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Comprehensive Poverty Evaluation of Rural Communities in the Philippines: Empirical Evidence from Community-Based Monitoring System (CBMS) and Econometric Modeling

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Abstract

The purpose of this paper is to look into the critical aspects of employment, health, and housing conditions in the context of poverty among households in San Jose, Camarines Sur, Philippines. The information was derived from the 2016 Community-Based Monitoring System (CBMS), which included 29 barangays. Although poverty levels vary by location, a significant proportion of households live below the total assets, income, and food thresholds. San Jose has 57.1% of its residents living in poverty. The variables of employment, health, and housing conditions, which differ by household and have an impact on poverty outcomes in San Jose, were then classified. Logistic regression models were estimated in aggregated and disaggregated configurations to confirm whether the aforementioned variables predict poverty outcomes. The findings claim to be statistically significant overall, and that there are variables that influence poverty as measured by assets, income, and food thresholds. According to the findings, employment is not a predictor of poverty outcomes in San Jose. Furthermore, researchers proposed policies in the Municipality of San Jose to alleviate poverty and promote economic development.

Keywords

Community-based Monitoring System, Employment, Health, Housing conditions, Poverty Alleviation, Poverty.

INTRODUCTION

Bicol Region's poverty incidence rises from 21.5% in 2018 to 26.1% in 2021, making Bicol Region one of the poorest provinces with a poverty incidence among families [1]. Looking at the Full Year 2021 Poverty Threshold for a Family of Five, Camarines Sur has the highest average poverty threshold for a family of five, with PhP 11,938 in a month during the full year of 2021, which is significantly higher than other provinces in Bicol Region. In terms of poverty incidence, Camarines Sur had the highest poverty incidence among Bicol Region provinces, at 29.8 percent in 2021, much higher than the other provinces; Albay and Masbate are two examples. Camarines Sur had a poverty rate of 38.7 percent, which was higher than the provinces of Albay and Catanduanes. Camarines Sur's population poverty rate increased from 36.8% in 2015 to 38.7% in 2021 [2]. Furthermore, the poverty rate among Camarines Sur families increased from 28.5% in 2015 to 29.8% in 2021. With the foregoing, one of the municipalities in Camarines Sur is San Jose, a 4th-class municipality that is one of the poorest in Camarines Sur, with a poverty incidence of 24.91% in 2018 [3]. San Jose had a -20% economic dynamism performance in 2022 according to the data from the Cities and Municipalities Competitive Index.

Investigating the complex traits of the poor in the Philippines, particularly in the Bicol Region of Camarines Sur, is necessary, appropriate, and material to improve the targeting of the government's platforms to address poverty in light of the current United Nations agenda, the Sustainable Development Goals (SDGs), which call for the eradication of extreme poverty by the year 2030, and the 2018 revision of the Multidimensional Poverty Index (MPI). This study, which focuses on employment, housing, health, and poverty, specifically links to SDGs 1, 2, 3, and 6 and 8.

As a result, research into the effects of employment, health, and housing conditions on poverty outcomes is worthwhile. The study aims to understand how indicators such as employment, health, and housing conditions affect poverty outcomes in San Jose, Camarines Sur, using the 2016 CBMS database.

MATERIALS AND DESIGN

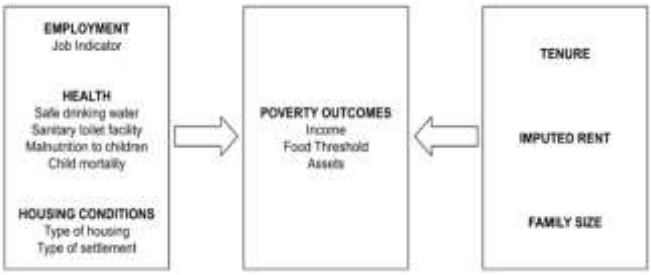

Figure 1. Conceptual Framework

Amartya Sen's Capability Approach has emerged as the leading alternative to traditional economic frameworks for

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thinking about poverty, which is relevant in this study and also has an effect on the individual's well-being. Sen contends that poverty is a complex, multidimensional concept that must take into account the various traits and conditions that individuals possess. The poor frequently lack not only financial resources, but also access to justice, credit, healthcare, education, and other opportunities and productivity. The capability approach describes the concepts of human development, poverty, and inequality under the various well-being characteristics. Thus, rather than a lack of income, poverty should be viewed as a lack of capabilities that limits one's freedom to achieve something. Sen believes that social evaluation should be based on how free people are to pursue the goals that they value. Poverty is defined in this framework as a "capability failure"—the inability of people to enjoy key "beings and doings" that are essential to human life. By definition, the concept is multidimensional [4].

The research process is depicted in the figure above. Independent variables such as employment, health, and housing conditions were captured using indicators. The CBMS database was used to determine child mortality, malnutrition in children, access to water and toilet facilities, housing characteristics, and total number of households. Child mortality and malnutrition were used to assess health conditions, access to safe water, and access to toilet facilities. The housing conditions were determined using households living in makeshift housing and households who are informal settlers. On the other hand, Poverty was calculated using the household total assets, income threshold, and food threshold. Households with three or fewer assets are considered poor. Control variables such as tenure, imputed rent, and family size will be used to establish the causal relationship between variables. Because Amartya Sen's capability approach is multidimensional, the figures show that other factors affect poverty and pose a risk to households. Furthermore, because the performance of the aforementioned variables in the Municipality of San Jose is poor, employment, health, and housing conditions were used as independent variables in this study. All of the variables mentioned above were established by the databases of the Community-based monitoring system (CBMS).

Research Design

The researchers used a quantitative method. The causal (explanatory) research design was used to investigate the variables in this study. This design is used to determine the extent and nature of the cause-and-effect relationships between the independent and dependent variables. Causal studies look at a situation or a specific problem to explain patterns of relationships between variables. Secondary sources were used as input in order to conduct this research. The dependent variables are asset, income, and food thresholds for households, while the independent variables are employment, health, and housing conditions. Several control variables were also included in the model. The study relied on the 2016 Community-Based Monitoring System (CBMS) of San Jose, Camarines Sur, Philippines. The study took place in the municipality of San Jose, Camarines Sur, which is ranked fourth in the province of Camarines Sur. All households in San Jose are invited to participate.

Data Analysis

In this study, [5], [6] and [7] models were used to determine the attributes of variables that affect a household's income-based poverty status. The dependent variables are asset, income, and food thresholds for households, while the independent variables are employment, health, and housing conditions. Several control variables were also included in the model. The causal-explanatory model was used in this study to determine the relationship between each variable. Descriptive statistics were used in this study to summarize and describe the variable characteristics in the data set. The data collected was binary, with the output having a value of "YES or NO" or "POOR and NON-POOR," which we coded as 1 for poor and 0 for non-poor. Logistic regression was used by the researchers. The relationship and significance of the independent and dependent variables were simplified using this type of regression. It looked into the link between employment, health, and poverty outcomes.

$$y = a + X\beta + u$$

where: Y = logit (p) = log [p / (1- p)],

p = probability of being poor in a household;

α = the intercept or individual effects of employment, health, and housing conditions which are assumed to be constant;

X = vector of independent variables or characteristics of employment, health, and housing conditions, including control variables;

β = vector of coefficients, intercepts, or effects of employment, health, and housing conditions on poverty outcomes; and

μ = error term.

Logit Regression was used to investigate the relationship between health and poverty outcomes. The following Econometric Model was used for logit regression analysis. This econometric approach uses binary data results to identify cause-and-effect correlations between specified variables.

In this study, the logit model was estimated as follows:

Logit Model 1

$$POV\_INC = \beta0 + \beta1EMPLOY + \beta4WAS\_Water + \beta5WASF\_Toilet + \beta2C\_MAL + \beta3C\_MOR + \beta6MSH\_OCCU + + \beta7I\_SETT + \beta7TENR + \beta8FAM + \beta9IMPTRE + \mu$$

Logit Model 2

$$POV\_ASS = \beta0 + \beta1EMPLOY + \beta4WAS\_Water + \beta5WASF\_Toilet + \beta2C\_MAL + \beta3C\_MOR + \beta6MSH\_OCCU + + \beta7I\_SETT + \beta7TENR + \beta8FAM + \beta9IMPTRE + \mu$$

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Logit Model 3

$$POV\_FT = \beta0 + \beta1EMPLOY + \beta4WAS\_Water + \beta5WASF\_Toilet + \beta2C\_MAL + \beta3C\_MOR + \beta6MSH\_OCCU + + \beta7I\_SETT + \beta7TENR + \beta8FAM + \beta9IMPTRE + \mu$$

Where:
POV_INC = the Poverty Classification/Status/Occurrence/outcomes based on households income
POV_ASSETS = the Poverty Classification/Status/Occurrence/outcomes based on households assets
POV_FT = the Poverty Classification/Status/Occurrence/outcomes based on food threshold;
EMP = employment (employed/unemployed)
C_MAL = child under 0-5 years old who are malnourished
C_MOR = child mortality
WAS_WAT = household with/without access to safe water
WASF_TOILET = household with/without access to sanitary toilet facility
MSH_OCC = households living in makeshift housing
I_SETT= Household who are informal settlers
TENR = tenure
FAM = family size
IMP = imputed rent
$\beta0$ = the intercept; and
μ = the error term

RESULTS AND DISCUSSION

Table 1. Poverty Measurements

Variables	Non-Poor		Poor	
	Frequency	Percentage	Frequency	Percentage
Total Assets	2,308	24.57%	7,084	75.43 %
Income	4,006	42.65%	5,386	57.35%
Food Threshold	9,277	98.78%	115	1.22%

Source: San Jose, Camarines Sur CBMS

There are 9,392 households and 42,051 members for observation in this study. Household distribution is the percentage of households in a barangay compared to the total number of households in a municipality; while the population distribution refers to the portion of the aggregate number of members per barangay from the total number of populations in a municipality. The municipality of San Jose is divided into 29 barangays for comparison. The data from the Community-Based Monitoring System in San Jose according to the core poverty indicators was utilized through the 29 barangays. The data were broken down into the number of population and households which falls below the poverty indicators. In the municipality of San Jose, as shown in Table 1, 57.3% are living below the poverty threshold, while 1.22% are experiencing food shortages. Mortality rates among children and malnutrition are low. Among the proportion of households and populations with high poverty metrics are unemployed members of the labor force, households with income below the poverty threshold, and households with 0-3 assets.

The proportion of children under the age of five is low, indicating that only 12 children died in 2016 out of a total population of 4,825 children under the age of five. Furthermore, the percentage of malnourished children in the total population of children 0-5 years old is 0.7%. Poverty is visible in the labor market with a 75% unemployment rate, indicating that 17,050 household members are unemployed, as the total population of labor force members (aged 15 and up) is 26,308.

Table 2. Poverty Indicators

Variables	Non-Poor		Poor	
	Frequency	Percentage	Frequency	Percentage
Job Indicator	2,320	24.70%	7,072	75.30%
Water Access	8,845	94.17%	547	5.82%
Toilet Access	7,725	82.24%	1,667	17.75%
Child Mortality Under 5 years old	9,380	99.86%	12	0.13%
Child Malnourished 0-5 years old	9,352	99.56%	40	0.43%
Makeshift Housing	9,216	98.12%	176	1.87%
Informal Settlers	8,149	86.77%	1,243	13.23

Source: CBMS San Jose

Poverty is visible in households with incomes below the poverty line. 57% of households earn less than the poverty line. Also, the proportion of households with 0-3 assets is high, indicating that three-fourths of the households are poor in terms of owned assets. Overall, food shortage is not common in San Jose, along with makeshift housing, access to safe water, mortality, and malnutrition. On the other hand, informal settlers, lack of sanitary toilet facilities, unemployment, families below the poverty threshold, and lack of assets are common as indicators of poverty in the municipality of San Jose.

The core poverty indicators from the Community-Based Monitoring System were used to investigate poverty in the Municipality of San Jose. There are 9, 392 observations on each variable. As shown in Table 2, 75% of all households do not have a job. which indicates that the employment

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situation in San Jose is poor, as evidenced by the high percentage of unemployed households in 2016. Children under 5 years old mortality rates and malnutrition rates are low, with percentages of 0.13% and 0.43% indicating that only 12 children under 5 years old died and 40 children under 5 years old were malnourished in 2016. Households without access to water have a percentage of 5.82%, and households without access to toilet facilities have a percentage of 17.75%. In terms of makeshift housing, it accounts for 1.87% of total households, while informal housing accounts for 13.23% of total households, implying that only 176 households live in makeshift housing and 1,243 households are informal settlers.

Table 3. Results of Logistic Regression in San Jose poverty as measured by total assets

Variables	Odd Ratio	Coefficient	P-Value
Job Indicator	1.03	0.034	0.64
Water Access	.71	-.33*	0.00
Toilet Access	2.72	1.001*	0.00
Child Mortality Under 5 years old	5.12	1.63	0.13
Child Malnourished 0-5 years old	.79	-.22	0.57
Makeshift Housing	1.48	.39	0.08
Informal Settlers	.80	-.21*	0.02
Tenure	1.25	.23*	0.00
Nuclear Family	1.51	.46*	0.00
Imputed Rent	.99	.40*	0.00

R-Squared = 0.0786 Number of obs = 8,946
Adj R-Squared = 0.0776 Prob > chi2 = 0.0000
Pseudo R2 = 0.0530

*denotes that it is significant at p-value < 0.05 and must reject the null hypothesis.

Source: CBMS, San Jose

With P-Values of 0.0000 for poverty measured by total household assets, the results show that the overall models are significant in predicting poverty outcomes across the Municipality of San Jose. According to table 3, informal settlers, tenure, imputed rent, and nuclear families are all significant in the model, while households with access to water and households with access to toilet facilities have a negative impact on the poverty outcomes determined by households' total assets. The outcomes of poverty as measured by total assets are negatively impacted by households with access to water and households living in informal settlements. In other words, there is a 22% decrease in households below the poverty line for every unit increase in informal settlers and every unit increase in malnourished children. The values for the logistic regression equation's coefficients are those that determine how well the independent variable predicts the dependent variable. They are given in log-odds units; $log(p/1-p) = 0 + 1WAS\_WAT + 2WASF\_TOILET + 3I\_SETT + 4TENR + 5FAM + 16IMP + u$ (p=Probability of being poor). For instance, a one-unit increase in the number of households without access to safe water causes a 54 percent drop in the dependent variable poverty. Another illustration is that, if all other independent factors remain constant, a nuclear family size increase of one unit would result in a 46% increase in poverty outcomes. All other variables are included in the analysis, but only the ones mentioned above are significant predictors according to p-values.

Table 4. Results of Logistic Regression in San Jose poverty as measured by Income Thresholds

Variables	Odd Ratio	Coefficient	P-Value
Job Indicator	1	0	-
Water Access	1.13	.12	0.24
Toilet Access	1.07	.07	0.27
Child Mortality Under 5 years old	1	0	-
Child Malnourished 0-5 years old	1	0	-
Makeshift Housing	.75	-.28	0.15
Informal Settlers	1	0	-
Tenure	1.02	.02*	0.02
Nuclear Family	.22	-1.50*	0.00
Imputed Rent	.99	4.93*	0.01

R-Squared = 0.2663 Number of obs = 8,946
Adj R-Squared = 0.2655 Prob > chi2 = 0.0000
Pseudo R2 = 0.0246

*denotes that it is significant at p-value < 0.05

Source: CBMS, San Jose

Results of Logistic Regression in San Jose poverty

Table 5. Results of Logistics Regression as measured by food thresholds

Variables	Odd Ratio	Co-efficient	P-Value
Job Indicator	1	0	-
Water Access	.64	-.43	0.41
Toilet Access	1.14	.13	0.63
Child Mortality Under 5 years old	17.50	2.86*	0.001
Child Malnourished 0-5 years old	19.34	2.96*	0.00
Makeshift Housing	3.26	1.18*	0.014
Informal Settlers	1	0	-
Tenure	.97	-.03	0.61

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Variables	Odd Ratio	Co-efficient	P-Value
Nuclear Family	1.57	.45	0.36
Imputed Rent	.99	-0.0	0.10

R-squared = 0.2248 Number of obs = 8,946
Adj R-Squared = 0.2240 Prob > chi2 = 0.0000
Pseudo R2 = 0.1448

The findings demonstrate that, with P-Values of 0.0000 for poverty determined by income thresholds and food thresholds, the overall models are significant in predicting poverty outcomes across the San Jose Municipality. The dependent variable is predicted by the coefficients of the logistic regression equation using the independent variable as the basis.

log(p/1-p) = 0 +1TENR+2FAM +13IMP+
log(p/1-p) = 0 +1C_MOR+2C_MAL+3MSH_OCC+

Tables 4 and 5 used the same procedure as table 3. Employment is not a significant predictor of poverty outcomes in the city of San Jose. Employment has a positive impact on poverty when measured by household total assets, but has a negligible value. The results show that the overall models are significant in predicting poverty outcomes throughout the San Jose Municipality, with P-Values of 0.0000 for poverty defined by income and food thresholds. As determined by income thresholds, three factors significantly influence poverty (tenure, family size, and imputed rent). The number of households with malnourished children under the age of five, the child mortality rate for children under the age of five, and the number of households living in squalid conditions all have a significant effect on poverty as measured by the food threshold.

CONCLUSIONS

Data have been disaggregated to examine each household since poverty predictors diverge and evaluation varies. The majority of households are poor in terms of income and owned assets. Food scarcity in the municipality is also reported but it is quite low. Furthermore, unemployment in the municipality is visible. Child Mortality and Malnutrition for children were also visible although their cases are quite low. Further, the housing characteristics of households were also reported. The poverty profile of San Jose shows that the households living below the poverty threshold are high. Based on the findings of the analysis using logistic regression models, it can be concluded that health predicts poverty outcomes. With regard to housing, it can be concluded that housing predicts poverty outcomes, it is also based on the findings of the analysis using the models. Through this, the researchers deduced that health and housing conditions affect poverty outcomes and as well as the poverty outcomes significantly. Sen also claimed that poverty is capability-failure, meaning that it prevents people from enjoying life, based on the capability approach. This implies the findings of our investigation. The findings of studies on the effects of health and housing conditions on poverty, as the findings show that health and housing problems are likely as a result of households becoming ill or other family members having to miss school or work to care for the sick relative which increases the likelihood of a family falling into poverty which stopping the households to enjoy their basic life. Furthermore, malnutrition exacerbates poverty by increasing healthcare costs, decreasing productivity, and slowing economic growth and preventing material deprivation, and maintaining a stable standard of living.

The help of government agencies, institutions, and other organizations are needed to alleviate poverty. The following are some of the specific recommendations; since health is one of the variables affecting poverty in San Jose, there is a need to expand the healthcare safety net and create community participation with the larger healthcare organization; educate people on proper nutrition and food preparation such as campaigning and handing out materials for information, education, and communication on basic hygiene, health, and sanitation; determine what factors influence poverty incidence in each household as the study focuses on each household; the LGU should allocate funds for household health care, such as free vitamins and check-ups for all the households in San Jose. The LGU must come “house-to-house” if needed to monitor every family; monitor project progress and ensure that poor households are always included in poverty-reduction plans; future researchers may use policy mapping to determine which barangays have the highest poverty incidence and the panel, cross-sectional, and repeated cross-sectional data can be used to determine the amount of poverty over time, as well as identify chronic and transient poor households if the CBMS is already available. Finally, future researchers can use the latest community-based monitoring system in San Jose as the scope of their study and use the same variables to determine if there is a change in poverty status in San Jose as well as the variables mentioned. The researchers recommended using the Logistics Regression.

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