increased for a healthier lifestyle, but they discern tradeoffs that restrain adjustments for food spending patterns (Beck et al., 2019).

An uncommon scenario attested by Nord and Brent (2002) is that food insecurity is also found in relatively high-income households, and this is due to unequal incomes or changes in household composition. Therefore, it implies that completely eliminating food insecurity is not dependent on employment income, especially if the nature of work varies among them. Nevertheless, the wages earned are insufficient to decrease their susceptibility to food insecurity (McIntyre et al., 2012). Regarding policies, Reeves, Loopstra, and Tarasuk (2021) and Hasanah et al. (2024) shared the same conclusion about how setting fair, livable minimum wages can help alleviate food insecurity.

Engel's law is an economic theory that states that the expenditure for food falls as the household income increases, albeit the total amount of food expenditure increases. With regard to this study, quoting from Engel himself said, "The poorer a family is, the greater the proportion of the total outgo [family expenditures] which must be used for food. The proportion of the outgo used for food, other things being equal, is the best measure of the material standard of living of a population." (Anker, 2011). Since low-income individuals or households are the demographic described in this study, a significant portion of their income is spent on food, considering increasing prices. Therefore, it leaves little room for other necessities and limited choices to improve their diet. The researcher can establish the relationship between minimum wage and food insecurity with Engel's Law.

H3: There is a significant relationship between consumer price index of food and food insecurity.

Price changes affect one's decision to divide their income to obtain their basic needs. Rising food price levels immensely affect people experiencing poverty since food takes up most of their expenditures, just like average household expenditures, as proved by Ishaq, Khalid, and Ahmad (2018). The reason for this is decreased purchasing power and eroded efforts from

adopting poverty reduction strategies. The results of the study by Mukhtar and Abdullah (2020) revealed that there is a statistically significant relationship between food price inflation and food insecurity via the Autoregressive Distributed Lag (ARDL) cointegration form. Rapidly rising food prices induce anxiety about meeting basic needs and experiences of food insecurity (Jolliffe et al., 2018). Inflation rates, along with agricultural lands, strongly and negatively impact countries with lower levels of food security (Saboori et al., 2022).

Most rural farming households in Enugu State, Nigeria, were food insecure, and climate change was the critical factor of food price inflation, causing a reduction in calorie intake (Q. Anugwa & Ugwu, 2022). As food insecurity and child malnutrition go hand-in-hand, food prices are one of their determinants, along with poverty and income in Sub-Saharan Africa (Drammeh et al., 2019). Woldemichael et al. (2022) also focused on the relationship between inflation and malnutrition, where they concluded that one of the neglected factors that result in hidden hunger and malnutrition is high food prices using the Ethiopian Demographic Health and Survey data. From Nepal, Singh et al. (2020) stated that chances are COVID-19 protocols influence food commodity prices and potentially harm nutrition security, affecting vulnerable populations the most. Artuc et al. (2022) presented the impact of the Ukraine conflict-induced surge in wheat and corn prices in lower-middle to low-income countries. They assumed that price fluctuations persist and households are more likely to adjust their consumption patterns to cope.

In the event that food-poor individuals and households are unaffected by food price changes, coping mechanisms are the measures they take to survive. In Addis Ababa, Ethiopia, coping strategies were cutting back expenditures on food by lessening their preferences on food, relying on less expensive food, and borrowing food (Biadgilign, 2023). Reducing the quantity of meals eaten in a day and purchasing food on credit were also ways to eat in Edo State, Nigeria (Ehebhamen et al., 2017).

Demand theory describes how changes in the quantity of goods or services demanded by consumers affect their prices in the market. This theory states that the higher the price of a good is, the less of it will be demanded. The budget constraint is determined by price-income pairs (Böhm & Haller, 2008). Since the study centers on individuals or households who have income less than the minimum required food threshold, food is seen as a necessity because they have reduced purchasing power. Inelastic demand is where a percentage change in price will only cause little to no change in the quantity demanded. While food demand is relatively inelastic in general, the power of minuscule price changes in food should not be underestimated as its effects impact particular demographics like those who are food insecure (Andreyeva et al., 2010). This implies that low-income households prioritize buying food in lower quantities, cheaper, less nutritious, and accessible food, making them food insecure. Hence, the demand theory will explain the relationship between subsistence incidence and the consumer price index of food.

H4: There is a significant relationship between economic growth and food insecurity.

The impact of minimum wage on food insecurity may be prone to omitted variable bias, and unobserved variables can alter the two variables' variations (Hasanah et al.). Del Carpio et al. (2018) resolved this by adding economic growth to the estimates to reduce the possible adverse effects it may cause. Economic conditions can influence income and food insecurity. Ntiamoah et al. (2023) deduced that economic growth positively impacts long-run food security. The analysis of Świetlik (2018) described that higher levels of food security are prominent in countries with high levels of GDP and in nations where GDP per capita rises fast. In contrast, Acquah, Kapunda, and Legwegoh (2016) argue that food insecurity is still widespread in the poorer areas of Gaborone and Botswana, indicating that economic growth does not clearly benefit many of those households. Long et al. (2020) stated that the two major causes of existing food insecurity in wealthier countries are economic inequality and neoliberalism. This validates how household food insecurity in nations with developed economies is highly associated with inequality (Pollard & Booth, 2019). Santos et al. (2023) corroborated that economic growth was concurrent with income inequality in exacerbating food insecurity, especially after the COVID-19 pandemic. Although economic growth rates are relatively growing, income inequality prevails, which diminishes the advantages of economic growth in eradicating food insecurity (Holleman & Conti, 2020).

Some studies found economic growth insignificant to food security. Carolan (2012) affirmed that economic growth alone cannot be trusted enough to solve global food insecurity based on the results of the Food and Human Security Index (FHSI). The author suggested that future research should emphasize why inequality affects FHSI indicators. In the time of the COVID-19 pandemic, the results from the study of Xu (2023) displayed that there is no significant negative relationship between a country's per capita GDP and food insecurity rate. On top of that, there is no significant positive relationship between a country's COVID-19 rates and changes in food insecurity rates. Since food security can be reflective of an individual's overall health regarding accessibility, adequacy, and utilization, according to Miladinov (2023), the effect of GDP per capita on undernourishment was negatively insignificant for low-income and upper-income countries.

The Kuznets Curve Theory is used to analyze the changes in income distribution during the process of economic development (Kuznets, 1955). It is a curve hypothesis that depicts an inverted U-shape where income inequality rises at the beginning and declines as the economy grows over time. The Philippine economy significantly grew from 2010 to 2019, where it has been described as a "Tiger economy," yet experienced a decline during the COVID-19 pandemic and slowly recovered from 2021 to the present. Although the Kuznets Curve is mostly used for environmental economics studies, recent research proposes a "Food Insecurity Kuznets Curve" which has proved an inverse U-shape relationship between inequality and food insecurity (Wesselbaum et al., 2021). While the study is limited to a short research timeframe, this theory will describe how economic growth in the short run can coincide with income inequality, thus

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relating to the existence of poverty followed by the prevalence of food insecurity. Simply put, "as an economy grows, the poor get poorer."

METHOD

This paper aims to assess and measure the extent of the relationship among the independent variables, poverty incidence, minimum wage, consumer price index of food, and economic growth with the dependent variable, food insecurity. Therefore, a quantitative-correlational research design will be applied to the study.

Panel data analysis is a statistical analysis of data sets with multiple observations on each sampling unit. This can be done by regrouping a time series of cross-sectional observations such as countries, firms, or randomly sampled individuals or households (Baltagi, 1995). Panel data enables the researcher to scrutinize the dynamics of change even with short time series and undertake longitudinal studies in various fields. In economics, this type of research analysis is commonly used to study the behavior of countless micro and macro-level variables (Arellano & Bond, 1991).

The secondary data obtained for the minimum wage was from the previous wage orders per region via the National Wage and Productivity Commission under the Department of Labor and Employment. Meanwhile, the data sets for the other three variables were collected from the Philippine Statistics Authority. This comprises all 17 regions of the Philippines for the years 2015, 2018, and 2021, making panel data analysis suited for this research, totaling 51 observations. The table below encapsulates the variables to be used in this research, their definition, units, and specific data sources.

Table 1. Summary of the Variables

Variable	Definition	Unit	Data source
Subsistence Incidence (FI)	The proportion of families/individuals with per capita income/expenditure that is less than the per capita food threshold to the total number of families/individuals.	Estimate (%)	Philippine Statistics Authority OpenSTAT
Poverty Incidence (POV_INC)	The proportion of families and/or individuals with per capita income/expenditure less than the per capita poverty threshold to the total number of families/individuals.	Estimate (%)	2021 Full Year Poverty Statistics Publication, PSA
Real Minimum Wage	The minimum amount of remuneration that an employer is	Philippine Peso	National Wage and Productivity

(MIN_WAGE)	required to pay wage earners for the work performed during a given period, which a collective agreement or an individual contract cannot reduce (ILO, 2015). Real wages include purchasing power in a given base year, unlike nominal wages.	(PHP)	Commission - Department of Labor and Employment (NWPC-DOLE)
Consumer Price Index of Food (FOOD_CPI)	A measure of change in the average retail prices of a fixed basket of commodities or goods and services commonly purchased by the households relative to a base year or base period.	Whole Number	National Wage and Productivity Commission - Department of Labor and Employment (NWPC-DOLE)
Per Capita Gross Regional Domestic Product (ECON_GROWTH)	A region's economic output per person is calculated by dividing the GDP of a country by its population	Philippine Peso (PHP)	Philippine Statistics Authority OpenSTAT

The data available for minimum wage released by the NWPC-DOLE was only limited to the nominal minimum wage rate or the raw amount of money earned, so the researcher decided to use the real wage rates. Real wage rates capture the purchasing power of the minimum income earned and reflect how much food and other necessities a worker can buy. The computation method was adapted from the PSA's Agricultural Wage Rate of Farm Workers, and the formula is as follows:

$$RWR_t = \left(\frac{NWR_t}{CPI_t} \right) x\ 100$$

Where:

RWR_t = Real Wage Rate of the given year

NWR_t = Nominal Wage Rate of the given year

CPI_t = Consumer Price Index of the given year

Linear regression only describes the mean distribution of the dependent variable. It minimizes squared error terms or maximizes log-likelihood, such as assuming a normal distribution. However, it is susceptible to outliers, especially if the key assumptions are unmet. Linear regression often fails due to the presence of skewness and heteroskedastic data, making it

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impossible for the model to achieve the best, unbiased linear estimators. Researchers are at times faced with issues like these, hindering them from drawing reliable inferences. (Croxford, 2016). Although linear regression would make a viable option fit for this study, the data collected turned out to be non-normal, highly skewed, has outliers that matter, and prone to heteroskedasticity in nature upon conducting initial tests (i.e., Jarque-Bera Test, graphs for data visualization). Having said that, quantile regression would be the best model as it offers robustness.

Quantile Regression is a regression analysis method formulated by Koenker (1978). This robust estimator minimizes the weighted sum of absolute residuals of the estimation. Simply put, quantile regression models are not sensitive to outliers, cover influential data points, and do not assume homoskedasticity. These are ideally used for non-normal and highly skewed data as they explore not only the median but also different quantiles of the dependent variable. Successively, quantile regression models deliver a more complete view of the relationships between the dependent and independent variables.

The equation is expressed as follows:

$$y_i = x_i'\beta_q + e_i$$

Where $\boldsymbol{\beta q}$ denotes the vector of unknown parameters related to the nth quantile and $\boldsymbol{i} = 1, \ldots, n$.

The researcher opted to use the 25th, 50th, and 75th quantiles to produce interquartile estimates aside from the median. Adapting the method from the study of Wubetie et al. (2023) where they categorized the food security scores into three classes over its quantiles, food insecurity estimates less than the 25th quantile ($\log FI \leq 1.3$) are regions with the least prevalence of food insecurity, while the food insecurity estimates within the 50th quantile ($1.3 \leq \log FI \leq 2.5$) are regions with moderate food insecurity, and food insecurity estimates greater than the 75th quantile ($\log FI \geq 2.5$) cover regions wherein the prevalence of food insecurity is high. Additionally, using the percentile scores in data distribution, the researcher would be able to gauge which particular regions are under each of the three classifications of food insecurity estimates since the number of observations is relatively small.

The regression coefficients, or "parameters," signify the amount the dependent variable changes for a unit increase in the dependent variable; all other variables are held constant. The coefficients will be tested at 1% and 5% levels of significance to explain the model of this study further. The p-value or the probability value determines the significance of each variable. It is used to assist in deciding if the null hypothesis should be rejected. The null hypothesis is rejected if the p-value is less than the 5% significance level.

For the final step, diagnostic tests will be employed. Panel data models are likely to display cross-sectional dependence in the errors due to shocks and unobserved components that incorporate with the error term. Therefore, the Pesaran CD test for cross-sectional dependence will be employed to check if it is present. Multicollinearity is a statistical phenomenon that

means there is a strong existing relationship among the independent variables, which can cause problems with the estimation and interpretation. Thus, Variance Inflation Factors will be used to test whether multicollinearity exists within the predictor variables. Any VIF values greater than 10.0 denote that there is a collinearity problem. To evaluate the stability of the quantile regression models, formal tests will be used, such as quasi-likelihood ratio (QLR). The QLR relates to the Ramsey RESET Test for linear regression, which is used to assess model specification. Koenker and Machado (1999) describe QLR tests based on the change in the optimized value of the objective function after the mitigation of the restrictions imposed by the null hypothesis. Koenker (2005) points out that the two test statistics, L-statistic and Lambda-statistic, can be likened to QLR tests.

All things considered, the equation formulated for the study is shown below.

$$\mathbf{logFI = \beta_0 + \beta_1(\tau)logPOV\_INC + \beta_2(\tau)logMIN\_WAGE + \beta_3(\tau)FOOD\_CPI + \beta_4(\tau)logECON\_GROWTH + \epsilon_i(\tau)}$$

Where:

logFI = Logarithmic Transformation of Food Insecurity (Subsistence Incidence)

β_0 = Constant or Intercept

β_i = Slope coefficients for each variable

τ = Quantile

logPOV_INC = Logarithmic Transformation of Poverty Incidence

logMIN_WAGE = Logarithmic Transformation of Real Minimum Wage

FOOD_CPI = Consumer Price Index of Food

logECON_GROWTH = Logarithmic Transformation of Economic Growth (Per Capita Gross Domestic Regional Product)

ϵ_i = Error term

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RESULT AND DISCUSSION

A. RESULT

Table 1. Quantile Regression estimates at tau = 0.25

variable	coefficient	p-value
constant	−4.69127	7.32e-010 ***
logPOV_INC	1.42747	7.78e-045 ***
logMIN_WAGE	−0.248801	0.0422 **
FOOD_CPI	−0.000325807	0.4565
logECON_GROWTH	0.346925	5.25e-08 ***

*Notes: *** p < 0.01, ** p < 0.05*

At the 25th quantile, poverty incidence and economic growth showed a positive relationship with food insecurity at a 0.01 level of significance. An increase of one unit in poverty incidence will lead to an increase in food insecurity by 1.4%, while a unit increase in per capita gross domestic regional product increases food insecurity by 0.3%. Meanwhile, the minimum wage resulted in a negative relationship with food insecurity at a 0.05 level of significance. This denotes that every one-unit increase in minimum wage will ultimately lead to a decrease in food insecurity by 0.2%.

However, the consumer price index of food does not affect food-insecure individuals or households in these areas. The regions with the least prevalence of food insecurity are the National Capital Region, Region III (Central Luzon), and Region IVA (CALABARZON).

Table 2. Quantile Regression estimates at tau = 0.50 (median)

variable	coefficient	p-value
constant	−4.33448	2.33e-010 ***
logPOV_INC	1.45353	1.35e-047 ***
logMIN_WAGE	−0.432590	0.0002 ***
FOOD_CPI	0.000513521	0.1879
logECON_GROWTH	0.396103	8.35e-011 ***

*Notes: *** p < 0.01*

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The results from the median quantile show that 3 out of 4 independent variables have a significant relationship with food insecurity at 0.01 level of significance. In contrast, the lone independent variable, the consumer price index of food, is insignificant. In every unit of change in poverty incidence, food insecurity increases by 1.5%. The same goes for economic growth with its positive correlation, in which a one-unit increase in per capita gross domestic regional product, food insecurity will increase by 0.4%. On the other hand, since minimum wage is negatively correlated, a one-unit increase in this variable will induce a decrease in food insecurity by 0.4%. The regions with a moderate prevalence of food insecurity are Region IVB (MIMAROPA), Region VI (Western Visayas), and Region XI (Davao).

Table 3. Quantile Regression estimates at tau = 0.75

variable	coefficient	p-value
constant	−2.32028	1.75e-015 ***
logPOV_INC	1.42438	3.85e-067 ***
logMIN_WAGE	−1.01874	2.15e-029 ***
FOOD_CPI	0.000454212	0.0023 ***
logECON_GROWTH	0.525267	5.07e-032 ***

*Notes: *** p < 0.01*

At the 75th quantile, all independent variables have a statistically significant relationship with food insecurity at 0.01 level of significance. A surge in poverty incidence by one unit will give rise to food insecurity by 1.4%. If food price levels increase by one unit, food insecurity will also follow with a 0.0005% increase. A one-unit addition to per capita gross domestic regional product will generate an increase in food insecurity by 0.5%. Lastly, the results suggest that raising minimum wage rates by a unit will decrease food insecurity by 1%. The regions with a high prevalence of food insecurity are, namely, Region IX (Zamboanga Peninsula) and Bangsamoro Autonomous Region in Muslim Mindanao (BARMM)

As the regions mentioned have the same level of food insecurity prevalence in the years 2015, 2018, and 2021, some regions experienced different levels. For example, Region V (Bicol), Region VII (Central Visayas), Region VIII (Eastern Visayas), Region X (Northern Mindanao), and Region XII (SOCCKSARGEN) are all regions with moderate prevalence of food insecurity in 2018 and 2021, yet they all fell under the category of high prevalence of food insecurity in 2015.

B. DISCUSSION

In terms of how the independent variables affect food insecurity, all null hypotheses are rejected. This indicates that poverty incidence, minimum wage, the consumer price index of food, and economic growth have a significant relationship with food insecurity.

The positive relationship between poverty incidence and food insecurity is backed by the study of Joulaei et al. (2023), where they stated that the socioeconomic status of households is the most crucial determinant of food insecurity. They added that the COVID-19 pandemic worsened the cycle of the two variables. In the context of absolute poverty, they are the ones who grew up poor and have insufficient income to sustain their needs, such as food. That is to say, if an individual or household is categorized as living under the poverty line, then it would be given that they are experiencing food insecurity. Poor households tend to have expenditures greater than their earnings, and with this, they are trapped in a cycle of poverty (Nawaz et al., 2022).

Minimum wages are negatively correlated with food insecurity. Low to minimum-wage earners tend to still be at risk of food insecurity, and its prevalence is not uncommon within households with incomes at the minimum wage level. (Newell et al., 2014; Tingay et al., 2003). For example, the minimum wage earners of NCR can afford basic necessities, yet they are living paycheck to paycheck. In other words, they can pay for their expenses, but they do not have a decent quality of living. Minimum-wage earners can buy food in sufficient quantities, but it might not be enough to afford nutritious food compared to high-income earners. In that sense, they are still considered food-poor. This occurrence can also be explained by market failure. According to Rocha (2007), there is a lack of consumer participation in markets in which market failure implies inaccessibility. To further elaborate, equitable food distribution might not extend to minimum wage earners as high food prices become a “barrier.” Healthy consumption is not an option for them as healthy food tends to be more expensive.

In contrast, the linkage between economic growth and food insecurity turned out to be positive. The favorable effects of economic growth are not enough to eliminate the problem of food insecurity when the existence of severe inequalities is unceasing. Each person cannot enjoy the fruits of economic growth if inequality is left unaddressed (Santos et al., 2023). Pertaining to the Kuznets Curve Theory, the more an economy develops, the poor become poorer because the income gap widens, and the issue stems from wealth distribution. This is supported by the study of Acquah, Kapunda, and Legwegoh (2016), wherein they also reiterated that food insecurity coexists with economic growth. However, they emphasized that there is an abundance of food in shops around the city, so the problem lies in food accessibility and the quality of food that affected households consume.

The insignificance of the consumer price index of food as a contributing factor to food insecurity finds an explanation in behavioral economics. This entails that changes in food prices for food-insecure people living in areas with the least and moderate prevalence of food insecurity do not matter because their only goal is “as long as they are able to eat.” They do not care about the quality and/or quantity of the food they consume. Behavioral economics allows space for

"irrationality" in making decisions and attempts to understand why. For instance, individuals may not always decide based on prices but may be influenced by drivers, such as opting for immediate gratification and overlooking long-term consequences (Zandstra et al., 2012). At the moment when individuals or households face food insecurity where the means to acquire food are beyond affordability and accessibility, they are more likely to resort to achievable coping strategies.

One profound coping strategy in the Philippines is called "Pagpag," which is the solution commonly used by people living through the hunger crisis. Pagpag or food scavenging is prevalent in slums across the country. Residents, often children, rummage through garbage dumps and sites for food waste such as spoiled meat, expired food, or restaurant leftovers. They are either eaten right away or recooked in various ways, such as frying or turning them into stews. The Philippine National Anti-Poverty Commission warned that their food consumption patterns can harm their health and nutritional status. On the contrary, pagpag consumers also claimed that this has always been the practice in their community because nobody died or got sick because of it (Delos Santos, 2019). Nevertheless, people who consume pagpag are food-poor, and this coping strategy is seen as a "taboo" for the general public, but it is worth noting that it is poverty that made them resort to this kind of practice. In short, the decisions they make are caused by the need to eat to survive.

The consumer price index of food is shown to be a significant factor only in regions with a high prevalence of food insecurity. More precisely, this demographic cares about the quality and quantity of food to eat. The positive relationship resonates with the analysis of Jolliffe, Seff, and de la Fuente (2018), as they provide evidence that rising food prices are reasons why food insecurity experience exists. The reason for this can be connected with how food prices are also a primary facet of inflation that depreciates purchasing power (Obayelu et al., 2022). Food budget shrinks, so the same amount of money buys less food. Their limited income meant limited purchasing power for food consumption in line with inadequate diet quality, variety, and quantity (U.S. Department of Agriculture, 2006).

Biadgilign (2023) and Ehebhamen et al. (2023) discussed some coping strategies of food-insecure people who are affected by economic shocks since they are dependent on their income to acquire food. If individuals or households had to reduce quantities of food, this would result in smaller portions and insufficient amounts of food, which would lead to hunger. They may also opt for less preferred foods, such as canned goods and processed foods, which are low quality and can pose health issues. They may sacrifice other essentials by cutting back expenses like utilities to afford enough food. In the Philippines, coping strategies adopted by households are skipping meals, eating wild food or immature crops, sending a family member to eat elsewhere, asking a child not to go to school, selling assets, and borrowing money (Bermudez et al., 2016).

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CONCLUSION

The main objective of this study is to assess the factors behind food insecurity in the Philippines and examine their impacts through panel quantile regression analysis. The regions with the least prevalence of food insecurity are the National Capital Region, Region III (Central Luzon), and Region IVA (CALABARZON), which are regions with the least prevalence of food insecurity. At the same time, Region IVB (MIMAROPA), Region VI (Western Visayas), and Region XI (Davao) are regions with a moderate prevalence of food insecurity. On the other hand, the regions where food insecurity is highly prevalent are Region IX (Zamboanga Peninsula) and Bangsamoro Autonomous Region in Muslim Mindanao. Other regions were determined to have experienced different levels of prevalence of food insecurity in different years. All independent variables have a statistically significant relationship with food insecurity. Poverty incidence was found to have a positive correlation with food insecurity. If an individual or household has been living under the poverty line, then it is given that they are food insecure. The minimum wage is negatively correlated with food insecurity, in which if minimum wages were raised, the incidence of food insecurity will be decreased. Economic growth correlates with food insecurity positively because as an economy improves, some get poorer, just as described by the Kuznets' Theory of Inequality, wherein the wealth gap widens, making it difficult for people experiencing poverty to sustain their needs, such as food. The consumer price index of food was revealed to have a positive correlation with food insecurity only in regions with a high prevalence of food insecurity, as the people affected by food price changes are concerned about the quantity and quality of food they eat. Moreover, the consumer price index of food is insignificant in regions with the least and moderate prevalence of food insecurity.

The Philippines takes pride in the rich and diverse food it has to offer, along with the abundance of the country's natural resources, shaping the identity of the Filipino people. However, throughout history, food insecurity has been a predicament. In order to deal with their intricacies and minimize their impact, the first step is acknowledging that food insecurity is a systemic issue and its factors come hand-in-hand with structural causes rooted in economic, social, and political shortcomings.

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