

# Integration of various methods for poverty evaluation on fishermen's household on the Northern Coast of Central Java, Indonesia

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**Abstract.** Poverty estimations have been carried out using a monetary approach, the poverty line, but there are always differences in the poverty lines set by the different institutions which measure the poverty. For this reason, it is necessary to have a multidimensional method of poverty evaluation, beyond the income levels. This research aimed to integrate the northern coast of Central Java fishermen poverty measurements by using both approaches, monetary and multidimensional, into a comprehensive method for the poverty status determination. Poverty measurement from the monetary perspective uses the poverty line according to the Asian Development Bank (ADB), the World Bank and the Food and Agriculture Organization (FAO), whereas the multidimensional approach uses the poverty measurement according to the Multidimensional Poverty Index (MPI). The results showed that there were differences in the calculation of poverty in fishermen's households. The integration of poverty analysis showed that fishermen's household poverty is influenced by age, education level, household size, ship weight, catch capacity, fishing time and organizational membership.

**Key Words:** poverty line, multidimensional poverty, fishermen's household.

**Introduction.** Various definitions of poverty have been revealed, being the subject of debate by the poverty observers. The World Bank Institute (2002) defines poverty as deprivation in welfare. According to Sen (2000), poverty can occur due to deprivation of capability, namely freedom to achieve something in one's life. Viewed from the causal perspective, poverty can be divided into two, namely natural poverty and structural poverty. Natural poverty occurs because of scarcity of natural resources so that productivity is low, while structural poverty occurs because the allocation of available resources is not evenly distributed.

The diversity of views on poverty shows that poverty is a multi-dimensional phenomenon, making measuring difficult. However, poverty must still be considered as a whole picture, requiring levers for alleviation by policy making. The World Bank (2007) suggests four reasons for which poverty must be measured, namely: (1) that the poor continue to be on the agenda and they need to be taken care of, (2) the necessity of the identification of the poor and of the interventions regarding the poverty alleviation, (3) the requirements for monitoring and evaluation of the projects or intervention policies addressing the poverty, and (4) the evaluation of the effectiveness of government institutions in poverty alleviation. Measurement of poverty is usually associated with the concept of absolute poverty, which viewed from the economic side is described by welfare indicators. Ravallion & Bidani (1998) suggests three stages of poverty measurement, including (1) defining the welfare indicators used, (2) establishing the minimum standards of welfare indicators, where these minimum standards are often known as poverty lines, and (3) making summary statistics.

Poverty is a problem that is not easy to solve in almost all countries of the world, including Indonesia, because it is a complex, multicriteria problem, involving various aspects of life. The complexity of the concept does not mean that poverty cannot be calculated. There are several methods for its measuring, based on different approaches, concepts and definitions of poverty. Research related to measuring poverty using a monetary approach has been widely carried out (Sugiyarto et al 2015; Braithwaite & Mont 2009; Ravallion & Chen 2019), but there is still a very limited number of studies that measure poverty using a multidimensional approach (Aguilar & Sumner 2020; Ogutu & Qaim 2019). Such a methodology uses two different perspectives: one-dimensional and multidimensional. The one-dimensional perspective measures poverty by a monetary method, through the poverty line based on the level of household income, whereas in the multidimensional perspective poverty can be seen as a multicriteria problem because it is related to economic, social, cultural, political inability and segregation. Comparing income or consumption levels to the welfare standards, such as minimum calorie requirements or poverty lines, is not sufficient, since poverty is related to the inability to reach non-income factors: health, education, clean water and sanitation.

The northern coastal area of Central Java is the second poorest province in Java (Central Bureau of Statistic Indonesia Banten 2020) and the capture fisheries sector is one of the leading sectors of the economy in this region. Current conditions indicate that the northern coast of Central Java has been damaged due to overfishing, so that the marine production in this region continues to decline, which ultimately has an impact on the increasing fishermen poverty. This study aims to measure the poverty of fishermen by integration of the poverty line and multidimensional approaches, in order to provide a comprehensive evaluation method and to identify the socio-economic factors influencing the fishermen's' poverty on the northern coast of Central Java, Indonesia.

Poverty is a condition in which a person or group of people is deprived of the basic rights to maintain and develop a dignified life, including: fulfillment of food needs, health, education, employment, housing, clean water, land, natural resources, healthy environment, security against violence and social inclusion. Poverty is reflected by the inability to meet basic needs, such as food, clothing, shelter, education and health, due to the scarcity of means or to the difficulty of accessing education and employment (Retnowati 2011).

The Central Bureau of Statistics Banten (2020) classified poverty into 4 categories, namely:

1. The relative poverty is defined as a form of poverty that occurs due to the influence of development policies that have not been able to reach all levels of society and its magnitude is estimated by the comparison between the wealth levels of families or households in a particular community.
2. The absolute poverty occurs as a result of the inability to meet the minimum basic needs. The inability can be interpreted as lack of financial means or essential skills.
3. The cultural poverty occurs in the populations of particular regions shackled by customary or cultural factors of, lacking of knowledge, experience, technology, entrepreneurial spirit and social drive to explore the natural wealth in their environment.
4. The structural poverty occurs a result of the incapacity of the social system to empower certain social groups that suffer from the lack of facilities, capital, mental attitude or business spirit needed to get rid of the problem of poverty. This situation is experienced by fishermen who do not have a boat.

The most resilient community groups, with higher levels of adaptation in dealing with poverty, are the fishing communities. Despite all the limitations, fishing communities have a high degree of autonomy and independence to overcome the problems of their daily lives based on the ability to reach the available resources. Such autonomous attitudes, independence and life strategies are obtained through a long process in their struggle with the problem of poverty (Kusnadi 2008). Poverty of fishing communities is a complex problem, due to a harsh natural environment, to the uncertainty in running their

businesses and to their dependence institutions for securing the survival of their families. The social security implements protection forms, both organized by the state and by the social institutions, against certain risks. The absence of alternative institutions in the coastal area to guarantee the survival of fishing communities has caused them to fall into patron-client patterns or institutions which, according to the researchers are often asymmetrical, from an etic perspective, based on mechanisms of perpetual debts subverting the fishers' savings and entrepreneurial capacity. However, based on the emic perspective of the fishermen, the strong patron-client pattern in fishing communities is caused by fishing activities that are full of risks and uncertainties so that they have no other choice but to depend on the owner of capital (patron) (Meiriana 2005).

In Indonesia, poverty in fishing communities can be characterized by the fluctuating income, consumptive expenditure, low family education level, unsupportive institutions, unefficient potential of family labor (wife and child) and lack of access to as shown by Mulyasari et al (2019). In addition, the conditions of poverty and socio-economic disparities in the lives of fishing communities are also characterized by inadequate quality of settlements. Poor fishers' villages will be easily identified from the condition of their residential houses: traditional fishermen have very simple dwellings with bamboo walls, sandy dirt floors, thatched roofs and limited furniture, but also from the low profile of their children's education level, daily consumption patterns and income level. Many children were dropped out before graduating from elementary school or even if they graduate, they could not continue their education to junior high school (Mulyasari et al 2019). The capture fisheries sector is one of the leading sectors in the province and most of the people have a livelihood as fishermen. In Indonesia, fishing communities live under poverty conditions with alarming environmental conditions. The Northern coast of Java faces the Java Sea and the coastal land has muddy characteristics, being very prone to the sea level rise. In addition, overfishing in the northern coastal of Central Java affects the catch volume and value, decreasing the fishermen's level of income.

The northern coast of Central Java is the second poorest province on the island of Java after DI Yogyakarta province (BPS 2020) and the capture fisheries sector is one of the leading sectors of the economy in this region. Current conditions indicate that the northern coast of Central Java has been damaged due to overfishing, so that the production of marine products in this area continues to decline, which in turn has an impact on increasing fishing poverty. This study aimed to measure fishermen poverty by using various approaches such as the poverty line and multidimensional approaches, so that it is expected to provide a comprehensive picture of fishermen poverty and identify socio-economic factors that affect fishermen poverty on the northern coast of Central Java, Indonesia.

## **Material and Method**

***Description of the study sites.*** This research was carried out on the northern coast of Central Java Province which included: Kendal Regency, Batang Regency, Pekalongan Regency and Pemalang Regency (Figure 1). Central Java Province is the second poorest province on the island of Java, situated between two large provinces, namely West Java and East Java. Central Java Province is divided into 29 districts and 6 cities. The total area of Central Java is 3.25 million hectares or around 25.04% of the area of Java (1.70% of the total area of Indonesia).

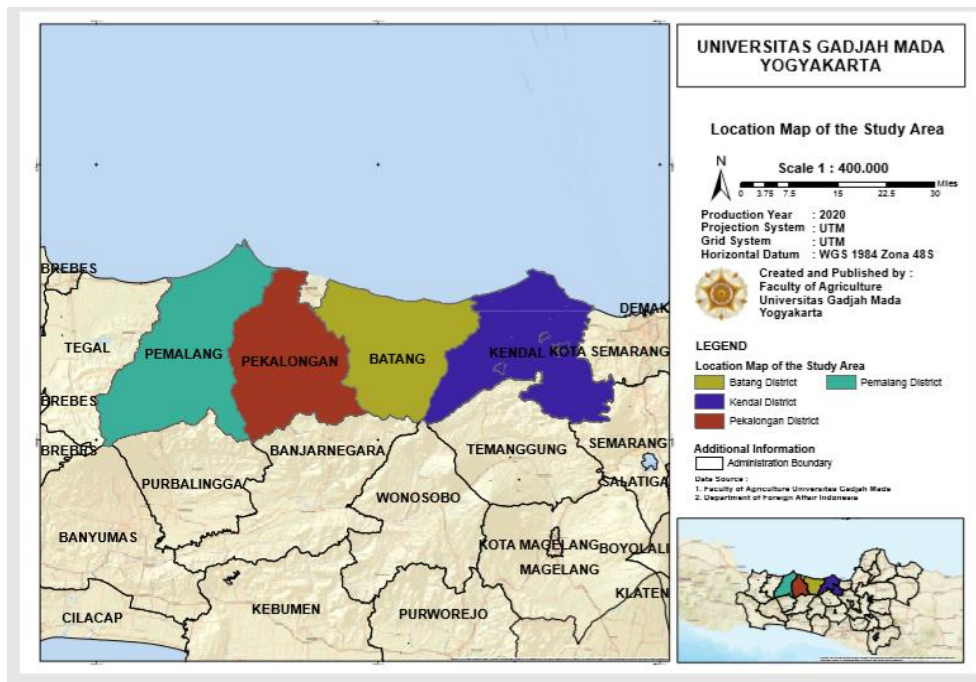


Figure 1. Study area.

**Sampling, questionnaire, and data collection.** The survey was conducted from March to June 2018, among 120 traditional fishermen, fishermen’s household using a structured questionnaire as follows: the first part concerned information on fishermen's socio-economic characteristics consisting of age, years of schooling, experience, household size, income and traditional fisheries activities; the second part gathered information related to fishermen’s household's income and expenditure; the third part gathered information related to the multidimensional poverty indicators, such as nutrition, child mortality, years of schooling, school attendance and standard living indicators.

**Method of analysis.** This study measures poverty by using two approaches: poverty line approach and multidimensional poverty. The poverty line in Indonesia calculates the ration between the per capita income and the consumption expenditure, but this approach is considered insufficient for a comprehensive evaluation. Poverty is a multidimensional phenomenon that is not only related to economic aspects (Figure 2).

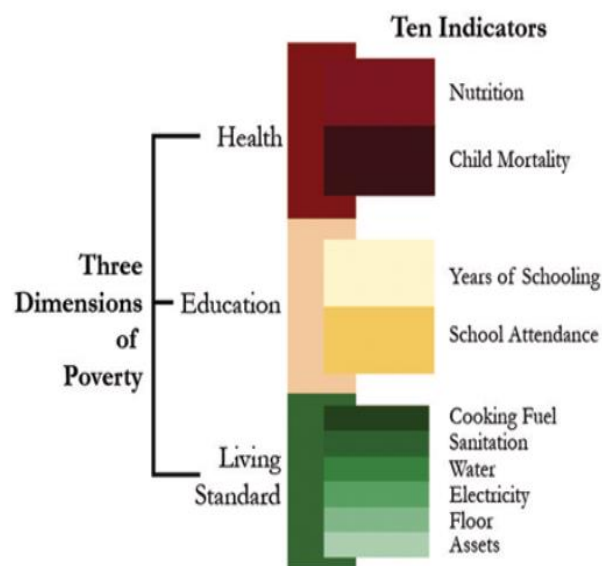


Figure 2. Dimensions and indicators of MPI (Alkire-Foster 2011).

**Poverty line.** The Asian Development Bank (ADB) set a poverty line in Indonesia to a value of USD 1.25 capita<sup>-1</sup> day<sup>-1</sup>. The World Bank retain a value of USD 3.2 capita<sup>-1</sup> day<sup>-1</sup> and the Food and Agriculture Organization (FAO) classified households in developing countries as above the poverty line if yearly capita income is higher than USD 1,500.

**Multidimensional poverty.** Since 2010, the United National Development Program (UNDP) and the Oxford Poverty and Human Development Initiative (OPHI) have agreed on a new poverty measurement initiative through the Multidimensional Poverty Index (MPI) published in the Human Development Report (HDR) in 2010. MPI is a methodology designed to measure acute poverty that can be easily adjusted to incorporate alternative indicators and weights from a national to a sub-regional context. Acute poverty refers to the incapacity to reach the internationally agreed minimum standards for indicators of basic needs, such as nutrition, education and clean water, and to the incapacity to reach minimum standards for indicators for other needs than the basic ones (Table 1).

Table 1

Indicators and measurement of the multidimensional poverty index (Alkire & Foster 2011)

<i>Indicators</i>	<i>Criteria</i>
Nutrition	1=mal nutrition, 0=otherwise
Child mortality	1=child mortality, 0=otherwise
Years of schooling	1=if ≤5 years, 0=otherwise
School attendance	1=if child/children did not attend school (1–8 years); 0=otherwise
Cooking fuel	1=firewood, 0=otherwise
Sanitation	1=lack of public toilet (inadequate sanitation); 0=otherwise
Water	1=clean water at more than 30 minutes' walk; 0=otherwise
Floor	1=ground floor; 0=otherwise
Electricity	1=no electricity; 0=otherwise
Assets	1=no assets like radio, tv, refrigerator, cellular phone, motorbike, car, etc.; 0=otherwise

**Factors affecting fishermen poverty.** This study uses linear regression analysis methods with variables selected as independent variables based on previous studies, such as age (Jamal 2014), years of schooling (Solaymani & Kari 2014), experience (Arliman 2013), household size, ship weight (Salim 1999), catch capacity (Jamal 2014), fishing time (Arliman 2013), fishing distance (Sujarno 2008), number of trips, fishermen group membership, ship crew (Sujarno 2008). The dependent variable is the poverty line ( $Y_1$ ), which is measured by the income obtained by fishermen,  $Y_2$  is a multidimensional weight from the calculation of the MPI indicators. The higher the multidimensional weight, the poorer the fishermen.

$$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \varepsilon_i$$

$$Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \varepsilon_i$$

Where:

$Y_1$  - poverty line (USD day<sup>-1</sup>);

$Y_2$  - multidimensional weight;

$\beta_0$  - constant;

$\beta_1, \beta_2, \dots, \beta_{10}$  - regression coefficient;

$X_1$  - age (years);

$X_2$  - years of schooling (years);

$X_3$  - experience (years);

- X<sub>4</sub> - household size (person);
- X<sub>5</sub> - ship weight (gross tonnage-GT);
- X<sub>6</sub> - catch capacity (ton trip<sup>-1</sup>);
- X<sub>7</sub> - fishing time (hours);
- X<sub>8</sub> - fishing distance (miles);
- X<sub>9</sub> - fishing trips (trips);
- X<sub>10</sub> - ship crew (dummy);
- X<sub>11</sub> - organizational membership (dummy).

## Results and Discussion

**Characteristics of fishermen's household.** Socio-economic characteristics give a description of the characteristics of fishermen in believing, acting and feeling, which include: age, years of schooling, experience, household size, household's income and fishery business characteristics (Table 2).

Table 2

Social-economic characteristics of fishermen

<i>Socioeconomic characteristics</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Std. deviation</i>
Age (years)	21.00	74.00	43.09	10.99
Years of schooling	0.00	16.00	5.84	2.98
Experience (years)	5.00	50.00	26.47	11.61
Household size (person)	1.00	7.00	3.02	1.30
Household income (USD month <sup>-1</sup> )	57.94	2,317.49	334.77	327.37
Ship weight (GT)	1.00	15.00	4.58	2.47
Fishing time (hours)	3.00	20.00	8.48	3.15
Fishing distance (miles)	0.50	50.00	7.08	9.62
Fishing trips (trip)	10.00	30.00	20.47	4.18
Catch capacity (kg trip <sup>-1</sup> )	3.00	2,250.00	230.03	405.86
Ship crew (person)	0.00	13.00	2.51	2.66

Most traditional fishermen on the northern coast of Java have a productive period between 15 and 64 years (Central Bureau of Statistics Banten 2020). Age is an important variable because it is related to physical strength which is an important requirement in working as a fisherman and is also related to fishermen's work productivity.

Education is a considerable effort made by every human being in improving knowledge and skills on the purpose of increasing the quality of individual and common resources. Tadjudin (1993) states that education not only about knowledge increasing, but is also related to the workforce skills improvement (expertise), which in turn can increase the productivity. The quality of human resources is determined by the quality and level of education, but the ability of reasoning, the potential freedom and the depth of knowledge are also affected. A high level of education potentially creates opportunities to get better jobs with relatively higher incomes, implicitly allowing to maintain a relatively better health. Most fishermen have low levels of education. Overall, the average fishermen's education did not reach the 9-year education target that was set and determined by the Government of Indonesia. Such a low level of education reflects the poverty in fishermen's households in Indonesia.

The experience is an important factor in working as a fisherman: it might be a capital for entrepreneurial initiatives, but it certainly improves the fishing technical know-how, including the identification of the fishing ground locations and the use of more sophisticated fishing gear. Fishermen in the northern coastal of Central Java have a fairly high average experience (Table 2), suggesting that they have never switched jobs, by lack of other opportunities, due to their low level of education.

One of the measures of the ship capacity in Indonesia is the gross tonnage (GT), corresponding to the volume of all the space located below the deck of the ship, added to

the volume of the enclosed and open space above the deck (superstructure). GT, is a reference for calculating the productivity of the fishing business. Most of the traditional fishing units are environmentally friendly, using ships weighing  $\leq 10$  GT. At the fish auction place, the mandatory landing locations, the local government gets information on the capacities and the catch volumes from the local marketing actors, since ships of less than 10 GT may not sell catches to foreign vessels.

The fishing time is the amount of time allocated by fishermen to carry out fishing activities in the sea. It comprises the supplies preparation for the fishing operations, the sea operating and the catch selling from fishing, within the limit of eight hours of work at sea and on land (the equivalent of one working day). Table 2 shows that fishermen on the coast of Central Java have an overflow of fishing time ranging from 3 to 20 hours with an average of 8.5 hours. During the shrimp and squid season, fishermen carry out fishing operations in two shifts. In the first shift, fishermen worked between 02.00-10.00 and the second shift was carried out between 16.00-22.00. However, under normal conditions, fishermen usually go to sea at around 05.00 in the morning and return at 12.00 or at most around 14.00 noon.

The fishing distance is the length of the itinerary covered to reach the fishing target, and is influenced by the opportunity to locate an acceptable fishing ground. It can be assumed that the time spent and the distance covered during the fishing trip increases the fish production. Fishermen usually reduce the fishing distance during a high tide. The majority of capture fisheries in the coastal areas of Java have a sea level of between 0.5 and 10 miles (Table 2), because the capacity of the ship is reduced, also limiting the transport of boat fuel reserves.

Catch capacity is the amount of catch obtained by fishermen from fishing activities. The amount and number of catches is related to the level of income earned by fishermen. Table 2 shows that the average catch of fishermen on the northern coast of Central Java is 230 kg, with the lowest catching capacity being 3 kg. Limited ship weight and fishing gear constitute an obstacle for fishermen to get more catching capacity.

Ship crew consists of all people who work on the ship, who are in charge of operating, maintaining and guarding the ship and its cargo. The number of crew members depends on the size of the ship, the weight of the ship and the production capacity of the fishing business carried out by the fishermen. Table 2 shows that most fishermen on the northern coast of Central Java have a crew of 0-4 person. This is because fishing ships are classified as small ships, their catch capacity is not large and the fishing distance is not too far away so it does not require many crew members.

The pattern of the fishing income (especially in traditional fishing) is very different from other types of businesses, such as traders or even farmers. If the trader can calculate the profit he gets every month and the farmer can predict his yield, the fishing activities are speculative and volatile, due to the uncertainties (Kusnadi 2009). When compared with farmers, the structure of the fishermen's income is less diversified because farmers have more time to work outside the agriculture (Riptanti 2005). The complexity of the problems faced by fishermen has an impact on a declining household economy that causes poverty among fishermen and coastal communities. In fact, fishing is their main livelihoods, dominating over the other household income contributions and the daily needs of the whole family relies on it. The poverty related problems afflicting fishermen make them living below the welfare line.

**Poverty line.** The results showed that the average poverty of the fishermen working in capture fisheries in the Central Java coastal area was 5.55%, based on the criteria of the World Bank and FAO (Figure 3). Fishermen in the northern coastal of Central Java have been using cantrang fishing gear in their fishing business, but after the ban they felt a decrease in their income. Cantrang is an active fishing gear by touching the bottom of the water, it is operated by spreading the rope around the circle, followed by lowering the net string, and then the two ends of the rope are displayed. In general, in Central Java, around 12,000 crew members are unemployed because around 300 cantrang fishing ships can no longer go to sea since the government has banned the use of cantrang fishing gear. There is no real solution for cantrang ship owners to be able to replace their

fishing gear. Capital constraints and access to bank credit remain unsolved. Termination of cantrang ship operations without a solution has caused a decrease in the income of the fishing communities. Fishermen switch to the arad, but an average of 45% of their revenue is used for the fishing trips operational costs, so that their income level decreases and cannot meet their household needs. Arad is one of the fishing gears included in the classification of trawl nets, because of its small size so it is also called a mini trawl. The operation is devoted to catching demersal fish, because there is a system of opening and closing the mouth of the net due to the presence of an otter board mounted on the front of the wing tip.

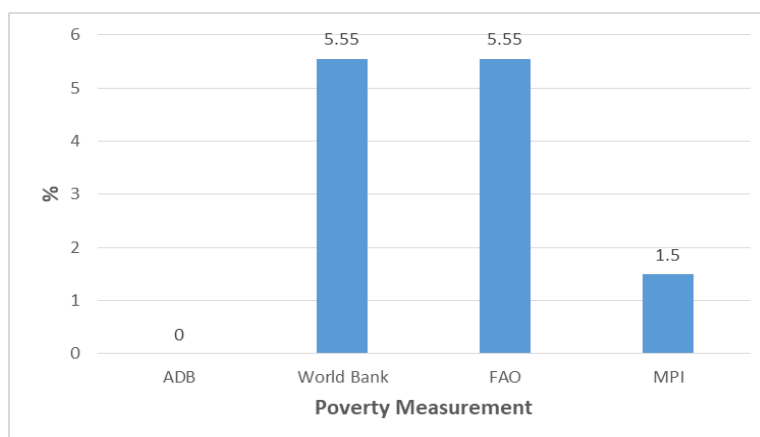


Figure 3. Results of poverty measurement.

**Multidimensional poverty.** The Multidimensional Poverty Index (MPI) is an integrated part of the framework Millennium Development Goals (MDGs), where each MPI indicator is part of the MDGs achievement targets. The existence of a global concern in solving the problem of poverty is the initial rationale of the emergence of the MPI. UNDP considers that expanding the poverty indicators and analyzing poverty in a multidimensional manner is the departing point in a strategy for the global poverty reduction. So far, the problem of poverty has been seen in the narrow scope of the indicators, so that the poverty reduction strategies were also narrow.

Table 3  
Results of the MPI methodology

MPI indicators	Four poor respondents according to MPI analyze				Σ
	1	2	3	4	
Household size	6	3	4	5	18
Health					
Nutrition	0	0	0	0	
Child mortality	1 <sub>(0.167)</sub>	0	0	1 <sub>(0.167)</sub>	
Education					
Years of schooling	1 <sub>(0.111)</sub>	1 <sub>(0.111)</sub>	1 <sub>(0.111)</sub>	1 <sub>(0.111)</sub>	
School attendance	1 <sub>(0.111)</sub>	1 <sub>(0.111)</sub>	1 <sub>(0.111)</sub>	0	
Living standard					
Cooking fuel	0	0	0	0	
Sanitation	0	1 <sub>(0.067)</sub>	1 <sub>(0.067)</sub>	1 <sub>(0.067)</sub>	
Water	1 <sub>(0.067)</sub>	1 <sub>(0.067)</sub>	1 <sub>(0.067)</sub>	0 <sub>(0.067)</sub>	
Electricity	0	0	0	0	
Floor	0	0	0	0	
Assets	0	0	0	0	
Sensor score (>0.333)	0.456	0.356	0.356	0.345	
Intensity of poverty (A)	2.736	1.068	1.424	1.725	6.953



Weight for indicators of health: 0.167.

Weight for indicators of education: 0.111.

Weight for indicators of living standard: 0.067.

Sensor score: the sum of the MPI indicator weights of each respondent.

Intensity of poverty (A) per respondent: sensor score x household size.

$$\text{Multidimensional Headcount Ratio}(H) = \frac{\sum \text{household size of poor respondents}}{\sum \text{household size of total respondents}} = \frac{18}{482} = 0.038$$

$$\text{Intensity of Poverty}(A) = \frac{6.953}{18} = 0.386$$

$$\text{MPI} = H \times A = 0.038 \times 0.386 = 0.015 = 1.5$$

The results of the MPI calculation (Table 3) show that the fishermen poverty index on the northern coast of Central Java reached 1.5 and the poverty of fishermen was largely reflected by the difficulty of households to have access to clean water and by the low access of the children to education (Figure 4). The condition of the clean water in the northern coastal area of Central Java raise concerns, due to the intrusion of sea water and to the subsequent contamination of the ground water around the fishing settlements in Kendal Regency. The condition of settlements adjacent to sea water is one of the obstacles for the community to get clean water. The northern Coast of Central Java is an industrial region that not only has experienced a decrease in land surface but also consumes large volumes of ground water. In addition, poverty is also reflected in the low level of education of fishermen (the average period of studies at elementary school is 5.48 years) and is one of the factors causing high poverty in the region (Figure 4). The school attendance of fishermen's children is also very low. Most of them, although being at the school age, cannot go to school due to poverty and limited household income of fishermen (Figure 4).

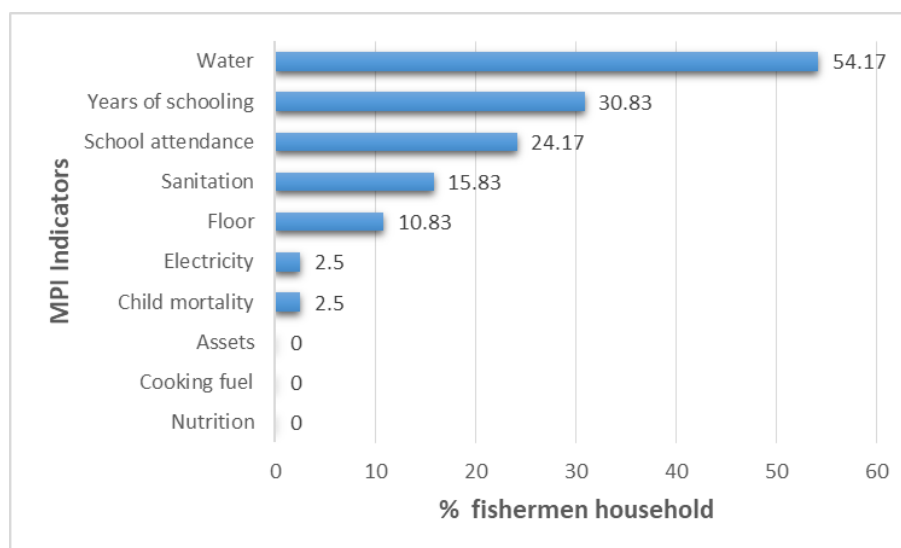


Figure 4. Percentage of fishermen's household based on MPI indicators.

**Factors affecting fishermen poverty.** The analysis of the factors affecting fishermen poverty was carried out using STATA 15 software and the results are shown in Table 4. The poverty level (poverty line and multidimensional poverty) of 120 fishermen was observed and the results show that both models of poverty had close  $R^2$  values (Table 4). Based on the results of the analysis, it is also found that the F test shows significant

results (Prob>F), which means that all the independent variables in each model jointly affect the dependent variables ( $Y_1$  and  $Y_2$ ).

Table 4

Results estimation

Variables	Poverty line ( $Y_1$ )		Multidimensional poverty ( $Y_2$ )	
	Coef.	$P >  t $	Coef.	$P >  t $
Constant	-4.3353	0.618	-0.0027	0.965
Age ( $X_1$ )	0.2876	0.074*	0.0001	0.903
Years of schooling ( $X_2$ )	-0.1777	0.656	-0.0134	0.000***
Experience ( $X_3$ )	-0.2068	0.206	0.0012	0.314
Household size ( $X_4$ )	-0.4453	0.557	0.0112	0.043**
Ship weight ( $X_5$ )	2.1260	0.000***	-0.0062	0.107
Catch capacity ( $X_6$ )	0.0068	0.017**	-1.4000	0.945
Fishing time ( $X_7$ )	-0.5948	0.083*	0.0109	0.000***
Fishing distance ( $X_8$ )	-0.0815	0.451	-0.0010	0.164
Fishing trips ( $X_9$ )	0.1994	0.411	0.0017	0.323
Ship crew ( $X_{10}$ )	0.0590	0.892	0.0045	0.158
Organization membership ( $X_{11}$ )	3.4379	0.129	0.0384	0.020**
	Number of obs = 120		Number of obs = 120	
	F (11,108) = 5.71		F (11,108) = 7.11	
	Prob > F = 0.0000		Prob > F = 0.0000	
	$R^2 = 0.3678$		$R^2 = 0.4200$	
	Adj $R^2 = 0.3035$		Adj $R^2 = 0.3609$	
	Root MSE = 10.288		Root MSE = 0.0744	

\*significant at the 0.1 level; \*\*significant at the 0.05 level; \*\*\*significant at the 0.01 level.

Based on the estimated results (Table 4) obtained using STATA 15 software, the poverty model in the monetary approach can be expressed as follows:

$$Y_1 = -4,3353 + 0,2876X_1 - 0,1777X_2 - 0,2068X_3 - 0,4453X_4 + 2,1260X_5 + 0,0068X_6 - 0,5948X_7 - 0,0815X_8 + 0,1994X_9 + 0,0590X_{10} + 3,4379X_{11} + \varepsilon_1$$

In the multidimensional approach it can be expressed as follows:

$$Y_2 = -0,0027 + 0,0001X_1 - 0,0134X_2 + 0,012X_3 + 0,0112X_4 - 0,0062X_5 - 1,4000X_6 + 0,0109X_7 - 0,0010X_8 + 0,0017X_9 + 0,0045X_{10} + 0,0384X_{11} + \varepsilon_2$$

Poverty is influenced by the age, ship weight and catch capacity and fishing time in the monetary model (poverty line), while in the multidimensional model it is influenced by the years of schooling, household size, fishing time and organizational membership (Table 4).

**Age.** The positive sign of the regression coefficient of this variable means that the higher the age of the fishermen, the higher the income of fishermen, which means that age can reduce poverty in the fishermen's household. With the age increasing, fishermen will also increase their experience (i.e. technical knowledge and understanding of the potential of catchment areas).

**Years of schooling.** The negative sign of the regression coefficient of this variable means that the lower the education of fishermen, the higher the poverty. The low level of education results in limited development capabilities (i.e. knowledge and skills), restricting the future job opportunities, therefore association of poverty and education is highly significant (Suryawati 2005). In their research Siregar & Wahyuniarti (2008) also found that the increasing number of individuals graduating with a diploma had a large

and significant effect on poverty reducing, reflecting the way society values the human capital.

**Household size.** The positive sign of the regression coefficient of this variable means that the higher the number of dependent family members, the greater the income spent on living expenses and the higher the poverty level. According to Sa'diyah & Arianti (2012), a high number of dependent household members can have several causes, such as many children, permanently unproductive family adult members (e.g. elder or disabled people) or temporarily unemployed family adult members. The average number of members in poor households is with around one person higher than in household which are not poor, in both urban and rural areas, suggesting a correlation between a larger number of household members and poverty (Sa'diyah & Arianti 2012). This situation is due to a vicious circle in the fishermen reasonment: on one side, they assume that each child is a guarantee of their future prosperity, but on the other side, households with more children tend to be poorer, compromising their future (TNP2K 2010).

**Ship weight.** The positive sign of the regression coefficient of this variable means that the higher the weight of the ship, the higher the income of the fishermen. Fishermen in the northern coastal area of Central Java have ships with an average weight of 4.58 GT, making them vulnerable to weather changes, high waves and storms. Weight makes fishing boats more stable in the face of changes in weather at sea. But, so far, fishermen were limited by their capital to increase the weight of their ships. Government policies and assistance in providing ships to fishermen are expected.

**Catch capacity.** The positive sign of the regression coefficient of this variable means that the catch capacity has a positive effect on increasing fishermen's incomes which means it can reduce poverty. Fishermen have a high dependency on the capture fisheries sector and the income of the fishermen depends on the fishermen's catches.

**Fishing time.** The positive sign of the regression coefficient of this variable means that the higher the flow of fishing time, the higher the poverty of fishermen. A high fishing time means that there are additional operational costs for fuel, food and other consumables. This is certainly burdensome to fishermen who have an average proportion of 40% of their total income used as operational costs for fishing.

**Organizational membership.** The positive sign of the regression coefficient of this variable means that organizing the fishing community is rewarding, in terms of poverty eradication. In Indonesia, there are still very limited organizations intended for fishermen. Fishermen on the north coast of Central Java prefer to use their free time to repair ships, nets or do other work related to fishing activities compared to participating in various activities related to fishing organizations (e.g. resources planning). Fishing organizations were temporarily formed during the Governmental programs of assistance, but terminated after the projects ended.

**Conclusions.** Formulating policies and solutions to the problem of poverty cannot be done with only a monetary approach. An integration of the poverty concepts, indicators and measurement methods is required, in order to be more comprehensive in describing the conditions of poverty in a community, and combining the monetary and multidimensional approaches provides a possible solution to this issue. Fishermen in the northern coastal area of Central Java, are a group of people classified as poor when compared to other community groups. Fishermen poverty is reflected in the difficulty of access to clean water and by the low level of education of fishermen. In addition, based on the integration of poverty measurement, it can be seen that fishermen poverty is influenced by age, education, household size, boat weight, catch capacity, time spent at sea and organizational participation. The results of this analysis are expected to inform supportive development policies that can be carried out by the Indonesian government in order to overcome the poverty problem affecting in particular the fishing communities.

**Acknowledgements.** This article was written as a part of dissertation research "Poverty, Livelihood Vulnerability, and Adaptation of Fishermen to Climate Change in the Coastal Area of Central Java and Bengkulu". The authors also gratefully acknowledge the financial support of Indonesia Endowment Fund for Education (LPDP) for funding this dissertation research.

**Conflict of interests.** The authors declare no conflict of interest.

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Received: 04 January 2021. Accepted: 10 May 2021. Published online: 22 May 2021.

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How to cite this article:

Mulyasari G., Irham, Waluyati L. R., Suryantini A., 2021 Integration of various methods for poverty evaluation on fishermen's household on the Northern Coast of Central Java, Indonesia. *AACL Bioflux* 14(3):1338-1350.