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Determinants of Household Welfare and Poverty in Canaman, Camarines Sur

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Abstract— Bicol region is among the poorest in the country as reflected in many official data of the Philippine Statistics Authority (PSA). Its economic productivity is significantly lower compared to other regions. Various studies have attributed this situation primarily to natural calamities including typhoons, volcanic eruptions, prolonged dry spells, and even floods during the rainy season. The region is within the typhoon path with over 20 typhoons crossing the region every year which gravely affects agricultural productivity - one of its major economic drivers. This resulted in a pervasive poverty situation in the area. These are broad and general attributions, but there are other specific factors that are considered determinants of household poverty and their state of welfare. These were examined using the CBMS data from one of the municipalities in the region – Canaman in the province of Camarines Sur. To do this, there were two models were applied to analyze welfare and poverty in Canaman. First, Feasible Generalized Least Squares (FGLS) were used to identify variables influencing household welfare. This model is used to correct for heteroskedasticity encountered using OLS. To identify the factors contributing to the likelihood of a household being classified as poor, a Probit Model was used. Both models were regressed on a set of explanatory variables reflecting household head (HH) characteristics, household characteristics, marital status of the HH, employment status of the HH, and urbanity. Results showed that older HHs benefit from slightly higher HIAE, consequently reducing the risk of falling into poverty. This finding suggests that households with younger HHs should be prioritized by poverty alleviation programs. Female-headed households have been found to suffer from lower welfare and a greater risk of being poor. The findings also support previous results which indicated that marital status is an important determinant of welfare. It was found out that married households are better off than those with household heads who are single, have been separated, or are currently cohabiting.

Keywords— Poverty determinants, poor household, social welfare

INTRODUCTION

Bicol has been consistently among the Philippine regions which registered the highest population poverty incidence in recent decades. In the year 2000, Bicol region ranked third among Philippine regions for the highest poverty incidence at 52.81% behind SOCCSKSARGEN (53.61%) and the Autonomous Region of Muslim Mindanao (ARMM) (64.46%). Masbate ranked third among provinces for the highest poverty incidence at 64.29% (Philippine Statistics Authority, 2005). Based on most recent estimates, the situation in Bicol has improved significantly with its poverty incidence standing at 27.0% in 2018 based on estimates from the Family Income and Expenditure Survey of 2018 (Philippine Statistics Authority, 2019). In 2015, the region still ranked third for the highest poverty incidence, but this improved to ranking sixth by 2018. This improvement may be attributed to the region's rapid growth, registering double-digit growth rates in three separate years since the year 2000.

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Although the situation in Bicol has improved significantly, much is left to be done. Despite improvement in the region's ranking in terms of individual poverty rate, the number of poor people in the region places it at the second-worst position. The region has 1.6million poor people coming second to ARMM with 2.5million poor people. Among the provinces, Camarines Sur ranks 7th worst with around 573,600 poor people or around a third of the region's poor (Philippine Statistics Authority, 2019). These statistics are alarming for the people of Camarines Sur, not only because they would have less than necessary to provide for their needs, but also because poverty may hinder them from reaching their full potential as human beings (Sen, 2014).

In response to the country's situation on poverty, several programs have been implemented. Among the notable ones are the Pantawid Pamilyang Pilipino Program (4Ps) and Kalahi-CIDDS, both led by the Department of Social Welfare and Development (DSWD). The 4Ps is a conditional cash transfer program aimed at improving the health and education outcomes of the neediest families in the country (Department of Social Works and Development, 2018). These improvements would mean that the poorest members of the country would be more functional members of the society at a minimal cost. While the 4Ps addresses poverty at the household and individual level, Kalahi-CIDDS addresses the needs of the community. In this program, members of the community would be in charge of identifying a project that is most needed in their community (Asian Development Bank, 2012). They would also be the ones in charge of planning and implementation of the program decreasing chances of corruption and improving transparency.

To complement efforts by the national government, poverty alleviation programs at the grassroots must also be initiated. By formulating such programs, specific areas of deprivation would be identified and be given priority action (Reyes & Mandap, 2019). This study, in particular, would focus on the poverty situation of Canaman, Camarines Sur. Poverty has been a consistent problem in Canaman with the municipality failing to maintain its poverty incidence below 30% (Philippine Statistics Authority, 2016). Additionally, when the province of Camarines Sur decreased its poverty incidence by 11.13% in the period 2006-2015, Canaman experienced an increase in poverty rate by 3.53% (Philippine Statistics Authority, 2016). Development theory tells us that economic growth is a necessary condition for development (Todaro & Smith, 2015). This presents increasing welfare, measured through income, a potential pathway to reducing poverty. With the goal of alleviating poverty, this study aims to (a) identify the determinants of welfare, and (b) identify the determinants of poverty in Canaman, Camarines Sur.

FRAMEWORK

Previous studies have identified several variable categories influencing household welfare and poverty status. Among these are household characteristics, household head (HH) characteristics, and urbanity. Household head characteristics important in the study of welfare and poverty are marital status, gender, employment status, and educational attainment, and age. According to the lifecycle hypothesis, much can be explained about the income or expenditure of an individual based on age. This may reflect the experience of the HH which is positively related to income. It also states that income tends to taper down when an individual reaches retirement age, hinting that the relationship of income with respect to age is nonlinear. With regard to the gender of the HH, some studies find that households with female heads are more prone to poverty (Geda et al., 2001). Employment reduces the risk to

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poverty (Sekhampu, 2013) with formal wage employment significantly increasing welfare (Mukherjee & Benson, 2003). Education has been found to positively impact efforts on poverty alleviation and welfare improvement. Grootaert, (1997) and Geda et al., (2001), found that more years of education lead to lowering the probability of being poor. Mukherjee & Benson, (2003) found that welfare is greatly improved with more education.

The household characteristics that would be included in the model are dependency ratio and household size. Larger household sizes have been found to lead to greater poverty incidence (Sekhampu, 2013) and lower household welfare (Gounder, 2012). However, when the square of household size is considered, welfare improves because of economies of scale (Fagernäs & Wallace, 2003). High dependency ratios are associated with greater poverty (Baulch & McCulloch, 2002) and lower household welfare (Akerele & Adewuyi, 2011). Marital status has also been identified to be important in improving welfare due to married HHs having an additional potential earner in their household (Anyanwu, 2014). Urbanity matters in the study of welfare and poverty because it conditions the availability of employment opportunities, and the quality of infrastructure and services (Gounder, 2012). Because of such differences, it is common for studies on poverty to study rural and urban areas separately. Glewwe, (1991) found very different determinants of poverty for rural and urban areas of Cote d'Ivore suggesting that distinct approaches should be considered for combatting poverty for the said areas.

METHODOLOGY

To achieve the objectives of the study, Canaman's Community-Based Monitoring System (CBMS) data for the year 2019 will be utilized. Being a census, the CBMS contains information on every single individual living in Canaman in the year 2019. The census contains information on 30,485 individuals living in 6,818 households. As of 2019, Canaman has 13,863 and 16,622 individuals living in rural and urban barangays respectively. In the subsequent analysis, the rural area is further subdivided into Central and West Canaman. This subdivision is based on the distance of the barangays to the vibrant economy of Naga city, as well as the susceptibility of the western barangays to flooding from the Bicol River. Karim, (1996) identified vulnerability to natural calamities as a factor aggravating poverty in Bangladesh. This leads us to believe that the poverty situation in the western barangays may be different from the rest of Canaman, deserving of separate analysis. The resulting subdivision of the barangays into west, central, and urban areas is presented in Table 1.

Table 1. Region Assignment of Barangays in Canaman

Region assignment	Barangays
Urban	Baras, Del Rosario, Dinaga, Haring, Pangpang, San Agustin, San Vicente, Santa Cruz, Tibgao
Central	Linaga, Poro, San Jose East, San Jose West, San Roque, Santa Teresita, Sua, Talidtid
West	Fundado, Iquin, Mangayawan, Palo, San Francisco, San Juan, San Nicolas

Two models will be estimated to analyze welfare and poverty in Canaman. First, a Feasible Generalized Least Squares (FGLS) model will be used to identify variables influencing household welfare. This model is used to correct for heteroskedasticity encountered using OLS. The dependent variable in this model is the logarithm of household income per adult equivalent (HIAE). This is calculated by taking the logarithm of the quotient of total household income divided by the number of equivalent adults. It should be noted that total household income

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includes incomes earned in cash or in kind. The number of equivalent adults is calculated using the modified OECD scale first proposed by Hagenaars et al., (1994). This is calculated using the formula

$$AE = 1 + 0.5 * (N_{adult} - 1) + 0.3N_{child}$$

where AE is the number of equivalent adults, N_{adult} is the number of adults in the household, and N_{child} is the number of children in the household. Household members aged 14 and below are considered children. Using a per adult equivalent measure has the advantage of considering differences in consumption needs based on age.

Table 2. Variable Definitions

Variable	Type	Variable description
Poor	Dummy	Poverty status; 1=poor, 0=nonpoor
IncAE	Continuous	Income per adult equivalent
Ln_IncAE	Continuous	Log of income per adult equivalent
Household head characteristics		
Age	Continuous	Age of the household head
AgeSQ	Continuous	Squared age of the household head
Education	Continuous	Number of years schooling
Gender	Dummy	Gender of household head; 1=female, 0=male
Household characteristics		
Size	Continuous	Number of household members
SizeSQ	Continuous	Squared number of household members
Youthdep	Dummy	Youth dependency ratio
Elderlydep	Dummy	Elderly dependency ratio
Marital Status		
Married	Dummy	1=Married household head, 0=otherwise
Never Married	Dummy	1=Household head never married, 0=otherwise
Widowed	Dummy	1=Widowed household head, 0=otherwise
Separated	Dummy	1=Separated household head, 0=otherwise
Live-in	Dummy	1=Household head is cohabiting with partner, 0=otherwise
Employment status		
Unemp	Dummy	1=Household head is unemployed, 0=otherwise
Self	Dummy	1=Household head is self-employed, 0=otherwise
Wage	Dummy	1=Household head is engaged in formal wage labor, 0=otherwise
Paidfamily	Dummy	1=Household head is paid worker in family-owned farm/business, 0=otherwise
Unpfamily	Dummy	1=Household head is unpaid worker in family-owned farm/business, 0=otherwise
Region		
Urban	Dummy	1=Household lives in urban Canaman, 0=otherwise
Central	Dummy	1=Household lives in central Canaman, 0=otherwise
West	Dummy	1=Household lives in west Canaman, 0=otherwise

To identify the factors contributing to the likelihood of a household being classified as poor, a probit model is constructed. The dependent variable is a dummy that takes the value of 1 when monthly HIAE falls below ₱10,168, and 0 otherwise. This poverty threshold is based on estimates of the Philippine Statistics Authority on the province

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of Camarines Sur for the year 2018. Both models are regressed on a set of explanatory variables reflecting household head (HH) characteristics, household characteristics, marital status of the HH, employment status of the HH, and urbanity. The variables contained in each category as well as its definitions are listed in Table 2. Summary statistics of the variables used are presented in Table 3.

RESULTS AND DISCUSSION

Table 4 presents the results of the FGLS regression on the log of HIAE. The model has an R2 of 0.2094 and a highly significant F statistic indicating significant predictive power of the model. It also shows the result for the probit estimation with a pseudo R2 of 0.1699 and a highly significant Chi2 statistic.

Table 3. Summary statistics of variables used.

	Canaman (N=30,485)			Rural (N=13,863)			Urban (N=16,622)		
Variable	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Poor	0.4966	0	1	0.6190	0	1	0.3946	0	1
IncAE	69743	4.8	6555897	46793	450	1820000	88883	4.8	6555897
Ln_IncAE	10.65	1.57	15.70	10.33	6.11	14.41	10.91	1.57	15.70
Household head characteristics									
Age	49.69	0	103.85	49.34	0	98.98	49.98	0	103.85
AgeSQ	2664	0	10784	2628	0	9797	2694	0	10784
Education	11.47	0	22	10.25	0	22	12.48	0	22
Gender	0.16	0	1	0.12	0	1	0.20	0	1
Household characteristics									
Size	5.64	1	20	5.82	1	16	5.48	1	20
SizeSQ	37.89	1	400	40.19	1	256	35.96	1	400
Youthdep	0.72	0	7	0.80	0	5	0.67	0	7
Elderlydep	0.10	0	3	0.10	0	3	0.11	0	3
Marital Status									
Married	0.31	0	1	0.32	0	1	0.31	0	1
Never Married	0.37	0	1	0.36	0	1	0.38	0	1
Widowed	0.04	0	1	0.04	0	1	0.04	0	1
Separated	0.01	0	1	0.01	0	1	0.01	0	1
Live-in	0.06	0	1	0.06	0	1	0.07	0	1
Employment status									
Unemployed	0.68	0	1	0.70	0	1	0.66	0	1
Self	0.05	0	1	0.04	0	1	0.05	0	1
Wage	0.23	0	1	0.19	0	1	0.26	0	1
Paidfamily	0.02	0	1	0.03	0	1	0.01	0	1
Unpfamily	0.03	0	1	0.04	0	1	0.02	0	1
Region									
Urban	0.55	0	1						
Central	0.26	0	1						
West	0.19	0	1						

The results of the estimation reveal that returns to age are relatively flat and slightly increasing with old age. Older HHs are able to gain increasingly higher income than younger HHs although with very little deviation, as reflected by the minuscule coefficient. Years of education of the HH is beneficial to both increasing welfare and poverty. Specifically, an additional year of education leads to 6.1% higher HIAE. Similarly, the probability of being poor is reduced by 2.4% for one more year of schooling. The results also reveal that households with female heads have 12.6% lower income than male-headed households; as a result, such households are more susceptible to poverty by 3% than male-headed households.

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Household size has a beneficial effect on poverty reduction, reducing the likelihood of falling into poverty by 9.1% per additional member of the household. The negative coefficient of the squared term reveals that large household sizes would eventually experience decreasing welfare and would eventually experience higher poverty. Both youth and elderly dependency decrease welfare and aggravate poverty, but youth dependency has worse effects on the outcome variables. In particular, youth dependency reduces HIAE by a 23.8% per unit increase in the ratio, while elderly dependency decreases the same measure by a 17.7% per unit increase in the ratio. In terms of impact to poverty, youth and elderly dependency increase the likelihood of being poor by 12.8% and 7.6% respectively, per unit increase in the respective ratios.

Table 4. Determinants of Welfare and Poverty in Canaman, Camarines Sur.

	Determinants of income per adult equivalent			Determinants of poverty		
Variable	Coefficient	Std. Error	p-value	Marginal effects	Std. Error	p-value
Household head characteristics						
Age	0.002	0.003	0.414	-0.002	0.004	0.222
AgeSQ	0.00006	0.000	0.015**	-0.00007	0.000	0.094*
Education	0.061	0.001	0.000***	-0.024	0.002	0.000***
Gender	-0.126	0.016	0.000***	0.030	0.024	0.000***
Household characteristics						
Size	0.010	0.008	0.222	-0.091	0.014	0.000***
SizeSQ	-0.001	0.001	0.005***	0.003	0.001	0.000***
Youthdep	-0.238	0.009	0.000***	0.128	0.014	0.000***
Elderlydep	-0.177	0.024	0.000***	0.076	0.036	0.000***
Marital status						
Never married	-0.025	0.012	0.035**	0.015	0.018	0.009***
Widowed	-0.045	0.031	0.153	0.020	0.045	0.180
Separated	-0.178	0.066	0.007***	0.056	0.091	0.059*
Live-in	-0.109	0.021	0.000***	0.064	0.034	0.000***
Employment status						
Self	0.170	0.025	0.000***	-0.068	0.037	0.000***
Wage	0.327	0.012	0.000***	-0.137	0.020	0.000***
Paidfamily	0.083	0.039	0.033**	-0.034	0.061	0.086*
Unpfamily	0.118	0.031	0.000***	-0.046	0.048	0.004**
Region						
Central	-0.267	0.013	0.000***	0.119	0.019	0.000***
West	-0.510	0.015	0.000***	0.221	0.022	0.000***
Constant	9.994	0.065	0.000***	0.048	0.108	0.000***
Number of observations	29723			29723		
	Adj.R^2=0.2094, F statistic=438.29***			Pseudo R^2=0.1699, Chi^2=6998.86***		

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

On the variables pertaining to marital status, households whose HHs are single, have separated, and have lived together have lower HIAE by 2.5%, 17.8%, and 10.9% respectively, when compared to households with a married

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HH. As a result, these households are more susceptible to poverty by 1.5%, 5.6%, and 6.4% respectively. Meanwhile, the poverty status of households headed by widowed individuals do not differ significantly from the poverty status of households with married heads.

In terms of the employment status of the HH, being employed in formal wage employment has the most beneficial impact on improving welfare and poverty reduction. Specifically, employment of the HH in this sector increases HIAE by 32.7% and reduces the probability of being poor by 13.7% compared to households with unemployed heads. Similarly, self-employment of the HH increases HIAE by 17% and reduces the likelihood of being poor by 6.8% compared to households whose heads are unemployed. Working in a family-owned farm or business also increases welfare and reduces the probability of being poor. Specifically, paid and unpaid family work increases HIAE by 8.3% and 11.8% respectively and lowers the probability of the household being poor by 3.4% and 4.6% respectively, compared to households with unemployed heads.

When urbanity is considered, a household situated outside of the urban barangays experiences worse welfare and higher poverty incidence. Compared to households located in an urban barangay, living in central Canaman reduces HIAE by 26.7% while the likelihood of being poor increases by 11.9%. Similarly, a household living in west Canaman on average suffers from 51% lower HIAE and is 22.1% more likely to be in poverty than households in the urban area.

CONCLUSIONS AND POLICY IMPLICATIONS

This study aimed to identify the determinants of welfare and poverty in Canaman, Camarines Sur using its CBMS data for the year 2019. It found that older HHs benefit from slightly higher HIAE, consequently reducing the risk of falling into poverty. This finding suggests that households with younger HHs should be prioritized by poverty alleviation programs. Female-headed households have been found to suffer from lower welfare and a greater risk of being poor. This may reflect disproportionate employment opportunities for females in Canaman. Identifying the precise reason why this happens may require further studies. Better educated HHs are able to benefit from better welfare and lower poverty incidence, highlighting the need for local support in improving human capital in Canaman.

Household size has a nonlinear relationship with a household's poverty status and welfare. Poverty is low with small household sizes, increases with moderate size, and worsens as household size further increases. This result may be supported by worsening welfare and increasing poverty experienced by households with high youth and elderly dependency ratios. Youth dependency is worse than elderly dependency as evidenced by greater coefficients in both models. A potential policy recommendation to address this problem is the intensification of family planning programs to reduce youth dependency in Canaman.

The findings also support previous results that identify marital status as an important determinant of welfare. It was found that married households are better off than those with household heads who are single, have been separated, and are currently cohabiting. Due to this, it is recommended that the LGU of Canaman regularly conduct mass weddings or "Kasalang Bayan" to make marriage accessible to everyone. To support these newly formed bonds, marriage counseling services must also be accessible. It has also been found that any form of employment,

be it in the formal wage sector or as a family worker, improves welfare and reduces poverty. It is therefore recommended that the LGU of Canaman provide opportunities for employment in both the formal and informal sectors. Formal employment can be directly enhanced by providing better access to education, while training and seminars may be provided to enhance family businesses. Finally, the study has revealed that a household's location within Canaman plays a significant factor in determining welfare and poverty. Those households situated in the urban area are better off than those in the central and western barangays. Moreover, households in the west are worse off than the rest of Canaman. A lot of factors may be contributing to this such as differences in infrastructure and higher cost to entrepreneurship due to greater distance from larger markets. Dissecting this problem may be the subject of succeeding studies.

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