

POVERTY MAPPING AND POVERTY ANALYSIS IN INDONESIA

Pemetaan dan Analisis Kemiskinan di Indonesia

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ABSTRAK

Tulisan ini menganalisis data-data kemiskinan di Indonesia di tingkat kabupaten dan kota. Pertama, peta kemiskinan dibuat dalam pembagian kabupaten atau kota untuk memberikan gambaran visual tentang kemiskinan. Kedua, menguji hubungan antara kemiskinan berdasarkan konsumsi dan kemiskinan berdasarkan ketidakmampuan memenuhi kebutuhan dasar hidup dengan analisis regresi menggunakan prinsip analisis komponen. Pendekatan ini memperjelas pengaruh tersedianya kebutuhan dasar hidup dan karakteristik kemiskinan lainnya terhadap kemiskinan berdasarkan konsumsi. Persentase penduduk yang berada di bawah garis kemiskinan, Indeks Kedalaman Kemiskinan, dan Indeks Keparahan Kemiskinan tersebar di seluruh kabupaten dan kota, menunjukkan kecenderungan indeks kemiskinan yang lebih tinggi dan lebih parah di pulau-pulau timur Indonesia dibandingkan daerah lainnya. Tidak hanya pengeluaran untuk makanan, tapi kebutuhan dasar hidup dan sektor kerja juga sangat berhubungan dengan kemiskinan berdasarkan konsumsi. Ketersediaan kamar kecil, akses ke air bersih dan pelayanan kesehatan umum dan pendidikan, yang sering diukur sebagai dimensi kemiskinan berdasarkan ketidakmampuan memenuhi kebutuhan dasar hidup, sangat mempengaruhi kemiskinan berdasarkan konsumsi. Untuk mengurangi tingkat keparahan kemiskinan, akses terhadap air bersih paling penting diantara faktor-faktor dalam kesehatan umum. Faktor pendidikan juga berkaitan dengan Indeks Keparahan Kemiskinan; kelulusan dari sekolah dasar dan sekolah lanjutan tingkat atas berbanding terbalik dengan keparahan kemiskinan dan lebih berpengaruh daripada pengeluaran untuk makanan.

Kata kunci : kemiskinan, Indonesia, kebutuhan dasar, pendapatan, pengeluaran

ABSTRACT

This paper analyzes poverty-related data in Indonesia at regency and city level. First, poverty mapping is carried out at disaggregated levels by regency or city to visually identify the prevalence of poverty. Second, the relationship between consumption-based poverty and capability-based poverty is examined using principal component regression. This approach clarifies the influence of basic needs availability and other poverty characteristics on consumption-based poverty. Poverty rate, poverty gap and severity

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poverty are scattered in all regencies and cities, showing the tendency that poverty indices are higher and more severe in eastern islands of the country compared to other regions. In addition to food expenditure, the basic needs and working sector are closely related to consumption-based poverty. The toilet availability, access to safe water and public health services and education, often measured as the dimensions of capability based poverty, are very important to have bearing on consumption-based poverty. To reduce severity of poverty, safe water access is especially the most important factor among other public health variables. Severity poverty also turns out to be correlated with education variables. Completion of elementary and higher education is negatively correlated with severity poverty and more important than food expenditures.

Key words : *poverty, Indonesia, basic needs, income, expenditure*

INTRODUCTION

Indonesia is a large and heterogeneous country. Total population stands at 237.556.363 people and consists of more than 300 ethnic groups with more than 400 different languages (BPS, 2010; Nababan, 1991). The majority population has been concentrated in Java Island, around 59 percent of the total population, occupied only 7.0 percent areas of the whole Indonesia. Since the regional autonomy put in place, the total administrative areas of the Republic of Indonesia are divided into 33 provinces, the number of the administrative areas at lower level also increased to 349 regencies (Kabupaten in Indonesian), 91 municipalities (Kota in Indonesian), 5,656 sub districts, and 71,563 villages (CAS, 2007). Regency and city are not only different in size but both also in demographics and economics. Even regency and city are same in administrative level, but commonly, regencies own larger area and more agricultural activities based economy than cities. Both regency and city have their own local government and legislative body. Such local governments gained greater administrative roles due to the onset of the enactment of Law Number 22 regarding Local Government in 1999 (the law was revised by Law Number 32 Year 2004).

Poverty is one of basic problems facing by developing countries and debate about poverty is not new issue and is still challenging in Indonesia. Under the process of decentralization, each regency and city government are expected to play greater roles to decrease poverty in their regions. In particular, the local government unit had responsibility in the provision of basic needs such as infrastructure, public school, and public health. However, the design and implementation of antipoverty programs have been often hindered by the lack of poverty information at geographically disaggregated levels (Ahmad and Goh, 2007). Moreover, the definition of poverty itself is problematic. Consumption based poverty reflects only a piece of household activities related to income. Sen (1999) called poverty as "capability deprivation". He noted that the more inclusive the reach of basic education and health care, the more likely it is that

even the potentially poor would have a better chance of overcoming penury. His capability approach highlights the importance of poverty reduction and elimination from non-income dimensions. Dhanani and Islam (2000) explained the distinction between capability poverty and consumption poverty and state that the official poverty data series (i.e. consumption poverty) as an inadequate indicator of capability poverty. The important point to eradicate capability poverty which is an underlying structural -and even chronic- phenomenon will change only gradually as a result of sustained economic growth and government interventions targeted at the poor. They measured non-income dimensions of poverty as education and health and found that 25% of Indonesians were unable to meet basic needs. Thus, capability poverty was found to be considerably higher than the 11% incidence of consumption poverty in 1996, suggesting the gap and inconsistency in poverty measurements. This gap and inconsistency could create confusion for policy makers in designing the best policy to tackle poverty problem. Increasing or decreasing in poverty is used as basic consideration in economic, educational, social, health and political decision. Consumption based poverty data is used not only by Indonesian government and NGO but also by international organizations to estimate the budget for unconditional cash transfers to the poor, to select beneficiary areas, to develop program for cross checking and referencing, and to follow up nutrition maps (Ahmad and Goh, 2007).

Since the definition of poverty is multi-dimension and difficult to measure. Therefore, there would be often inconsistency in policy making depending upon which poverty variables are to be considered. For example Simatupang and Timmer (2008) and Mc Culloch (2008) suggest Indonesia's government to reform its rice policy to avoid increasing in rice's price using consumption based poverty, and Dawe (2008) similarly suggest Indonesia's policy makers to open rice import ban and engaging fully with the world market. In other side, capability poverty issues is used by Indonesian researchers to defend rice policy and support high rice price for the sake of poor people especially farmers (Sawit, 2007). In this case, one could see how sensitive and important poverty issues as basic of decision making. Any decision taken would greatly affect the prosperity of the population.

Apart from the debate between consumption based poverty and capability poverty, Sen (1999) has mentioned the relation of income poverty and capability poverty. Enhanced capabilities in leading life would tend, typically, to expand a person's ability to be more productive and earn a higher income, but a connection going from capability improvement to greater earning power is also would be expected (Sen, 1999). Unfortunately, no recent studies focus on the relationships between capability poverty and consumption poverty. To characterize poverty from different perspectives, this paper analyzes many of poverty related data in Indonesia at regency and city level. First, poverty mapping is carried out at disaggregated levels to visually identify the prevalence of poverty. Second, this paper examines the relationship between consumption

based poverty and capability based poverty using principal components regression. This approach clarifies to what extent the availabilities of basic needs and other poverty characteristics are correlated with consumption based poverty.

METHODOLOGY

Data

The poverty data used in this paper are from the National Socio Economic Survey (Susenas) Kor held by Central Bureau of Statistic Indonesia in 2007. Central Agency of Statistic (CAS) is using different method to calculate poverty in district/city level and national and province level. Susenas Consumption Module and Susenas Kor are used to calculate poverty at national and province level and total sample is 68,000 households. At district/city level, CAS is using Susenas Kor with total sample 280,000 households. Susenas Consumption Module includes household expenditure in value and quantity where Susenas Kor includes only household expenditure in value (CAS, 2008).

The datasets include poverty information in 2005, 2006 and 2007, basic needs variables and other social-economic characteristics related to poverty. The consumption based poverty indices are; (1) poverty ratio (P0), (2) poverty gap index (P1) and (3) poverty severity index or squared poverty gap (P2).

Theoretical Framework

Consumption based Poverty

Poverty ratio (P0) also known as headcount index, is the proportion of the population whose consumption (or other measures of living standard) is less than the poverty line. It indicates the incidence of poverty, but it ignores the differences in well-being between different poor households. Poverty ratio (P0) is described as follow:

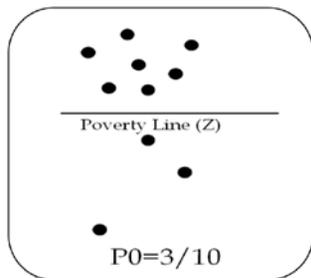


Figure 1. Poverty Ratio (P0)

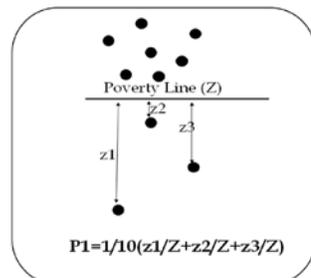


Figure 2. Poverty Gap Index (P1)

Poverty gap index (P1) expresses the poverty gap as a percentage of the poverty line. Poverty gap is the average of the gaps between poor people's consumption level and the poverty line. The poverty gap index indicates the "deepness" of poverty (Figure 2).

Finally, poverty severity index (P2) is also known as squared poverty gap. It puts more weight on the well-beings of the poor by using the squared gaps between poor's consumption level and the poverty line. This measure takes inequality among the poor into account. Poverty severity index (P2) is described as follow:

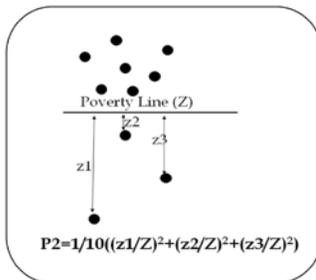


Figure 3. Poverty Severity Index (P2)

Equation (1) is used to calculate poverty indices, this equation is made by Foster-Greer-Thorbecke in 1984 (CAS, 2009).

$$P\alpha = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - y_i}{z} \right]^\alpha \dots\dots\dots (1)$$

- $\alpha = 0$ Poverty Ratio (incidence of poverty)
- $\alpha = 1$ Poverty Gap Index (deepness of poverty)
- $\alpha = 2$ Poverty Severity Index (severity of poverty)
- z = poverty line
- y_i = average of per capita expenditure per month for people under poverty line ($i=1,2,\dots,q$), $y_i < z$
- q = number of people under poverty line n = total population

Basic Needs and Employment Variables Related to Consumption based Poverty

The measurement of consumption based poverty does not consider the deprivation of basic needs and other socio-economic indicators. In this paper,

we try to find the relation of some basic needs variables and consumption based poverty. Variables related to public health are the availability of safe water (WATER), sanitation facility (TOILET), the use of contraception (BC) as part of Birth Control participation program, and BCG vaccinations for children under 5 years old (BCG). School dropped out ratio at elementary school (EDR: elementary school dropped-out ratio) and school completion ratio up to high school (HCR: high school completion ratio) covers the educational achievements at each regency and city. Food expenditure ratio by poor (FE_P) is used to reflect the economic burden attributing to food. Finally, population ratios in agriculture (AGRI) and informal (INFORMAL) sectors are used as variables representing employment situations. All the variables are measured by percentage.

Principal Components Regression Analysis on Poverty Data

To examine the relationships between consumption and capability based poverty, this section employs principal component regression. Dependent variables are consumption based poverty indices, namely, P0, P1, and P2. Socio-economic characteristics representing the availabilities of basic needs and employment situations, all variables listed in Table 2, are used as explanatory variables ($x_j, j=1$ to 9).

Principal components regression involves two steps to avoid multi-collinearity problems in the explanatory variables. First, principal components analysis are practiced on the datasets containing all variables (x_j). We obtain the principal components (\hat{z}_m, m is the number of principal components used) which is consisted of linear relations of variables (x_j). At the second step, the obtained principal components are included as explanatory variables to predict the dependent variable (see Equation (2)). Dummy variables (d_n) are also included in the regression to control both provinces and city effect (4 region dummies with benchmarking Java and 1 city dummy with benchmarking regency). Finally, the estimated coefficients are transformed back from the components (\hat{z}_m) to original explanatory variables (x_j) (see Equation (3)).

$$P_i^{2007} = \sum_m \alpha_m \cdot \hat{z}_m + \sum_n \delta_n d_n \dots\dots\dots (2)$$

$$P_i^{2007} = \sum_{j=1} \beta_j \cdot x_j + \sum_n \delta_n d_n \dots\dots\dots (3)$$

Estimated coefficients in Equation (3) indicate to what extent variables related to poverty are correlated with various poverty indices.

Furthermore, the poverty level in 2007 is not only affected by basic needs variable (x_j), but also the poverty level in previous years. The phenomenon of poverty could be more appropriately described using autoregressive process.

Such autoregressive effect needs to be controlled to properly assess the effectiveness of basic-needs provisions on consumption based poverty. Equation (4) is used to capture the autoregressive effect on the consumption poverty while other relevant variables remain.

$$P_i^{2007} = \gamma \cdot P_i^{2005} + \sum_{j=1} \beta_j \cdot x_j + \sum_n \delta_n d_n \dots\dots\dots (4)$$

γ in the Equation (4) indicates the level of autocorrelation in consumption based poverty. All the estimations are carried out using SHAZAM 10.0 (Whistler *et al.*, 2008) .

RESULTS AND DISCUSSION

Poverty Indices and Mapping in Indonesia

Table 1 shows the poverty indices by regions in Indonesia. In this paper, we divided Indonesia by five regions; Java, Sumatra, Kalimantan, Sulawesi and Islands. The eastern islands (Nusa Tenggara, Maluku, and Papua) are included in Islands.

In Table 1, the mean values of all poverty indices (P0, P1, and P2) are highest in Islands and lowest in Kalimantan, indicating high and severe poverty in the eastern islands of Indonesia. The rankings of P0, P1, and P2 are consistent. Sulawesi, Sumatra, and Java are moderate in poverty indices.

Table 1. Indonesia's Poverty Indices by Regions

		<i>Kalimantan</i>	<i>Java</i>	<i>Sumatra</i>	<i>Sulawesi</i>	<i>Islands</i>
N	sample	53	116	136	69	71
P ₀	Mean	11.22	16.85	17.37	18.24	30.90
	S.D.	5.1	7.9	8.9	7.5	12.4
P ₁	Mean	1.73	2.64	2.85	3.00	6.55
	S.D.	1.0	1.4	1.8	1.5	3.8
P ₂	Mean	0.42	0.65	0.74	0.77	2.07
	S.D.	0.3	0.4	0.5	0.5	1.7

Source: Authors' calculation using data from CAS (BPS, 2008).
 Note: S.D. stands for standard deviations.



Figure 4. Poverty Mapping in Indonesia (P0 : Poverty Ratio)

Source: Authors' calculation using data from CAS (BPS, 2008) with R2.7.1, Maptools (R Development Core Team, 2008).

Figure 4 illustrates the spatial disparities of consumption poverty in Indonesia by each regency and city. Poverty ratio (P0) is scattered in all islands of Indonesia and over both sides of the equator. One can see darker color in eastern islands and lighter color in Kalimantan, indicating that the majority of poverty is in the island of New Guinea. In this vein, this poverty mapping is consistent with Table 1. Furthermore, it is clear that the spatial disparities in poverty exist even within region. For example, high poverty rates can be observable at both northern and southern Sumatra while moderate and lower poverty can be found in the central part of Sumatra. When analyzing Java Island only, the poverty mapping showed that central Java and north coast of East Java had relatively high poverty ratio compared to West Java. Such heterogeneities in consumption based poverty indices might be in part associated with by the basic-needs provided by each local governments.

Table 2. Variables Related to Poverty by Regions (Percentage).

		Java	Sumatra	Kalimantan	Sulawesi	Islands
WATER	Mean	53.58	40.01	37.98	40.95	33.91
availability of safe water	S.D.	17.4	20.4	21.9	16.5	20.7
TOILET	Mean	75.21	69.297	68.923	62.823	57.31
sanitation facility	S.D.	16.2	20.3	16.6	18.6	22.3
BC	Mean	64.53	62.14	67.92	60.54	55.76
birth control program	S.D.	4.9	9.1	4.8	5.7	11.7
BCG	Mean	94.62	85.28	86.65	88.59	86.28
BCG vaccinations	S.D.	7.5	12.8	8.8	8.6	11.9
EDR	Mean	50.68	53.90	57.23	57.89	62.40
school dropped-out	S.D.	7.7	8.0	9.6	8.3	12.1
HCR:	Mean	7.00	8.77	6.07	7.16	6.67
high school completion	S.D.	5.7	5.4	4.0	4.3	5.8
FE_P	Mean	81.17	81.42	81.22	81.26	81.28
food expenditure by poor	S.D.	1.0	1.2	1.0	1.0	1.0
AGRI	Mean	43.18	64.80	68.86	67.80	66.19
work in agriculture	S.D.	26.4	24.8	22.3	21.2	27.2
INFORMAL	Mean	56.76	68.92	73.67	74.21	86.51
work in informal sector	S.D.	17.6	17.8	19.2	16.3	14.4

Source : Author using data from CAS (BPS, 2008).

Note : S.D. stands for standard deviations.

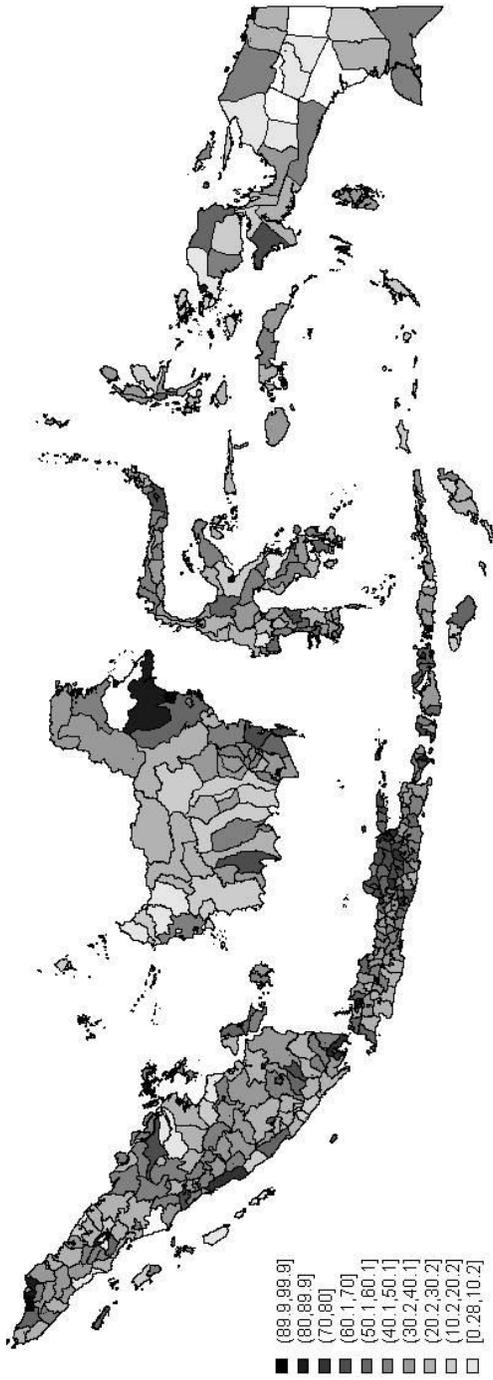


Figure 5. Safe Water Access Mapping in Indonesia
 Source: Authors' calculation using data from CAS (BPS, 2008) with R2.7.1, Maptools (R Development Core Team, 2008).

Variables Related to Consumption based Poverty

In Table 2, the mean values of availability of safe water, toilet, the use of contraception and vaccinations are highest in Java; showing that the average of public health service in Java is more advanced than other regions. In education, the mean value of school dropped out ratio at elementary school is lowest in Java, but the mean value of school completion ratio up to high school is highest in Sumatra. The mean values of food expenditure ratio are similar across five regions. One distinction is the high standard deviations of the food expenditure ratio for the poor (FE_P) in Sumatra. The food price might be varied in Sumatra depending up each regency and city. In employment, one can see that informal sector is major source of employment in the range between 57% and 87%. Agricultural sector (AGRI) is highest in Kalimantan and lowest in Java. Java also has lowest informal sector (INFORMAL), suggesting formal sector is more developed in Java.

Figure 5 illustrates the spatial disparities of safe water access in Indonesia by each regency and city. Safe water or clean water access is defined as water from protected natural water source, water well, Perusahaan Air Minum (PAM) which is government drink water company, or bottled water sold by private company (BPS, 2009). All sources of water mentioned above are safe to drink without causing health hazard (note that except for bottled water sold by private company, others are recommended to boil before consumption). Other sources of water such as water from river, rain, lake and water from unprotected well or natural water sources are considered as unsafe water access and omitted from our calculation.

Result and discussions of Principal Components Regression Analysis

The first and second principal components are used as explanatory variables in the second step regression ($m=2$). The cumulative percentage of the first two Eigen values are calculated as 76%, indicating that the first two principal components account for 76% of the total variations in the explanatory variables.

Estimating Equation (2) revealed that consumption based poverty indexed (P_i , $i=0, 1, 2$) was negatively correlated with the first principal component and positively with the second principal components. Both eigenvectors put higher weight on WATER, BCG, FORMAL, INFORMAL. Only first eigenvector put weight on FE_P. Finally, Equation (3) was transformed back from the components (\hat{z}^m , $m=1,2$) to original explanatory variables (x_j). The estimation result of principal component regression analysis is shown in Table 3.

In Table 3, significant regional and city dummy variables indicate that the prevalence of poverty is different across regions and also between city and

regency. City dummy is estimated to be negative, unsurprisingly indicating lower poverty ratio in city (Kota in Indonesian).

Table 3. Estimation of Principal Component Regression Analysis on Poverty

	P ₀		P ₁		P ₂	
	estimates	t-value	estimates	t-value	estimates	t-value
<u>Regional and City Dummy</u>						
Sumatra	-3.230 ***	-3.27	-0.379	-1.46	-0.054	-0.49
Kalimantan	-10.325 ***	-8.23	-1.659 ***	-5.02	-0.417 ***	-2.99
Sulawesi	-3.501 ***	-3.02	-0.418	-1.37	-0.079	-0.61
Islands	7.346 ***	6.08	2.836 ***	8.91	1.157 ***	8.62
City dummy	-2.756 **	-2.12	-0.618 *	-1.80	-0.198	-1.37
<u>Health and Facilities</u>						
WATER	-0.069 ***	-7.69	-0.011 ***	-4.62	-0.002 **	-2.39
TOILET	-0.071 ***	-5.49	-0.011 ***	-3.32	-0.002	-1.58
BC	-0.002 ***	-3.58	-3.27E-04 **	-2.19	-5.71E-05	-0.91
BCG	-0.024 ***	-5.59	-0.004 ***	-3.38	-7.74E-04	-1.61
<u>Education</u>						
EDR	0.021 ***	6.42	0.003 ***	3.87	7.11E-04 *	1.91
HCR	-0.011 ***	-8.12	-0.002 ***	-4.87	-4.01E-04 **	-2.57
<u>Food Availability</u>						
FE_P	7.99E-05 ***	3.37	1.29E-05 **	2.06	2.19E-06	0.83
<u>Employment</u>						
AGRI	0.062 ***	3.83	0.010 **	2.24	0.003	1.54
INFORMAL	0.060 ***	8.38	0.009 ***	4.99	0.002 ***	2.86
CONSTANT	21.898	10.36	3.506	0.14	0.794	0.08
R-squared	0.558		0.474		0.356	

Data Source: Authors' calculation.

Note: ***: Significant at 1%, **: Significant at 5%, *: Significant at 10%

Poverty rate (P₀) and poverty gap (P₁) are significantly reduced when health and sanitation facilities increase. Both poverty indices decrease when more population could have safe water (WATER) and toilet facility (TOILET). Participation in BCG vaccinations for children under five years old (BCG) and the use of contraception (BC) reflect people's access to basic health services. The more people could access to public health services, the less poverty rate and poverty gap prevail in each regency and city. Among health services and sanitation facilities, availability of safe water is the most important factor to

reduce poverty generally. Severity poverty also decreases when the rate of safe water availability increase with only 5% significance level.

The result in Table 3 also shows that education is important variable that closely related to consumption based poverty indices. Poverty rate (P0), poverty gap (P1) and severity poverty (P2) are all decreased when more population finish high school (HCR). Similarly, poverty indices are positively correlated with school dropped out ratio at elementary school (EDR).

All poverty indices increase when poor people's ratio of expenditure on food increases. The result in Table 3 shows 1% significance for poverty rate, 10% for poverty gap and not significant for severity poverty. It indicates that food availability is still important agenda for reducing poverty, especially targeting at poor people. However, it also indicates that people under severe poverty are not affected by food price increase. Lower food price can only help the people under moderate poverty but not for people under severe poverty.

Employment situations provide interesting results. The employment ratio in agricultural sector is positively correlated with poverty ratio (P0) and less correlated with poverty gap (P1), but no correlation was found with severity index (P2). Being a farmer may imply to be poor in Indonesia, but the levels and severities might be ironically mitigated by being a farmer. More significant results are found in INFORMAL sector. As the ratio of population working in INFORMAL sector increases, poverty indices increase.

Table 4 indicates the estimation results when the poverty level in 2005 is included as explanatory variables. The estimated γ is in the range between 0.409 and 0.475. It means that almost half of poverty level is transmitted to succeeding years. Judging from the estimated γ (=0.475), the severity of poverty (P2) is most likely to prevails in subsequent years, thus requiring continuous efforts and long-term involvements to reduce the level of severity.

Other estimated coefficients are consistent with Table 3. One distinction is that both R-squared and t-statistics are greatly improved. It suggests that poverty is more appropriately characterized when considering its succeeding effect. The magnitudes of coefficients are also consistent with Table 3. WATER and TOILET are estimated to be significant and large; reinforcing the previous results that basic needs related to public health is the most important factor as the determinants of poverty. Following public health and sanitation facility variable, elementary and higher education turn out to be influential. All poverty indices are related positively to EDR (elementary school dropped-put ratio) and negatively HCR (high school completion ratio).

FE_P (food expenditure by poor) turns out to be statistically significant. The magnitude of coefficient is, however, still small. This result suggests that availability of food is important for all poverty indices, but could be less prioritized compared to public health and education.

Overall, the availability of basic needs variables which include educational achievements, health facilities and services and employment conditions are closely linked to consumption based poverty. All signs are understandable in economics sense and most variables become statistically significant.

Table 4. Autoregressive Model of Principal Component Regression Analysis

	P ₀		P ₁		P ₂	
	estimates	t-value	estimates	t-value	estimates	t-value
<u>Poverty Level in 2005</u>						
Pi_2005	0.409 ***	12.80	0.44087	13.77	0.475 ***	14.08
<u>Regional and City Dummy</u>						
Sumatra	-2.242 ***	-2.65	-0.20539	-0.94	-0.018	-0.20
Kalimantan	-6.449 ***	-5.80	-0.73671 ***	-2.59	-0.106	-0.90
Sulawesi	-1.633	-1.63	0.022	0.09	0.056	0.53
Islands	6.807 ***	6.59	2.3731 ***	8.85	0.884 ***	7.82
City dummy	-1.428	-1.28	-0.34131	-1.19	-0.124	-1.03
<u>Health and Facilities</u>						
WATER	-0.056 ***	-7.22	-0.009 ***	-4.68	-0.002 ***	-2.57
TOILET	-0.066 ***	-5.94	-0.012 ***	-4.34	-0.003 ***	-2.68
BC	-0.002 ***	-4.57	-4.70E-04 ***	-3.74	-1.33E-04 **	-2.52
BCG	-0.022 ***	-6.01	-0.004 ***	-4.37	-0.001 ***	-2.68
<u>Education</u>						
EDR	0.019 ***	6.54	0.003 ***	4.55	8.29E-04 ***	2.69
HCR	-0.009 ***	-7.38	-0.001 ***	-4.64	-3.20E-04 **	-2.47
<u>Food Availability</u>						
FE_P	8.94E-05 ***	4.41	1.92E-05 ***	3.67	5.49E-06 **	2.50
<u>Employment</u>						
AGRI	0.023	1.62	-9.93E-04	-0.27	-0.001	-0.92
INFORMAL	0.040 ***	6.29	0.005 ***	3.14	7.81E-04	1.17
CONSTANT	16.461	9.06	2.712 ***	5.74	0.6778 ***	3.34
R-squared	0.679		0.633		0.558	

Data Source: Authors' calculation.

Note: ***: Significant at 1%, **: Significant at 5%, *: Significant at 10%

The results mentioned above, however, require cautions when designing policy interventions and implementation. For example, employment in informal sector was correlated with poverty indices, and the policy implications can be interpreted in different ways. First, developing formal sector is very important agenda to reduce the poverty because the results show that poverty indices and employment in informal sector is positively correlated each other. In another way, the presence of informal sector is very important because more than 50% of labor force in Indonesia is still in informal sector. Shifting from informal to formal sector may put many of the poor into even unemployment, eventually increasing overall poverty. Thus, actual poverty generation mechanisms are complexes and too difficult to identify the causal relation clearly. Although this study showed potential causal relationship from the lack of basic needs and employment status to consumption based poverty, it should be noted that consumption based poverty might in reverse have influence on these variables.

CONCLUSIONS AND POLICY IMPLICATION

Poverty rate, poverty gap and severity poverty are scattered in all regencies and cities in Indonesia, showing tendency that poverty indices are higher and more severe in eastern islands compared to other regions (Java, Sumatra, Kalimantan and Sulawesi). Kalimantan has lowest mean values of all poverty indices. Also, we observed high spatial heterogeneities in poverty indices across the region. Poverty rate in cities is lower than in regencies.

Using principal component regression, we found that not only food expenditure but basic needs and working sector are also closely related to consumption based poverty. Basic needs such as the toilet availability, access to safe water and health services and education, often measured as the dimensions of capability based poverty, may play pivotal roles in determining the degree of consumption based poverty. Since our results suggest strong evidence of correlation between capability poverty and consumption poverty, whichever the concept of poverty is used –consumption or capability- if the concern is to decrease the poverty and increase people's welfare, the local governments have to continue spending an appropriate amount of public expenditure for providing more access to facilities of education and health services, eventually reducing consumption poverty as well.

Our estimation results also indicate that safe water access (WATER) is the most important among other public health variables especially to reduce severity of poverty. Local government is encouraged to provide more access to safe water for people under severe poverty. The severity of poverty also turns out to be correlated with both education variables, namely EDR and HCR, indicating that elementary and higher education are more important than food expenditure in order to reduce severe poverty. Lower food price policy might alleviate the incidence, deepness and severity of poverty, but because the

magnitude of coefficients is very small, the impact of lowering food price for people under poverty is also limited. Thus, our approach could be used to prioritize government policy options under different poverty concepts.

In concluding, several limitation of analysis should be pointed out. First, our analysis does not consider the dynamics of poverty due to the lack of time series data. Only autoregressive model is utilized in this analysis. The absence of time effect is limitation of this study. Second, our analysis could be done using more disaggregate level data, kecamatan in Indonesia. Extension of this study in any of the above direction would make a useful contribution in understanding poverty.

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