Poverty dynamics in Indonesia: empirical evidence from three main approaches

Rudi Purwono [a,*], Wahyu Wisnu Wardana [a,b], Tri Haryanto [a], M. Khoerul Mubin [a]

[a] Department of Economics, Universitas Airlangga, Airlangga Street No.4, Surabaya 60286, Indonesia
[b] Research Institute of Socio-Economic Development (RISED), Gubeng Kertajaya 5C Street No.47, Surabaya 60286, Indonesia

A B S T R A C T

Although the number of studies on poverty dynamics in Indonesia is growing, the findings remain inconclusive. This study aims to reexamine the poverty dynamics in Indonesia by using three main approaches: the spell approach, the component approach, and the equally distributed equivalent (EDE) poverty gap approach. The study employed household panel data from the National Socio-Economic Survey of Indonesia (Susenas) 2008 and 2010 and also the FGT index. The analysis shows that the spell approach tends to underestimate chronic poverty (households remain poor in two consecutive periods of observations). It estimates that 6.7% of the total households experienced chronic poverty. Meanwhile, the conclusion of poverty dynamics under the component approach is sensitive to the choice of poverty parameter of the FGT index. By employing the poverty parameter of $\alpha = 0$, around 11.07% of total households were classified as chronically poor (average expenditure below the poverty lines). However, applying the poverty gap ($\alpha = 1$) and poverty severity ($\alpha = 2$) indicates that the chronic component reached 63.16% and 54.15% of the total poverty, respectively. Likewise, the EDE poverty gap approach also suggests that poverty in Indonesia is mainly chronic at 92% of the total component of poverty. The high percentage of chronic poverty is contributed by the significant cost of inequality.

1. Introduction

New challenges have emerged for Indonesia following its success story of cutting down the poverty rate over the past decades. Although the rate dropped from 24% in 1999 to 9.8% in 2020 (Statistics Indonesia, 2020a), the average pace of the reduction fell from 1.9% between the 1970s and 1990s to only 0.5% between 2002 and 2017 (Yusuf, 2018; World Bank, 2020). This trend may also be exacerbated by the rising income inequality (Balisacan & Pernia, 2002; Ram, 2007; Fosu, 2017), whose Gini coefficient rose from 0.30 in 1999 to 0.39 in March 2020 (Statistics Indonesia, 2020b). Furthermore, Indonesia's vulnerability to poverty level is relatively high, with 30% of the population being either poor or prone to poverty (World Bank, 2020). For example, as the Asian financial crisis hit Indonesia's economy, the share of people living below $3.2 per day (the World Bank's poverty line for lower-middle-income countries) increased from 79.8% in 1996 to 90.2% in 1998. As the economy recovered from the crisis, many poor Indonesians moved out of poverty (Dartanto et al., 2020).

The illustration of the poverty movement above demonstrates that many people may quickly fall into and out of poverty. As poverty is a dynamic phenomenon (Dercon & Shapiro, 2007; Dartanto & Otsubo, 2016), any non-poor households may fall into poverty from one period to the next due to a negative shock like illness, economic crisis, or crop failure. Likewise, poor households may escape poverty after securing a better job, getting a promotion, or benefitting from improved infrastructure (Dartanto & Nurkholis, 2013; Dartanto et al., 2020). With this in mind, Sen (1981) conceptualized two poverty dynamics: chronic and transient poverty. The former is long-term poverty, signifying that households are trapped under the poverty margin for a relatively long period of time. The latter is transitory or temporary poverty, which means that households may move in and out of poverty (Hulme & Shepherd, 2003; Mai & Mahadevan, 2016).

The distinction of poverty dynamics calls for different interventions. Tackling chronic poverty requires human and physical capital investment while tackling transient poverty requires social safety net programs (Jalan & Ravallion, 1998; Hulme & Shepherd, 2003). Measurements are also essential. If chronic poverty is predominant, the priority should be improving access to education and health as part of

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human capital investment (Moeis et al., 2020). If transient poverty is more common, the priority should be providing financial credits or health insurance (Mai & Mahadevan, 2016).

To measure poverty dynamics in question, there are three primary analytical tools (Mai & Mahadevan, 2016). The first tool is the spell approach, which classifies chronically and transiently poor households based on the number of spells where income or expenditure falls below a poverty line (Quinn, 2014; Israeli & Weber, 2014). The second tool is the component approach, which distinguishes permanent component of a household's income or expenditure from its transitory variations. The third is the equally distributed equivalent (EDE) poverty gap approach, which is an extension of the component approach proposed by Duclos et al. (2010), estimating chronic and transient poverty by relaxing the assumption of constant expenditure levels over time (Mai & Mahadevan, 2016).

Previous studies on poverty dynamics in Indonesia have examined the phenomena by using various approaches and datasets, but primarily by utilizing the spell approach. For instance, Alisjahbana and Yusuf (2003), Timmer et al. (2007), Dartanto and Otsubo (2016); and Dartanto et al. (2020) applied the spell approach to panel datasets from the Indonesian Family Life Survey (IFLS). Dartanto and Nurkholis (2013) applied it to the 2005 and 2007 panel datasets from the National Socio-Economic Survey of Indonesia (Susenas). Meanwhile, Akita and Dariwardani (2013) used the component approach to the Susenas panel datasets from 2008, 2009, and 2010 at an individual level. Their analysis sets the poverty parameter of the Foster-Greer-Thorbecke (FGT) index = 0 (poverty headcount ratio), i.e. focusing on the share of individuals whose average expenditure over 2008–2010 fell below the poverty line. All of the studies above consistently suggest that Indonesia's poverty is mostly transient, suggesting social safety net programs policy as a solution. However, a recent study by Mai and Mahadevan (2016) concludes that chronic poverty in Indonesia is significantly more prevalent than the transient one. By employing the EDE poverty gap approach and the panel datasets from the IFLS in four waves (1993, 1997, 2000, and 2007), they found that 76% of the poverty is chronic, which suggests that long-term income growth is a more promising solution, done through investment in human capital.

The research mentioned above suggests that Indonesia's poverty dynamics varies following the approach used. Consequently, the policy making becomes ambiguous. It is also worth noting that the spell approach—the most adopted approach thus far—considers poverty incidence only and overlooks the poverty gap and severity. Under the spell approach, the level of poverty is assumed to be the same across the board. In reality, some poor households may have income or expenditure far below the poverty line, while others have income or expenditure near or around the poverty line. Therefore, relying on the analysis of poverty dynamics on poverty incidence may overstate the transient poverty. Moreover, poverty dynamics analyses in Indonesia have not used much of the component approach and the EDE poverty gap approach, which considers the poverty gap and severity.

This paper attempts to fill the gap by: 1) measuring poverty dynamics in Indonesia by using three approaches (the spell approach, the component approach with various poverty parameter of the FGT index, the EDE poverty gap approach); 2) analyzing how different approach and poverty parameter can result in different conclusions. As a first study that compares three main approaches, the current research aims to show that aggregating poverty dynamics from different approach and poverty parameter may result in different chronic and transient poverty estimates. The results are expected to inform policymakers and analysts in deciding which approach and poverty parameters should be applied in analyzing growing and deepening poverty levels.

The rest of the paper is organized as follows: the second section reviews the literature on the study of poverty dynamics; the third section sets out the data and methodology used in the analysis; the fourth section discusses the results; and the last section concludes the discussion.

2. Literature review

2.1. Poverty dynamics and its Measurements

There are two main approaches to estimate chronic and transient poverty using longitudinal datasets (Yaqub, 2000; Glewwe & Gibson, 2005). The spell approach defines chronic and transient poverty based on the length of poverty spells experienced by households over a certain period of time. The component approach (proposed by Jalan & Ravallion, 1998) decomposes poverty into the permanent and transitory component (Glewwe & Gibson, 2005; Bayudan-Dacuycuy & Lim, 2013). A variation of the component approach is the Equally Distributed Equivalent (EDE) poverty gap approach (Mai & Mahadevan, 2016).

The spell approach classifies individuals or households as chronically poor when the welfare indicator is below the poverty line in all or nearly all observation periods (Baulch & Hoddinott 2000; Baulch & Masset, 2003). This requires an extended duration, although the precise length is arbitrary (Hulme & Shepherd, 2003). Alternatively, transiently poor is used to describe individuals or households whose welfare indicator varies around the poverty line, with most of the time above it (Glewwe & Gibson, 2005; Duclos & Araar, 2006). Several disadvantages of the spell approach are: a) prone to measurement errors (Glewwe & Gibson, 2005); b) may fail to correctly reflect the transitory poverty since it treats a household with two out of six poverty experiences and a household with five out of six poverty experiences as both transitory poor (Haddad & Ahmed, 2003); c) uses the headcount poverty measurement only, ignoring the depth of poverty and inequality of income distribution (Mai & Mahadevan, 2016).

The component approach differentiates permanent and transitory component of a household's income or expenditure (Dartanto et al., 2020). Chronically poor means the permanent component falls below the poverty line (McKay & Lawson, 2003). The most common method to identify the permanent component is the intertemporal mean or average household income or expenditure (Dartanto et al., 2020). In other words, the chronically poor are those with average expenditure over time (during the observations) falling under the poverty line (Glewwe & Gibson, 2005). Meanwhile, transient poverty indicates the variability of welfare indicators relative to its average, which is obtained by subtracting the total components of poverty from the chronic components (Bayudan-Dacuycuy & Lim, 2013; Mai & Mahadevan, 2016). Nevertheless, some drawbacks of the component approach are: a) insensitivity to the number of poverty incidence, for example some households facing poverty most of the time, but getting out of it once (measured from the significantly higher income than they normally have) may not be considered chronically poor; b) decreasing component of total poverty along with the aversion to poverty (α); and c) having no cardinal interpretation (Duclos & Araar, 2006).

To overcome such drawbacks, Duclos et al. (2010) developed an alternative tool known as the equally distributed equivalent (EDE) poverty gap approach. Under this approach, a poor household with welfare indicators falling below the poverty line during all observation periods is differentiated from the poor households which have the same average welfare indicator but with varied poverty experiences. The approach considers a household's risk-aversion to unexpected welfare indicators (Martinez Jr, 2016) and relaxes the assumption of constant income or consumption levels over time (Mai & Mahadevan, 2016).

2.2. Previous studies on poverty dynamics in Indonesia

Several studies have explored the poverty dynamics in Indonesia by using various datasets and approaches but mainly using the spell approach. As a result, the conclusion on poverty dynamics varies following the approach applied in the analysis. One of these studies was conducted by Alisjahbana and Yusuf (2003). Using the spell approach and datasets from the IFLS, they concluded that the poverty profile was predominantly transient. They estimated that 29% of poor households

were categorized as chronically poor. The remaining 71% were considered transient. Studies by Timmer et al. (2007); Widyanti et al. (2009); Dartanto and Otsubo (2016), and Dartanto et al. (2020) also explored the poverty dynamics in Indonesia using the spell approach and panel datasets from the IFLS. All concluded that poverty in Indonesia was predominantly transient.

Meanwhile, Dartanto and Nurkholis (2013) examined poverty dynamics in Indonesia by using the spell approach and panel datasets from the Susenas in two periods (2005 and 2007). Similarly, they found that a vast percentage of the households experienced transient poverty (amounting to 81.11%), and small number faced chronic poverty (18.89%). Moreover, other studies by Skoufias and Suryahadi (2000) and Widyanti et al. (2001) using the same approach, employed a longitudinal dataset called the village survey. The finding shows that that transient poverty was much more prevalent than chronic poverty.

Akita and Dariwardani (2013) also investigated the poverty dynamics in Indonesia by applying the component approach and the Susenas datasets at the individual level in three waves. In this study, they employed the poverty parameter of the FGT index of α equals 0 (poverty incidence). Under this approach, a chronically poor individual is defined as those whose average expenditure in 2008–2010 is below the poverty lines; and transiently poor individuals are those whose average expenditure above the poverty line but fall into poverty in a certain period of time. The research confirmed that roughly 9% of total individuals were chronically poor, whereas almost 17% were transiently poor, and 74% of the observations were categorized as non-poor. Equivalently, chronic and transient poverty contributed around 34.69% and 65.31% of total poverty. Table 1 summarizes the selected previous studies on poverty dynamics in Indonesia.

Unlike the previous studies which suggest that poverty is mainly transient, research by Mai and Mahadevan (2016) shows a contradictory result. By utilizing EDE poverty gap approach and longitudinal dataset

Table 1
Previous Studies on Poverty Dynamics in Indonesia.

Selected studies	Approach	Data Source	Time Period	Chronic Poverty (%)	Transient Poverty (%)
Dartanto et al. (2020)	Spell	IFLS	1993, 1997, 2000, 2007 & 2014	12.00	88.00
Dartanto and Otsubo (2016)	Spell	IFLS	1993, 1997, 2000, 2007	3.20	96.80
Mai and Mahadevan (2016)	EDE Poverty Gap	IFLS	1993, 1997, 2000 & 2007	76.00	24.00
Akita and Dariwardani (2013)	Component	Susenas	2008, 2009 & 2010	34.69	65.31
Dartanto and Nurkholis (2013)	Spell	Susenas	2005 & 2007	18.89	81.11
Widyanti et al. (2009)	Spell	IFLS	1993, 1997 & 2000	40.98	59.02
Timmer et al. (2007)	Spell	IFLS	1993 & 2000	32.46	67.54
Alisjahbana and Yusuf (2003)	Spell	IFLS	1993 & 1997	29.21	70.79
Widyanti et al. (2001)	Spell	Village Survey	1998 & 1999	38.46	61.54
Skoufias and Suryahadi (2000)	Spell	Village Survey	1998 & 1999	30.28	69.72

Source: adapted from Mai and Mahadevan (2016) and other sources.

of the Indonesian Family Life Survey (IFLS) in four waves (1993, 1997, 2000, and 2007), the study estimated that 76% of poverty in Indonesia was chronic. The main claim is that the finding represents both developed and less-developed areas, Islamic and non-Islamic groups, and heads of household with different educational levels. By decomposing the chronic component of poverty into average poverty gap and cost of inequality, the study found that 70% of chronic component of poverty was contributed by the cost of inequality. The research implies that there is a sizeable proportion of households in Indonesia trapped in poverty for a long time. Therefore, investing in human and physical capital will be substantially more effective in reducing poverty.

3. Data and methodology

3.1. Data Source

The data was obtained from the longitudinal datasets of the National Socio-Economic Survey of Indonesia (Susenas), from the Statistics Indonesia (Badan Pusat Statistik or BPS). Specifically, this study utilized the two latest waves of the Susenas panel: 2008 and 2010. Statistics Indonesia does not conduct the Susenas panel survey anymore after 2010. As the research utilized a short period of panel data, the interpretation of the result of this study should be taken with caution. Nevertheless, the current study can complement or challenge the previous studies that result in contradicting findings.

The sample in the datasets covered roughly 68,800 households nationwide in both years. The results of merging and cleaning the datasets yielded 46,196 households. The panel Susenas consists of two primary datasets: the core and the module. The core dataset records detailed information on households' socio-economic characteristics such as education, health, employment, housing. The module dataset collects information on both household's food and non-food expenditure or consumption and shocks and the coping strategy. The study will utilize the household's expenditure instead of income to estimate its welfare due to its reliability and consistency with the economic theory. The current study divided the total expenditure in the corresponding year with total household members to obtain per capita expenditure.

This research employs the poverty lines at provincial levels for rural–urban areas released by the Statistics Indonesia. The poverty line consists of the minimum food and non-food expenditure. In 2008, the national poverty line for rural areas was 161,831 rupiahs per capita per month and 204,896 rupiahs in urban areas. Two years later, the national poverty line for rural areas increased by roughly 19%, whereas that of urban areas rose approximately 14%.

3.2. Empirical framework

3.2.1. The spell approach

Following the previous studies by Alisjahbana and Yusuf (2003); Dartanto and Nurkholis (2013), this study applies poverty measures of Foster, Greer, and Thorbecke (FGT) with α equals zero or poverty headcount index (P_0). The formula of the FGT index is provided below:

$$P_{\alpha,t} = \frac{1}{n} \sum_{i=1}^{q} \left(\frac{Z_t - y_{it}}{Z_t} \right) \alpha \qquad (1)$$

where P is the poverty index, n is the total population, Z_t is the poverty line at time t, Y_{it} represents i^{th} household's per capita expenditure at time t, q indicates the number of households whose per capita expenditure below or exactly at the poverty line, α is the poverty parameter of the FGT index with the value of 0, 1 or 2. The α equals 0, 1, and 2 indicates headcount index, poverty gap index, and poverty severity index, respectively.

The chronically poor are defined as households whose per capita expenditure is below the poverty lines, both in 2008 and 2010. Transiently poor indicates households with a per capita expenditure below

the poverty lines either in 2008 or 2010.

Particularly, households with expenditure below the poverty line in 2008 and then above the poverty lines in 2010 are categorized as transiently poor (+), and vice versa. Finally, households with per capita expenditure above the poverty lines both in 2008 and 2010 are to be classified as non-poor. In this research, the analysis focuses on the classification of the two categories only: chronic and transient (either (+) or (-)). The illustrative definition of poverty dynamics under the spell approach is shown in the Fig. 1.

3.2.2. The component approach

Let Y_{it} be per capita expenditure of household i in year t ($t = 1, 2, ..., T$). To make each per capita expenditure of every households comparable across time, let us divide Y_{it} by the respective poverty line in year t and called it as a normalized expenditure per capita denoted as Y_{ij}. Thus, when $Y_{ij} = 1$, it indicates that household i has per capita expenditure exactly at the poverty line in year j. Similarly, $Y_{ij} < 1$ shows that a household i has per capita expenditure falls below the poverty line at period j, and vice versa.

Following Jalan and Ravallion (1998), the average per capita expenditure during the observations is used to estimate the chronic component of poverty of household i. The formula to obtain the average expenditure of household i is shown in the equation below:

$$\bar{y}_i = \frac{1}{T} \sum_{j=1}^{t} y_{ij} \tag{2}$$

where T = 2 in this study (2008 and 2010). The value of $\bar{y}_i < 1$ indicates that the average per capita expenditure falls below the poverty line and therefore, the household i could be categorized as chronically poor. Conversely, the value of $\bar{y}_i > 1$ shows that the average per capita expenditure is above the poverty line and thus, the household i is not classified as chronically poor. From the equation above, we can obtain the aggregate chronic poverty, which is estimated as follows:

$$P_\alpha(y) = \frac{1}{n} \sum_{i=1}^{n} \left(1 - \bar{y}_i\right)_{+}^{\alpha} \tag{3}$$

where n is the number of observations, the subscript $(+)$ indicates that when $(1 - \bar{y}_i)$ is negative (i.e., $\bar{y}_i > 1$), it should be equalized into 0. Moreover, α denotes the poverty parameter with the value of 0, 1, or 2. When $\alpha = 0$, the estimation of chronic poverty focuses on the share or percentage of households whose average per capita expenditure fall below the poverty line. When $\alpha = 1$ and $\alpha = 2$, the estimation considers the poverty gap and poverty severity among chronically poor households (those whose average per capita expenditure is below the poverty line). This study employs α equals 0, 1, and 2 to understand how the

changes in poverty parameter under the component approach affect the aggregate poverty dynamics estimation. Previous study by Akita and Dariwardani (2013) that employs the component approach only focuses on the $\alpha = 0$.

To obtain the estimates of transient poverty with $\alpha = 1$ or 2, the total poverty should be computed first. Let us define the poverty gap of each household i as follows:

$$g_{ij} = (1 - yij)_{+} \tag{4}$$

where y_{ij} is the normalized per capita expenditure of household i at time j and g_{ij} is the corresponding poverty gap. When the normalized per capita expenditure y_{ij} is above the poverty line ($Y_{ij} > 1$), the poverty gap g_{ij} equals 0. After that, the total poverty of each household i could be defined as:

$$P_\alpha(g_i) = \frac{1}{T} \sum_{j=1}^{t} g_{ij}^{\alpha} \tag{5}$$

where T = 2 in this study (2008 and 2010), g_{ij} shows the corresponding poverty gaps of each household and α is the poverty parameter (either 1 or 2). Afterwards, we could obtain the aggregate chronic poverty by adding all of the total poverty of each household $P_\alpha(g_i)$ and divide it by total observations (n) as shown below:

$$P_\alpha(g) = \frac{1}{n} \sum_{i=1}^{n} P_\alpha(g_i) \tag{6}$$

Finally, the aggregate transient component of poverty could be estimated by subtracting the aggregate total poverty $P_\alpha(g)$ in the equation (6) from aggregate chronic poverty $P_\alpha(y)$ in the equation (3) as given below:

$$P_\alpha^{transient}(y) = P_\alpha(g) - P_\alpha(y) \tag{7}$$

Furthermore, when the poverty parameter of $\alpha = 0$, the transient poverty is defined as the percentage of those whose average per capita expenditure is above the poverty lines ($\bar{y}_i > 1$) but they experienced poverty from time to time (either in 2008 or 2010) or $Y_{ij} < 1$ for some j.

3.2.3. The equally distributed equivalent (EDE) poverty gap approach

This approach solves the issues in previous tools by utilizing the equally distributed equivalent (EDE) poverty gap. If assigned to all households and in all periods, it would still produce the same poverty measure as that generated by the distribution of poverty gaps (g) (Muyanga et al., 2007). Under the approach, the aggregate total poverty is defined by:
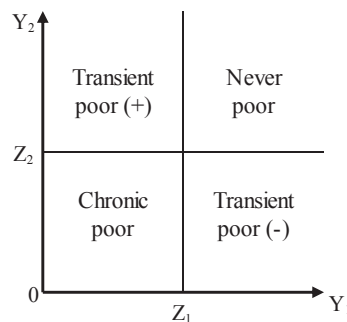
Note: Y_1 and Y_2 indicate a household's per capita expenditure in 2008 and 2010 respectively; Z_1 and Z_2 represent poverty line in 2008 and in 2010.
Source: Dartanto and Nurkholis (2013)

Fig 1. Matrix Classification of Poverty Dynamics Under the Spell Approach. *Note: Y_1 and Y_2 indicate a household's per capita expenditure in 2008 and 2010 respectively; Z_1 and Z_2 represent poverty line in 2008 and in 2010.*
Source: Dartanto and Nurkholis (2013).

$$\Gamma_\alpha(g) = P_\alpha(g)^{1/\alpha} \tag{8}$$

where $P_\alpha(g)$ is the aggregate total poverty obtained in the equation (6) and α is the poverty parameter that equals 2 in this study. Thus, the aggregate total poverty under the EDE poverty gap approach equals the square root of the aggregate total poverty under the component approach.

The next step is to obtain the transient component of poverty of each household i by the following formula:

$$\theta_\alpha(g_i) = \gamma_\alpha(g_i) - \gamma_1(g_i) \tag{9}$$

where:

$$\gamma_\alpha(g_i) = \left(\frac{1}{T} \sum_{j=1}^{t} g_{ij}^\alpha \right)^{1/\alpha} \tag{10}$$

Based on equation (10), the current study applies the poverty parameter of $\alpha = 2$; T equals 2 (2008 and 2010), and g_{ij} is the poverty gap of household i at time j as obtained by equation (4). Similarly, the value of $\gamma_1(g_i)$ in equation (9) is obtained by the formula in equation (10) with $\alpha = 1$.

In addition, the aggregate transient component of poverty could be estimated by summing up each household's transient component of poverty in equation (9) and divided it by the number of observations (n) as shown in the equation below:

$$\Gamma_\alpha^{transient}(g) = \frac{1}{n} \sum_{i=1}^{n} \theta_\alpha(g_i) \tag{11}$$

Lastly, the chronic component of poverty is produced by substracting the total poverty in the equation (8) from the aggregate transient component of poverty as obtained by equation (11) as provided by the the following equation:

$$\Gamma^{chronic}(g) = \Gamma_\alpha(g_i) - \Gamma_\alpha^{transient}(g) \tag{12}$$

Moreover, following a study by Mai and Mahadevan (2016), chronic poverty could be disaggregated into two main components: the average of poverty gap in the population indicated by $\Gamma_1(g_i)$ and the cost of inequality in household EDE poverty gaps denoted by $C_\alpha(\gamma_\alpha)$. Therefore, the chronic component of poverty could be estimated by the formula below:

$$\Gamma^{chronic}(g) = \Gamma_1(g) - C_\alpha(\gamma_\alpha) \tag{13}$$

where $\Gamma_1(g)$ is the average poverty gap and $C_\alpha(\gamma_\alpha)$ is the cost of inequality in EDE poverty gaps between households. Detailed explanation on the formula derivation of EDE poverty gap approach could be found in a study by Muyanga et al. (2007) and Mai and Mahadevan (2016).

4. Results and discussion

4.1. Results

This section presents the main findings of the poverty dynamics from the main analytical approaches: the spell approach, the component approach, and the EDE poverty gap approach sequentially. According to the spell approach's estimation, the national poverty dynamics in Indonesia mainly consist of transient poverty. Fig. 2 indicates that 6.7% of total households (observations) in the study were classified as chronically poor (households that fell into poverty both in 2008 and 2010), which means that chronic poverty contributed 28.28% of the total poverty. Meanwhile, 17% of the total households were transiently poor (those that fell into poverty either in 2008 or 2010), which means that transient poverty contributed 71.72% of the total poverty. This leaves a conclusion that 76.34% of the remaining households were categorized as non-poor in 2008 and 2010.
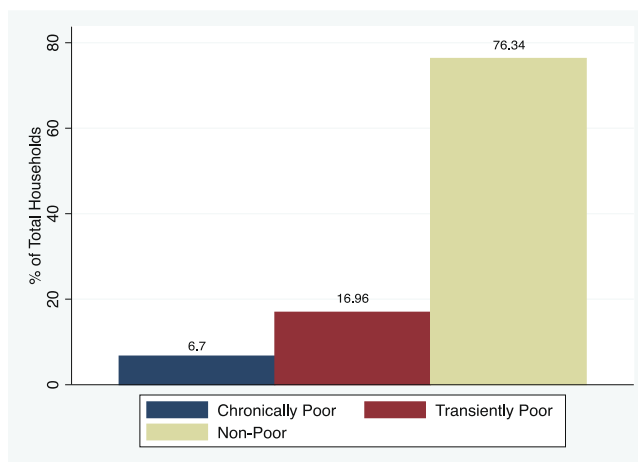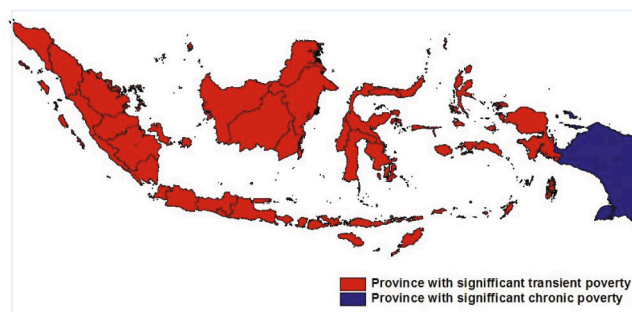

Source: Author's calculation based on Susenas datasets

Fig 2. Poverty Dynamics in Indonesia Under the Spell Approach at National Level. *Source:* Author's calculation based on Susenas datasets.

Nevertheless, disaggregating poverty dynamics into a sub-national level reveals that there are substantial transiently poor households in almost all provinces except for the Papua province, whose households are mostly chronically poor (60.58%) and transiently poor only at 39.42%. Fig. 3 shows that Papua, the easternmost province of Indonesia, indicated by blue color, is the only one with a significant proportion of chronic poverty among the 33 provinces.

The analysis of poverty dynamics using the spell approach at the sub-national level also highlights several provinces with a higher percentage of chronic poverty relative to the national level. These include Aceh, North Sumatra, Lampung, Special Region of Yogyakarta, West Nusa Tenggara, East Nusa Tenggara, Central Sulawesi, Southeast Sulawesi, Gorontalo, Maluku, West Papua, and Papua. The region with the lowest rate of chronic poverty was Bangka Belitung Island. Table 2 shows the detailed information on the percentage of chronically and transiently poor households relative to total poverty in 33 provinces in Indonesia.

The second analysis on poverty dynamics utilized the component approach with a poverty parameter of $\alpha = 0$, 1, and 2. The analysis using the poverty parameter of $\alpha = 0$ indicates 11.07% of the total households had the average per capita expenditure below the poverty line (chronically poor). Meanwhile, 12.58% of the total households were classified as transiently poor. It means that chronic poverty contributed by roughly 47% of the total deprivation, whereas transient poverty 53%. Further analysis by considering the poverty gap ($\alpha = 1$) and severity ($\alpha = 2$) shows the opposite findings. When $\alpha = 1$, the total component of poverty was 0.0268. It comprises 0.0169 or 63% of chronic poverty and 0.0099 or 37% of transient poverty. Likewise, when $\alpha = 2$, the total component of poverty was 0.0074. It consists of 0.0040 or 54% of the

Source: author's calculation based on Susenas datasets

Fig 3. Poverty Dynamics in Indonesia Under the Spell Approach at Provincial Level. *Source:* author's calculation based on Susenas datasets.

Table 2

Proportion of Chronic and Transient Poverty Under the Spell Approach at Regional Level.

Province	Chronic Poverty (%)	Transient Poverty (%)	Province	Chronic Poverty (%)	Transient Poverty (%)
Aceh	28.57	71.43	West Nusa Tenggara	33.33	66.67
North Sumatera	30.97	69.03	East Nusa Tenggara	29.08	70.92
West Sumatera	25.15	74.85	West Kalimantan	21.54	78.46
Riau	21.92	78.08	Central Kalimantan	13.76	86.24
Jambi	20.62	79.38	South Kalimantan	17.92	82.08
South Sumatera	19.51	80.49	East Kalimantan	25.81	74.19
Bengkulu	26.50	73.50	North Sulawesi	19.66	80.34
Lampung	29.72	70.28	Central Sulawesi	32.04	67.96
Bangka Belitung Islands	10.29	89.71	South Sulawesi	27.16	72.84
Riau Islands	16.95	83.05	Southeast Sulawesi	31.42	68.58
Jakarta	14.81	85.19	Gorontalo	38.07	61.93
West Java	26.68	73.32	West Sulawesi	26.88	73.12
Central Java	26.64	73.36	Maluku	35.75	64.25
DI Yogyakarta	32.58	67.42	North Maluku	25.64	74.36
East Java	28.27	71.73	West Papua	37.66	62.34
Banten	17.71	82.29	Papua	60.58	39.42
Bali	18.32	81.68			

Source: Author's calculation based on Susenas datasets.

chronic poverty and 0.0034 or 46% of the transient poverty. Thus, there is a stark difference in the conclusion of poverty dynamics analysis when different poverty parameters of α are used. Fig. 4 illustrates the contribution of chronic and transient poverty under the component approach with $\alpha = 0$, 1, and 2.

Because $\alpha = 0$ (poverty headcount) ignores the poverty gap and severity, the following analysis under the component approach focuses on the $\alpha = 2$. Despite the significant bearing of chronic poverty on total deprivation at national level, further analysis at the regional perspective presents significant variations. There were 18 provinces with notable proportions of chronic components, while the other 15 experienced the opposite condition. Provinces with substantial chronic poverty were Aceh, North Sumatra, West Sumatra, Bengkulu, Lampung, West Java, Central Java, DI Yogyakarta, East Java, West Nusa Tenggara, and East Nusa Tenggara, Central Sulawesi, South Sulawesi, Southeast Sulawesi, Gorontalo, Maluku, West Papua, and Papua. Fig. 5 shows the map of provinces with significant levels of chronic poverty indicated by the color of blue.

The analysis at the provincial level also shows that Central Kalimantan had the lowest chronic poverty component of 24%. Meanwhile, West Papua and Papua had the highest chronic poverty component, 73.20%, and 73.51%, respectively. Several provinces also experienced higher component of chronic poverty relative to the national level i.e., North Sumatra, Bengkulu, Yogyakarta, West Nusa Tenggara, East Nusa
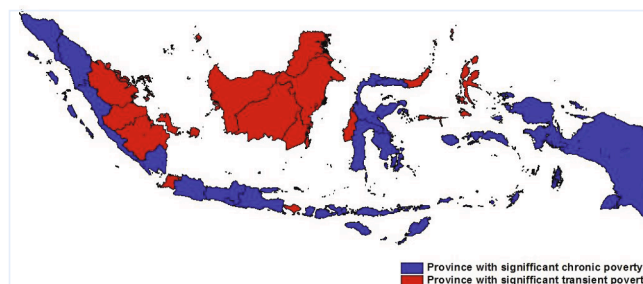
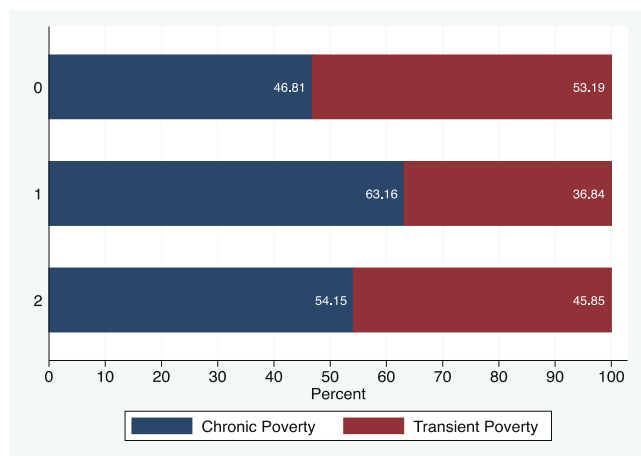*Source:* Author's calculation based on Susenas datasets

Fig 5. Poverty Dynamics in Indonesia Under the Component Approach ($\alpha = 2$) at Provincial Level. *Source:* Author's calculation based on Susenas datasets.

Tenggara, Central Sulawesi, Southeast Sulawesi, Gorontalo, Maluku, West Papua, and Papua. Specific information on the poverty components in 33 provinces in Indonesia is presented in Table 3.

The third analysis decomposes poverty into chronic and transient poverty by employing the equally distributed equivalent (EDE) poverty gap approach. Generally, the result shows that poverty in Indonesia was chronic. In particular, the total poverty was 0.0862 which consisted of 0.0794 (92%) of chronic component and 0.0066 (8%) of transient component of poverty. Fig. 6 represents the poverty component using the EDE approach at national level.

At the national level, it seems that the percentage of chronic poverty was overestimated. Therefore, it is vital to conduct a decomposition analysis of chronic poverty into the average poverty gap and the cost of inequality as provided in the equation (13). The analysis shows that the high proportion of chronic component of poverty of 0.0794 comprising 0.0267 (34%) of average poverty gap and 0.0527 (66%) of cost of inequality.

At the regional level, there were some provinces whose total poverty is relatively high, i.e., Aceh, West Nusa Tenggara, East Nusa Tenggara, South Sulawesi, Gorontalo, Maluku, West Papua, and Papua. Furthermore, all provinces had a significant chronic component of poverty, ranging between 90% and 95%. The decomposition of chronic poverty also reveals that many provinces suffered from high chronic component of poverty due to the cost of inequality. DKI Jakarta had the highest share of the cost of inequality (86%) followed by South Kalimantan (82%). Conversely, Papua had the lowest percentage of cost of inequality (38%). Detailed information on the total poverty, chronic poverty and its decomposition at regional level is given at the Table 4 and Fig. 7.
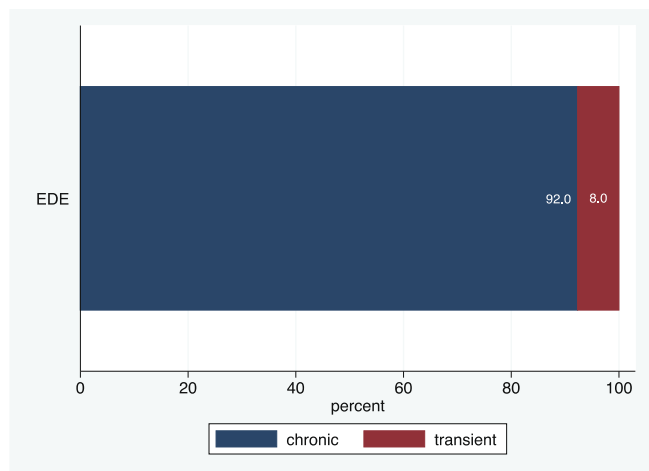

Source: Author's calculation based on Susenas datasets

Fig 4. Poverty Dynamics Under the Component Approach at National Level Using $\alpha = 0, 1$, and 2. *Source:* Author's calculation based on Susenas datasets.

Table 3
The Poverty Dynamics Under the Component Approach ($\alpha = 2$) at Provincial Level.

Province	Total Poverty	Chronic Component	Transient Component
Aceh	0.0118	0.0060 (51%)	0.0058 (49%)
North Sumatera	0.0047	0.0029 (60%)	0.0019 (40%)
West Sumatera	0.0041	0.0021 (51%)	0.0021 (49%)
Riau	0.0035	0.0014 (39%)	0.0022 (61%)
Jambi	0.0028	0.0011 (40%)	0.0016 (60%)
South Sumatera	0.0079	0.0036 (46%)	0.0043 (54%)
Bengkulu	0.0091	0.0049 (54%)	0.0042 (46%)
Lampung	0.0090	0.0048 (53%)	0.0043 (47%)
Bangka Belitung Islands	0.0022	0.0008 (37%)	0.0014 (63%)
Riau Islands	0.0037	0.0015 (39%)	0.0022 (61%)
Jakarta	0.0009	0.0003 (36%)	0.0006 (64%)
West Java	0.0061	0.0033 (54%)	0.0028 (46%)
Central Java	0.0081	0.0041 (51%)	0.0040 (49%)
DI Yogyakarta	0.0090	0.0050 (56%)	0.0040 (44%)
East Java	0.0075	0.0039 (52%)	0.0036 (48%)
Banten	0.0024	0.0008 (35%)	0.0015 (65%)
Bali	0.0020	0.0008 (39%)	0.0012 (61%)
West Nusa Tenggara	0.0109	0.0065 (60%)	0.0043 (40%)
East Nusa Tenggara	0.0171	0.0088 (52%)	0.0083 (48%)
West Kalimantan	0.0033	0.0016 (49%)	0.0017 (51%)
Central Kalimantan	0.0029	0.0007 (24%)	0.0022 (76%)
South Kalimantan	0.0020	0.0009 (42%)	0.0012 (58%)
East Kalimantan	0.0032	0.0016 (49%)	0.0017 (51%)
North Sulawesi	0.0032	0.0016 (50%)	0.0016 (50%)
Central Sulawesi	0.0087	0.0050 (57%)	0.0037 (43%)
South Sulawesi	0.0072	0.0037 (51%)	0.0035 (49%)
Southeast Sulawesi	0.0137	0.0078 (57%)	0.0059 (43%)
Gorontalo	0.0133	0.0079 (59%)	0.0055 (41%)
West Sulawesi	0.0054	0.0022 (40%)	0.0032 (60%)
Maluku	0.0155	0.0098 (64%)	0.0056 (36%)
North Maluku	0.0031	0.0014 (47%)	0.0016 (53%)
West Papua	0.0320	0.0234 (73%)	0.0086 (27%)
Papua	0.0468	0.0344 (74%)	0.0124 (26%)

Source: author's calculation based on Susenas dataset.

Source: Author's calculation based on Susenas datasets

Fig 6. Poverty Dynamics Under the EDE Poverty Gap Approach at National Level. *Source:* Author's calculation based on Susenas datasets.

4.2. Discussion

The results show that the spell approach tends to underestimate chronic poverty. However, in less developed provinces such as Papua, the approach claims that 60.58% of the total poverty is chronic. This finding is reasonable because Papua has had the highest poverty rate across regions for a long while. In 2012, Papua's poverty rate was the

highest nationwide at 39.39%; and despite the development effort, the poverty rate remained high at 26.24% in 2020 (Statistics Indonesia, 2020c).

The underestimation of chronic poverty by the spell approach in this research is in line with the previous studies. Glewwe and Gibson (2005) mentioned that this approach is most likely to underestimate chronic poverty. They claimed that 85% of previous studies on poverty dynamics applying the spell approach with multiple contexts underestimated chronic poverty. To put it in another way, this study supports the claim that the spell approach overestimates transient poverty.

Meanwhile, the conclusion of poverty dynamics under the component approach is sensitive to the choice of poverty parameter. Precisely, if the poverty parameter of the FGT index of $\alpha = 0$ (poverty headcount ratio), a smaller percentage of the households will be classified as chronically poor. This finding is consistent with the previous study by Akita and Dariwardani (2013) that applies the component approach with $\alpha = 0$ to the Susenas panel datasets. If poverty gap and severity are considered in the analysis by setting up the poverty parameter of $\alpha = 1$ and $\alpha = 2$, the conclusions will be different; that is, the chronic component of poverty will be much higher than the transient poverty. The difference is in line with research by Israeli and Weber (2014). They found that the FGT parameter significantly affects the poverty dynamics analysis. The use of poverty parameters of $\alpha = 0$ and $\alpha = 2$ yields different results. As mentioned previously, using the FGT index of $\alpha = 0$ ignores the severity level of the poverty; while using $\alpha = 1$ or $\alpha = 2$ gives more weight to the severity level. We argue that the differences in our findings could be attributed to the severe poverty gap among the poor. Even though a smaller percentage of households were categorized as chronically poor (i.e., having average per capita expenditure below the poverty line), it seems that many of them suffered from a considerable poverty gap (per capita expenditure falling far below the poverty line). Therefore, the estimations of poverty dynamics using $\alpha = 1$ or $\alpha = 2$ shows higher percentage of chronic poverty.

The estimation of poverty dynamics using the EDE poverty gap approach also supports the research by Mai and Mahadevan (2016). Although the current study employs a shorter period of panel datasets compared to Mai and Mahadevan (2016), the results confirms that chronic poverty is predominant. This finding is consistent across provinces in Indonesia. Another study by Muyanga et al. (2007) also confirms that the EDE poverty gap approach tends to result in higher chronic component of poverty.

The levels of chronic component of poverty in this study are higher than the findings by Mai and Mahadevan (2016). This difference could be attributed to the datasets employed in the study. Mai and Mahadevan (2016) used four waves of IFLS datasets that cover 13 out of 33 provinces in Indonesia excluding some less developed provinces. Meanwhile, the current study utilized Susenas dataset that covers all provinces in Indonesia, including the under-developed provinces, which affects the estimates.

Furthermore, the decomposition analysis shows that the high percentage of chronic component of poverty could actually be attributed to the cost of inequality nationwide. Hulme and Shepherd (2003) refer to cost of inequality as relative chronic poverty, which refers to households that are persistently located around the same quantile of the income distribution (Ribas and Machado, 2007). While many people move in and out of poverty quickly from time to time, a certain percentage of individuals or households are trapped under the relative poverty line with a notable poverty gap. Thus, we believe that although the number or percentage, more people in Indonesia experience poverty transitions, some people at the poorest quantile of income distribution might remain poor, with significant poverty gap, for a relatively long time. Mai and Mahadevan (2016) argue that the high cost of inequality might reflect the wage gap or unequal job opportunities among the people.

On the contrary, the cost of inequality in Papua was relatively low compared to other regions, achieving only 38% of chronic poverty. It implies that a vast majority of Papuans did not move into and out of

Table 4
The Poverty Dynamics Under the EDE Poverty Gap Approach at Provincial Level & Its Decomposition.

Province	Total Poverty	Transient Component	Chronic Component	Decomposition of Chronic Poverty	
				Average Poverty	Cost of Inequality
Aceh	0.1086	0.0097 (9%)	0.0988 (91%)	0.0389 (39%)	0.0599 (61%)
North Sumatera	0.0689	0.0039 (6%)	0.0650 (94%)	0.0178 (27%)	0.0473 (73%)
West Sumatera	0.0644	0.0042 (7%)	0.0602 (93%)	0.0165 (27%)	0.0437 (73%)
Riau	0.0594	0.0041 (7%)	0.0553 (93%)	0.0140 (25%)	0.0412 (75%)
Jambi	0.0524	0.0033 (6%)	0.0492 (94%)	0.0113 (23%)	0.0379 (77%)
South Sumatera	0.0889	0.0082 (9%)	0.0807 (91%)	0.0293 (36%)	0.0514 (64%)
Bengkulu	0.0954	0.0083 (9%)	0.0871 (91%)	0.0336 (39%)	0.0535 (61%)
Lampung	0.0951	0.0086 (9%)	0.0865 (91%)	0.0355 (41%)	0.0510 (59%)
Bangka Belitung Islands	0.0474	0.0029 (6%)	0.0445 (94%)	0.0094 (21%)	0.0351 (79%)
Riau Islands	0.0608	0.0042 (7%)	0.0567 (93%)	0.0135 (24%)	0.0432 (76%)
Jakarta	0.0300	0.0013 (4%)	0.0288 (94%)	0.0039 (14%)	0.0248 (86%)
West Java	0.0782	0.0056 (7%)	0.0726 (93%)	0.0228 (31%)	0.0498 (69%)
Central Java	0.0902	0.0080 (9%)	0.0822 (91%)	0.0309 (38%)	0.0513 (62%)
DI Yogyakarta	0.0949	0.0077 (8%)	0.0872 (92%)	0.0338 (39%)	0.0534 (61%)
East Java	0.0868	0.0071 (8%)	0.0797 (92%)	0.0283 (36%)	0.0514 (64%)
Banten	0.0488	0.0032 (6%)	0.0456 (94%)	0.0103 (22%)	0.0354 (78%)
Bali	0.0450	0.0027 (6%)	0.0423 (94%)	0.0096 (23%)	0.0327 (77%)
West Nusa Tenggara	0.1042	0.0087 (8%)	0.0955 (92%)	0.0391 (41%)	0.0563 (59%)
East Nusa Tenggara	0.1307	0.0137 (10%)	0.1170 (90%)	0.0556 (48%)	0.0614 (52%)
West Kalimantan	0.0574	0.0039 (7%)	0.0535 (93%)	0.0137 (26%)	0.0398 (74%)
Central Kalimantan	0.0540	0.0042 (8%)	0.0498 (92%)	0.0119 (24%)	0.0379 (76%)
South Kalimantan	0.0451	0.0023 (5%)	0.0428 (95%)	0.0078 (18%)	0.0349 (82%)
East Kalimantan	0.0569	0.0033 (6%)	0.0536 (94%)	0.0139 (26%)	0.0397 (74%)
North Sulawesi	0.0563	0.0037 (7%)	0.0525 (93%)	0.0142 (27%)	0.0384 (73%)
Central Sulawesi	0.0933	0.0073 (8%)	0.0860 (92%)	0.0319 (37%)	0.0541(63%)
South Sulawesi	0.0847	0.0066 (9%)	0.0781 (91%)	0.0255 (33%)	0.0527 (67%)
Southeast Sulawesi	0.1171	0.0105 (8%)	0.1066 (92%)	0.0450 (42%)	0.0616 (58%)
Gorontalo	0.1155	0.0104 (9%)	0.1051 (91%)	0.0494 (47%)	0.0557 (53%)
West Sulawesi	0.0737	0.0069 (9%)	0.0668 (91%)	0.0233 (35%)	0.0436 (65%)
Maluku	0.1244	0.0109 (9%)	0.1134 (91%)	0.0523 (46%)	0.0611 (54%)
North Maluku	0.0556	0.0033 (6%)	0.0522 (94%)	0.0129 (25%)	0.0393 (75%)
West Papua	0.1789	0.0145 (8%)	0.1644 (92%)	0.0800 (49%)	0.0844 (51%)
Papua	0.2163	0.0193 (9%)	0.1970 (91%)	0.1225 (62%)	0.0745 (38%)

Source: Author's calculation based on Susenas datasets.
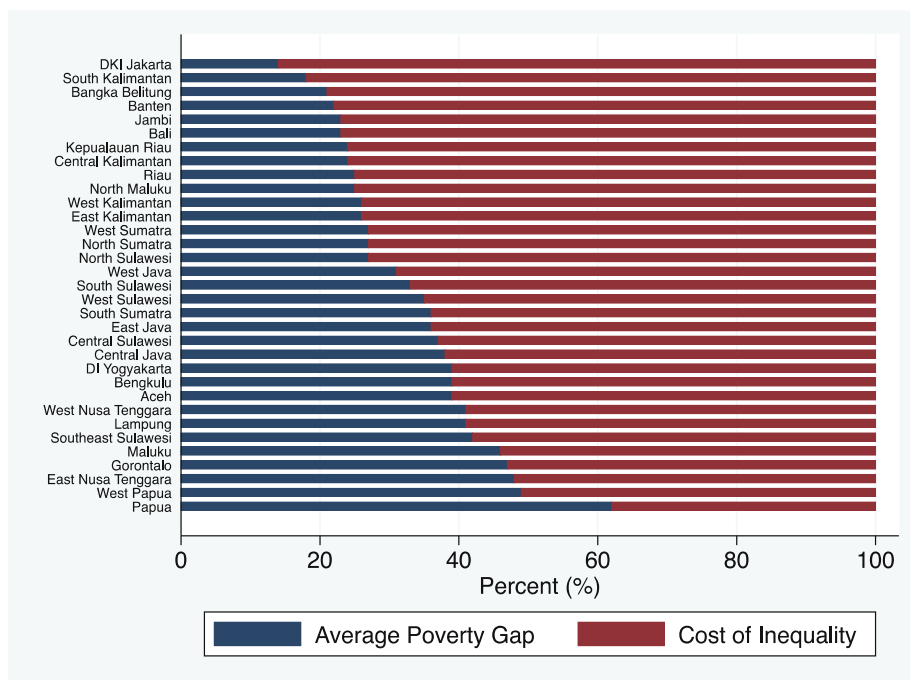
Source: Author's calculation based on Susenas datasets

Fig 7. Chronic Poverty Decomposition. *Source:* Author's calculation based on Susenas datasets.

poverty, i.e., there was a slight movement of welfare transitions among the households. To put it in another way, majority of Papuans suffered long-term poverty. Meanwhile, DKI Jakarta had the highest share of the cost of inequality to the chronic component of poverty (86%). It indicates that a significant percentage of households experience poverty transitions in DKI Jakarta, while the remaining face long-term poverty with a significant poverty gap.

5. Conclusion

Based on three main approaches, the aggregate conclusions on poverty dynamics analysis yields different findings. The spell approach and the component approach with the poverty parameter of the FGT index of $\alpha = 0$ show poverty in Indonesia is transient. However, the component approach with the FGT index of $\alpha = 1$ or 2 suggests otherwise. Therefore, it is essential for policymakers to examine the issue more closely. If poverty is homogeneous—where poor households have the same level of poverty—applying the spell approach or the component approach with the basis of poverty headcount is preferable. If the deprivation is unequal, i.e., the poverty gap across poor households differs substantially, applying the component approach with the FGT index of $\alpha = 1$ or 2 is better. Similarly, using the EDE poverty gap approach with the FGT index of $\alpha = 2$ (poverty severity) indicates that the chronic component of poverty is much more prevalent. Decomposition analysis shows that the high cost of inequality leads to high chronic poverty. It implies that while many households move in and out of poverty, a particular share of households that are usually located at the bottom quantile of the income distribution cannot escape poverty for a relatively long time. To conclude, considering the poverty gap or severity in the analysis reveals how chronic the poverty could be. But since this research uses very short panel datasets, the interpretation of the findings should be taken with caution.

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CRediT authorship contribution statement

Rudi Purwono: Conceptualization, Methodology, Formal analysis, Resources, Writing - original draft, Supervision, Funding acquisition. **Wahyu Wisnu Wardana:** Conceptualization, Methodology, Formal analysis, Resources, Writing - original draft, Writing - review & editing, Project administration. **Tri Haryanto:** Conceptualization, Methodology, Formal analysis, Resources, Writing - review & editing, Project administration. **M. Khoerul Mubin:** Conceptualization, Methodology, Formal analysis, Resources, Writing - review & editing, Project administration.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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