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Research paper

The Role of Agropolitan Project in Eradicating Poverty: Multidimensional Poverty Index

Mohd Khairi Ismail[1], Chamhuri Siwar[2*], A. S. A. Ferdous Alam[3]
Rospidah Ghazali[4], Basri Abdul Talib[5]

[1]Ph.D Student, Institute for Development & Environment (LESTARI), Universiti Kebangsaan Malaysia
[2]Emeritus Professor, Institute for Development & Environment (LESTARI), Universiti Kebangsaan Malaysia
[3]Senior Lecturer, School of International Studies, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia
[4]Research Fellow, Institute for Development & Environment (LESTARI), Universiti kebangsaan Malaysia
[5]Associate Professor, Faculty of Economics & Management, Universiti kebangsaan Malaysia
**Corresponding author's email: csiwar@ukm.edu.my.*

Abstract

Objective: This study aims to measure the poverty rate of the participants of the Agropolitan Projects by using the Multidimensional Poverty Index (MPI).
Methodology: The measurement of MPI used 14 indicators, which covered the dimensions of education, health, living standards, household income, mindset, and environment. This study measured the poverty rate of smallholders within the same area by comparing the poverty levels between the participants and non-participants of this project. This comparison was done as a foundation to expound the effectiveness of Agropolitan Projects in eradicating poverty. The number of samples for the study consisted of 45 participants from the Gahai Agropolitan Project, Lipis and 45 rubber smallholders in Lipis, Pahang, Malaysia.
Results: The findings showed that all household members of the participants from the Gahai Agropolitan Project, Lipis were free from multidimensional poverty. The MPI also shows that 2.91% of household members of rubber smallholders in Lipis were categorised as multidimensional poor. This study proved that the Gahai Agropolitan Project was able to eradicate multidimensional poverty among the participants within the project.
Implication: MPI is a comprehensive method in measuring the poverty level, which can help the policymakers to outline an effective poverty eradication programme based on the perspective of multidimensional poverty index.

***Keywords**: Multidimensional Poverty Index (MPI); Gahai Agropolitan Project; Rubber Smallholders.*

1. Introduction

The effort in eradicating poverty is the main agenda for Malaysia ever since its independence in 1957. The effort is illustrated through the initiation of the New Economic Policy (NEP), where poverty eradication becomes the focus and fundamental objective for development process in Malaysia (1). NEP's success raked a prestigious accolade for Malaysia, echoing our achievement in reducing poverty percentages and income inequality (2). Consequently, the effort in eradicating poverty is further succeeded through the National Development Policy (NDP), Vision 2020, and hitherto, the New Economic Model (NEM). Now, in general, Malaysia has successfully achieved the goal of reducing poverty percentages from 49.3% in 1970 to 0.6% in 2014 (3). Although the success of Malaysia in eradicating poverty is something worth commending for, the poverty phenomenon is still linked with issues of unequal development between cities and rural areas. This is supported with the economic reports expressing the existence of different types of poverty between cities and rural areas in Malaysia (4). On the national level, the percentages of poverty in cities are lower as compared to rural areas. Groups living in rural areas would commonly face issues of dwindling behind in terms of education, technology, living standard, social, and economic opportunities, which ultimately leads to the dilemma in poverty (4).

From the socioeconomic aspect, the government has implemented numerous programmes in alleviating and eradicating poverty; ubiquitously associated with rural areas. Among them is the Rural Mega Uplifting Programme (PLMLB) that is aimed towards eradicating poverty in rural areas through the increase of income and life quality and accelerating the development of underdeveloped, remote, and neglected locations (5). Thus, the Agropolitan Project was created from the programme's implementation, which was initially executed by the Ministry of Rural and Regional Development (KKLW). The project concentrates on three main components, namely, social, physical, and the economy of rural, remote, and neglected areas that pose significant economic potential. Since 2007, Malaysia has successfully developed eleven Agropolitan Projects. Additionally, a jubilant moment was accorded when reports indicated the projects' success in increasing the income of participants as was intended (3). The implementation of this programme allowed project participants to earn monthly incomes with an average of RM 900–RM 1800, and hence liberated them from poverty (5). However, such achievement was solely measured through the poverty line income which, by principal, focuses exclusively on income without accounting other social aspects.

Therefore, considering the nature of the Agropolitan Project as a comprehensive development project, the degree of participants' poverty must be measured using a comprehensive poverty measurement and not simply through income. According to Alkire & Santos (6), the Multidimensional Poverty Index (MPI) is an alternative benchmark for poverty measurement that is able to provide accurate measurement on poverty as compared to PLI, because it considers other non-monetary aspects. Thus, the utilisation of the Multidimensional Poverty Index provides accurate measurement of participants' poverty level. Additionally, this research incorporates poverty measurement for smallholders so as to compare the levels of poverty in unveiling the effectiveness of the Agropolitan Project.

2. Literature Review

2.1 Poverty

From the economic perspective, poverty is often associated with hunger, limited opportunities, choices, education, health, asset productivity, vulnerability to risk, and proneness to hostility (7). Meanwhile, from the sociological aspect, it includes moral and cultural factors as the contributing sources to poverty. Indolent habit, dependence on fate, and complacency also act as sources to poverty. According to anthropologists, these aspects led to the term of "cultural poverty" (8). For psychologists and sociologists, poverty is attributed with the low-driven attitude towards achievement. Furthermore, academicians from three distinguished disciplines: economy, sociology, and history, regarded poverty as something emanating from societal structure and history (9). Socioeconomic inequality exists in everyday life through oppression, causing a notable income gap between the rich and poor.

Within the context of Malaysia, achievement in economic development is indeed an encouraging feat of success. Nevertheless, to this date, Malaysia grapples with poverty issues (10). Despite successful efforts in eradicating poverty on the national level, poverty by strata remains as a focal scope, with much of the discourse in poverty by strata centering between cities and rural areas. Poverty in rural area, however, often presents a much higher rate than within the city area (3). A commonly seen scenery among the rural communities is those engaged in agricultural activities. Factors such as education, technology, living standard, and low employment opportunities cause rural communities to be left behind and vulnerable to poverty. For rural communities' dependant on agricultural activities, they have limited access to resources and equipment, specifically land, capital, labour, and technology (1). Paddy farmers, rubber tappers, and fishermen are considered to be the poorest in rural areas. This group yields the lowest productivity, and by no means, have bargaining power in the market. This situation has led them earning menial income and consequently poverty in a perpetual cycle.

2.2 Agropolitan Programme in Eradicating Poverty

The weakness in conventional rural development models had brought in efforts of designing alternative models. In 1974, economist John Friedman introduced the concept of agropolitan development. Agropolitan is a unique alternative development concept that prioritises "development from the bottom-up" feature, aimed at increasing the socioeconomic level of rural communities. Agropolitan development highlights network development in cities and rural areas at the societal level (11-14). According to Buang et al.(15), agropolitan is a contrasting development model to the conventional archetype that would typically center on the "top-down approach". The agropolitan model applies the use of micro-planning, which includes the target group, government, as well as research and development (R&D) of local and educational institutions. Besides the optimal use of resources, the primary features of agropolitan involve integrated development, which comprise complete physical infrastructure and institutions. Moreover, both non-agricultural and agricultural economic activities actualise agropolitan development as a complete agricultural city. In the agropolitan programme, economic activities surrounding the development area are able to contribute towards the region. Access to farming and non-farming employment opportunities is also available within commercial agropolitan lands.

Friedman (11) discussed agropolitan as a paradigm that focuses on the main production and manufacturing of an area. Agropolitan development also stresses the importance of development interaction between rural and city areas in a locality. And as a development model, agropolitan has become the main choice for a number of countries, namely Indonesia, Nepal, and Malaysia, in their rural development planning (16-18). However, the implementation of the Agropolitan Project in Malaysia concentrates on the aim of eradicating poverty in rural areas rather than the production of agricultural cities as was proposed by Friedman in 1974 (15). As stated by Hayroll et al.(18), this programme aims to eradicate poverty among the hard core poor in Malaysia. Under the direction of the Prime Minister's Department (JPM), four ministries including Ministry of Rural and Regional Development (MRRD) were tasked with the responsibility to assist the Malaysian government in eradicating poverty. From 10,000 individuals in hard core poverty, 5,600 individuals were assigned to MRRD, while the remaining persons were managed through the economic corridor development project (18).

2.3 Multidimensional Poverty Index (MPI)

Deficiencies in measuring poverty using income and its use in measuring poverty itself prompted efforts in measuring poverty through multiple dimension aspects (19). Approaches in unidimensional, solely measure poverty through income in determining individuals' level of poverty. Hence, using the Multidimensional Poverty Index (MPI), this overcomes the shortcoming in unidimensional measurement as it considers aspects that are non-monetary, chiefly among them are health, education, and living standards in measuring individual poverty. Based on the concept of capability approach founded by Sen (20), poverty refers to more than the inability to have money; it refers to a myriad of social indicators, for example, limitation in having health care, education, and standard of living. In other words, individuals who possess adequate income yet lack aspects that are non-monetary are still considered as poor. This idea considers poverty in a broader context, and thus, this creates the need to measure poverty in a precise manner.

A research by Alkire & Santos (6) suggested a better method to measure nationwide poverty through standards that incorporate elements possessing a broader measurement of multidimensional poverty. Therefore, the measurement of this research is founded on the methodology discussed by Alkire & Foster (19). Although sophisticated, the Multidimensional Poverty Index (MPI) offers accurate illustration of poverty in a country than it does using unidimensional approaches. Furthermore, this measurement emphasises dimension and indicators in determining individual poverty without the proxies of dimensions appearing in pecuniary forms.

3. Research Methodology

3.1 Research Area

This research was conducted in the district of Kuala Lipis, Pahang, Malaysia. It was carried out in the Gahai Agropolitan Project, Lipis, Pahang. The Gahai Agropolitan Development Project was initiated in 2007 and concluded in 2012 (5). The project covers an area of 238.76 hectares involving the participation of 50 people with provided settlement. It was supervised by the implementation

agency entrusted by the Ministry of Rural and Regional Development (MRRD), an agency better known as the Rubber Industry Smallholders Development Authority (RISDA).The selection of Gahai Agropolitan Project, Lipis for this research is founded on two criteria. First, the issue of poverty synonymous with the Agropolitan Project's establishment is based on the hard core poverty eradication programme in the state of Pahang, as the state had shown having the highest rate of poverty in Malaysia (3). Second, the project's duration exceeded the five year period. Due to the exceeding five year period of development, a research on the impact can be performed in the selected region so as to study the project's impact in eradicating poverty as a whole. Furthermore, this research includes the presence of smallholders in the district of Kuala Lipis, Pahang, located at the area of Kampung Tanjung Gahai. The smallholders' poverty was measured to provide a comparison in the level of poverty between Kampung Tanjung Gahai, located three kilometres away from the Gahai Agropolitan Project, Lipis, and in effect, measuring the effectiveness of the Gahai Agropolitan Project itself. Kampung Tanjung Gahai comprises 60 homes, whereby a significant majority of 50 homes are resided by smallholders.

3.2 Research Sampling

This research uses purposive sampling. The sample of this research consists of 45 participants from the Gahai Agropolitan Project and another 45 smallholders from Kampung Tanjung Gahai. The amount of 45 participants from the Agropolitan Project is sufficient for sampling purposes, duly because the total number of the Agropolitan Project population is 50 individuals. The determination of the number of participants as samples follows the proposed sampling amount by Krejcie & Morgan (21). Inclusively, the selection of smallholders surrounding the area of Kuala Lipis was fundamentally done because of the purposive sampling concept. Those 45 smallholders were chosen from 50 smallholders in Kampung Tanjung Gahai, Lipis.

This research utilised primer data collected through interviews and questionnaires from the participants of the Gahai Agropolitan Project, Lipis and smallholders from the district of Lipis, Pahang. The participants of the Gahai Agropolitan Project consider themselves as those in hard core poverty, thus they were selected to participate in the early development of the Gahai Agropolitan Project. However, by 2015, the entire participants had been categorised as those alleviated from poverty, as according to the calculation in the poverty line income, they had successfully earn monthly incomes exceeding RM950 (5). The earnings have surpassed the threshold for the poverty line income, which is RM870 for rural areas in Peninsular Malaysia. It is noted that this standard measurement of poverty line only refers to poverty line income. On a different note, respondents from the list of smallholders are individuals categorised as non-poor, but possess identical socioeconomic features with participants from the Gahai Agropolitan Project. Hence, the selection of these smallholders as respondents is placed upon the affinities shared with participants from the Gahai Agropolitan Project. Such feature refers to the following: **[1]** these smallholders live in the same area as the Gahai Agropolitan Project's participants; and **[2]** they are categorised as smallholders.

For this research, the measurement in Multidimensional Poverty Index (MPI) will be used to measure the actual poverty status. Although there are distinctive differences, for instance ownership and land area are for both categories of respondents in asset ownership, such variation will not be considered in the MPI measurement. Only comparisons with MPI's essentials, certain dimensions and indicators in MPI, will be studied. This ensures a fair comparison in poverty towards both respondent categories.

3.3 Poverty Measurement

This research employs the proposed Multidimensional Poverty Index (MPI) by the Eleventh Malaysia Plan (RMK-11) adapted from (6). Yet, to attain precise poverty measurement in accordance with the context of research area, this research's MPI has been tailored with additional dimensions and indicators. The need to introduce new dimensions and indicators are further approved and explained at length in Alkire & Foster (19) study. Appendix 1 shows the list of dimensions and indicators within the MPI proposed in RMK-11. In Appendix 1, there are four main dimensions, namely education, health, living standard, and income. Each dimension is represented by different indicators. For instance, the education dimension has two indicators, which are the years of household members (AIR) enrolled in education and the attendance for children aged between 6–16 years old to school. For weighted determination in every indicator, values are assigned to the numbers of dimensions and indicators. In reference to Appendix 1, the weighted total for four dimensions is 1. Should there exist in those four dimensions, where every dimension has a weighted value of 1/4, the value would then be divided according to the numbers of indicators. And because the educational dimension contains two indicators, the value of 1/4 is divided to two, and thus, this leads to every indicator for the educational dimension to be valued at 1/8. If the value on every weighted indicator is totalled, the weighted value for MPI is 1. The weighted certainty for the indicators is based on the assumptions that every dimension has the same priority in measuring individual poverty.

Although this research uses the proposed MPI in RMK-11, there are notable additions of dimensions and indicators appropriated to the context of the research area. The requirements and preferences of dimension and indicator for MPI have been thoroughly discussed by Alkire (22) in an article titled, "Choosing Dimensions; The Capability". As a research's emphasis of choice and addition in dimension and indicator are not a considerable issue behind any research that employs MPI, rather, such preference demands requirements to be defined and reasonable justification behind the opted dimension and indicator. According to Robeyns (23), the researcher must provide explicit depiction of how and why a particular dimension and indicator was chosen as their MPI. Alkire (22) stated five methods in choosing dimension and indicator in forming MPI. Those five methods refer to: (i) data availability, (ii) normative assumption, (iii) general agreement, (iv) existing participation process, and (v) empirical evidences regarding populace values. The addition of dimension and indicator for MPI in this research adheres to both (22-23).

This research operates on the normative assumption approach in selecting the indicators for psychological and environmental dimensions. Such approach allows the researcher to choose the dimension based on individual assumption and priority. From the approach, this research adds two dimensions as were present in RMK-11's MPI, in studying the respondents' poverty level. The two dimensions are psychological and environmental dimensions. For the psychological dimension, it is measured through the Rosenberg self-esteem indicator, a prominent psychological measurement possessing ten questions in valuing individual identity and mind (24). Through this approach, individuals attaining scores lesser than 15 are categorised as those who exhibit low self-esteem, evincing their experience in the psychological dimension of poverty.

Against this backdrop, the environmental dimension is represented by the average indicator of the number of days the respondents spent on rubber tapping activity within a month. The reason of choosing an average number of tapping days as an indicator is because of the nature within the rubber tapping activity, as it is highly subjected to environmental factors vis-à-vis weather and tapping seasons. Through consultation with Rubber Industry Smallholders Development Authority (RISDA), a smallholder or rubber tapper would normally tap between 15 to 18 days a month.

And if an individual was reduced to tapping below 15 days, it might have been attributed to environmental factors, weather, and tapping seasons. Therefore, if they possess an average of daily tapping lesser than 15 days a month, they are categorised as poor in the environmental dimension.

Referring to RMK 11's MPI, the health dimension is only represented by two indicators, health facilities and clean water supply. For this research, an additional indicator was included in this research's health dimension, namely the food intake indicator. Internationally, the food intake indicator takes prominent position, siding with the nutritional intake indicator. Citing an MPI model designed by Oxford Poverty & Human Development Initiative (OPHI), they had used the nutritional intake indicator. This research, on the other hand, adopts food intake as a replacement proxy for the nutritional intake indicator by virtue of smoother passage in gathering information. Information is determined through the standard consumption of the Asian society of their daily meal; breakfast, lunch, and dinner; a three-times-a-day activity. Wherein, if the respondents and their household constituents consume lesser than three times a day, they are indicated as poor. It is noted that all alterations made to the dimensions and indicators for this MPI are expressed in Appendix 2.

3.4 Calculation in Multidimensional Poverty Index (MPI)

The calculation of the MPI for this research follows (19) in (25). Their research elaborated 12 main steps in calculating MPI, and they were applied within this research. The steps are as follows:

1. Selection of analytical units. Analytical units may list individual, household numbers, and even the institutions themselves.
2. Dimensional selection depends on the research's objectives.
3. Selection of indicators for every dimension. Selected indicators must not possess correlation between dimensions.
4. Determining the poverty line in every dimension. If an individual crossed the line of poverty for a dimension, they are considered poor for that specific dimension.
5. Using the poverty line to replace personal achievement and their status associated with conventional poverty measurement.
6. Calculating the number of disadvantages experienced by every individual.
7. Setting a second poverty line, *k* gives dimensional values for a person, enabling him/her to be categorised as poor for every dimension.

$$C_i = w_1 I_1 + w_2 I_2 + \ldots + w_d I_d$$

Where $I_i = 1$ if individual experienced disadvantages in indicator *i* and $I_i = 0$, if otherwise, and w_i is the weight for the indicator *i* with;

$$\sum_{i=1}^{d} w_i = 1$$

1. Using the second poverty line, *k* for attaining the dataset for the poor and non-poor populace

$$c_i \geq k$$

Where c_i is for the disadvantaged score and k is the poverty line.

2. Calculating the poverty rate (H) and dividing it with the sum of poor individuals with the total of individuals.

$$H = \frac{q}{n}$$

Where q is the number of individuals facing poverty in numerous dimensions, and *n* is the total of individuals.

3. Calculating the average poverty gap (A) refers to the average of disadvantages experienced by those poor.

$$A = \frac{\sum_{i=1}^{n} C_i k}{q}$$

Where $C_i k$ score is for individual disadvantages and q is the total of individuals experiencing multidimensional poverty.

4. Calculating the synchronised poverty rate (Mo). If the resulted data appears binary or ordinal, multidimensional poverty will then be measured through synchronized poverty rate, Mo.

$$M_O = H \; x \; A$$

5. Sorting through groups and dimensions. Synchronised poverty rate, Mo, may be sorted through sub-groups, for instance, religion, city/rural areas, and race.

4. Research Outcome

The research outcome is deliberated in three sections. First, the discussion focalises on the analysis of respondents' profile. Next, the poverty level for the Gahai Agropolitan Project participants and smallholders of Kampung Tanjung Gahai is analysed through the Multidimensional Poverty Index (MPI). Third, the poverty level between participants of the project and smallholders of Kampung Tanjung Gahai is compared using MPI.

4.1 Respondent's Profile

This research benefitted from the involvement of 45 participants from the Gahai Agropolitan Project and 45 smallholders from Kampung Tanjung Gahai (Table 1). The profile analysis on respondents from the Gahai Agropolitan Project showed a majority of participants are men at 82.2%, while the remaining 17.8% are women. Within the age division, the highest percentage of participants consisted of those aged between 46–50 years old at 28.9%, followed by those between 36–40 and 41–45 years old, where both groups hold the same percentage of 22.2%. The remaining percentage of 11.1% are those 56 years old and above, and lastly only 1% is accounted for persons without a specific age group, i.e. at the age of 35 years old.

The profile analysis on respondents from Kampung Tanjung Gahai showed a majority of 88.9% of the population are men, while the women make up the other 11.1%. This expresses a somewhat identical feature to the project's demography. However, the smallholders' age division presents a contrasting view between the two. A majority of 53.3% of the respondents are those aged 56 years old and above. This is followed by those aged between 36–40 years old at 15.6%, and the remaining 4.4% are shared by those 35 years old and below. At this junction, a clear indication stands that a majority of the respondents are in the elderly category.

The analysis on the level of education taken by the respondents from the Gahai Agropolitan Project revealed another interesting demographical feature. 51.1% of the respondents had acquired High School-Upper Secondary (SPM), 17.8% obtained their lower-secondary level (PMR/SRP), and the remaining 26.7% are those who finished their primary years at Standard 6. Such features are those passing the highest standard in primary level, as they happen to be in their 50s or above. For the respondents from Kampung Tanjung Gahai, a majority of them, at 53.3%, passed their primary school education. This is followed by those possessing SPM at 35.6%. There are recorded respondents whom possess Malaysian Higher School Certificate at a minute percentage of 4.4%.

The number of household members (AIR) in the Gahai Agropolitan Project indicated a majority of the respondents have four or more dependent constituents living with them. The highest recorded household members are in the range of 5 to 6 people. Respondents who have 1 to 2 and 3 to 4 AIRs are presented in the values of 11.1% and 26.7%, respectively. However, a few

respondents were recorded to have more than nine household members, with only 4.4%. The patterns of AIR for the smallholders in Kampung Tanjung Gahai differ to this. Their AIR of 3 to 4 household members is registered at 42.22%, which is in contrast to the respondents from the project. Furthermore, the smallholders who have more than nine household members are registered at a minimal percentage of 2.2%.

Table 1: Respondent's profile information

Detail	Gahai Agropolitan		Kg. Tg. Gahai		χ^2 (p-value)
	n = 45		n = 45		
	(%)	Min	(%)	Min	
Gender					
Men	82.2		88.9		0.809 (0.368)
Women	17.8		11.1		
Age					
35 years old and below	2.2		4.4		18.290 (0.03)
36–40 years old	22.2	(46.22)	15.6	(55.00)	
41–45 years old	22.2		8.9		
46–50 years old	28.9		11.1		
51–55 years old	11.1		6.7		
56 years old and above	13.3		53.3		
Education					
Primary School/ Standard 6/ UPSR	26.7		53.3		11.529 (0.021)
High School-Lower Secondary/PMR/SRP	17.8		6.7		
High School-Upper Secondary/ SPM	51.1		35.6		
STPM/certificate	2.2		4.4		
Numbers of House-hold Members					
1–2 people	11.1		26.67		29.847 (0.000)
3–4 people	26.7	(5.60)	42.22	(3.822)	
5–6 people	44.4		22.22		
7–8 people	13.3		6.67		
More than 9 people	4.4		2.2		

Source: Field research (2017)

4.2 Estimation on multidimensional poverty for Gahai Agropolitan Project Participants

Table 2 reports the percentages of deficiencies in their respective poverty dimensions experienced by the respondents from the Gahai Agropolitan Project and their household members for every studied indicator. Through the income dimension, 4.4% experienced difficulties on attaining income above the poverty line income. In the educational dimension, there are respondents who suffer deficiencies for the indicator, briefly by their household member level of education and presence at school. Specifically, in the household member level of education, 48.9% of the respondents are recorded poorly in this indicator. To add, another 17.8% of the respondents suffer absenteeism in school from their household members aged between 6 to 17 years old. The percentage underscores the respondents' household member inability to complete essential school years, or worst, being completely left out from basic education.

The analysis in respondents' living standard dimension showed that the respondents experienced deficiencies in two indicators, namely number of bedrooms and waste collection facility. The results indicate that 36.6% of the participants have an insufficient number of bedrooms in their residence. The values were deduced from the number of household members sharing a single bedroom, for no more than two individuals in a room. Adding to the tone, all of the respondents reported difficulties in accessing the waste collection facility. However, a differing positive tone appears in the midst of this, as there are no reported deficiencies in the healthcare facility and access to clean water supply. The environmental and psychological indicators show positive results in the health dimension. Though with that said, there are reported cases where respondents experienced poor food intake at 2.2%. Other than that, there are no reported deficiencies in other indicators in the health dimension.

Table 2: Indicators on deficiencies experienced by household members for Gahai Agropolitan Project

Types of deficiencies experienced	No of Respondents	(%)
Income	2	4.4
Years of education (AIR)	22	48.9
Presence to school	8	17.8
Food intake	1	2.2
Numbers of bedrooms	16	36.6
Waste collection	45	100
Vulnerability/ Tapping days	2	4.4

Source: Field research (2017)

While the discussion for Table 2 centres on the deficiency in terms of indicators assigned for respondents and the deficiency of a dimension itself, it lacks the research's emphasis over a need for an accurate measurement on a person's estate. Hence, in obtaining the precise category of the respondents' poverty through multiple dimensions, an aggregate line of separation must be acquired through the total minimum indicator, where respondents are actually experiencing deficiency in the established poverty definition. In other words, this separating line is the deciding line of poverty that accurately categorises whether a person truly resides in multidimensional poverty or otherwise. Alkire et al., (19) proposed that individuals may be categorised as poor in the multidimension perspective if they experience deficiency above 1/3 from the total indicators applied in the research's MPI. Whereby, for this research, 14 indicators stand through the designed MPI. Both the respondents and their household members may be categorised as poor in multi dimensions if they exceeded 1/3 of the indicators, or 5 indicators over 14 used indicators. From Table 3, the number of maximum deficiency experienced by the respondents is four indicators, a foretelling indication for a possible conclusion that not every respondent experiences multidimensional poverty.

Table 3: Percentages of Household Members for Gahai Agropolitan Project Experiencing Deficiency in Poverty Dimensions

No of Indicators	No of Respondents	(%)
1	15	33.3
2	15	33.3
3	10	22.2
4	5	11.1

Source: Field research (2017)

4.3 Estimation on Multidimensional Poverty for Respondents in Kampung Tanjung Gahai

Following the theme of the previous discussion, the discussion for this section sets the motion of poverty for smallholders in Kampung Tanjung Gahai using the Multidimensional Poverty Index (MPI). Table 4 reports the percentages of respondents with their deficiencies through the respective poverty indicator. The income dimension indicated 17.8% of the smallholders are met with deficiencies in their income by earning less than the poverty line income. For the educational dimension, some smallholders are reported to having low levels of education and presence to school for their household members. Specifically, the household members (AIR) level of education scored a deficiency at 22.2%. Meanwhile, 2.2% of household members aged between 6 to 17 years old have issues of absenteeism in school. This percentage indicates that certain household members of the smallholders were unable to complete essential years in school, or worse, have been left out from education. At this junction, a shared trend appears

between the AIR of the project and AIR of the smallholders who scored poorly in the educational indicators.

The analysis in the standard of living recorded the smallholders living in a deprived condition through their poor scores in six indicators, namely residential condition, number of bedroom, toilet condition and availability, transportation, communication, and waste collection facilities. Here, an unshakeable truth unravels, where there exist deficiencies in almost every indicator for the living standard dimension. The results point towards the respondents or smallholders' inability and difficulties in having access to waste collection facility. Another 26.7% of the smallholders remained in unhygienic conditions, where they scored poorly in the toilet indicator. Adding to this, the indicators for transportation and communication facilities recorded a high level of deficiency at 13.3% and 8.9%, respectively. Lastly, the indicators for residential condition and number of bedrooms scored the least out of all mentioned at only 2.2%.

While Table 4 reports the percentages according to indicators, Table 5 reports the percentages of deficiencies through the poverty dimensions for the smallholders in Kampung Tanjung Gahai. Table 5 shows that the maximum indicators for total deficiencies met by the respondents are seven indicators. The deficiencies for one and two indicators charted the highest percentage, at 28.9% and 33.3%, respectively. For respondents who experienced three and four indicators, they registered at 15.6% and 17.8%, respectively. Although the maximum allotted indicator is seven, only 2.2% percent managed to register deficiencies between 5 to 7 indicators, a minute registration to the schedule.

Table 4: Indicators on deficiencies experienced by household members of Kampung Tanjung Gahai

Types of Deficiencies Experienced	No. of Respondents	(%)
Income	8	17.8
Years of education (AIR)	10	22.2
Presence to school	1	2.2
Food intake	3	6.7
Residency condition	1	2.2
Number of bedrooms	1	2.2
Toilet	12	26.7
Waste collection	45	100
Communication facilities	4	8.9
Transportation	6	13.3
Vulnerability/ Tapping day	15	33.3

Source: Field research (2017)

Again, according to Alkire & Foster (19), individuals are recognised as poor through multiple dimensions if they experience deficiencies exceeding 1/3 of the total indicators for a research's MPI. Referring to Table 5, two respondents register in this category as they have exceeded four indicators listed on the schedule. This research's MPI, however, further distinguishes itself from the contemporary research measurement; it is based solely on income, by accounting the number of respondents and their respective household members. An example includes the consideration over the plight of poverty for those two respondents who registered in this category. Aside from their deficiencies in four indicators, another requisite includes the number of their household members in considering their poverty rate (H). According to Table 6, 30 from 252 household members (11.9%) are poor with a poverty rate (H) of 0.291 or 2.91%.

Table 5: Percentages of Respondents in Kampung Tanjung Gahai Experiencing Deficiencies in Poverty Dimensions

No of Indicators	Total Respondents	Percentages (%)
1	13	28.9
2	15	33.3
3	7	15.6
4	8	17.8
5	1	2.2
6	0	0
7	1	2.2

Source: Field research (2017)

The distinctive capacity of MPI to measure extends beyond the measurement of poverty itself; rather, the depth and depravity of poverty experienced by the household members are also taken into consideration. In considering the depth of poverty met by poor household members, a synchronised poverty rate, likewise, must be taken into account. At k = 5, the synchronised poverty rate is 0.0154. Line six in Table 6 explains the average deficiencies encountered by poor household members. And at k = 5, the average poverty registers at 0.5278, signifying the fact that on average, the poor household members are engaged in deficiencies of 52.78% from the entirety of presenting dimensions and indicators.

Table 6: Numbers of Household Members Experiencing Deficiencies in Poverty Dimensions

Details	Value
Point of aggregate separation (k)	5
Numbers of respondents experiencing deficiencies exceeding 5 indicator and above	2
Total Household Members (AIR) with deficiencies exceeding 4 indicators	30
Poverty rate, H (Total number of poor household members for respondents/ total number of respondent household members)	0.0291
Synchronized poverty rate, (Mo, =H.A)	0.0154
Average poverty, (A)	0.5278

Total number of household members for smallholders in Kampung Tanjung Gahai=252

Source: Field research (2017)

4.4 Poverty Comparison

This research uses the Multidimensional Poverty Index (MPI), essentially because the nature of MPI for this research operates on a different but yet prudent strategy, diverging itself from contemporary poverty measurement: poverty line income. MPI is a comprehensive measurement that integrates non-monetary dimensions as aspects to appraising individual poverty. As such, six dimensions were used within this research's MPI parameter in appraising poverty among the respondents. The list includes income, education, health, living standard, environment, and psychology. The results through the use of MPI revealed a distinctive result as compared to the conventional use of poverty line income, duly because of its dimensional integration. An instance is when 4.4% of respondents from the Agropolitan Project were reported to having deficiencies in income through the MPI measurement, as can be expected; yet using the same measurement, they fail to register as being poor through multiple dimensions. Such instance accentuates the MPI's ability as a comprehensive form of measurement in appraising individual poverty through strategic parameters of accounting more than one indicator.

The results of this research proved the non-existential nature of poverty met by the Agropolitan Project participants and their respective household members that would otherwise be associated with the traditional use of the term poverty. For example, the calculation in MPI showed that the maximum deficiencies experienced by respondents from the Gahai Agropolitan Project are pegged at four indicators, while their neighbouring Kampung Tanjung Gahai respondents registered at five and seven indicators. This suggests a much dire circumstance for the latter demography. However, notwithstanding the plight of poverty experienced by both demographic factors, the state of poverty listed through certain indicators in Table 3 deserves better attention from relevant parties. Indicators such as waste collection in the project areas should be addressed promptly, since the known nature of poor waste handling is known to lead into an array of undesirable social issues, such as becoming a hot bed for contagion and consequently, a hazardous ecosystem that is unfit for human life. Policy makers and enforcers should formulate and execute a constructive plan of emplacing a central depository facility for waste collection; one that is integral to any society establishment.

Other indicators also express the same demand for promptness from relevant parties; for example, the percentages of education years for household members and the number of bedrooms for their residence deserve emphasis. This suggests the nature of insufficient information gained through the previous use of poverty measurement made different by the information obtained in this research, which provides better judgment for policy makers and enforcers in enhancing their design for development policy.

Inclusively, the grid of poverty established through multiple dimensions in this research's MPI reflects the daily struggles encountered by smallholders and their household members. As one respondent managed to score seven indicators, this clearly stresses a pressing need for aid in alleviating their suffering. Referring to Table 4, the high typology score of deficiencies was experienced by smallholders, involving 11 indicators and envelops almost all of the research's dimensions, excluding the psychological dimensions. This is definitely a situation that calls for a consolidated effort in aiding the smallholders to escape the binding chain of poverty. Specifically, one area could be addressed, wherein for the income aspect, 17.8% of the respondents are still limited or poor in terms of their income. Perhaps, a situation has occurred due to the smallholders' neglected voice in an exclusive provision, a provision received by participants of the Gahai Agropolitan Project, which has further exacerbated them into poverty. Other than that, deficiencies in living standards covering almost every indicator are evident to the smallholders' impoverished state. Hopefully, the results obtained through this MPI would plug the missing information and serves as a better channel for policy makers in aiding the smallholders.

Table 7 entails the order of deficiencies engaged by respondents in the Gahai Agropolitan Project and Kampung Tanjung Gahai, an order proprietary to the Multidimensional Poverty Index (MPI). The number of indicators represents the maximum number of deficiencies, where the participants of the project hold 7 indicators, while smallholders hold 11 indicators. In brief, it alludes to the smallholders' higher state of deficiencies as compared to the participants of the project. Referring to Table 7, position 1 shows the percentages of highest deficiency met by the respondents, and position 10 is the lowest deficiency.

Table 7: Arrangement of position for indicators in Multidimensional Poverty Index for participants of Gahai Agropolitan Project and smallholders in Kampung Tanjung Gahai

Order	Participants of Gahai Agropolitan Project	Smallholders in Kampung Tanjung Gahai
	Indicators	
1	Waste collection facility	Waste collection facility
2	Years of education (AIR)	Tapping day
3	Number of bedrooms	Toilet
4	Presence to school	Years of education (AIR)
5	Income	Income
6	Tapping day	Transportation
7	Food intake	Communication facility
8		Food intake
9		Presence to school
10		Residence
11		Number of bedroom

Source: Field research (2017)

5. Conclusion

The discourse of this research has attended to the Gahai Agropolitan Project's role in eradicating poverty among participants with absolute poverty. Since its inception in 2007, participants have enjoyed a better state of living through accommodation in basic support and facilities in meeting their daily struggles. They have also made their living through participating in rubber planting activity, an activity considered as one of the available economic components within the project; generating a lucrative source of income for participants and consequently alleviating them from poverty. As seen through this research outcome, only 4.4% or 2 respondents are categorised as poor in the poverty line income. However, a different view is expressed through the MPI measurement, whereby it presented all participants from the Agropolitan Project as those exempted from multidimensional poverty. Justification for such outcome is drawn from their access to adequate necessities, one that includes both non-monetary and monetary aspects. This proves the ability of the Agropolitan Project in eradicating poverty among participants.

Furthermore, in acknowledging the success of the Gahai Agropolitan Project over poverty eradication, a comparison analysis of poverty between participants of the Gahai Agropolitan Project and smallholders of Kampung Tanjung Gahai was made. The comparison analysis used the Multidimensional Poverty Index (MPI), with results that speak the existence of multidimensional poverty among the smallholders. In contrast to this, participants of the Gahai Agropolitan Project did not experience multidimensional poverty. Moreover, from the aspects of policy and programme execution, it is indubitably suggested that the execution of such project promotes effectiveness for efforts in eradicating poverty. Lastly, the users of Multidimensional Poverty Index (MPI) may provide a refined and accurate measurement in appraising poverty; one notable trait is through deficiencies that exist within the dimensions of poverty. Information on dimensional deficiencies are important for policy makers in their judgment, particularly in forms of appropriate aid for those in poverty or to those in impoverished state of poverty.

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Appendix 1

Summary on dimension, indicator and separation line in Multidimensional Poverty Index (MPI)

Dimension	Indicator	Cut-off poverty line	Weighted
Education	Years of Education	All household members aged between 17–60 possessing fewer than 11 years of education	1/8
	Presence to School	Children aged between 6–16 years old who have not attended School	1/8
Health	Facilities	Distance to healthcare facilities exceeding 5 km and without mobile-clinic facilities	1/8
	Clean Water Supply	Other than treated water supply connected in houses and public water pipe/stationed pipe or water faucet	1/8
Living Standard	Residency Condition	Dilapidated structure	1/24
	Bedroom	More than two household members/rooms	1/24
	Toilet	Other than flush toilets	1/24
	Waste collection	No facility	1/24
	Transportation	All household members who do not use public nor private means of Transportation	1/24
	Basic communication	Not possessing fixed-line phone or mobile phone	1/24
Income	Income	Monthly household earning lesser than poverty line income	1/4

Source: Epu (3)

Appendix 2

Summary on dimension, indicator, and separating line used in research

Dimension	Indicator	Cut-off poverty line	Weighted
Education	Years of education	All household members aged between 17–60 possessing fewer than 11 years of education	1/12
	Presence to school	Children aged between 6–16 years old who have not attended school	1/12
Health	Facilities	Distance to healthcare facilities exceeding 5 km and without mobile-clinic facilities	1/18
	Clean water supply	Other than treated water supply connected in houses and public water pipe/stationed pipe or water faucet	1/18
	Food intake	Food intake that is fewer than three (3) times a day	1/18
Living standard	Residency condition	Dilapidated	1/36
	Bedroom	More than two household members/rooms	1/36
	Toilet	Other than flush toilet	1/36
	Waste collection	No facilities	1/36
	Transportation	All household members who do not use public nor private means of transportation	1/36
	Basic communication	Not possessing fixed-line phone or mobile phone	1/36
Income	Income	Monthly household earning lesser than poverty line income	1/6
Environment	Vulnerability/Weather uncertainties	Average tapping day that is fewer than 15 days (a month)	1/6
Psychology	Mind/Thoughts	Low self-esteem score	1/6

Source: Adapted from Epu (3)