Multidimensional Poverty Analysis of the Rubber Farming Households in Makilala, Cotabato, Philippines

Cheryl L. Eusala[1], Josefina T. Dizon[2], Rowena T. Baconguis[2], Maria Ana T. Quimbo[2], and Merlyne M. Paunlagui[2]

1 Ph.D. in Community Development Graduate, University of the Philippines Los Baños and Assistant Professor IV, Central Luzon State University

2 Professors, College of Public Affairs and Development, University of the Philippines Los Baños,

国連SDGsは2030年までに地球上から貧困を解消することを目指し、貧困を多元的に理解するために多次元貧困指数(MPI)を提唱している。本稿ではMPI算出ツールを用いてフィリピンのゴム栽培農家の状況を検証した。

Abstract

The central challenge for policymakers is to reduce poverty and deprivations, and the nature of poverty reduction policies is influenced by how poverty is being framed. The official measurement and analysis of poverty in the municipality of Makilala are based on the monetary approach; accordingly, farmers are the poorest sector in the country. Within these premises, this study was conducted to bring in a new approach to measuring poverty based on a multidimensional analysis. Generally, it aimed to analyze the multidimensionality of poverty of rubber farming households in Makilala, Cotabato, using the Multidimensional Poverty Assessment Tool. A total of 167 rubber-farming households with an area of one hectare and below were randomly selected as respondents to the study. The dashboard approach of the Multidimensional Poverty Assessment Tool (MPAT) analyzes the multidimensionality of poverty. Results revealed that the Non-Farm Assets and Exposure and Resilience to Shocks were the most deprived dimensions. The study recommended a results-based policy and programs for local implementation toward poverty reduction.

Introduction

Poverty is one of the most prevalent and pervasive social problems in underdeveloped countries (Mss et al., 2017). It has also become a common social problem, even in most developed countries (Gale, 2007). That is why its reduction is one of the highest priorities of international development (Bonfiglioli, 2003). The Sustainable Development Goals (SDGs) primary aim is to "end poverty in all forms everywhere" by 2030 with the clear pledge that "no one will be left behind.

Over the past decades, progress has been marked in reducing poverty globally. Nevertheless, extreme poverty remains a global concern and continues to be a rural phenomenon (Anriquez, 2007). In the Philippines, data from the Philippine Statistics Authority (PSA) revealed a poverty incidence of 26.3 % and 21% in the first semester of 2015 and 2018, respectively, based on Family Income and Expenditure Survey (Bersales, 2019). It corresponds to about 22 million Filipinos, or 3.8 million families were officially income-poor. Suansing (2017) argued that the poorest regions in the country are located in rural and agricultural areas. This is due to low farm productivity and a lack of non-farm or off-farm opportunities (Dy, 2015).

The municipality of Makilala, Cotabato in Mindanao, is an agricultural and rural area with a total land area of 34,356.53 hectares, of which 71% is devoted to agricultural production. Rubber is the leading crop planted in about 10,565 hectares recorded in 2014; thus, the majority are rubber farmers. In 2010, Makilala recorded an alarming 44.47% poverty incidence (MPDC, 2017). The poverty incidence was calculated in terms of income or

consumption expenditure. Albeit special anti-poverty programs implemented by the local government, the poverty rate remained high in 2017, 39.5%, much higher than the national average of 21% in 2018.

However, income alone is not a reliable indicator of a comprehensive picture of poverty (Laderchi, 1997). It does not account for other necessary well-being variables. It often does not give holistic information about the poor (Israel & Hakim, 2015) due to its severe limitations that only lead to a partial understanding of poverty (Adenuga et al., 2013). Through the years, uni-dimensional approaches to poverty have come under critical scrutiny. Thus, the birth of the multidimensional approach by the United Nations in 1990. The development of the Human Development Index (HDI) marked the beginning of a shift from monetary poverty measurements to the multidimensional approach (Donohue & Biggs, 2015). The multidimensional approach considers multiple indicators of well-being aside from insufficient income (Adenuga et al., 2013) and develops a multifaceted approach to solving rural poverty (Israel & Hakim, 2015).

Central to this study is to bring in a new area of poverty measurement based on a multidimensional approach for the rubber-farming sector in Makilala, Cotabato, as no study has ever been conducted measuring their well-being status as rubber farmers experienced difficulties due to price fluctuations of raw rubber products. The price volatility of raw rubber products is believed to have contributed to the high poverty incidence in the municipality. As per the record, it went as high as P100.00 per kilo in 2010, and in 2010 it went down to Php18.00 to 25.00 per kilo.

Primarily, this study adopted a new tool for local-level rural poverty assessment, the Multidimensional Poverty Assessment Tool (MPAT), developed by the International Fund for Agricultural Development (IFAD). The MPAT has ten fundamental dimensions related to rural poverty and human well-being. These are (1) food and nutrition security, (2) domestic water supply, (3) health and healthcare, (4) sanitation and hygiene, (5) housing, clothing, and energy, (6) education, (7) farm assets, (8) non-farm assets, (9) exposure and resilience to shocks, and (10) gender and social equality. Thus, this study aimed to analyze the poverty status of rubber farming households in Makilala, Cotabato multidimensionally and recommend policies, programs, and projects to address the poverty problem.

Literature Review
"Ending poverty means addressing its multiple dimensions" (Alkire, OPHI, & UK, 2013)

There has been a "widespread agreement that poverty is a multifaceted phenomenon" since the pioneering works of Bourguignon & Chakravarty (2003) and Tsui (2002). Several kinds of literature are rapidly growing now, including Alkire & Foster (2011a), Chakravarty, Deutsch, and Silber (2008), Deutsch and Silber (2005), Duclos, Sahn, and Younger (2006), and Maasoumi and Lugo (2008), and Ferreira & Lugo (2013), among others.

Accordingly, poverty has many dimensions and a complex of deprivations such as health, nutrition, education, services, housing, and assets, among others. It is not just about money. Nowadays, the view of poverty as multidimensional is widely supported by poor communities, as well as governments and development agencies (Alkire et al., 2013). Although most countries around the world define poverty as a lack of money, the poor people themselves consider poverty as multidimensional. Focusing on income alone is not enough to capture the actual reality of poverty as poor people suffer various deprivations in their daily lives — such as poor health, lack of education, inadequate living standards, disempowerment, poor quality of work, the threat of violence, and environmentally hazardous areas, among others (Oxford Poverty and Human Development Initiative [OPHI], 2019). OPHI (2019) presented some reasons why to use a multidimensional approach to poverty, such as:

- *Monetary-based poverty measures can miss a lot* — Studies revealed that the overlapping between monetary and non-monetary measures of poverty is not perfect. Mostly, not all individuals who are income poor are multi-dimensionally poor, and not all multidimensionally poor individuals are income poor. Thus, the need to consider both

monetary and non-monetary measures of poverty in policies to address the needs and deprivations faced by poor populations is essential.

- *Economic growth does not always reduce poverty or deprivation*. Many studies have found that economic growth is not strongly associated with reducing other deprivations, such as child malnutrition or child mortality.
- *Poor people describe their experience of poverty as multidimensional*. Poor people describe ill-being as poor health, nutrition, lack of adequate sanitation and clean water, social exclusion, low education, bad housing conditions, violence, shame, disempowerment, and much more.
- *The more policy-relevant information available on poverty, the better-equipped policymakers will be to reduce it*. For instance, an area where most people are deprived of education requires a different poverty reduction strategy from an area in which most people are deprived of housing conditions.

Thus, an alternative lens through which poverty may be viewed and understood is through multidimensional measures (Alkire & Foster, 2011b).

Many scholars from different countries used a variety of dimensions for the multidimensional poverty approach. Batana (2013) uses four indicators (1) assets, (2) health, (3) schooling, and (4) empowerment in the study of multidimensional poverty measurement among women in 14 Sub-Saharan African countries. Yu (2013) studied multidimensional poverty in China and selected five dimensions such as (1) per capita household income, (2) access to water, (3) body mass index as a measure of health, (4) having completed primary education, and (5) access to medical insurance as an indicator of social security. The papers of Trani, Biggeri, & Mauro (2013) on the multidimensionality of child poverty in Aghanistan consider eight dimensions, namely: (1) health, (2) material deprivation, (3) food security, (4) care and love, (5) social inclusion, (6) access to schooling, (7) freedom from economic exploitation, and (8) shelter and environment. Another multidimensional poverty study conducted in Bhutan by Santos (2013)

that served as a source of happiness in the 2007 Gross National Happiness Survey selected six dimensions, namely: (1) health, (2) education, (3) access to electricity, (4) safe water, (5) improved sanitation, and (6) enough room per person in dwelling. Two additional dimensions are included for the rural areas, such as (1) access to roads and (2) land ownership.

Recently, a new multidimensional poverty measurement was developed intended to measure local-level rural poverty using ten dimensions that measure six fundamental needs such as (1) food and nutrition security, (2) domestic water supply, (3) health and health care, (4) sanitation and hygiene, (5) housing, clothing and energy, and (6) education); and four central aspects of rural livelihoods and well-being such as (7) farm assets, (8) non-farm assets, (9) exposure and resilience to shocks, and (10) gender and social equality. This is called the Multidimensional Poverty Assessment Tool (MPAT), developed by the United Nations International Fund for Agricultural Development (IFAD). The MPAT was developed with the understanding that the most fundamental and essential needs of people, as defined in dimensions 1-6 of MPAT, must first be addressed before they can effectively tackle long-term goals. The dimensions 7-10 of MPAT, which go beyond basic human and psychological needs that sometimes constrain the capacity of rural people to step away from poverty, are part of the enabling environment.

This study considered the new multidimensional poverty measurement from IFAD, which is ideally suited for the study's purpose, location, and respondents. The MPAT assesses local-level rural poverty by aggregating people's perceptions on ten different indicators based on data collected from household or village surveys. It captures fundamental human needs, endowment with assets, exposure to risks, which helps understand sustainability aspects, and social equality, including gender, which serves as a proxy for the social dimension of development.

Methodology

The study was conducted in Barangay Biangan, Barangay Luayon, and Barangay Sta. Felomina in

Makilala, Cotabato. These barangays were randomly selected from the top 10 barangays with high poverty incidence in the municipality.

The two-stage sampling technique and Cochran's formula were employed to generate 167 respondents who were allocated proportionally and randomly selected from the three barangays.

The study's respondents were the rubber farming households in Makilala, Cotabato, limited only to those who owned at least a hectare of rubber farm.

This study used a survey research design and employed quantitative-qualitative research methods to analyze the multidimensional poverty of the rubber farming households in Makilala, Cotabato, Philippines, using the modified Multidimensional Poverty Assessment Tool (MPAT) v.6 frameworks from the International Fund for Agricultural Development (IFAD).

A combination of techniques in data gathering was employed in the study. These include face-to-face interviews, key informant interviews, focus group discussions, and secondary data from the Office of the Municipal Planning and Barangay Government Unit.

Various analytical tools and procedures were employed to answer the different objectives of the study. Descriptive statistics using percentages, frequencies, and means were used to describe the socio-demographic and economic characteristics of the rubber farming households in Makilala, Cotabato. The weighted arithmetic average and weighted geometric average formulas were used to compute the subcomponents and component values using the formula shown in the mathematical equation below:

Weighted arithmetic average

$$y_{jk} = \sum_{i-1}^{L} W_{ik} X_{IJK}$$

Where:
y_{jk}: score for household j in subcomponent k
W_{ik}: weight attached to survey question i in the subcomponent k
X_{yk}: scaled score for household j in question i in subcomponent k

It holds that $\sum_i w_{ik} = 1$ *and* $0 \leq w_{jk} \leq 1$.

Weighted geometric average

$$y_{jk} = \prod_{i-1}^{L} X_{ijk}^{w_{ik}}$$

Where:
y_{jk}: score for household j in subcomponent k
w_{ik}: weight attached to survey question i in the subcomponent k
X_{yk}: scaled score for household j in question i in subcomponent k

It holds that $\sum_i w_{ik} = 1$ *and* $0 \leq w_{jk} \leq 1$.

It adopted the pre-programmed excel spreadsheet that automatically does all the calculations based on the survey information. The MPAT results were presented in a dashboard using a radar graph to quickly assess the most deprived dimension that needs to be prioritized. The MPAT scores in the range of 0 -100 were classified into four color-coded categories:

1. Scores of 80-100 were classified as high scores, represented in green color;
2. Scores of 60-80 were classified as medium-high scores in orange color;
3. Scores of 30-60 were classified as medium-low scores, represented in yellow color; and
4. Scores of 0-30 were classified as low scores and in red color.

Results and Discussion

Socio-demographic and Economic Characteristics of Rubber Farming Households

Table 1 presents the socio-demographic and economic characteristics of the rubber farming households (RFHs) and shows that the majority (65%) of the heads of the RFHs were in the age bracket of 25-54 years old having a mean age of 46 and classified as prime working-age. The majority were males (67%), married (90%), with an elementary level of education, with an average of 5 household sizes,

Regarding the rubber farmers' ethnicity, the majority were (51%) Bagobo/Tagabawa, with an average farm size of 0.59, engaged in rubber farming for almost 16

Table 1. Socio-demographic and economic characteristics of the respondents

CHARACTERISTICS	FREQUENCY (n=167)	PERCENTAGE	MEAN / MODAL RESPONSE	CHARACTERISTICS	FREQUENCY (n=167)	PERCENTAGE	MEAN / MODAL RESPONSE
Age (years)				*Ethnicity*			
15-24	8	5		Bagobo	85	51	
25-54	109	65		Cebuano	54	33	
55-64	35	21	46.23	Boholano	22	13	Bagobo/Tagabawa
65 & above	15	9		Ilonggo	2	1	
				Ilocan	2	1	
Gender				Muslim	2	1	
Male	112	67		*Number of Years in Farming*			
Female	55	33	Male	<10	28	17	
				10-15	82	49	15.8
Civil Status				16-30	48	29	
Married	150	90		>30	9	5	
Widowed	8	5		*Cropping System*			
Single	5	3	Married	Monocropping	101	61	Monocropping
Live-in	2	1		Intercropping	66	39	
Separated	2	1		Farm Size			
Highest Educt'l Attainment				<0.50	62	**37**	0.59
Elem Level	49	29		0.50-1.0	105	**63**	
Elem Grad	32	19		*Farm Distance to the Market Outlet (km)*			
High School Level	40	24	Elementary Level	<1	96	57	
High School Grad	32	19		1.1 - 2	39	23	
College Level	10	6		2.1 – 3	21	13	1.45
College Grad	4	3		>3	11	7	
Household Size				*Net Income from Rubber Farming (Php)*			
1-5	110	66		Less than 1,000	12	7	
6-10	54	32	5	1,000 – 3,000	102	61	Php 2,547.71
>11	3	2		3,001 – 6,000	51	31	
				Above 6,000	2	1	

years and practiced monocropping or planted rubber trees only in their farm. For marketing of raw rubber (cup lumps), the majority of the RFHs (57%) claimed to have sold their cup lumps less than 1 km from their rubber farms due to the presence of buyers from the seven rubber processing plants in the municipality. Due to the low price of cuplump, RFHs' average net income solely from rubber farming is only Php2,547.71 per month.

Multidimensional Poverty Analysis of Rubber Farming Households

The study found out that two (food and nutrition security and domestic water supply) out of the six fundamental needs obtained high scores of above 80 points. Meanwhile, the other four fundamental dimensions (health and health care; sanitation & hygiene; housing, clothing & energy; and education) obtained scores of 60-80 points or medium-high scores. Notably, the 'quality' sub-dimensions of almost all the fundamental dimensions were the common deprivation denominators that the rubber farming households experienced, which scored from medium-high to even medium-low scores. Similarly, two new rurality dimensions (farm assets and gender & social equality) obtained above 80 points or high scores. However, two dimensions (non-farm assets and exposure and resilience to shocks) also scored lowest at 30-60 points, which means that these dimensions need appropriate action in addressing rural poverty problems among the rubber farming households in the study area (Figure 1).

Furthermore, the MPAT results revealed that among the ten dimensions, the 'non-farm assets' dimension was the most deprived, having the lowest average score of 44.2. It implies that rubber farming households lack
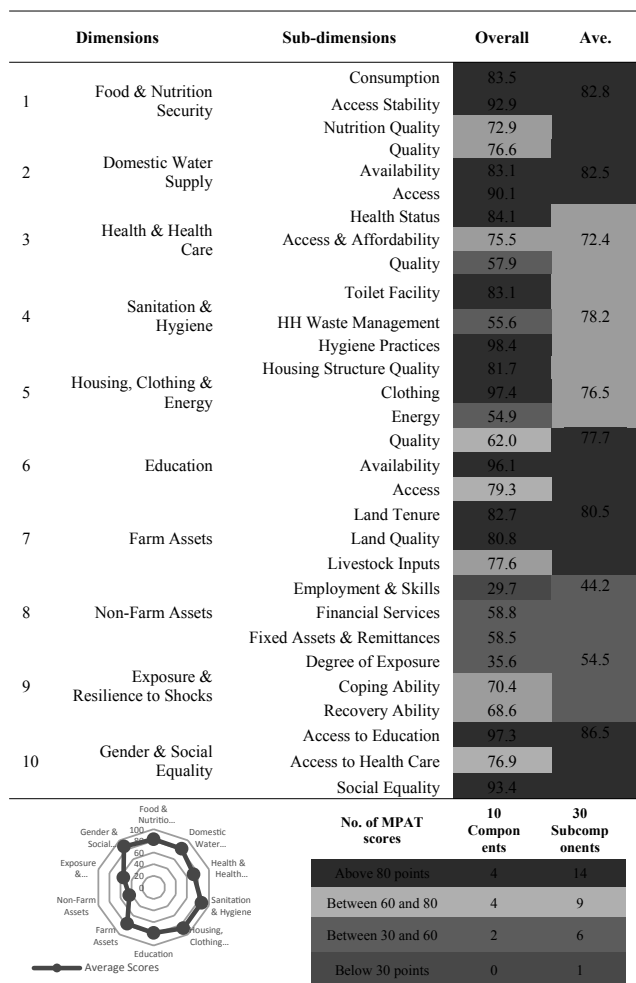
	Dimensions	Sub-dimensions	Overall	Ave.
1	Food & Nutrition Security	Consumption	83.5	82.8
		Access Stability	92.9	
		Nutrition Quality	72.9	
2	Domestic Water Supply	Quality	76.6	82.5
		Availability	83.1	
		Access	90.1	
3	Health & Health Care	Health Status	84.1	72.4
		Access & Affordability	75.5	
		Quality	57.9	
4	Sanitation & Hygiene	Toilet Facility	83.1	78.2
		HH Waste Management	55.6	
		Hygiene Practices	98.4	
5	Housing, Clothing & Energy	Housing Structure Quality	81.7	76.5
		Clothing	97.4	
		Energy	54.9	
6	Education	Quality	62.0	77.7
		Availability	96.1	
		Access	79.3	
7	Farm Assets	Land Tenure	82.7	80.5
		Land Quality	80.8	
		Livestock Inputs	77.6	
8	Non-Farm Assets	Employment & Skills	29.7	44.2
		Financial Services	58.8	
		Fixed Assets & Remittances	58.5	
9	Exposure & Resilience to Shocks	Degree of Exposure	35.6	54.5
		Coping Ability	70.4	
		Recovery Ability	68.6	
10	Gender & Social Equality	Access to Education	97.3	86.5
		Access to Health Care	76.9	
		Social Equality	93.4	

No. of MPAT scores	10 Components	30 Subcomponents
Above 80 points	4	14
Between 60 and 80	4	9
Between 30 and 60	2	6
Below 30 points	0	1

Figure 1. MPAT components and subcomponents scores of the rubber farming households in Makilala, Cotabato

non-agricultural income-generating ability, access to credit, and household wealth. This finding corroborates the findings of Cerio (2018) that the non-farm assets dimension is the most deprived dimension among the upland farming households in Goa, Camarines Sur, Philippines. On the other hand, the gender and social equality dimensions were the most sufficient, with the highest score of 86.8. It connotes that RFHs in the study area claimed that their household members have equal access to children's education, health care, and social equality.

The other three dimensions with high (80-100) scores

were food and nutrition equality (82.8), domestic water supply (82.5), and farm assets (80.5). Four dimensions that scored medium-high (60-80) were sanitation and hygiene (78.2), education (77.7), housing, clothing & energy (76.5), and health & health care (72.4). Exposure and resilience to shocks obtained a medium-low score of 54.5.

Discussed below are the detailed results of each dimension across the RFHs in the study area.

1. Food and Nutrition Security
This dimension measures the stability and availability of sufficient quantities of adequately nutritious food to the household. It assessed consumption, access stability, and food and nutrition security. It ranked second with the highest average score (82.8) among the ten dimensions. Among the three sub-dimensions, access stability obtained the highest average score of 92.9, followed by the consumption sub-dimension (83.5) and nutrition quality sub-dimension (72.9).

The study revealed that the majority of the RFHs claimed that they had sufficient food to eat, almost all RFHs (95%) claimed that no member of their households had slept hungry, and they mostly had rice, bread, cereals, pasta, potatoes, and cassava. Thus, this dimension revealed that most of the RFHs showed high food and nutrition security levels. However, there was still a minimal percentage of RFHs who also experienced food shortages. With this, Makilala is still in the fight to fulfill SDG No. 2, which is to obtain "zero hunger."

2. Domestic Water Supply
This dimension measures the quality, stability of supply, and household access to the domestic water supply. It ranked third with a high average score of 82.5 among the ten dimensions. Among the three sub-dimensions, accessibility got the highest average score of 90.1, followed by availability (83.1) and quality sub-dimension (76.6).

This revealed that most of the RFHs have their own installed water source inside their homes or backyards that they are afforded to pay for and supply whole year-round and meet their required water needs. This means

that accessibility and availability of domestic water supply are not a problem for RFHs. For the water quality sub-dimension, the majority (82%) of the RFHs believed that the water was safe with excellent quality. Thus, treatment is not necessary before drinking.

3. Health and Health Care

Health and health care (HHC) dimension measures the quality of health care based on health status, people's access to health care, and the quality of care provided. It ranked 8th among the ten dimensions, with an average score of 72.4. Among the three sub-dimensions, the health status got the highest score of 84.1, access and affordability (75.5), and the quality sub-dimension with a medium-low score of 57.9.

The health status sub-dimension revealed that almost half (47%) of the RFHs had family members who rarely got sick with non-serious illnesses (once or twice a year). Fortunately, more than three-fourths (77%) declared that they never had any household members with severe illnesses in the past 12 months. Meanwhile, the overall health status in the study area has improved moderately, as perceived by the three health practitioners interviewed during KII.

In terms of health access and affordability sub-dimension, the majority (81%) of the RFHs claimed that it would take less than 30 minutes of travel to reach the nearest health centers that can diagnose and treat simple illnesses and minor injuries since all barangays in the municipality have established health centers with trained BHWs on duty under the supervision of the LGU health personnel. Moreover, for the affordability of the professional treatment of severe illnesses, about 41% claimed to afford hospital fees if they borrowed money. In comparison, 32% declared to afford treatment fees provided that the government or employer will help them out.

The healthcare quality sub-dimension has the lowest overall score of 57.9 among the three sub-dimensions of the health and health care dimension. Despite the established health centers with trained health practitioners (midwife and barangay health workers or BHW) at the barangays, most of the RFHs (84%) claimed that

medical supplies in the health centers were insufficient and about (89%) of the RFHs regarded barangay health centers with low service quality because of the insufficiency of medical supplies, particularly medicines. Thus, adequate healthcare services were rarely provided to the community.

4. Sanitation and Hygiene

Sanitation and hygiene (SH) measure the quality of the household's sanitation (toilet facilities), food waste management, and personal hygiene. SH has three sub-dimensions, namely, (1) toilet facility, which assesses the general quality of the toilet facilities the household uses, (2) waste management which assesses how the households manage their waste materials and (3) hygiene practices sub-dimension, which assesses the quality of the household's general hygiene practices. The SH dimension ranked fifth among the ten dimensions, with an average score of 78.2. Among its three sub-dimensions, hygiene practices (98.4) and toilet facility (83.1) obtained high scores, respectively, while waste management obtained a medium-low score of 55.6.

Regarding hygiene practices sub-dimension, the majority (92%) of RFHs brushed their teeth twice or thrice a day, about 95% washed their hands before eating, and 97% of RFHs cleaned their hands after defecating. Hence, proper hygiene was being practiced by the majority of the RFHs. For the toilet facility, 74% of the RFHs owned enclosed-flush and pour-flush toilets, 15% had enclosed-pit toilets, and the other 9% used communal toilet facilities. Unfortunately, 4% of the RFHs had no toilet facilities; thus, they would defecate anywhere, making the place unsanitary. Meanwhile, the RFHs claimed that their toilets were usable very often (50%) and always (48%) whole-year-round. The waste management sub-dimension revealed that 99% of the RFHs used food waste materials to feed their pets or guard dogs. For their non-food waste materials, more than half (58%) of the RFHs burned them, while the others (29%) composted their non-food remains.

In general, the majority of RFHs practiced proper sanitation and hygiene. However, a few still needed

immediate interventions on the importance of cleanliness and sanitation to their health and nutrition.

5. Housing, Clothing, and Energy

Housing, clothing, and energy dimension measures the general construction quality of the household's home, the availability of adequate clothing, and the quality of the energy sources used in the home (concerning indoor air pollution and fuel efficiency). It ranked sixth among the ten dimensions, with an average score of 76.5. Among the three sub-dimensions, clothing got the highest overall score of 97.4, followed by housing structure (81.7) and energy with a medium-low score of 54.9.

The results revealed that most of the RFHs claimed to have enough clothing (94%) and adequate footwear (92%) for the whole family, either for the wet or dry season. Regarding energy sources sub-dimension, most (88%) of the RFHs used stable voltage electricity from the grid, and 87% used wood or other natural material for cooking. For the housing structure quality sub-dimension, results revealed that more than half (56%) of the RFHs' houses had exterior walls made of cement blocks, and 68% of the RFHs claimed that their houses could withstand strong winds and severe rains.

6. Education

This dimension measures the quality of children's formal education, availability, and access. It ranked seventh among the ten dimensions, with an average score of 77.7. Among its sub-dimensions, the availability of education got the highest overall score of 96.1, followed by access with a score of 79.3, and the quality sub-dimension with a score of 62.0.

For the availability sub-dimension, three head teachers from the study sites who were interviewed revealed that all teachers had adequate teaching supplies that are needed for effective teaching. Also, two head teachers claimed that all students have adequate school supplies like books, paper, and pencils for effective studying. Moreover, the school authorities accommodated all students, and not even a single child was denied admission. Thus, all the children had an equal chance for education.

All 38 barangays in Makilala have complete elementary grade levels schools and implemented no collection policy since free primary education is implemented in the municipality. Thus, education accessibility is not a problem. Many (34%) of the RFHs claimed that it took less than 15 minutes for their kids to arrive at school, while about 30% claimed about 15-30 minutes, and 8% revealed that their children took beyond 30 minutes to arrive at school. Meanwhile, the education quality sub-dimension was perceived to have low quality, though a moderate improvement in the students' overall performance in the last two years was claimed.

7. Farm Assets

This dimension measures the household's general ability to produce food and create agriculture-based income. It ranked fourth among the ten dimensions, with an average score of 80.5. Among the three sub-dimensions, land tenure got the highest score of 82.7, followed by land quality with a score of 80.8, and livestock inputs with a score of 77.6.

The land tenure sub-dimension measures the RFHs' access to agriculture, the number of hectares intended for agriculture, and its ownership status. This study purposively included RFHs who owned 1 hectare and below rubber farm in its sampling universe. Thus, 100% of them legally owned their lands and had access to farming. The majority (90%) of the RFHs owned a hectare and below, while the other 10% owned bigger than one hectare planted with other crops. For soil quality, most (90%) of the RFHs perceived that their farm soil was a mixture of loamy and clay. Only half (50%) of the RFHs raised livestock for the livestock inputs dimension. About 46% of them always had enough water to supply their livestock. However, more than half (55%) had difficulty feeding their livestock, 27% can 'always' supply enough feeds, and 18% supply sufficient feeds.

8. Non-Farm Assets

Non-farm assets measure the household's non-agricultural income-generating ability, access to credit, and household wealth. Results revealed that non-farm assets ranked tenth and the most deprived dimension of the

RFHs with the lowest average score of 44.2. Among the three sub-dimensions, the employment and skills sub-dimension got the lowest score of 29.7. The other two sub-dimensions are among the lowest, with an average score of 58.8 for financial services and 58.5 for fixed assets and remittances.

The employment and skills sub-dimension assessed RFHs income earned from small businesses and skilled services rendered. Results revealed that 87% of the RFHs claimed that not anyone in their households managed or ran their own small business. Also, 92% claimed that no one in their households provided others a skilled service for livelihood. Hence, the majority of them were dependent on farming activities.

Regarding RFHs' access to financial services, 31% assumed they might not be granted loans, while 29% were sure they could not avail of any bank loans. On the other hand, 27% assumed they might be granted a loan, and only 13% were sure they could easily avail of a loan. Meanwhile, 14% of the RFHs declared that they are debt-free, while 58% claimed to have a little debt, 26% said they were moderately indebted, and only 2% were indebted a lot. Most loans were from financial institutions such as microfinance institutions (26%) and rural credit cooperatives (25%). Others borrowed money from informal sources such as relatives (20%), friends (12%), and private lenders (2%). The result implies that RFHs had low access to financial institutions that offered lower interest rates like banks. Instead, most of their loans were from other credit facilities and informal financing institutions with high-interest rates since rubber would take almost seven years before it becomes tappable or productive. Thus, banks do not consider financing rubber production because of the long waiting period for payment.

For the fixed assets and remittances sub-dimension, results revealed that most (70%) of the RFHs do not have adult family members working outside their households. Thus, the remittance opportunity is nil. With this, most RFHs were dependent solely on their farm income. Meanwhile, almost all (99%) of the RFHs had suitable roofing materials (metal sheeting), and 69% owned at least one television.

9. Exposure and Resilience to Shocks

Exposure and resilience to shocks measure the household's exposure to natural and socio-economic shocks and its ability to cope and recover from such shocks. This dimension obtained the second-lowest average score of 54.5 among the ten dimensions. It implies that the RFHs were highly exposed to natural and economic shocks with less resilience.

Among the three sub-dimensions, the degree of exposure has the lowest overall score of 35.6. Historically, Makilala had been exposed to natural disasters such as flash floods, earthquakes, drought, and rain-induced landslides. Thus, the RFHs perceived that they were prone to natural and socio-economic shocks in the next 12 months. Of all the possible adverse events that might occur, the earthquake was ranked first by the RFHs (62%) with high-major damage severity (90%) and likely (46%) to occur in the next 12 months.

The second adverse event ranked by the RFHs was a local conflict (22%). The majority (63%) believed it would 'likely' occur in the next 12 months with 'high to major' (67%) damage severity since peace and order have been a pressing concern as insurgent groups like the New People's Army thrive in the municipality. The third was the low market price (16%) of natural rubber products (cuplump), which is 'likely' (48%) to occur in the next 12 months with high to major (58%) damage severity. This economic shock or price fluctuations of raw rubber (cup lumps) was recorded in the municipality. At one time in 2010, the price of raw rubber (cup lumps) reached as high as Php100 per kilo, and today the price of 15-day-old rubber cup lumps is Php 20-25 per kilo which distressed the rubber farmers. Accordingly, rubber price volatility is due to international market forces. Thus, other farming strategies and skills development for rubber farmers must be developed and introduced.

Other identified socio-economic and natural shocks were drought, flood, and family sickness. During the first half of 2016, El Nino dry spell (drought) hit Makilala, which affected the farmers' agricultural production and created social unrest, resulting in a street demonstration demanding food support. Flash floods

were recorded in 2006 and 2009, affecting four barangays, with seven deaths and hundreds of households.

Despite the high degree of exposure perceived by the RFHs, their coping ability scored a medium-high level (70.4). However, the three coping strategies identified by the RFHs primarily depend on government and family aid if adverse events occur. They said that their primary strategy is to rely on local government (62%), second is to rely upon the national government's help (22%), and third is to borrow money from relatives (16%). These coping mechanisms connote dependence on agencies and people, which could be critical if the help they were expecting could not be delivered.

Further, the study revealed a low recovery ability of the RFHs in the event of a disaster. The majority (76%) perceived that they could recover from damage and return to a satisfactory situation within a year. Moreover, in an extreme disaster that could destroy their houses, 49% claimed that it would take 12 months to rebuild their houses, 39% for about 24 months, and the rest would take 3 to 4 years to rebuild their houses. Meanwhile, if a disaster will occur in the next 12 months, most (59%) of the RFHs relied on government assistance, particularly from the local government and 28% from family/relatives.

10. Gender and Social Equality

This dimension measures the quality of access to education and health care for female and male children and adults and the degree of social equality in the barangay. It ranked first among the ten dimensions and the sufficient dimension as perceived by the RFHs, with an average score of 86.8. Among the three sub-dimensions, access to education has the highest average score of 97.3, followed by social equality with a score of 93.4, and access to health care with a 76.9 score.

Access to education sub-dimension got the highest average score of 97.3 among the three sub-dimensions. Results showed that most of the female (52%) and male (56%) children of the RFHs were likely to achieve college level, while almost the same percentage (15% & 14%) of both females and males will likely achieve vocational or senior high school level. The RFHs were

confident enough that their children could attain a higher level of education since primary and secondary education in Makilala is free of charge. Furthermore, the establishment of the Makilala Institute of Science and Technology and Makilala Vocational and Technical Skills Training Center offered free tertiary education and skills development for free. With these, the RFHs claimed that access to education for both females and males is assured, and there are no reasons their kids could not proceed to higher education.

For the social equality sub-dimension, the majority (71%) of the RFHs claimed they had equal economic or political opportunity regardless of religion and ethnic affiliation. Also, the barangay leaders claimed that economic and political opportunities were equal for everyone in the community.

Meanwhile, access to health sub-dimension revealed that more than half (53%) of the RFHs claimed that both men and women received about the same or equal health care when needed, while 46% claimed that women received more health care compared to men. Similarly, more than half (51%) of the RFHs claimed that health centers could 'sometimes' provide adequate health care services for women due to the limited medical supplies and, at the same time, the lack of funds intended for health services in the barangays. Nevertheless, 42% declared that women received adequate health care when needed.

Policy/Program Recommendations to Reduce Poverty among the Rubber Farming Households

As discussed above, the MPAT revealed that the rubber farming households were significantly deprived in the new rurality dimensions such as the non-farm assets and exposure and resilience to shocks, which only scored 44.2 and 54.5, respectively. Special attention will also be needed for the other four dimensions, such as health and health care, housing, clothing and energy, education, and sanitation and hygiene, which scored at 60-80 points or the medium-high level. Despite being sufficient on food and nutrition, domestic water supply, farm assets, and gender and social equality dimensions, which scored between 80 and 100, the RFHs were still

vulnerable to poverty. Their deprivations on non-farm assets and exposure and resilience to shock were the critical factors that would significantly affect their sources of income (rubber farming). Rubber farming, when exposed to socio-economic and environmental shocks such as low prices, local conflict, drought, and earthquakes, would mean loss of their farming livelihood. Further, their deprivation of non-farm assets or their inability to earn income from skilled work or businesses (non-farm assets) makes them more miserable when shocks hit them.

With these findings, a policy, program, and projects are recommended to address the multidimensional poverty experienced by the rubber farming households in Makilala, Cotabato. The focus is on improving the most deprived dimensions with average scores of 30-60, such as the non-farm assets and exposure and resilience to shocks (Figure 2).

1. Support for Non-Farm Assets Development

Non-farm assets are the economic activities that generate income from employment and skills, fixed assets and remittances, and financial services. Accordingly, agriculture alone cannot provide enough livelihood opportunities. Thus, non-farm employment and enterprise are potentially vital in reducing rural poverty, especially during adverse shocks, since smallholder farming households can less tolerate negative shocks. However, RFHs were deprived of these non-farm assets,

making them difficult to survive when adverse shocks hit them. Technical skills development and microfinancing support are some of the identified intervention programs to address this problem.

1.1 Capacity Building through Technical Skills Development

The majority (87%) of the RFHs claimed to have no other sources of income except farming, and 92% declared to have no skills for potential off-farm income. Thus, technical skills development is essential for rubber farmers to generate off-farm income. Some of the identified skills development programs linked to LGU-Makilala TESDA-accredited Vocational School (Makilala Vocational Technical Skills Training Center), which offers free technical skills development, are driving, small engine repair, automotive, and vulcanizing. Also, the Municipal Agricultural and Services Office could facilitate technical assistance on capability building of the rubber farmers' other household members (wife or children), such as food or product processing and soap making, among others. Hence, the need for policies, programs, or projects that reinforce the government's focus on farmers' capability building through technical skills development.

1.2 Micro-financing Support Fostering Entre-preneurship

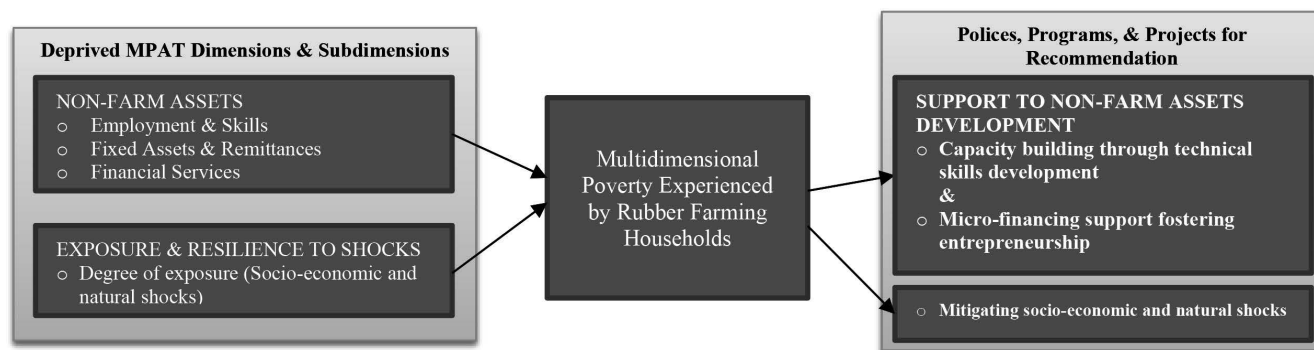Varied income sources are essential in the fight against poverty through the incorporation of more

Figure 2. Policy framework to combat multidimensional poverty experienced by the rubber farming households in Makilala, Cotabato, Philippines

non-farm activities (Jatta, 2013). The majority (60%) of the RFHs claimed they could never avail of loans from institutions with lesser interest rates. Hence, micro-financing from the local government is recommended to provide capital to start a non-farm business of rubber farming households to put into practice their developed technical skills from vocational school (e.g., automotive, driving, vulcanizing, or carpentry) or learned capabilities from training (e. g., food or product processing, cooking, and more). Because according to Gupta (2003) and Khanam et al. (2018), micro-finance has shown a positive effect on poverty alleviation and increases borrowers' living conditions by raising their income. Thus, micro-financing is one way to achieve poverty reduction. LGU-Makilala could consider this strategy through policy creation.

2. Mitigating Socio-economic and Natural Shocks

Most of the RFHs declared they were vulnerable to socio-economic and natural shocks. They identified low rubber prices and local conflict as the socio-economic shocks and earthquakes and drought as the natural shocks. Mitigating these aspects is extremely important since the respondents solely depend on rubber farming as their primary source of income and livelihood. Hence, it is highly recommended to the Municipal Disaster Risk Reduction and Management Office of the LGU-Makilala have a contingency plan specifically for this purpose. Furthermore, the local conflict must be included in the Municipal Peace and Order and Public Safety Plan to be addressed.

Conclusion

This study concluded that the rubber farming households in Makilala, Cotabato were multidimensionally poor, particularly on the aspects of new rurality components such as the 'non-farm assets' and 'exposure and resilience to shocks'. The rubber farming households in Makilala, Cotabato, lack the non-agricultural income-generating ability and do not have any available skills for livelihood development such as for business or skilled works. They have no remittances and could not

avail of loans from the banks. Hence, the respondents merely reckoned on farming activities for livelihood and survival. The rubber farming households claimed to have been highly exposed to socio-economic shocks (such as the low price of cup lumps and local conflict, among others) and natural shocks (earthquake and drought).

Given the above premise, it is crucial to develop non-farm income opportunities through capacity building, technical skills development, and support microfinancing for rubber farmers to ensure survival during socio-economic and natural shocks. Furthermore, contingency plans to mitigate socio-economic and natural shocks must be in place to support rubber farmers in times of disaster.

Lastly, the Multidimensional Poverty Analysis Tool (MPAT) analyzed using the combination of the dashboard approach, and counting approach of Alkire and Foster methodology captured the realms central to human well-being and, by extension, to poverty reduction in the 21st century congruently. While most of the poverty measurement studies in the government used income or consumption expenditures, this study contributes to the scant literature on multidimensional poverty assessment in the government, particularly in the municipality of Makilala, specifically rubber farming households. This study served as the municipal baseline data of the rubber farming households' poverty status multidimensionally. MPAT gives a new avenue in assessing rural poverty to provide an enabling environment for the poor to escape poverty.

Note for the future MPAT User:

The MPAT is an open-source tool intended for use by those concerned with rural poverty alleviation. All the resources needed to use the MPAT, such as MPAT User's Guide (IFAD, 2014), MPAT Book (2009), MPAT Excel spreadsheet, and the survey instruments, are available at https://www.ifad.org/en/web/knowledge/publication/asset/39631564. To the future user of this MPAT, the researcher recommends conducting cross-checking of every survey question and choices that correspond to the excel spreadsheet valuations to ensure the

correctness of the results. As the researcher found out that the downloadable survey questions and choices were different from that of the excel spreadsheet, which significantly affects the whole analysis.

References

1. Adenuga A., Omotesho O. Ojehomon V., & Diagne, A. (2013). Poverty Analysis of Rice Farming Households: A Multidimensional Approach. *Agricultural University of Tirana*, 12 (4), 641–651.

2. Alkire, S., & Foster, J. (2011a). Counting and Multidimensional Poverty Measurement. *Journal of Public Economics*, 95(7–8), 476–487. https://doi.org/10.1016/j.jpubeco.2010.11.006

3. Alkire, S. & Foster, J. (2011b). Understanding and Misunderstandings of Multidimensional Poverty Measurement. *J Econ Inequal*, (9), 289–314. https://doi.org/10.1007/s10888-011-9181-4

4. Alkire, S., OPHI, & UK. (2013). How to Measure the Many Dimensions of Poverty? In Development Co-operation Report: Ending Poverty (pp. 43–51). OECD, 2013. Retrieved from https://www.oecd-ilibrary.org/docserver/dcr-2013-7-en.pdf?expires=1557216168&id=id&accname=guest&checksum=BA8F285906C-448605C29BD2D0D5BE984

5. Alkire, S. & Santos, M. (2013). A Multidimensional Approach: Poverty Measurement & Beyond. *Social Indicators Research*, 112(2), 239–257. https://doi.org/10.1007/s11205-013-0257-3

6. Anriquez, G. (2007). e JADE Rural Development and Poverty Reduction: Is Agriculture Still the Key? 4(1), 5–46.

7. Batana, Y. (2013). Multidimensional Measurement of Poverty in Sub-Sahara Africa. Social Indicators Research. https://doi.org/10.1007/s11205-013-0251-9

8. Bersales, L. (2017). Farmers, Fishermen and Children Consistently Posted the Highest Poverty Incidence among Basic Sectors — PSA. Retrieved from https://psa.gov.ph/poverty-press-releases/nid/120251

9. Bersales, L. (2019). Proportion of Poor Filipinos Registered at 21.0 Percent in the First Semester of 2018. https://doi.org/Reference No.: 2019-053

10. Bonfiglioli, A. (2003). Empowering the Poor: Local Governance for Poverty Reduction. New York, NY 10017: United Nations Capital Development Fund Two United Nations Plaza, 26th Floor New York, NY 10017. Retrieved from http://unpan1.un.org/intradoc/groups/public/documents/un/unpan010168.pdf

11. Bourguignon, F., & Chakravarty, S. (2003). The Measurement of Multidimensional Poverty. *Journal of Economic Inequality*, 1(25), 25–49. https://doi.org/10.1007/978-0-387-79253-8_6

12. Cerio, C. (2018). Multidimensional Poverty Assessment and Informal Ex-Ante Social Risk Mechanisms of Farming Households in Upland Communities of Goa, Camarines Sur, Philippines. Master's Thesis. Master of Science in Rural Sociology. University of the Philippines Los Baños.

13. Cohen, A. (2010). The Multidimensional Poverty Assessment Tool: A New Framework for Measuring Rural Poverty. Development in Practice, 20(7), 887–897. https://doi.org/10.1080/09614524.2010.508111

14. Donohue, C. & Biggs, E. (2015). Monitoring Socio-environmental Change for Sustainable Development: Developing a Multidimensional Livelihoods Index (MLI). *Applied Geography*, 62, 391–403. https://doi.org/10.1016/j.apgeog.2015.05.006

15. Dy, R. (2015). MDG 2015: Benchmarking Philippine Poverty Scorecard. Retrieved from https://business.inquirer.net/199061/mdg-2015-benchmarking-philippine-poverty-scorecard

16. Ferreira, F. & Lugo, M. (2013). Multidimensional Poverty Analysis : Looking for a Middle Ground, 1–16. https://doi.org/10.1093/wbro/lks013

17. Gale, T. (2007). Poverty in Underdeveloped Countries — The Poorest of the Poor. Encyclopedia.Com. Retrieved from https://www.encyclopedia.com/international/news-and-education-magazines/poverty-underdeveloped-countries-poorest-poor=

18. Gupta, A. (2003). The Role of Microfinance in Reducing Poverty. Special Seminar in International Management — India. http://www.microfinancegateway.org/sites/default/files/mfg-en-paper-the-role-of-microfinance-in-reducing-poverty-2003.pdf.

19. International Fund for Agricultural Development (2014). The Multidimensional Poverty Assessment Tool (MPAT). Retrieved from https://www.ifad.org/en/web/knowledge/publication/asset/39631564

20. Israel, A. & Hakim, A. (2015). Business and Economics Multidimensional Poverty Assessments in Rural Farm Household, South- West of Nigeria: Evidence from Oyo State Farm Settlements. https://doi.org/10.4172/2151-6219.1000157

21. Khanam, D., Mohiuddin, M., Hoque, A., & Weber, O. (2018). Financing micro-entrepreneurs for poverty alleviation: a performance analysis of microfinance services offered by BRAC, ASA, and Proshika from Bangladesh. Journal of Global Entrepreneurship Research, 8(1). https://doi.org/10.1186/s40497-018-0114-6

22. Laderchi, C. (1997). Poverty and Its Many Dimensions: The Role of Income as an Indicator. *Oxford Development Studies*, 25(3), 345–360. https://doi.org/10.1080/13600819708424139

23. Municipal Planning and Development Coordinator (2017). Local Government Unit of Makilala, Philippines

24. Municipal Planning and Development Coordinator (2019). Peace and Order and Public Safety Plan. Local Government Unit of Makilala, Philippines

25. Msss., A., Vu, C., Pintak, I., Lehning, A., Vu, C., Theories, I., & Pintak, I. (2017). Journal of Human Behavior in the Social Environment Theories of Poverty Theories of Poverty: Findings from Textbooks on Human Behavior and the Social Environment, 1359 (December). https://doi.org/10.1300/J137v16n01

26. OPHI (2019). What is Multidimensional Poverty? Retrieved August 1, 2019, from https://ophi.org.uk/policy/multidimensional-poverty-index/

27. Santos, M. (2013). Tracking Poverty Reduction in Bhutan: Income Deprivation alongside Deprivation in other Sources of Happiness. Social Indicators Research. https://doi.org/10.1007/s11205-013-0248-4

28. Suansing, B. (2017). Philippines' Poverty Rate: Rural Communities Still Left Behind. Retrieved from https://borgen-project.org/philippines-poverty-rate/

29. Trani, J., Biggeri, M., & Mauro, V. (2013). The Multidimensionality of child poverty: An empirical investigation of children of Afghanistan. Social Indicators Research. https://doi.org/10.1007/s11205-013-0253-7

30. Yu, J. (2013). Multidimensional Poverty in China: Findings Based on CHNS. Social Indicators Research. https://doi.org/10.1007/s11205-013-0250-x