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## Farmers Household Multidimensional Level and Its Effect on Participation in Agricultural Land Conservation in Disaster Residents

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# Farmers Household Multidimensional Level and Its Effect on Participation in Agricultural Land Conservation in Disaster Residents

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**Abstract.** This research was carried out in intervolcano basin of Merapi-Merbabu, Sawangan District, Magelang Regency. The purpose of the research are: (1) analyze the level of multidimensional poverty on households of farmers in the area of the intervolcano basin of Merapi-Merbabu, Sawangan District; (2) analyze the effect of multidimensional poverty toward the participation of farmers in the conservation farmland in intervolcano basin of Merapi-Merbabu, Sawangan District. To achieve that goal used to descriptive method with geography approach that is complex of region approach. The population of the research is the whole had of horticulture crops farmer households in the Wonolelo Village, Banyuroto Village, and Ketep Village in Sawangan District. Sampling done by the technique quota random sampling with attention to the widespread mastery of the land. Data were collected through interview, forum group discussion, observation, and documentation. The analysis used is a combination of a descriptive quantitative analysis and statistic analysis, by observing the Multidimensional Poverty in Indonesia Index. The results of this research indicate that: (1) the level of multidimensional poverty of farmer households based on research results of 33% of the 52 respondents that belong to the low; (2) farmer who have experienced multidimensional poverty tends to be more proactive in the conservation of farmland than the farmers who are not experience multidimensional poverty.

## 1. Introduction

The agricultural sector still plays an important role in the life of the Indonesian people. The percentage of the population with livelihoods as farmers is still quite large. The results of the 2013 agricultural census showed that there were 26.14 million households in Indonesia. Of the 26.14 million agricultural business households in Indonesia, 98.53% are land-use agricultural business households, more than half of which are classified as smallholders [1].

Although there are many households in Indonesia that work in the agricultural sector, it turns out that this sector has not fully been able to provide welfare to the community. This is indicated by the still high level of poverty in farmer households. The largest number of poor people (55%) in Indonesia are farmers in rural areas and 75% of them are household farmers of food crops and secondary crops. The poverty of farmers is thought to be closely related to the widespread expansion of agricultural land, the narrowness of land ownership and control, and the limited business opportunities [2]. Poverty can be influenced by various factors. In the concept of multidimensional poverty the degree of incompetence is measured based on three main dimensions that affect the capability to prosper, namely education,



health, and quality of life standards. In Indonesia the characteristics of multidimensional poverty are dominated by quality of life standards [3].

The Merapi-Merbabu Inter-Volcano Valley Area in Sawangan Subdistrict is an area that is currently widely used as agricultural land. This area includes Wonolelo Village, Banyuroto Village, Ketep Village, and Kapuhan Village, which is very well known for horticultural crops. Agricultural activities have been developed for a long time. In 2015 the area of agricultural land reached 1,662.35 hectares in the form of dry land with a distribution of 340.88 hectares in Kapuhan Village; 195.73 hectares in Ketep Village; 760.31 hectares in Wonolelo Village; and 365.43 hectares in Banyuroto Village [4]. Based on these conditions it is interesting to know the multidimensional poverty level of farmer households to see how much the benefits of agricultural business are in the welfare of the community.

Agriculture in this area on the other hand can also have a negative impact, especially in the form of erosion and decreasing the quality of land. Based on the preliminary survey, it is also known that conservation measures with vegetative, mechanical, and chemical methods are relatively lacking. One indicator as an example is the use of steep slopes without terrace construction and directional planting of slopes that cut contours in the absence of reinforcing vegetation (Figure 1). The steep slope of the hillside is included in the land class that does not allow for agriculture. However, the need for expansion of agricultural land is thought to be related to the multidimensional level of poverty in farm households, so that the addition of agricultural production is done as an effort to increase farmer household income.



Figure 1. Agricultural Land Use that is not in accordance with the Conservation Method (Source: Pre survey, 2017)

Damage of agricultural land needs to be immediately reduced by taking land conservation measures. Conservation on agricultural land is basically done so that agricultural activities can obtain optimum results but the land used is still functioning sustainably. In simple terms, land conservation can be done by utilizing land in accordance with its level of ability. The role and responsibility in land conservation is for farmers cultivating land. Assuming that the expansion of agricultural land so far has been aimed at increasing farmer household income, it is assumed that the multidimensional poverty level of farmer households has an effect on the willingness to participate in environmental conservation.

The Merapi-Merbabu Inter-volcano Valley is an area that faces potential eruption hazards from Merapi Volcano and Landslide from Merbabu Volcano [5]. Agricultural activities carried out in disaster prone areas have strategic value. Aside from being a source of community livelihood to build resilient communities, agricultural products are also very important to support the creation of independence in the face of disaster emergency situations. Conservation activities based on sustainable agriculture are very important so that these goals can be achieved.

This paper aims to analyze multidimensional poverty levels in farm households in the valley between volcano Merapi-Merababu sub-district of Sawangan and analyze multidimensional poverty levels on farmer participation in conservation of agricultural land in the valley between Merapi-Merabu volcano Sawangan District.

## 2. Literature Review

The problem of poverty has always received major attention in Indonesia. This happened because of the government's awareness that failure to overcome the problem of poverty would lead to various social, economic and political problems in the midst of society [6]. Until 2007 Indonesia's population of more than 110 million still lived in poverty earning less than 1.5 US \$ per day, even the majority of the poor in Southeast Asia lived in Indonesia [7]. Poverty is a complex and multidimensional problem and has a very broad impact on the quality of human life. The issue of poverty is a global problem because there are still many people in developing countries that are below the poverty line [8].

[9] explains that the phenomenon of poverty is usually always illustrated by a lack of income to meet basic needs, a low standard of living, lack of material, always in a state of debt, not prosperous and unable to live properly. Based on the causes there are three dimensions of poverty, namely the natural dimension, the structural dimension and the cultural dimension. Natural poverty can occur due to limited natural resources, natural disasters and low use of technology. Structural poverty is poverty that occurs due to social inequality with government policies that are actually not friendly to the poor. Poverty can occur because an organization or government decides on a policy that results in the population experiencing poverty. The cultural poverty is caused by the values and culture adopted by a person or group of people, such as apathy, wasteful, inferior, not independent and the integration of community units effectively with existing institutions.

The problem of poverty is always characterized by vulnerability, helplessness, isolation, and inability to convey aspirations. In the poor, this condition is exacerbated by policy makers and programs that ignore the differences in the conditions and abilities of various elements of society in them. There are three main characteristics of poverty in Indonesia, namely (1) many households that are around the national poverty line which are equivalent to PPP 1.55 US dollars per day, so that many residents who are classified as not poor but are vulnerable to poverty, (2) size poverty is based on income so it does not reflect the true poverty line. In this case, many are not classified as poor in terms of income but are categorized as poor because of the lack of access to basic services and low indicators of human development, (3) Indonesia's vast and diverse regions cause differences between regions which trigger poverty [8].

[8] further explained that poverty has almost the same impact in various countries, namely: (1) loss of welfare for the poor (clothing, food, shelter), (2) loss of the right to education (3) loss of the right to health, (4) exclusion from humanitarian decent work, (5) marginalization of legal protection, (6) loss of the right to security (7) loss of the right to participation in government and public decisions, (8) loss psychological rights, (9) loss of the right to innovate, and (10) loss of the right to freedom of life.

Eradicating poverty is not an easy job, it takes time, strategy and support from various parties including the poor. Therefore it must be done carefully, even very carefully so that the poor can be alleviated from the suffering of poverty [9]. Responsibility for poverty alleviation has become a global agenda with the Millennium Development Goals with the first target of tackling poverty and hunger with efforts to reduce the proportion of the population under 1 US dollar per day to half during the period 1990-2015 [8].

Identification of poor people in efforts to alleviate poverty is done through efforts to determine poverty lines. [10] explained that by using certain criteria the poverty line was set, which in turn the proportion of the population below this line was classified as poor. One example of determining the poverty line is according to Sayogyo with the following criteria: (1) Not spending poorly above 320 kilograms of rice exchange rate per person per year, (2) Poor household expenditure below 320 kilograms of rice exchange rate per person per year, (3) Very poor is insufficient food, expenditure below 240 kilograms of rice exchange rate per person per year.

Today in the era of the Sustainable Development Goals (SDG) that have entered its second year, poverty alleviation is still placed as the first global goal. In this global agreement there is a transformation of the definition of poverty. If in the Millennium Development Goals (MDG) era, poverty is still seen as an inability to fulfill living needs with a consumption or monetary approach. Now, poverty is broadly defined, namely in all its forms or dimensions. One of the objectives of the SDG is that all countries make a commitment to reduce at least half the proportion of poor, multidimensional men and women. The measure used is the multidimensional poverty index (IKM). IKM measures the degree of inability or underdevelopment of someone in the dimensions that affect their capability to achieve prosperity[11].

In an effort to alleviate poverty globally, one measure that is widely used today is the multidimensional poverty index (IKM) or the multidimensional poverty index (MPI). IKM was introduced since 2010 by HDRO in the annual report on human development. IKM was developed by Alkire and Santos (2010) for the 2010 human development report. In the IKM three dimensions were measured, namely health, education, and living standards. The dimensions used in this SMI are basically a reflection of the human development index or the Human Development Index / HDI [12].

The background of the development of the SMI is that in some countries poverty is defined as income or consumption level. Most countries adhere to this concept in identifying poverty. However, the poor outnumber the income to explain the experience of poverty. Other aspects are often also related to education, health, housing (board), power, respect, work, personal security, and so on. There are no indicators, such as income or consumption, which are uniquely able to describe various aspects that contribute to poverty [13].

The multidimensional poverty index (IKM) measures the degree of inability / underdevelopment of a person in the three main dimensions that influence his capacity to prosper, namely education, health, and quality of life standards. This method is useful for identifying the level of urgency of community capabilities. As explained above, this measurement is similar to the human development index that measures human development outcomes based on the basic components of quality of life, namely longevity and health, knowledge, and decent life[3]. The three main dimensions of the multidimensional poverty index (IKM) [14], are described as follows:

1. Education

This aspect includes indicators, namely the year of education and education of children. The year of education gets a very shortage if there are no household members who complete five years of education. As for the second indicator the value is very deficient if school-age children do not attend school for 1 to 8 years

2. Health

This aspect includes two indicators namely child mortality and nutrition. In the indicator of child mortality the value is very deficient if there is child mortality in the family. Meanwhile, nutrition indicators if there are children or adults who experience malnutrition

3. Life standard

This aspect has the most indicators including electricity, drinking water, sanitation, floors, cooking fuel, and assets. The very value of deficiencies for each indicator is as follows: (1) electricity gets a very short value if there is no electricity in the household, (2) drinking water if the household cannot access clean drinking water with a travel distance of 30 minutes from home, (3) sanitation if it does not have a toilet or if the toilet is used in general, (4) the floor if it is dirty, sand floor or livestock manure, (5) fuel for cooking if cooking with wood, charcoal, or livestock manure, (6) assets if they do not have more than one radio, TV, telephone, bicycle or motorcycle, and do not have a car or tractor.

Meanwhile on the page[15], it is explained that the dimensions and indicators of the multidimensional poverty index in Indonesia are as follows:

1. The Health Dimension includes:

- a. sanitation, with household thresholds that do not have their own defecation facilities and goose neck types

- b. clean water, with household threshold without access to proper water sources such as protected wells, plumbing meters, retail plumbing and protected springs, and the distance of water sources with septic tanks less than 10 m
  - c. childbirth helper, with a threshold of labor that is not helped by a doctor, midwife or other medical staff and paramedics
  - d. underfive nutrition, with threshold is a toddler who does not fulfill 70-220 gr carbohydrate intake, 15-35 gr protein, 35-62 gr fat and 637.5 -1600 kcal energy which is adjusted for the 0-5 year age group
2. Education dimension, including:
- a. continuity of education, with threshold school-age children who do not complete education up to high school / vocational school or equivalent.
  - b. literacy, with threshold family members aged 15-64 years who are not able to read Latin, Arabic or other letters.
  - c. access to preschool education services, with threshold children aged 3-6 years who do not have access to pre-school education services such as play groups, Early Childhood Education (PAUD), Kindergarten (TK), and other types of preschool education.
3. The standard of living dimension includes:
- a. source of lighting, with a household threshold that has a non-PLN lighting source such as petromak / aladin, pelita / sentir / torch, etc. and does not have PLN electricity above 900 watts.
  - b. fuel / energy for cooking, with household threshold that still uses kerosene, charcoal, briquettes, fuel wood and others and does not use electricity and gas as the main fuel for cooking.
  - c. roofs, floors and walls, with threshold: households that experience at least two of the following three conditions (roof, floor and wall) i) the widest roof of a house other than concrete, tile, shingle, zinc and asbestos; ii) the largest floor of a house other than marble, ceramics, granite, tiles, terrazzo, cement and wood; iii) the largest wall of a house other than walls and wood.
  - d. Home ownership, with a threshold: households that are still renting, contracting, leasing free of others, free of rent from parents / relatives / relatives and others

### 3. Method

This research is a descriptive study that aims to explain the symptoms encountered in detail. Descriptive methods are combined with explanatory methods, in accordance with the purpose of this study which seeks to uncover the causes arising empirically in the field. Related to the population, this research is a sampling study that uses a portion of the population members to explore the character of the population as a whole. Related to the characteristics of the object, this study is an analytical survey research with quantitative data and its analysis using statistical media. Survey research is also characterized by the use of questionnaires and planned interviews. Related to the analysis of this study using quantitative descriptive methods.

The approach used in this study is the geographical approach, namely the complex approach of the region. This approach is an integration between the shell approach and the ecological approach. This approach is used to describe clearly the complexity of regional elements that are interrelated with each other. Data collection techniques using interview techniques, focus group discussion, observation, and documentation. The analysis technique used is a combination of quantitative descriptive statistics with statistical analysis.

The population in this study were all household heads of horticulture farmers in the valley between the Merapi-Merbabu volcano of Sawangan Sub-district. Sawangan sub-district which is physiographically included in the valley between Merapi-Merbabu volcanoes is Wonolelo Village, Ketep Village, Kapuhan Village, and Banyuroto Village, Krogowan Village. Wonolelo village is the village that has the most farmer households with horticulture plantations namely 1,682 households (BPS, 2017) so that this study is more focused on Wonolelo Village. From the population, samples were taken using simple random sampling technique. This technique takes sample members from the population

randomly regardless of the strata. The researcher took a sample of 52 heads of household farmers as respondents

#### **4. Result and Discussion**

##### *4.1 Study Area*

This research was conducted in the physiographic area of the Merapi-Merbabu Inter-Volcano Valley in Sawangan Subdistrict, Magelang Regency. Astronomically the study area is located at 427800 MT to 440010 MT and 9167510 MU to 9174300 MU at UTM zone 49 coordinates. The total area of 4062.76 ha includes Ketep Village, Banyuroto, Wonolelo, Kapuhan, Krogowan, Paten, Sengi, Krinjing, Sewukan, Irakah, Lencoh, Klakah and Tlogolele. Village areas included in Sawangan Sub-District are Ketep Village, Banyuroto, Wonolelo, Kapuhan, and Krogowan. The boundary of the research area to the north is Selo and Sawangan Subdistricts, to the south of Selo District and Dukun District, to the east of Selo District, and to the west by Sawangan and Dukun Districts (Figure 2).

Geologically, the study area is composed of various types of constituent rocks with those of all quarters. The constituent rocks of the study area consist of the Merapi Volcano (Qmi) sediment, the lava dome and the runway (d), the avalanche deposits from the hot cloud (na), and the Merbabu volcanic rock (Qme). The sediment of the Merapi Muda Volcano and the Merbabu Volcano Rock are most commonly found in the study area. Geomorphologically, the study area consisted of volcanic land slopes, volcanic feet, volcanic foot plains, inter-volcanic plains, fluviovolant plains, and inter-volcanic basins. The landforms compose young volcanic landscapes on the side of Merapi, and volcanic landscapes are located on the side of Merbabu[5].

The climate in the study area is characterized by the potential for moderate rainfall both in the volcanic lower slope morphology units, volcanic feet, volcanic foot plains, and volcanic plains of volcanoes. Rainfall data shows the highest rainfall reaches 1734 mm while the lowest rainfall is 295 mm. Based on the rain conditions, the climate type in the study area according to the Schmidt-Ferguson classification is included in the Climate C type, whereas according to the Oldeman classification the area is included in the B2 type climate[16]. Hydrological conditions in the study area are characterized by the presence of stagnant rivers young with a radial flow pattern. Most of these rivers are ephemeral rivers which only drain water during rain and shortly after rain [5]. The potential of groundwater varies between the parts of Merbabu Volcano and Merapi Volcano. [16]explained that in the Merapi Volcano region in the study area there were aquifers with flow through the gap and space between grains, composed of volcanic sediment material from Merapi Muda. These aquifers fall into the category of aquifers with high productivity and wide distribution. Land use in the research area varies, consisting of rice fields, settlements, shrubs and grass, moorings, and mixed gardens. Rice fields are the most common form of land use in the research area, but at this time there has been a lot of conversion of paddy fields into moor. Shrubs and grass are often found in river valleys. The mixed gardens are often found on the slopes of the volcano, especially the Vulkan Merbabu region [5].



preschool education services. From the education dimension it can be seen poverty in terms of education. Continuity of education is a sub-indicator with the threshold of school-age children who do not reduce education to high school / vocational or equivalent.

The results of the analysis show that most of the horticultural farming families in Wonolelo Village have very limited access to education. As many as 52% only completed education at the elementary level, 15% completed education at the junior high school / equivalent level, 14% at the high school / equivalent level, and only 4% completed education up to diploma and undergraduate level. The head of household who was the respondent in this study also conveyed information that almost half of the farmer households in Wonolelo Village had family members who did not complete basic education.

Judging from the indicators of family members who did not finish school at the high school level, it turned out that there were quite a number of horticultural farming families whose family members did not complete their education to high school level. Meanwhile there were only a few incidents of family members who had stopped going to school then continued again. This shows that family members of horticulture farmers in the study area can continue their education continuously, but due to various reasons many do not complete their education to high school level.

The next sub-indicator of the educational conditions of family members of horticulture farmers is literacy. Criteria for literacy are family members who cannot read Latin, Arabic, or other letters. The results of the analysis showed that the illiteracy rate in the family of horticultural farmers in Wonolelo Village was only 12%. In other words, only 12% of respondents whose family members cannot read Latin, Arabic and other letters. Another sub-indicator is access to preschool education services. The criteria for this sub-indicator are children aged 3-6 years who do not have access to pre-school education services such as play groups, Early Childhood Education (PAUD), Kindergarten (TK), and other types of preschool education. The results of the analysis show that access to pre-school education services is quite low. 88% of respondents stated that their families did not attend preschool education.

Furthermore, the results of the analysis of the dimensions of education taking into account the sub-indicators (1) access to primary and secondary education services, (2) literacy, and (3) access to pre-school education services indicate that the education level of horticultural farming families in Wonolelo Village is generally rather low. This is based on an analysis of three factors that indicate that of the three sub-indicators, only one sub-indicator meets the criteria of literacy. In this sub-indicator it turns out that almost all farmers can read both Latin letters, Arabic, and other writings. Meanwhile in the other two sub-indicators there were many who did not meet the criteria. Access to more basic and secondary education services only reaches the elementary level, so many do not take secondary education. In addition there are very few children who get preschool education.

#### *4.2.2. Health Dimension*

The next dimension used as an indicator in the multidimensional poverty assessment in Wonolelo Village, Sawangan District is a health dimension. There are four sub-indicators of this health dimension, namely: (1) sanitation, (2) clean water, (3) delivery helper, and (4) toddler nutrition. Health is one of the important dimensions because from health indicator data it can be seen whether the community has been able to access health and seek good health or not. Efforts to access and seek health can be one of the benchmarks in determining poverty levels. The poverty level of horticultural farming families in Wonolelo Village, Sawangan District based on the results of the interviews is as follows.

Sanitation is the first sub-indicator assessed from the health dimension. The criteria for sanitation are households that do not have their own defecation facilities and goose neck types. The results of interviews with respondents indicated that 73% of the horticultural farming families already had their own defecation facilities. Meanwhile, another 27% still do not have their own defecation facilities.

The next sub-indicator in assessing health dimensions is clean water. The criteria for clean water are households without access to other water sources such as protected wells, plumbing meters, retail plumbing and protected springs, and the distance of water sources with septic tanks less than 10 m. In this study, it was found that access to clean water was very easy, 98% of farmers stated that it was easy

to get clean water. Access to drinking water is also easy, 94% of farmers say that drinking water can be accessed within less than 30 minutes of travel.

In the study area there are many springs with varying discharge. Although access to clean water is said to be easy, there are problems in fulfilling water needs by utilizing these springs, which are constrained by fluctuating and small spring discharges in the dry season and the ownership of springs which are generally owned by landowners who own the land. Fluctuating discharge of springs and the distance of springs with houses often influences the amount of water discharge that is distributed using distribution pipes to each household. Uneven spring ownership also causes potential social problems, namely the involvement of farmers who do not have springs to farmers who have springs.

Subsequent health sub-indicators are birth attendants and toddler nutrition. For the childbirth helper sub-indicator, the category is labor that is not helped by a doctor, midwife or medical staff and other paramedics. The results showed that 90% of births in horticultural farm households were assisted by midwives or similar medical personnel. Furthermore, in the sub-indicator of toddler nutrition intake the criteria used are whether in the farmer's family there are family members aged less than 16 years who are malnourished as well as the incidence of child mortality. Data from the research shows that 96% of farmers stated that their family members who were less than 16 years old did not experience malnutrition cases and 90% of farmers stated that their entire family had never experienced malnutrition. Meanwhile the case of dal's child death in the farmer's family only 16.7%.

Based on the results of the analysis from the health dimension, it can be concluded that farmers in Sawangan District cannot be categorized as poor. This is indicated by all sub-indicators that show good conditions, including good access to health, almost all farmers have access to clean water, have their own defecation facilities, do not experience malnutrition, low child mortality cases, and deliveries that have been helped by medical staff (midwife).

#### *4.2.3 Dimensions of Living Standards*

The last dimension used in the measurement of multidimensional poverty in horticultural farmers in Lembah Antar Gunugapi Merapi-Merbabu is the dimension of living standards. In this dimension of living standards there are several sub-indicators such as information sources; fuel / energy for cooking; roofs, floors and walls of houses; and home ownership. This dimension measures assets or ownership of goods.

From the standard dimension of life, horticultural farmers in the study area were not included in the category of poor. Two of the four sub-indicators in this dimension indicate that many farmers have been able to achieve a decent standard of living. In terms of asset ownership in the form of board needs, such as radio, television, telephone, bicycle and motorcycle, it turns out that 100% have one or more of these items. In addition, 93.3% of the farming families already have information in the form of electricity facilities. 73.3% of the farmer's family house floor has been hardened with either ceramics or ordinary cement. In relation to the use of fuel / energy for cooking, quite a lot of farming families use fuel wood as cooking fuel which reaches 60%. The use of fuel wood as fuel / energy is actually not always caused by difficulties in obtaining other fuels, but it is also influenced by the availability of fuelwood which is sufficient up a lot in the research area.

#### *4.2.4. Determination of Multidimensional Poverty Levels*

After analyzing each dimension, the multidimensional poverty level of the family of horticulture farmers was carried out in the study area. To determine the multi-dimensional poverty level, a formula is calculated. Multidimensional poverty is measured using the Multidimensional Poverty Index (MPI) calculated using a weighted weight of dimensions and indicators. The weight of the dimensions is weighed the same, namely 1/3 of each dimension and each indicator in the dimension is also weighed equally. So that we get the indicator weight as follows: the weight of the health indicator consisting of two indicators is valued at 1/6, the weight of education consisting of two indicators is valued at 1/6 and the weight of quality of life consisting of six indicators rated 1/18.

Everyone who is assessed in the MPI is seen from the indicators assessed. The assessment consists of a range of 0-1. When someone meets a poverty assessment according to the MPI indicator, he is subject to point 1. An assessment will continue to be made on each indicator. After getting an assessment of ten indicators, it will be calculated based on the formula as follows:

$$C_i = I_1W_1 + I_2W_2 + \dots + I_nW_n \tag{1}$$

where  $I_i = 1$  if someone is in the indicator  $i$  and  $I_i = 0$  if not.  $W_i$  is the weight of the indicator  $i$  with:

$$\sum_{i=1}^n W_i = 1$$

All indicators and dimensions are added together, then the average value is searched. Someone is said to be poor when the total average rating is greater than 1/3. MPI is the multiplication of the multidimensional headcount ratio (H) with the intensity of poverty (A)

$$H = \frac{q}{n} \tag{2}$$

Where  $q$  is the number of individuals categorized as poor in a multidimensional manner while  $n$  is the total population.

$$A = \frac{\sum_{i=1}^n C_i(k)}{q} \tag{3}$$

Where  $C_i(k)$  is the score of individual  $i$  and  $q$  is the number of individuals experiencing multidimensional poverty.

So that:

$$MPI = H \times A \tag{4}$$

The calculation results show that 33% of respondents in the study area are still included in the category of poor families based on these multi-dimensional poverty criteria. Meanwhile more than 67% of respondents are in a better standard of living or are not included in the category of poor families based on multidimensional poverty indicators. There are several aspects in multi-dimensional poverty that are quite interesting to be discussed further because they influence the multidimensional poverty experienced by the community.

Most of the farmer families in the study area (75%) did not complete their education at the high school level, indicating that the average family farmer only received education from elementary to junior high school level. In addition 88% of respondents stated that family members of the farmer did not attend pre-school education such as kindergarten, early childhood education. The low level of education of farmer family members can be caused by several factors both internal and external. Apart from economic factors, the low awareness of the importance of education for farmer families is also a factor that causes the low level of education of farmer family members.

Regarding the source of clean water as a supplier of drinking water needs, most respondents still use the spring directly, which is 96.7%. This is also related to the ease of access of these springs from homes of people less than 30 minutes by foot by 94%. Although it is quite easy to access, the spring is prone to drought, especially in the long dry season so that residents will lose clean water sources. The availability of clean water is actually an indicator that is still quite vulnerable. Other alternatives are needed and better guarantee the availability of water throughout the year such as water wells or boreholes.

The multidimensional poverty index calculated using the previous formula compared with other methods of poverty calculation is the method of daily minimum income of 1.5 US Dollars. If we use the current dollar exchange rate of around 22,000 rupiah, the result is more respondents who experience poverty, which is 87%. This difference may occur and be complementary because income factors alone cannot describe as a whole as well as the previous method. It is also necessary to look at rural poverty

as above from other perspectives such as the level of happiness of the population, culture, and values of wisdom of the local community.

Table 1. Poverty Using Income Method.

Category	Criteria	Total KK
Poor	<Rp 22.000	46 KK (87%)
Not poor	>Rp 22.000	7 KK (13%)

#### 4.3 Effect of Multidimensional Poverty Levels on Farmer Participation in Agricultural Land Conservation

Based on calculations using the multidimensional poverty index, 33% of farmer families are still classified as poor according to multidimensional poverty criteria. This condition also shows that family members included in the multidimensional condition are poorer than those who have lived more properly. As a family that has a livelihood as a farmer, the success of the farmer's family in overcoming multidimensional poverty is largely determined by the success of the farming efforts carried out.

In farming, land is the main capital for farmers. It is interesting to know whether there is an influence between multidimensional poverty levels experienced by families of horticultural farmers with participation in efforts to conserve agricultural land. Agricultural land conservation is carried out to ensure the sustainability of land productivity and land sustainability. Land conservation is very important to be carried out by farmers in an effort to improve farm yields so as to improve the welfare of farmer families and overcome multidimensional poverty. Conservation of agricultural land can be done by several methods, namely vegetative, mechanical, and chemical methods. Vegetative methods and mechanical methods are methods that can be applied simply by horticulture farmers, for example by changing plants, planting slope reinforcement plants, planting contours, and making terraces to prevent landslides.

Land management by changing plants has many benefits such as increasing food production, harvesting and planting frequency, considering market prices before planting, considering the season, increasing soil fertility through previous crop residues, improving soil structure, preventing accumulation of plant pests and diseases, and increase productivity in certain types of plants. Most of the respondents have implemented this business seen from the percentage that has implemented that is equal to 62%.

Planting slope reinforcement plants is intended to resist erosion rates and prevent landslides from occurring on agricultural land. Respondents who have applied for planting of slope reinforcement plants are 69%. However, there are still many who have not implemented this, possibly because they have not fully known the benefits of this conservation effort.

The next method is planting agricultural crops in the direction of land contours. Planting in the same direction as the contour is also intended to hold the rate of surface erosion so that not much nutrients are washed away. Most of the respondents have implemented this business, which is 77%, although there are still many who have not implemented it. There are still many who have not implemented this effort because it is already possible to plant not in the direction of contours and certain types of plants that do not require too much water so that water is quickly wasted more expected.

Another method is to create a terrace that prevents landslides that aim to prevent landslides, especially in areas that have a high slope. The terrace can hold the water rate and prevent erosion and maintain soil nutrients. 79% of respondents have done this business even though there are still many who have not implemented it. This can be understood because, like planting in the same direction as the contour, most likely the respondents have already planted plants that are not in the same direction as the contour or the type of plant that is planted does not require water that can be excessive at times such as heavy rain.

Based on the above mentioned land conservation business indicators, it can be concluded that the majority of respondents have made efforts to conserve agricultural land, which is more than 60%. If we compare with the low multidimensional poverty level, it can be concluded that it turns out that there is a link between multidimensional poverty levels and conservation efforts. The lower the multidimensional poverty, the greater the effort to conserve agricultural land is carried out. The correlation between multidimensional poverty and land conservation is indicated by the number 0.13. This shows that there is a weak positive correlation of these two variables. The correlation is weak can be caused by various internal and internal factors from the community as the subject of research. Research results per indicator show that farmers who experience multidimensional poverty tend to be more proactive in land conservation compared to farmers who do not experience multidimensional poverty. Allegedly farmers who experience multidimensional poverty pay more attention to land conservation because to maintain the sustainability of agricultural land owned. Besides that, the way of land conservation is also relatively the same, it is possible this happens because of the habits of the people who have been hereditary. Of course, to find out more about the causes of the weak correlation between multidimensional poverty and land conservation, further research is needed.

## 5. Conclusion

The multidimensional poverty level of farmer households based on the results of the study amounted to 33% of 52 respondents, meaning that poverty occurred even though a small percentage still needed to be investigated further on poverty indicators that might not have been well identified. The most influential dimension of poverty in farm households is from the dimension of quality of life because it accounts for the highest percentage of deficiencies compared to education and health. The willingness of farmer households to participate in environmental conservation shows positive results with more than 60% having applied business conservation indicators for agriculture. Although there is still a need for further education on land conservation efforts. The relationship between poverty levels and participation in environmental conservation is a weak positive correlation where the lower the poverty level the higher the effort to conserve land.

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