

Poverty line and multidimensional poverty index through Sustainable Development Goals in Indonesia

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Abstract. The study aimed to determine the poverty line (PL) and the Multidimensional Poverty Index (MPI) integrated with SDGs. Quantitative data on PL and MPI were collected from the central statistics agency, including income, education access, health services, and decent living standards. The data that has been collected are analyzed descriptively to describe the poverty profile in districts/cities in Central Java, Indonesia. The analysis data compares PL and the MPI to identify the differences and gaps. The findings show the existing poverty alleviation programs were still sectoral and partial, so a holistic and coordinated approach was needed. The study highlights the importance of multidimensional strategies to improve quality of life, aligned with the SDGs to ensure effective poverty alleviation.

1 Introduction

The implementation of poverty alleviation programs by Central Java, Indonesia's provincial government, is not yet effective in reducing the number of poor people. Districts/cities with high populations of poor people in Central Java remain unchanged. Central Java found that poverty was often interpreted as absolute poverty, characterized by a lack of income to meet living needs, lack of ownership of resources, and aspects of economic, social, and political structures [1]. People become poor because they cannot secure a decent job that generates enough income or lack the skills or capacity to obtain suitable employment [2–4].

Low-income people need jobs and capacity building. So, poverty alleviation policies must start by opening opportunities for low-income people to get decent jobs and improving people's abilities through various systematic and integrated programs between sectors and regions [5–9]. On the other hand, the implemented poverty alleviation agenda was still sectoral, partial, and temporary, not on target, and it viewed people with low incomes as the object of activity [10–13].

Implementing poverty alleviation programs in Central Java found the phenomenon of mistargeting due to inaccurate data [14]. The program's implementation seems to be more like a gift that promotes consumptive behaviors than productive ones, and there was no education for the community to free people from poverty. Therefore, the program was necessary to improve data collection, review poverty criteria, verify and validate by involving

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the community, and ensure that the program's substance was directed towards productive activities [15–19]. Education or training on poverty alleviation should be added, and local governments should involve the community in preparing programs that follow the community's needs [20]. The program design must consider the community's local needs, capabilities, and potential, which can sort out the targets, whether productive or non-productive groups [21–25].

Poverty alleviation in rural areas in Grobogan Regency and Wonosobo Regency, Indonesia, found that poverty conditions differed between regions [26]. In Grobogan Regency, basic infrastructure problems such as access to roads, bridges, and water affect the affordability of access to education, health, and sanitation. Meanwhile, in Wonosobo Regency, community behaviors due to cultural factors/habits hampered the level of education and sanitation of the community.

Measuring poverty with the absolute poverty approach, expressed in monetary units (purchasing power parity), was inaccurate because poverty in developing countries was multidimensional [3, 27]. The dimensions include a long and healthy life, education, and a decent standard of living. A long and healthy life measures the probability of a population dying before age 40. Education was measured by the percentage of the adult population who were illiterate. A decent standard of living was measured by access to clean water sources, health facilities, and the nutritional status of toddlers.

The Sustainable Development Goals (SDGs) provide a comprehensive framework for addressing the various dimensions of poverty to ensure that no one is left behind. Specifically, Goal 1 aims to end poverty in all its forms everywhere. In contrast, other goals focus on aspects such as quality education (Goal 4), clean water and sanitation (Goal 6), and decent work and economic growth (Goal 8). Integrating poverty lines (PL) and the Multidimensional Poverty Index (MPI) in the context of sustainable development goals (SDGs) allows for a more holistic approach to poverty alleviation. This integration ensures that poverty alleviation efforts are about increasing incomes and improving the overall quality of life.

Although regional poverty alleviation strategies have been prepared, several programs/activities have been implemented, and the data show that poverty rates are still high in Central Java; further studies are needed to better understand the best-required schemes in Central Java. The main problem that needs to be answered is how to get a more comprehensive picture of poverty so that poverty alleviation programs in Central Java are more effective.

The objectives of this study are (1) to determine the poverty profile in Regencies/Cities in Central Java based on the poverty line (PL) and (2) to determine the poverty profile in Regencies/Cities in Central Java based on the Multidimensional Poverty Index (MPI). Integrating these findings with the SDG framework aims to provide actionable insights for more effective poverty alleviation strategies in Central Java.

2 Methods

Quantitative data on the poverty line (PL) and the Multidimensional Poverty Index (PMI) were collected from the Central Statistics Agency or Badan Pusat Statistik (BPS) and other official sources [31]. The data includes indicators such as income, education access, health services, and decent living standards. The data that has been collected is then analyzed descriptively to describe the poverty profile in districts/cities in Central Java. The analysis includes comparing the poverty line and the PMI to identify the differences and gaps. Indicators from PMI were analyzed to determine the most urgent poverty dimensions that require intervention. The Central Statistics Agency collects data such as income, education access, health services, and decent living standards. The collected data was analyzed to describe the poverty profile in districts/cities in Central Java. The analysis includes

comparing the PL and the MPI to identify differences and gaps. Indicators from MPI were analyzed to determine the most urgent poverty dimensions that require intervention. The MPI approach evaluates poverty dimensions such as education, health, and living standards. Each indicator in the MPI was given equal weight to ensure a fair and accurate assessment of each dimension of poverty. The PL and MPI's analysis results were integrated with the relevant Sustainable Development Goals (SDGs), especially Goal 1 (ending poverty in all its forms), Goal 4 (quality education), Goal 6 (clean water and sanitation), and Goal 8 (decent work and economic growth). The analysis results were validated through focused group discussions with stakeholders, including representatives from local governments, non-governmental organizations, and affected communities. Inputs from these discussions are used to confirm the initial findings and ensure the relevance and accuracy of the recommendations produced.

3 Result and Discussion

The study produced poverty profiles in Regencies/Cities in Central Java based on the poverty line (PL) and the Multidimensional Poverty Index (MPI). Data shows that poverty in Central Java has a complex dimension, not only limited to income but also includes aspects of education, health, and living standards. The distribution of series, median, and average food line data has increased from 2012 to 2021, as shown in Fig 1.

The data found that there were outliers of very cheap food lines in Surakarta from 2012 to 2014, which was different from other regencies/cities in Central Java. Increasingly, from 2012 to 2021, the upper limit of the purchase price of food lines in districts/cities in Central Java is larger than the lower limit. Besides, the increase in the upper limit is greater than the increase in the lower limit in purchasing food lines. The depth of poverty was the worst from 2015 to 2017, a huge increase in the upper limit compared to the previous year and afterward. However, precisely because of Covid in 2020, it did not cause too much of an index. The depth and severity of poverty related to purchasing power parity increased from 2013 to 2018, mostly in Wonosobo.

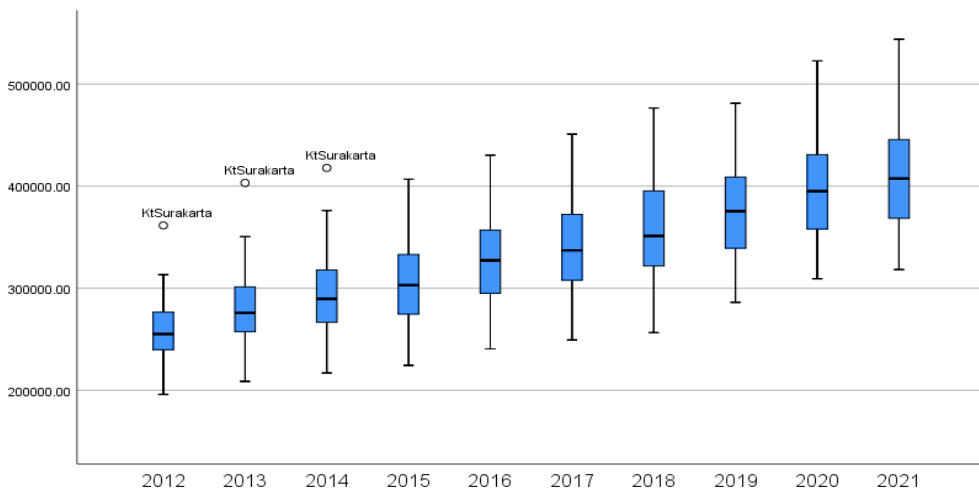


Fig 1. Poverty Line (PL) in Regencies/Cities in Central Java from 2012 to 2021

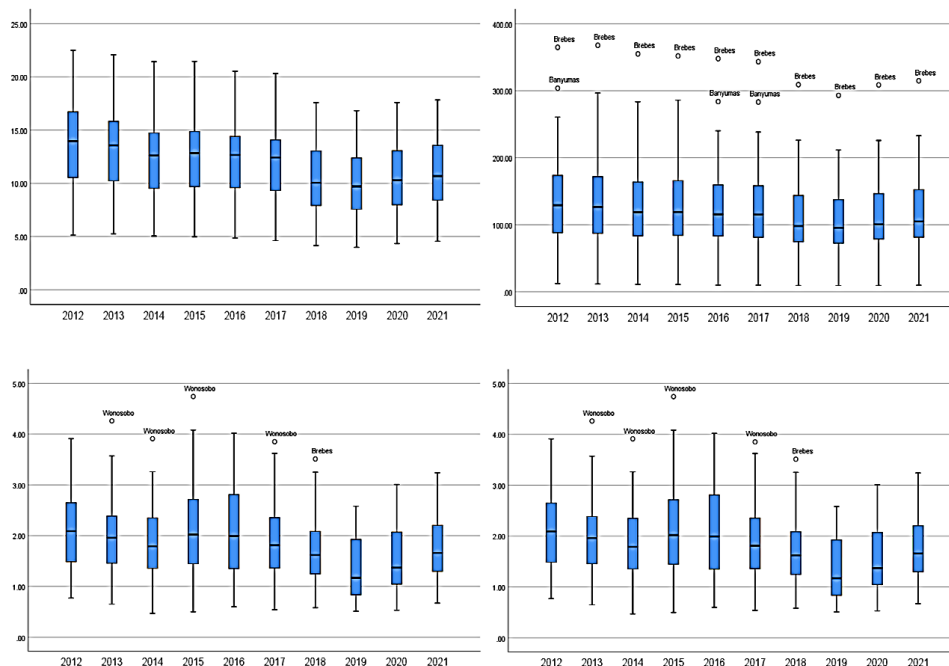


Fig 2. Analysis of Poverty Statistics in Regencies/Cities in Central Java from 2012 to 2021

The severity index was related to the variety of food and non-food ingredients consumed by low-income people. The severity index looks severe in Wonosobo and Brebes Regencies; due to limited purchasing power, people buy less varied food, according to PL. Fig 2 shows that there has been a decrease in the number of poor people in Central Java from 2012 to 2021. However, there is still a poor category for the population, and the severity index and poverty are worsening. The longer they stay in the poor category, the lower the wage level, and in turn, people are unable to supply investment and demand for products and services produced by producers. As a result, no company was interested in entering areas with many poor people and producing unemployment. The perspective was following the vicious cycle theory of poverty. The increase in the number of poor people, from polled data of 350 units (35 city districts in 10 years), leads to an increase in the depth of poverty. It is no different, and the severity of poverty has increased.

Fig 3 shows that the severity of poverty was the same as the severity of poverty, the worse the poverty level. An increase in the depth of poverty causes an equal increase in the severity of poverty. The farther the purchasing power of income from the poverty line, the worse the inability to vary the variety of food and non-food purchased, as shown in Fig 4. The poverty line shows that most districts/cities in Central Java have significant poverty levels. The data reveals that the economy's inability to meet basic needs is still a major problem.

Regencies 2, 3, and 4 are categorized as poor. The headcount index was obtained at 0.8, meaning that 18 out of 20 people in all districts were included in the poor category. As many as 80% of people have poor indicators without more than 0.3 out of 10 poverty indicators in 3 dimensions. Coefficient A was the average relative intensity/depth (weighted average) of the presence of 10 indicators for the poor category. If intensity was known that A was 0.857 or 85.7%, then the number of poor people (80% of people) does not have an average of 85.7% of the 10 MPI poverty indicators. Analyzed using a graph with the x-axis being H and the y-axis being A. Positive linear from bottom left to top right, and not steep enough to show the increase in H has only a slight impact on the rise A.

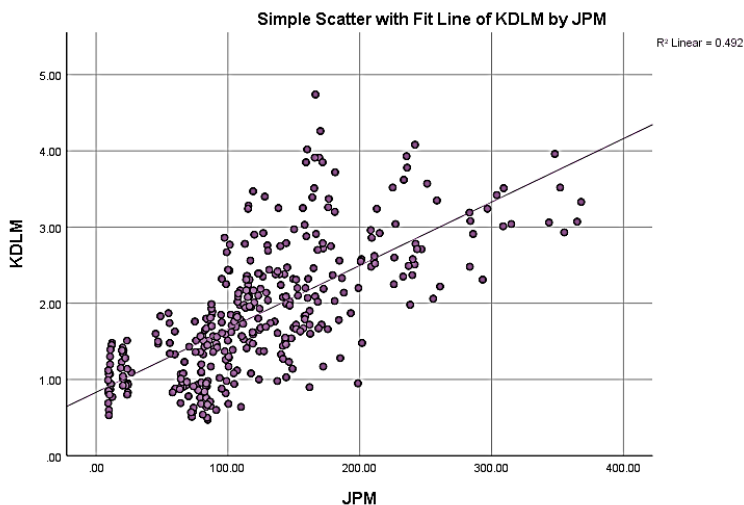


Fig 3. Analysis of Poverty Statistics in Regencies/Cities in Central Java from 2012 to 2021

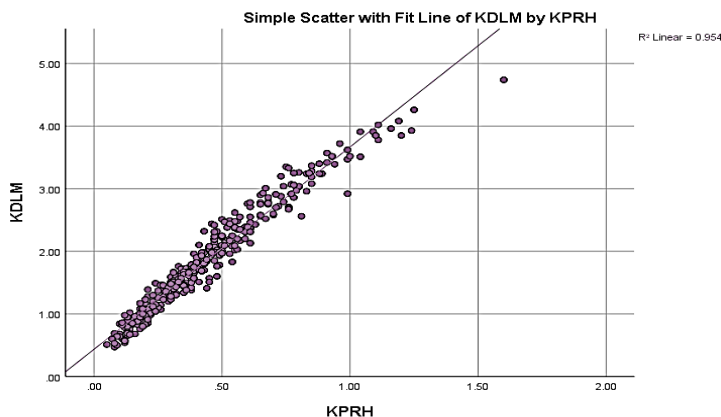


Fig 4. Poverty Severity Index (KDLM) and Coefficient of Variation from Household Income (KPRH)

Table 1. MPI headcount index multiplied by the weighted average weight in each district

Dimension	Indicator Weight	Regencies 1	Regencies 2	Regencies 3	Regencies 4
		2 Household	1 Household	1 Household	1 Household
		4	7	5	4
Years of schooling	0.166667	0	1	1	1
School attendance	0.166667	0	1	1	0
Nutrition	0.166667	0	1	1	0
Birth weight	0.166667	1	1	1	1
Housing	0.055556	0	1	1	1
Sanitation	0.055556	0	1	1	0
Cooking fuel	0.055556	0	1	1	0
Drinking water	0.055556	0	1	1	0

Dimension	Indicator Weight	Regencies 1	Regencies 2	Regencies 3	Regencies 4
		2 Household	1 Household	1 Household	1 Household
		4	7	5	4
Electricity	0.055556	1	1	1	1
Assets	0.055556	0	1	0	1

Table 2. People Considered Poor (H) and Average Poverty Intensity (A)

Region	Percentage of People Considered Poor (H) (%)	Average Intensity of Poverty (A) (%)
Kab. Banjarnegara	7.0	39.5
Kab. Wonosobo	6.5	38.5
Kab. Brebes	6.0	38.0
Kab. Pemasang	6.0	37.5
Kab. Purbalingga	5.5	37.0
Kab. Pekalongan	5.5	37.0
Kab. Banyumas	5.0	36.5
Kab. Kebumen	5.0	36.5
Kab. Tegal	5.0	36.5
Kab. Magelang	4.5	36.0
Kab. Boyolali	4.5	36.0
Kab. Temanggung	4.5	36.0
Kab. Demak	4.5	36.0
Kab. Kendal	4.5	36.0
Kab. Semarang	4.0	35.5
Kab. Blora	4.0	35.5
Kab. Grobogan	4.0	35.5
Kab. Sragen	3.5	35.0
Kab. Karanganyar	3.5	35.0
Kab. Wonogiri	3.5	35.0
Kab. Sukoharjo	3.5	35.0
Kab. Klaten	3.5	35.0
Kab. Batang	3.5	35.0
Kab. Kudus	3.5	34.5
Kota Semarang	3.0	34.5
Kota Surakarta	3.0	34.5
Kota Salatiga	3.0	34.5
Kota Pekalongan	3.0	34.0
Kota Tegal	3.0	34.0

Central Java Province can see a higher number of poor people (H) and an increase in the average absence of 10 MPI indicators (A). The data was divided into three theories from the graphic: first, the low A group, namely Kudus, Wonogiri, Sragen, Karanganyar, Sukoharjo, Surakarta city, and Salatiga. The second group is an outlier of the group, namely the Banjarnegara and Pemasang districts. The third group is in addition to the first and second groups. The outlier group has a unique characteristic: the relationship between H and A is inverted. Banjarnegara Regency, outside of group data, has a poor population of only 7%, but the 7% does not have an average of 39% of the 10 MPI indicators or was quite deep. Pemasang Regency, with an H level or a greater proportion of poor people than other districts/cities, namely 9% of the total population, only has a low average depth compared to Banjarnegara Regency. On average, 9% of the population in Pemasang only has an absence of less than 37% of the 10 MPI indicators lower than Banjarnegara Regency.

The first group has low H and A. The number of poor people in this group is quite low, and the average percentage of ownership from the 10 MPI indicators is low. The second group is most districts/cities in Central Java; namely, the rate of the poor population is

moderate, and the average ownership of the moderate population is also moderate in the ownership of 10 MPI indicators. The results of determining the MPI indicator in each dimension will get the sensor weight of each component and the contribution to the total MPI. Each component can be analyzed differently and complements each other in all three dimensions of MPI. The Aladin indicator is the biggest contributor to MPI; most house walls are still in the poor category. The data analyze the vicious circle of poverty theory from the side of demand and supply, namely when income was low. The supply side explained that low income results in low investment in the industrial sector, so no industry was interested in expanding to the area [15]. As a result, people's income becomes low. The demand side, explaining that when their income is low, people will also ask for goods and services in the market, is also low. As a result, no industry expands to the area, so people's income is low. MPI and Regional Minimum Wage. The quartile divided the Regional Minimum Wage data into four parts: high, upper-middle, lower-middle, and lower-income.

Table 3. Quartile of Regional Minimum Wage

Min	1,805,000
Q1	1,900,200
Q2	1,986,450
Q3	2,104,229
max	2,810,025

Based on Table 3, the distribution of MPI coefficients can be known. The coefficient is interpreted as a multidimensional poverty index, part of the total population with an average ownership of 10 MPI indicators. The data was divided into four quartile groups of Regional Minimum Wage: high, upper middle, lower middle, and lower income. When the Regional Minimum Wage or income decreases, the MPI index increases. The incomes fall or are low, people cannot offer investment to the industrial sector (supply side) and cannot afford to buy more goods and services from the industry (demand side). As a result, no sector invested in the area, and there were no jobs for people. In sequence, people's incomes drop. The decline in income from high to low increased the MPI coefficient.

Table 4. MPI and Average MPI with Income Levels for Regions

Region	MPI	Average MPI
Kab. Batang	0.10	0.10
Kab. Demak	0.08	0.10
Kab. Kendal	0.09	0.10
Kab. Semarang	0.07	0.10
Kota Semarang	0.06	0.10
Kab. Karanganyar	0.13	0.13
Kab. Magelang	0.12	0.13
Kab. Purbalingga	0.15	0.13
Kota Salatiga	0.11	0.13
Kab. Banyumas	0.09	0.09
Kab. Pemalang	0.10	0.09
Kab. Tegal	0.08	0.09
Kota Magelang	0.07	0.09
Kab. Brebes	0.11	0.11
Kab. Kebumen	0.12	0.11
Kab. Sragen	0.14	0.11
Kab. Wonogiri	0.13	0.11

Table 4 shows the number of regions/cities with low income is relatively the same as other income quartile groups. When the district/city population is low-income, it is increasingly unable to meet only 0.3 of the poverty indicators, and worse than the number of poor people, the absence of 10 MPI indicators is more than 60%.

Table 5. Poverty Lines and Multidimensional Poverty Indexes in Various Regions

Region	Poverty Line (%)	MPI (%)	Region
Grobogan	15.2	35.4	Grobogan
Wonosobo	18.5	42.3	Wonosobo
Pemalang	20.1	38.2	Pemalang
Banjarnegara	17.8	41.5	Banjarnegara
Semarang	10.2	20.3	Semarang
Surakarta	8.3	15.6	Surakarta

Table 5 shows that MPI's analysis shows that in addition to income problems, other factors such as access to education, health services, and quality of life contribute to poverty. MPI indicators show that many households in Central Java simultaneously experience shortages in several dimensions of poverty. The study's results reveal the complexity of poverty in Central Java, which an approach to increasing income cannot overcome [4, 15]. The integration between the poverty line and the MPI provides a more comprehensive picture of poverty, allowing for a more precise identification of the need for intervention. Existing poverty alleviation programs were still sectoral and not integrated. An approach that only focuses on increasing income cannot overcome the problem of multidimensional poverty [2, 3, 26]. The MPI approach allows for identifying restricted dimensions of poverty, such as education and health, often overlooked in conventional programs.

Integrating PL and MPI with the SDGs framework shows that poverty alleviation efforts must cover various aspects of life, not only economic aspects. For the community, the study provides insight into improving the quality of life must be done through comprehensive and coordinated interventions, involving various sectors and stakeholders. The novelty of the study lies in the integration of PL and MPI with SDGs. The approach provides a new perspective in designing sustainable poverty alleviation strategies. The findings applied to other contexts with similar poverty characteristics, the potential to become a model in poverty management in various regions [2, 26]. The study emphasizes the importance of a comprehensive and integrated approach to poverty improvement efforts.

4 Conclusion

Poverty has a complex dimension that can't be overcome by increasing income. The integration between the PL and MPI with the SDGs provides a comprehensive picture of poverty, which identifies the need for more targeted interventions. Poverty improvement programs were currently proven to be sectoral and partial, so a more holistic and coordinated approach was needed between sectors and regions. The results show that poverty in Central Java, Indonesia not only caused by a lack of income, but also by limited access to education, health services, and a decent standard of living. Therefore, poverty improvement strategies that involve various aspects of life and active participation of the community are needed to achieve greater effectiveness. Integration of PL and MPI with the SDG framework was assumed to produce useful recommendations to improve the quality of life of the poor in Central Java.

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