Poverty dynamics in farm and rural households: PATANAS data analysis 2007–2018

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Abstract. In developing countries, the majority of the population work as farmers. Thus, the welfare realization can be achieved by increasing farmers' welfare. Welfare is the opposite of poverty, therefore, the prevalence of poverty is seen as an indicator of welfare. This study aims to analyze the dynamics of poverty at the farm and rural household levels. The data used is from a panel data survey of the National Farmers Panel (PATANAS) on four agroecosystems from 2007 to 2018, collected by the Indonesian Centre for Agricultural Socio-Economic and Policy Studies (ICASEPS), Ministry of Agriculture. The data were analyzed statistically descriptive by making six poverty categories based on the distance between per capita income and the poverty line published by Central Bureau Statistic (CBS). The study results show that rural households still use the land as their main base of income in all types of agroecosystems. On the other hand, non-agricultural income sources have consistently increased, indicating a structural change from the dominance of agriculture to industry and services. There has been a decrease in the number of rural households categorized as almost non-poor, destitute, and suffering. The number of households categorized as non-poor and very poor is dominant in all agroecosystems. It shows that there is widening inequality. Recommendations can be given in farm upgrading through agricultural modernization, rural agro-industrialization, and even job transfer from rural farmers to the formal urban sector.

1. Introduction

The 1945 Constitution of the Republic of Indonesia mandates that ensuring the acquisition of a just and equitable prosperous life for all Indonesian people is part of the state's goals, the rights of every citizen, and for that, the government and the state are obliged to make it happen. Thus, improving welfare must always be used as the main target of implementing national development.

As it is known, most Indonesian people still depend on agriculture for their lives, so it is natural for the government to make agricultural development the basis for efforts to improve people's welfare. This is also consistent with research results that agricultural development is the main key to reducing poverty in developing countries, including Indonesia [1,6,8].

In this study, welfare is seen as the opposite of poverty. Poor people are not able to meet their basic needs, which means they are not prosperous. Thus, the prevalence of poverty is seen as an indicator of the welfare level of a population such as agricultural households or rural communities. The level of poverty on a national scale is well known, but how its dynamics over time at the farmer household level is not widely known. This study aims to analyze the dynamics of poverty at the farm and rural household levels. Both the poverty line and the data used in this review are sourced from BPS. The materials used in writing this review are mainly sourced from [7].
2. Material and methods

The analysis at the farmer household level was carried out using data from National Farmers Panel (PATANAS) at three different agroecosystem locations and base commodities, namely (1) lowland rice, (2) secondary crops and vegetables on dryland, and (3) plantations. By using the distance between the level of income per capita (IP) and the poverty line (PL) of CBS as a basis, the welfare level of farm households is divided into six categories, namely, (1) not at risk of being poor (IP > 1.6PL), (2) at risk of being poor (1.4 PL < IP < 1.6 PL), (3) almost poor (1.2 PL < IP < 1.0 PL), (4) almost not poor (1.0 PL < IP < 0.8 PL), (5) destitute (0.8 PL < IP < 0.6 PL), and (6) suffered (IP <= 0.6 PL) [9][10][12][14].

In general, sample selection villages for the PATANAS study followed the following procedure by Irawan et al. [16]: (1) selection of village types based on land and agricultural commodity bases using the LQ (Location Quotient) coefficient, (2) sample villages for each village type on the basis of Certain plantings are carried out by taking into account that the area owned by the village is greater than the average planting area per village at the provincial and national levels, and (3) the selection of the sample village takes into account other criteria such as not being a subdistrict or subdistrict capital village, not included in the plan. development/expansion of cities, dryland-based sample villages are not included in the area where irrigation networks are planned to be built, and the selected sample villages are not included in other sample villages. Based on this procedure, three types of villages were obtained as described.

The selection of sample households in each sample village is carried out in stages, namely (1) determination of census blocks based on land area and may include more than 1 hamlet/hamlet in the sample village; (2) conduct a household census that is included in the census block with a maximum number of 200 households; and (3) 40 households were selected randomly from the results of the census that could reflect the household structure in the sample village. Furthermore, the same households are sampled every three years, for example research for village type-1 should be carried out in 2007, 2010, 2013, and 2016, as well as for village type-2 should be carried out in 2008, 2011, 2014, and 2017, and for the type of village-3 should be carried out in 2009, 2012, 2015, and 2018. However, in the period 2013–2015 there was a change in policy so that the PATANAS research was not carried out in that time span.

3. Results and discussion

3.1. Dynamics at national level

Sustainable development has succeeded in increasing general welfare, which is reflected in reducing the national poverty rate, both in absolute numbers and in prevalence percentages. The national poverty prevalence rate has fallen to below 10% since March 2018 (Table 1). This pattern of decline also occurred in the previous decade [17]. The prevalence of poverty which is already less than 10% (single digit) for the first time in Indonesia's history is considered an extraordinary development achievement. However, the number of Indonesians who suffer from poverty is still quite large, reaching 25.67 million people or 9.66% of the total population in September 2018.

Since September 2017, poverty reduction has tended to slow down, that the reduction is increasingly difficult or better known as "the last mile problem". Poverty reduction in rural areas seems to be more difficult than in urban areas. In March 2014-March 2018, the poverty rate in urban areas decreased from 8.34% to 7.07%, while in the same period, in rural areas, the poverty rate decreased from 14.17% to 13.20%. Thus, the national poverty alleviation program will be more effective and fairer if prioritized in rural areas.
Table 1. Development of the number of poor people in Indonesia, March 2014 - September 2018.

| Year       | Number of poor people (million people) | Poverty prevalence |
|------------|----------------------------------------|--------------------|
|            | urban       | rural     | national | urban     | rural     | national |
| March 2014 | 10.51 (37.16) | 17.77 (62.84) | 28.28 (100) | 8.34 | 14.17 | 11.25 |
| September 2014 | 10.36 (37.36) | 17.37 (62.64) | 27.73 (100) | 8.16 | 13.76 | 10.96 |
| March 2015  | 10.65 (37.25) | 17.94 (62.75) | 28.59 (100) | 8.29 | 14.21 | 11.22 |
| September 2015 | 10.62 (37.25) | 17.89 (62.75) | 28.51 (100) | 8.22 | 14.09 | 11.13 |
| March 2016  | 10.34 (36.92) | 17.67 (63.08) | 28.01 (100) | 7.79 | 14.11 | 10.86 |
| September 2016 | 10.49 (37.79) | 17.28 (62.21) | 27.76 (100) | 7.73 | 13.96 | 10.70 |
| March 2017  | 10.67 (38.42) | 17.10 (61.56) | 27.77 (100) | 7.72 | 13.93 | 10.64 |
| September 2017 | 10.27 (38.64) | 16.31 (61.36) | 26.58 (100) | 7.26 | 13.47 | 10.12 |
| March 2018  | 10.14 (39.08) | 15.81 (60.92) | 25.95 (100) | 7.07 | 13.20 | 9.82 |
| September 2018 | 10.13(39.46) | 15.54 (60.54) | 25.67 (100) | 6.89 | 13.10 | 9.66 |

Note: number in the brackets are the share (%).

The depth (P1) and severity (P2) of rural poverty declined very slowly so that both in 2018 were still higher than in 2014 (Table 2). The increase in the depth and severity index of high poverty indicates that the rural poor tend to be poorer (further away from the poverty line) and the distribution of income among the poor is getting worse. However, both the depth and the severity of poverty have consistently declined since March 2017. The four main parameters of poverty, the absolute number, prevalence, depth, and severity of poverty in rural areas, have decreased consistently since March 2017. March 2017 is a milestone in the success of poverty reduction in rural areas.

Table 2. Development of rural poverty March 2014–September 2018.

| Year       | Amount (thousand people) | Percentage amount (P0) | Depth index (P1) | Severity index (P2) |
|------------|--------------------------|------------------------|------------------|---------------------|
| March 2014 | 17.77                    | 14.17                  | 2.26             | 0.57                |
| September 2014 | 17.37             | 13.76                  | 2.25             | 0.57                |
| March 2015  | 17.94                    | 14.21                  | 2.55             | 0.71                |
| September 2015 | 17.89              | 14.09                  | 2.40             | 0.67                |
| March 2016  | 17.67                    | 14.11                  | 2.74             | 0.79                |
| September 2016 | 17.28              | 13.96                  | 2.32             | 0.59                |
| March 2017  | 17.49                    | 13.93                  | 2.49             | 0.67                |
| September 2017 | 16.31             | 13.47                  | 2.43             | 0.65                |
| March 2018  | 15.81                    | 13.20                  | 2.37             | 0.63                |
| September 2018 | 15.54            | 13.10                  | 2.32             | 0.62                |

Source: CBS 2018

Most of the heads of households in rural areas worked in the agricultural sector (A), still reaching 58.04% in March 2017, a slight decrease from 59.14% in March 2014. The share of household heads working in the industrial sector (I) also declined from 6.37% in March 2014 to 5.00% in March 2017. The service sector (S) is the second largest provider of employment, reaching 28.10% in March 2017, an increase from 26.17% in March 2014. Structure absorption of the labor force follows the dominant sequence of the Agriculture, Services and Industry sectors (AIS pattern) in the period March 2014-March 2017 (Table 3).

In addition to not experiencing a change in pattern, the direction of changes in the structure of employment in rural areas during the period March 2014–March 2017 is also seen as inconsistent with the general phenomenon of transformation of the economic structure that the share of employment in agriculture (A) decreased and was followed by an increase in the share of the industrial sector (I) until the composition changes from the dominance pattern of the Agriculture-Industry-Services (AIS pattern)
to the Industrial-Agricultural-Other sectors (IAS pattern), then followed by an increase in the share of the service sector (S) to a steady transformation with the order of dominance of the service-industry-sector. Agriculture (SIA pattern) [11,14]. The decline in the share of the agricultural sector is in accordance with the general phenomenon. Anomalies occur in the decline in the share of the industrial sector and an increase in the share of other sectors. Structural transformation anomaly is also reflected in the type of work in farming and agricultural labor which tends to increase from 5.56% in March 2014 to 6.46% in March 2017. It is presumed that the structural change anomaly has caused the slow reduction of poverty in rural areas and remains high. poverty in the agricultural sector.

**Table 3.** Share of number of rural households by main occupation of the head of household in March 2014 and March 2017 (%).

| No. | Sector/type of employment | March 2014 | March 2017 |
|-----|---------------------------|------------|------------|
| 1.  | Agriculture (A)           | 59.14      | 58.04      |
|     | Farming                   | 53.58      | 51.58      |
|     | Farm workers              | 5.56       | 6.46       |
| 2.  | Industry (I)              | 6.37       | 5.00       |
| 3.  | Other sectors (S)         | 26.17      | 28.10      |
| 4.  | Does not work             | 8.32       | 8.87       |
|     | Total                     | 100.00     | 100.00     |

Source: CBS, Susenas March 2014 and March 2017.

3.2. **Dynamics at the farm household level**

The main sources of income for PATANAS survey respondents are rice fields, dry fields, and gardens or it can be said that farmers still rely on land-based income sources. The respondents' annual income in the paddy field agroecosystem increased from IDR 11.9 million, in 2010, to IDR 20.7 million in 2016 (Table 4). The income of respondents in dryland agroecosystems also increased rapidly, especially in dryland based on vegetable crops. Meanwhile, in plantation land agroecosystems, income from plantations decreased from IDR 18.3 million in 2012 to IDR14.4 million in 2018.

**Table 4.** Average income of PATANAS respondents by source (IDR thousand/year).

| Agroecosystem | PATANAS Source of Income | 2007 | 2010 | 2016 |
|---------------|--------------------------|------|------|------|
| Rice field    | Rice field               | 12,320 | 11,927 | 20,763 |
|               | Other farms              | 1,752  | 737  | 1,095 |
|               | Livestock                | -      | 486  | 1,647 |
|               | Non-farm                 | 8,503  | 12,028 | 22,132 |
|               | Total                    | 20,685 | 21,750 | 45,538 |
| Dryland       | Dryland and garden       | 895   | 6,325 | 9,314 |
| Palawija      | Other farms              | 256   | 824  | 2,350 |
|               | Livestock                | 1,813  | 914  | 3,297 |
|               | Non-farm                 | 4,838  | 9,922 | 18,436 |
|               | Total                    | 6,231  | 23,410 | 51,185 |
| Dryland       | Dryland and garden       | 6,231  | 23,410 | 51,185 |
| vegetables   | Other farms              | 857   | 1,560 | 11,222 |
|               | Livestock                | 2,680  | 2,370 | 3,450 |
|               | Non-farm                 | 3,409  | 8,301 | 14,778 |
|               | Total                    | 2,680  | 2,370 | 3,450 |
| Plantation    | Plantation               | 9,492  | 18,232 | 14,353 |
|               | Other farms              | 2,841  | 5,186 | 8,301 |
|               | Livestock                | 330    | 506  | 2,059 |
|               | Non-farm                 | 6,292  | 12,629 | 17,953 |

Source: CBS, Susenas March 2014 and March 2017.
Annual income from non-agricultural sources of income increased consistently across agroecosystem locations. In lowland agro-ecosystems, annual income from non-agriculture increased from IDR 8.5 million in 2007, to IDR 12.1 million in 2010 and IDR 2.2 million in 2016. In dryland agro-ecosystems based on secondary crops, it increased from IDR 4.9 million to IDR 9.9 million in 2011, and to IDR 18.4 million in 2017. In vegetable-based dryland agro-ecosystems, it increased from IDR 3.4 million in 2008, to IDR 8.3 million in 2011, and IDR 14.8 million in 2017. While in plantation land agro-ecosystems, annual income from non-agriculture increased from IDR 6.3 in 2009, to IDR 12.6 million in 2012, and to IDR 17.9 million in 2018. The share of income from the agricultural sector tends to decrease, while the share of industrial income and services tend to rise, which indicates a structural change from the previous sequential dominance of agriculture-service-industry to service-agriculture.

When viewed by category, the number of respondents who in the initial Patasna survey year (paddy fields=2007, dryland=2008, and plantations=2009) were categorized as almost not poor, destitute and suffering, in the next two survey stages generally decreased. In the rice field agroecosystem, respondents who were categorized as very poor or suffering decreased from 92 people or 16.4% of the total respondents in 2010 to 70 people or 12.5% (Table 5). In dryland agroecosystems with secondary crops, respondents categorized as very poor decreased consistently from 84 people in 2008 to 44 people in 2011, and 38 people in 2017.

In plantation agroecosystems, the number of respondents in the very poor or suffering category decreased from 56 people in 2009 to 34 people in 2011, and slightly increased to 35 people in 2018. On the other hand, in the non-poor category, the number of respondents consistently increased in the three rice fields agroecosystems, palawija-based dryland and vegetable-based dryland. Meanwhile, in plantation agroecosystems, the number of respondents in the non-poor category actually decreased from 195 people in 2012 to 170 people in 2018 after increasing from 158 people in 2009 to 195 people in 2012.

By observing that the number of respondents in the near-poor, near-poor, and destitute categories tend to be minimal and only in the single digits, while in the non-poor and very poor or suffering categories, the number is very large, which means income inequality is getting bigger. The CBS income Gini index data in rural areas shows that the income Gini index increased from 0.302 in 2007 to 0.329 in 2019 which indicates a widening income inequality.

### Table 5. Percentage of PATANAS survey respondents by poverty level category.

| Categories     | Rice field 2007 | Dryland – palawija 2007 | Dryland – vegetables 2007 | Dryland – plantation 2007 | 2010 | 2011 | 2012 | 2018 |
|----------------|-----------------|-------------------------|---------------------------|---------------------------|------|------|------|------|
| Not poor       | 60.6            | 52.6                    | 58.9                      | 21.9                      | 38.4 | 45.6 | 29.8 | 61.2 | 74.4 | 50.3 | 62.5 | 54.0 |
| Risk poor      | 8.6             | 11.1                    | 11.8                      | 9.5                       | 15.9 | 14.1 | 9.1  | 9.9  | 5.8  | 13.7 | 9.3  | 12.1 |
| Almost poor    | 6.9             | 8.6                     | 6.4                       | 9.1                       | 9.5  | 6.6  | 4.1  | 10.7 | 8.3  | 4.1  | 6.1  | 8.3  |
| Almost not poor| 7.1             | 6.6                     | 3.9                       | 12.0                      | 8.2  | 9.1  | 5.8  | 5.8  | 4.1  | 5.7  | 6.1  | 7.0  |
| Destitute      | 6.9             | 4.8                     | 6.4                       | 12.8                      | 9.1  | 8.7  | 9.9  | 9.1  | 2.5  | 8.3  | 5.1  | 7.6  |
| Suffer         | 10.0            | 16.4                    | 12.5                      | 34.7                      | 19.0 | 15.8 | 41.3 | 3.3  | 5.0  | 17.8 | 10.9 | 11.1 |
| N              | 350             | 561                     | 559                       | 242                       | 232  | 241  | 121  | 121  | 121  | 314  | 312  | 315  |

3.3. The pathways out of poverty

The road map for poor households out of poverty is mapped out as shown in Figure 1. The subjects of the initial policy were smallholders and agricultural laborers in rural areas. The policy objective is to improve the welfare of policy subjects so that they can get out of poverty permanently. The area is divided into rural and urban. The economic sector is divided into the agricultural sector and the non-agricultural sector (industry and services). Each economic sector is divided into a high-productivity
formal subsector and a low-productivity informal subsector. Prosperous households are indicated by employment and/or business in the formal subsector, while poor households are indicated by employment and/or business in the formal subsector.

There are three direct pathways for poor agricultural households to prosper permanently. **Pathway 1:** Upgrading farming. This path is pursued by increasing the scale, efficiency and diversification of farming businesses with innovation programs, intensification and expansion of cultivated land and waters, increasing the number of domesticated animals, and/or transferring commodities to high value ones which can be realized through strengthening and modernizing agricultural businesses. **Pathway 2:** Transfer of work and/or business. In essence, this pathway is to attract farm laborers and smallholders to work and/or establish businesses in the formal non-agricultural sector in rural areas by spurring the development of rural industries, particularly agro-industry and producers of rural household needs, through rural agro-industrialization programs. **Pathway 3:** Urbanization and job and/or business transfer by attracting farm laborers and small farmers to work and/or work in the formal sector in urban areas (urbanization). This path can be realized by spurring the growth of labor-intensive formal manufacturing and service industries as well as the development of rural-urban connectivity infrastructure.

The main effort to realize the right path is managing the transformation of the national economy in relation to the transformation of the agricultural sector. The suggested strategy is to manage the transformation of national development by making agricultural transformation the driving axis of macroeconomic transformation. This strategy basically rests on two interrelated pillars, namely the transformation of the macro economy and the transformation of the agricultural sector. The macro transformation agenda is directed at bringing the Indonesian economy out of the middle income (Lewis) trap. Some parties are of the view that the stagnation of Indonesia's economic growth at around 5%/year in recent years is an indication that the economy has fallen into the middle income trap, remains in a lower middle income status, cannot upgrade to a high-income developed country [2,3]. The phenomenon, also known as the Lewis growth backlogging trap, is a fundamental problem that causes Indonesian agriculture to experience increasingly heavy labor pressures so that poverty remains high.

For this reason, the recommended national development strategy is to make the agricultural sector a driving force for national economic development [15]. That means, agricultural development is made back as a priority for national development as in the New Order era. This view is based on the idea of stages of economic growth, which essentially states that the take-off of an economy from being
dominated by the agricultural sector to an advanced industrial-based one requires the acceleration of growth in the agricultural sector [5].

4. Conclusions
It is an extraordinary achievement that the prevalence of national poverty has fallen to below 10% (single digit) for the first time in Indonesia's history in March 2018. However, the poverty rate in rural areas is still in double digits, namely, 13.10% in September 2018. It is suspected that there has been an anomaly of structural changes both in the national, rural and agricultural sectors. Poverty is an agricultural and rural phenomenon that is increasingly difficult to reduce so that poverty alleviation programs need to be more focused on agricultural households and rural communities.

Three choices of roadmaps are suggested to bring farm households out of poverty. First, upgrading farming businesses by increasing the scale, efficiency and diversification of farming businesses through strengthening and modernizing agricultural businesses. Second, transfer of work and/or business by attracting farm laborers and smallholders to work and/or establishing businesses in the non-agricultural sector in rural areas through rural agro-industrialization programs. Third, migration or urbanization and job or business transfer by attracting farm laborers and small farmers out of the countryside to then work and or do business in the formal sector in urban areas through programs to increase rural-urban connectivity. The suggested strategy to smooth the three paths above is to manage the transformation of national development with the axis of agricultural transformation.

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