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Understanding Child Deprivation in Indonesia: The Multiple Overlapping Deprivation Analysis (MODA) Approach

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1. Introduction

Ending poverty in all its form everywhere is the first goal of Sustainable Development Goals (SDGs) in which Indonesian government has committed to achieve. It is mentioned in the goal 1.2 that the target is to reduce at least by half the proportion of men, women, and children of all ages living in poverty in all its dimensions. For over the past few years, Indonesian government has been concentrating on solving the poverty problem through various policies. However, most of it emphasized on income poverty. Whereas, in reality, poverty is multidimensional (Ferreira, 2011). The monetary aspect cannot reveal the broader picture of what life is really like for the poor (Alkire et al., 2015). In other words, how we measure poverty can importantly influence how we understand it, how we analyze it, and how we create policies in order to eradicate it (Alkire and Foster, 2011).

The welfare of children has been the focus of Indonesian government among the priorities in the 2015-2019 National Medium Term Development Plan (the RPJMN). In a developing country like Indonesia, children are particularly vulnerable to deprivation of their specific needs. They cannot be regarded as full economic agents exercising consumer sovereignty: they are not able to secure their own income/resources until a certain age and they are not sovereign in making consumption decisions (White et al., 2002). They are usually the weaker parties in the household. Moreover, to meet their basic needs, they have to rely more than adults on the production of goods and services by public authorities (especially in education and health, but also in public provisions and services) (Gordon et al., 2003a).

The use of the single-dimensional income approach as the sole poverty measurement indicator has its limitations. Thus, to give a broader and better picture of poverty condition, the multidimensional framework is required. Multidimensional measures provide an alternative lens through which poverty may be viewed and understood (Alkire and Foster, 2011). Multiple deprivation analysis looks beyond household income because it focuses directly at the

household's ability to access and benefit these goods and services (Bima, L and Marlina, C., 2017). In the context of children's well-being, the basic needs of children comprise both monetary and non-monetary dimensions. Poor children are less likely to fulfill their basic needs due to financial constraints. However, it does not mean that children with better financial condition could obtain all their basic needs. Regardless of their wealth level, children may suffer deprivation due to various factors (Bastos & Machado, 2009). Children are deprived when their basic needs and rights—such as access to proper sanitation facilities and health services—are not fulfilled. The lack of access could be because either their households do not have financial capability or there is no supply in their environment.

This paper presents the findings from a study on poverty and multidimensional deprivation among children in Indonesia. By adopting the Multiple Overlapping Deprivation Analysis (MODA) methodology developed by UNICEF, we analyze children's conditions and their deprivation against various dimensions based on children's life cycle. This methodology is useful to provide better understanding on the complexity of deprivation faced by children.

2. Literature Review

Childhood poverty is often measured by single dimensional, financial or sector-based (compartmentalized) development goal indicators (UNICEF, 2012). However, there is increasing recognition that stand-alone monetary measures cannot fully capture what it means for a child to be poor (Chzhen and Ferrone, 2016). There is an additional concern of hidden inequities in these measures, as they mask the multiple and overlapping deprivations that are more likely to occur in socio-economically disadvantaged groups.

For the last two decades, multidimensional deprivation analysis has been introduced as an attempt to address the child poverty issues. Most of them, similar to monetary poverty analyses, are based on household level data, assuming equal access to services and equal resource distribution among all family members. Even though poverty has traditionally been associated with the lack of a certain income, many arguments have been made on the conceptual difference between 'income' and 'basic needs' poverty (Ravallion, 1998). Measurement of the two fields of poverty has shown that the group of people identified as income poor does not fully coincide with the group that is found to be multi-dimensionally poor based on the basic needs approach (de Neubourg et al. 2012b). Therefore, both types of poverty analysis can make valid contributions to the objective of poverty reduction.

Deprivation can be defined using one or more of the following sources (UNICEF, 2012):

• National norms, standards, or legislation;

- Internationally-agreed definitions, international conventions, e.g. United Nations Millennium Development Goals (MDGs), Convention on the Rights of the Child (CRC), UN resolutions and reports;
- Regionally-agreed definitions (e.g. by the European Union);
- Theories written by scholars, researchers, academia;
- Explicit or implicit assumptions about what people value or should value;
- Public "consensus";
- Empirical evidence regarding what children (or others) value most as elements of wellbeing.

MODA prefers to use international standards as guiding principles for choosing the most relevant dimensions of child well-being (UNICEF, 2012). The Convention on the Rights of the Child (CRC) (1989), in combination with the World Summit on Social Development (1995) and the Millennium Development Goals (2000; 2003) can serve as a basis for the construction of a core set of dimensions that are essential to any child's development irrespective of their country of residence, socio-economic status, or culture. In this research, dimensions and indicators to measure the child deprivation is based on The Convention on the Rights of the Child (CRC).

Categories	Dimensions	Sources
Survival	Food, nutrition	CRC Art. 24
	Water	CRC Art. 24
	Health care	CRC Art. 24
	Shelter, housing	CRC Art. 27
	Environment/pollution	CRC Art. 24
Development	Education	CRC Art. 28
	Leisure	CRC Art. 31
	Cultural activities	CRC Art. 31
	Information	CRC Art. 13, 17
Protection	Exploitation; child labour	CRC Art. 32
	Other forms of exploitation	CRC Art. 33-36
	Cruelty, violence	CRC Art. 19, 37

 Table 1. Child Well-being Dimensions According to the CRC

	Violence at school	CRC Art. 28
	Social security	CRC Art. 16, 26, 27
	Birth registration; nationality	CRC Art. 7, 8
	Birth registration; nationality	CRC Art. 7, 8
Participation	Information	CRC Art. 13, 17
	Freedom of expression, views, opinions;	CRC Art. 12-15
	being heard; freedom of association	

Source: UNICEF

3. Methodology

3.1 Multiple Overlapping Deprivation Analysis (MODA)

MODA intends to analyze child deprivation by identifying deprived children from a multidimensional perspective (UNICEF, 2012). The MODA methodology is designed to be used in a specific country setting using recent and high quality survey data and making country specific choices on age groups, dimensions, indicators and thresholds.

Step by step procedure of MODA is as follows (UNICEF, 2012).

- 1. Choose concepts, definition, and data choice;
- 2. Choose dimensions and indicators. And then, specifying the indicator threshold and age groups.

For single deprivation analysis

- 3. Estimate a child deprivation headcount ratio for each indicator and dimension;
- Construct a profile of the deprived children for each dimension.
 For multiple overlapping deprivation analysis,
- 5. For each child, estimate the number of dimensions in which (s)he is deprived
- 6. Calculate the share of children deprived in 0, 1, 2, ..., d dimensions, both at the national level and by subgroup;
- 7. Carry out a deprivation overlap analysis analyzing the overlap and non-overlap of deprivations;
- 8. Construct a profile of the children in the deprivation overlaps;
- 9. Estimate the multidimensional child deprivation headcount ratio (H) for each age group using various cut-off points;
- 10. Estimate the average intensity of deprivation (A) among the deprived for each age group using various cut-off points;

- 11. Estimate the adjusted multidimensional child deprivation headcount ratio (M₀) for each age group using various cut-off points;
- 12. Estimate H, A, and M₀ for the entire child population.

3.2 Data, Indicators, and Dimensions

The data used to analyze the child deprivation is taken from the 2015 National Social and Economic Survey (the SUSENAS) conducted by BPS Statistics Indonesia. The survey covered both rural and urban population. The survey collected information related to demographic and detailed information on household's consumption on food and non-food. A household is defined as a person or a group of people related or unrelated to each other, who live together in the same dwelling unit and share a common source of food.

Taking into account the availability of the data, the analysis uses 6 dimensions which involve 15 indicators. The indicators selection in each dimension is based on the indicators of SDGs and with consideration of some principles on The Convention on the Rights of the Child (CRC). The deprivation analysis is applied to the age group 0-4 years and 5-17 years. The indicator selection is adjusted to every age group, in which focuses on the reference age. It is noted that a child whose age is not in the reference age in an indicator is considered as not-deprived in the indicator. For example, 0-2 year-old children are considered not-deprived in the indicator participation of formal education.

Dimension	Indicator	Deprivation Concept			
		0-4 years	5-17 years		
(1)	(2)	(3)	(4)		
		A 0-4 year old child	A 5-17 year old child		
		who lives in a house	who lives in a house		
Housing	House area	with area per capita is	with area per capita is		
		less than or equal to 7,2	less than or equal to 7,2		
		m ²	m^2		
		A 0-4 year old child	A 5-17 year old child		
	Type of floor	who lives in a house	who lives in a house		
		with earth floor	with earth floor		
Facility	Drinking water	A 0-4 year old child who doesn't have access to decent drinking water	A 5-17 year old child who doesn't have access to decent drinking water		

Table 2. Chosen Indicators and Dimensions with the Concept of Deprivation based on Age

Group
-

		1 0 4 11 1.11		
		A 0-4 year old child	A 5-17 year old child	
	Sanitation	who doesn't have	who doesn't have access	
		access to decent	to decent sanitation	
		sanitation facility	facility	
		A 0-4 year old child	A 5-17 year old child	
		who live in a	who live in a household	
	Cooling fuel	household using	using natural resource	
	Cooking fuel	natural resource such	such as charcoal,	
		as charcoal, firewood,	firewood, etc. as	
		etc. as cooking fuel	cooking fuel	
		A 0-4 year old child	A 5-17 year old child	
		with calorie	with calorie	
	Calorie	consumption is less	consumption is less than	
	consumption	than Minimum Dietary	Minimum Dietary	
	1	Energy Requirements	Energy Requirements	
		(MDER)	(MDER)	
		· · · · · · · · · · · · · · · · · · ·	A 5-17 year old child	
Food and			with fat consumption is	
nutrition	Fat proportion	-	more than 35 percent of	
			calorie consumption	
		0-23 month old child	•	
		who is never given		
	Consumption of	exclusive breast milk	_	
	breast milk	or additional food		
		(adjusted to each age)		
	Easter al sale al		A 7-17 year old child	
	Formal school	-	who doesn't participate	
	participation		in formal education	
			A 7-17 year old child	
Education	Sahaal		who doesn't participate	
Education	School		who doesn't participate in formal education or	
Education	School participation by	-	who doesn't participate in formal education or participate in it but in	
Education	School participation by age	-	who doesn't participate in formal education or participate in it but in lower grade than he/she	
Education	School participation by age	-	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in	
Education	School participation by age	- A 0-4 year old child	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child	
Education	School participation by age Birth certificate	- A 0-4 year old child who doesn't have birth	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth	
Education	School participation by age Birth certificate	- A 0-4 year old child who doesn't have birth certificate	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate	
Education	School participation by age Birth certificate	- A 0-4 year old child who doesn't have birth certificate	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child	
Education	School participation by age Birth certificate Child marriage	- A 0-4 year old child who doesn't have birth certificate -	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status	
Education Child protection	School participation by age Birth certificate Child marriage	- A 0-4 year old child who doesn't have birth certificate -	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married	
Education Child protection	School participation by age Birth certificate Child marriage	- A 0-4 year old child who doesn't have birth certificate -	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married A 5-17 year old child	
Education Child protection	School participation by age Birth certificate Child marriage	- A 0-4 year old child who doesn't have birth certificate -	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married A 5-17 year old child who work or help their	
Education Child protection	School participation by age Birth certificate Child marriage Child labor	- A 0-4 year old child who doesn't have birth certificate -	 who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married A 5-17 year old child who work or help their family to earn money 	
Education Child protection	School participation by age Birth certificate Child marriage Child labor	- A 0-4 year old child who doesn't have birth certificate -	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married A 5-17 year old child who work or help their family to earn money within last week	
Education Child protection	School participation by age Birth certificate Child marriage Child labor	- A 0-4 year old child who doesn't have birth certificate - - A 0-4 year old child	 who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married A 5-17 year old child who work or help their family to earn money within last week A 5-17 year old child 	
Education Child protection	School participation by age Birth certificate Child marriage Child labor Health insurance	- A 0-4 year old child who doesn't have birth certificate - - A 0-4 year old child who doesn't have any	 who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married A 5-17 year old child who work or help their family to earn money within last week A 5-17 year old child who doesn't have any 	
Education Child protection	School participation by age Birth certificate Child marriage Child labor Health insurance	- A 0-4 year old child who doesn't have birth certificate - - A 0-4 year old child who doesn't have any health insurance	 who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married A 5-17 year old child who work or help their family to earn money within last week A 5-17 year old child who doesn't have any health insurance 	
Education Child protection Health	School participation by age Birth certificate Child marriage Child labor Health insurance	- A 0-4 year old child who doesn't have birth certificate - - A 0-4 year old child who doesn't have any health insurance A 12-59 month old	 who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married A 5-17 year old child who work or help their family to earn money within last week A 5-17 year old child who doesn't have any health insurance 	
Education Child protection Health	School participation by age Birth certificate Child marriage Child labor Health insurance Immunization	- A 0-4 year old child who doesn't have birth certificate - - A 0-4 year old child who doesn't have any health insurance A 12-59 month old child who doesn't get	who doesn't participate in formal education or participate in it but in lower grade than he/she should be in A 5-17 year old child who doesn't have birth certificate A 5-17 year old child with marital status married or ever married A 5-17 year old child who work or help their family to earn money within last week A 5-17 year old child who doesn't have any health insurance	

3.3 Deprivation Indicators in Multidimensional Analysis

3.3.1 Single Deprivation Analysis: Analysis by Indicator and by Dimension

The deprivation headcount ratio for each indicator and dimension is the number of children deprived in each specific indicator and dimension as a share of the child reference population to whom each specific indicator and dimension refers. The calculation of the deprivation headcount ratio uses the formula below.

$$h_{j,r} = \frac{q_{j,r}}{n_r}$$
$$q_{j,r} = \sum_{i=1}^{n_r} y_j$$

where

- $h_{j,r}$ headcount ratio of children deprived in dimension j of the reference population r;
- q_j number of deprived children in dimension j of the reference population r;
- n_r total number of children in the reference population r;
- y_j deprivation status of child *i* in dimension *j*, with $y_j = 1$ if $x_j < Z_j$ (deprivation) and $y_j = 0$ if $x_j \ge Z_j$ (no deprivation);

 x_j - value of dimension *j* for child *i*;

 Z_j - threshold of the dimension *j*.

3.3.2 Multiple Overlapping Deprivation Analysis: Deprivation Count and Overlap Analysis Per Age Group

A child-centered multidimensional approach means that the total number of deprivations of each child should be counted in order to identify children with 0, 1, 2, 3, 4, ..., d deprivations. Counting deprivations should happen firstly for each individual separately to inform about the breath of deprivation for each child. Moreover, the total amount of deprivations per child will also be further used in the identification of multi-dimensionally deprived children. The deprivation calculation uses the following formula:

$$\mathbf{D}_{\mathbf{i}} = \sum_{j=1}^{d} y_j$$

where

Di – total number of dimensions each child *i* is deprived in; with $y_j = 1$ if child *i* is deprived in the dimension *j*; $y_j = 0$ if child *i* is not deprived in dimension *j*.

Accumulating the number of deprived children for each number of deprivations will give an overview of what share of all the children is deprived in 0, 1, 2,..., d dimensions in each age group. After that, this paper carries out a deprivation overlap analysis analyzing the overlap and non-overlap of deprivations. Deprivation overlap can be studied by combining (maximum) three dimensions in a Venn-diagram. The diagram gives a good visual representation of the extent to which the deprivations coincide. Each figure comprises eight different groups of children: three groups with children deprived in only one of the three dimensions, three groups of children deprived in two dimensions, one group of children who are not deprived in any of the three specified dimensions, and the last group of children deprived in all three dimensions simultaneously. In particular, the latter group deserves additional attention, since they may be the most vulnerable with respect to the dimensions analyzed.





To identify the multi-dimensionally deprived children, the multidimensional deprivation headcount should be measured. It measures the number of children deprived depending on the dimensions selected for each age group and the chosen cut-off point to identify the deprived. The MODA methodology uses the cut-off approach with various cut-off points, K. This means that child i is considered deprived if the number of dimensions in which the child is deprived (D_i) is equal to or larger than the cut-off point, K. This can be defined as follows:

$$y_K = 1$$
 if $D_i \ge K$,

$$y_{K} = 0$$
 if $D_{i} < K$

To calculate the multidimensional child deprivation headcount, the following formula can be applied:

$$H = \frac{q_k}{n_a}$$
$$q_K = \sum_{i=1}^n y_K$$

where

H - multidimensional child deprivation headcount ratio according to cut-off point *K* in age group *a*;

 q_K - number of children affected by at least K deprivations in the age group a;

 n_a - total number of children in the age group a;

 y_K - deprivation status of a child *i* depending on the cut-off point *K*;

 D_i - number of deprivations each child *i* experiences;

K - cut-off point.

The next step is to measure the average intensity of multidimensional deprivation. The average intensity of multidimensional deprivation measures the breadth of child deprivation among the multi-dimensionally deprived children. It is the sum of all existing deprivations among children identified as deprived, as a share of the sum of all possible deprivations among those deprived in at least K dimensions. The average intensity of deprivation uses the following formula:

$$\mathbf{A} = \frac{\sum_{1}^{q_k} c_k}{q_k \, x \, d}$$

where

A - average intensity of multidimensional deprivation according to the cut-off point K for the age group a;

 q_k - number of children affected by at least K deprivations in the age group a;

d - total number of dimensions considered per child within the relevant age group a;

 c_K - number of deprivations each multi-dimensionally deprived child *i* experiences, with $c_K = D_i * y_K.$

Next step is estimating the adjusted multidimensional child deprivation headcount ratio (M_0) for each age group using various cut-off points. M_0 consists of

both the multidimensional child deprivation headcount ratio and the average intensity of deprivations of the deprived. This measure satisfies various of the basic properties of poverty measures, such as the "dimensional monotonicity". Dimensional monotonicity suggests that in a situation where a multi-dimensionally poor person increases his or her poverty by becoming deprived in a dimension on which he/she was previously not deprived, overall poverty levels will increase. In other words, it means that this poverty measure is sensitive to the breadth of poverty that is experienced by each individual. This feature is one of the main reasons for adopting this measure as a key instrument in MODA methodology.

The multidimensional child deprivation headcount ratio uses the following formula:

$$\mathbf{M}_0 = \mathbf{H} * \mathbf{A} = \frac{\sum_{1}^{q_k} c_k}{n_a \, x \, d}$$

where

 M_0 - adjusted multidimensional child deprivation headcount ratio among children affected by at least *K* deprivations in age group *a*;

 c_K - number of deprivations each multi-dimensionally deprived child *i* experiences, with $c_K = D_i * y_K$.

Last step is to estimate H, A, and M_0 for the entire child population. The multidimensional headcount ratio (H), the average intensity of deprivations (A), and the adjusted headcount ratio (M_0) should initially be calculated for each age group separately (as mentioned in the previous steps). However, these measures can be combined if, for policy-making purposes, single numbers for the whole child population are required. In this case, the averages adjusted for the amount of children in each age group, are preferred.

The formula is:

$$\mathbf{H} = \left(\frac{n_{a1}}{n_{at}} \times H_{a1}\right) + \left(\frac{n_{a2}}{n_{at}} \times H_{a2}\right) + \ldots + \left(\frac{n_{ax}}{n_{at}} \times H_{ax}\right)$$

where

H - deprivation headcount among children affected by at least K deprivations in the total child population studied;

 $a_{1,2,\ldots,x}$ - age groups;

 a_t - total child population aged 0 to 17, with $a_t = \sum_{1}^{x} a_1 + a_2 + \dots + a_x$.

The average intensity of deprivation among the multi-dimensionally deprived child population (A) can be calculated using a similar approach by calculating the weighted average of all age groups. The total M_0 can be obtained by multiplying H with A.

4. Results

4.1 Single Deprivation Analysis

Housing Dimension

Child deprivation in housing dimension has a strong relation with household's economic status, type of residence, educational attainment of the head of household, and the number of household members (UNICEF & SMERU, 2012). Child poverty analysis in which housing becomes one of its dimensions showed that the bad quality of housing is associated with the lower income of a household¹.

Table 3. Percentage of Deprived Children in Housing Dimension per Age Group, 2015

Indicators	0-4 years		5-17 years		
	Age Reference	Deprived	Age Reference	Deprived	
(1)	(2)	(3)	(4)	(5)	
House of Area	0-4 years	17.4	5-17 years	16.3	
Kind of floor	0-4 years	5.8	5-17 years	6.2	

Source: BPS, SUSENAS 2015

As seen in Table 3, it can be seen that 17 of 100 0-4 year-old children in Indonesia living in an indecent house with area $\leq 7,2 \text{ m}^2$ (deprived). Meanwhile, the percentage of 5-17 year-old children who are deprived in that indicator is 16,3 percent. On the other hand, in indicator type of floor, the percentage of deprived children aged 5-17 years is higher than 0-4 years. Nonetheless, it is not really different. The percentage is 5,8 percent for 0-4 years and 6,2 percent for 5-17 years.

¹ The Many Dimensions of Child Poverty in Indonesia: Patterns, Differences and Associations Gracia Hadiwidjaja, Cindy Paladines and Matthew Wai-Poi

Facility Dimension

Good facility for living can absolutely help children to grow actively and positively. Basic facilities needed by children include decent drinking water, decent sanitation, and cooking fuel.

Indicators	0-4 ye	ars	5-17 years		
	Age Reference Deprived		Age Reference	Deprived	
(1)	(2)	(3)	(4)	(5)	
Drinking water	0-4 years	29.6	5-17 years	31.2	
Sanitation	0-4 years	46.7	5-17 years	45.8	
Cooking fuel	0-4 years	21.7	5-17 years	24.4	

Table 4. Percentage of Deprived Children in Facility Dimension Per Age Group, 2015

Source: BPS, SUSENAS 2015

Children aged 0-4 years who are deprived in terms of indicator drinking water is 29,6 percent. This is not really different with percentage of deprived children aged 5-17 years which is 31,2 percent. It means that 3 of 10 children in Indonesia does not have access to decent drinking water. They potentially get disease as they consume water contaminated with bacteria.

There are 47 of 100 children aged 0-4 years and 46 of 100 children aged 5-17 years who are deprived in indicator sanitation. They also potentially get disease as their sanitation facility is unhealthy. Meanwhile in the terms of cooking fuel, 21,7 percent of 0-4 year-old children live in a household with natural resource as their cooking fuel. It also happens for children aged 5-17 years. 24 of 100 children aged 5-7 years also do not have decent cooking fuel in their household.

Food and Nutrition Dimension

Nutritious foods are everyone's basic needs, especially children. Children, in their growing stage, need healthy foods so that they can maintain healthy weight, avoid certain health problems, stabilize their energy, and sharpen their minds. In other words, food and nutrition have a profound effect on children's physical and mental well-being.

Indicators	0-4 ye	ars	5-17 years		
	Age Reference	Deprived	Age Reference	Deprived	
(1)	(2) (3)		(4)	(5)	
Calorie consumption	0-4 years	8.2	5-17 years	59.1	
Fat proportion			5-17 years	1.2	
Consumption of breast milk	0-23 months	20.5			

Table 5. Percentage of Deprived Children in Food and Nutrition Dimension Per Age Group, 2015

Source: BPS, SUSENAS 2015

There is a standard minimum calorie intake (Minimum Dietary Energy Requirement/MDER) per age group and sex. The Ministry of Health Indonesia has released a regulation no. 75 in 2013 regarding a reference about standard nutrients for Indonesian people, not only children. Calorie consumption for every child is obtained by the average calorie consumption per individual in a household. A child is deprived when the calorie intake per day is less than the standard MDER, which is adjusted by age and sex. As seen in Table 5, 8 of 10 children aged 0-4 years do not consume enough nutrition. While for children 5-17 years, more than 50 percent children in Indonesia consume calorie less than the standard minimum intake.

Fat proportion is total fat consumption divided by total calorie consumption and then multiply by 100. If the fat proportion is more than 35 percent, the children would be defined as deprived. The overconsumption of fat would give negative impact on children's health as they might reduce the consumption of other nutrients such as protein, vitamin, etc. The percentage of children aged 5-17 years who consumed fat more than 35 percent is only 1,2 percent.

According to Government Regulations no.33 in 2022, exclusive breast milk should be given to babies until they reach 6 months. After 6 months, breast milk should also be given with other additional foods until the babies reach 23 months. In SUSENAS 2015, questions regarding breastmilk are only given to 0-23 month-old baby. Therefore, this indicator only involved 0-23 months as the age reference. As seen in Table 5, 20 of 100 babies in Indonesia do not consume breast milk.

Education Dimension

Education is also children's basic need so that they can contribute positively to the development of a country. One of the crucial problems Indonesia has is lack access to education. Economic problem in a household is the main reason of low participation in education. Some parents do not have enough money to afford school for their children. With no education, they are most likely to be poor just like their parents.

Indicators	0-4 year	rs	5-17 years		
	Age Reference	Deprived	Age Reference	Deprived	
(1)	(2)	(3)	(4)	(5)	
Formal school			5-17 years	14.9	
participation			,		
School participation by			7-17 years	473	
age			/ I/ years	Т7.5	

Table 6. Percentage of Deprived Children in Education Dimension Per Age Group, 2015

Source: BPS, SUSENAS 2015

There is no question about pre-school or pre-education on children aged less than 5 years old in SUSENAS 2015. Therefore, this dimension is not applied for 0-4 year-old children. As seen in Table 6, 15 of 100 children in Indonesia do not participate in formal school, while, 47 of 100 children participate school in lower grade than they should be in.

Child Protection Dimension

Birth certificate is children's requirement as it becomes the tool to get access to public facilities like education and health. As seen in Table 7, 27 of 100 children aged 0-4 years old are deprived due to not having a birth certificate. Ending child marriage becomes a concern of SDGs. 1 of 100 children aged 10-17 years old in Indonesia is married or ever married. In indicator child labor, 6 of 100 children in Indonesia is a child worker.

Indicators	0-4 yea	irs	5-17 years		
	Age Reference Deprived A		Age Reference	Deprived	
(1)	(2)	(3)	(4)	(5)	
Birth certificate	0-4 years	27.1	5-17 years	17.1	
Child marriage			10-17 years	0.9	
Child labor			10-17 years	6.3	

Table 7. Percentage of Deprived Children in Child Protection Dimension Per Age Group,2015

Source: BPS, SUSENAS 2015

Health Dimension

The ownership of health insurance is really needed as it captures the ability of people to get access to health care. In table 8, it shows that the number of children who do not have health insurance is more than 50 percent (for aged 0-4), while for aged 5-17, the percentage is almost 50 percent. This means that the awareness of health insurance ownership, especially among children is still low.

Table 8. Percentage of Deprived Children in Health Dimension Per Age Group, 2015Indicators0-4 years5-17 years

Indicators	0-4 yea	ars	3-17 ye	ears
	Age Reference	Deprived	Age Reference	Deprived
(1)	(2)	(3)	(4)	(5)
Health insurance	0-4 months	63.3	5-17 years	48.7
Immunization	12-59 months	56		

Source: BPS, SUSENAS 2015

The children are defined deprived when they do not get complete immunization. Complete immunization includes 1 BCG vaccine, 3 DPT vaccines, 4 polio vaccines, 4 hepatitis B vaccines, and 1 MMR vaccines. A child will get complete immunization after 12 months old and as SUSENAS 2015 only covers 12-59 month old children for questions regarding immunization. Therefore, the age reference for this indicators is 12-59 years old. As seen in Table 8, 56 of 100 children in Indonesia haven't got complete immunization. In other words, there are more than 50 percent of children who are vulnerable to suffer from various diseases.

4.2 Child Deprivation in Each Dimension

A child is defined as deprived in a dimension if they are deprived in at least one indicator is a dimension. Children aged 0-4 years old are at the vulnerable stage (BPS & UNICEF, 2016). As shown in Figure 2, health dimension is the most vulnerable dimension for children to be deprived. This happens as more than 80 percent of children do not have health insurance or get complete immunization. Second dimension with the highest number of deprived children is facility. Lack access to decent water, sanitation, and cooking fuel causes children to be deprived in facility dimension.



Figure 2. Percentage of 0-4 Year-Old Children Deprived in Each Dimension

On the other hand, in age group 5-7 years, the dimension with the highest number of deprived children goes to facility (61 percent) and followed by food and nutrition (60 percent). If lack access to decent water, sanitation, and cooking fuel are the factors causing the deprivation in facility, lack of calorie consumption and excess of fat consumption triggers children to be deprived in food and nutritious dimension. The next dimension with the highest number of deprived children is education. 56 of 100 children do not participate in formal school and if they do, they are in lower grade than they should be in.

Source: BPS, SUSENAS 2015



Figure 3. Percentage of 5-17 Year-Old Children Deprived in Each Dimension

Source: BPS, SUSENAS 2015





Source: BPS, SUSENAS 2015

This paper examines the extent to which specific dimension overlap with each other in groups of three. There are 20 unique combinations of three dimensions at a time, but for the sake of representation, Figure 4 illustrates the overlap between one set only for each group. It shows the overlapping deprivation between three dimension with the highest percentage of deprived children in each age group. The percentage of 0-4 year-old children deprived in three dimensions (health, facility, and child protection) is 19 percent. 6 of 100 children are not deprived in those three dimensions. Whereas, in the age group 5-17 years old, 20 of 100 children are deprived in the three dimensions (education, food and nutrition, and facility). Approximately 7,1 percent of children are not deprived in the three dimensions.

4.3 Multiple Overlapping Deprivation Analysis

Multiple overlapping deprivation analysis shows children's conditions who are deprived in some dimensions. As shown in Figure 5 and 6, the percentage of deprived children in two age groups follows a normal distribution with positive skewness. This captures that overall, children in Indonesia have deprivation in some certain dimensions. In 0-4 years, the peak is in 2 dimensions which means that approximately 1 of 3 children aged 0-4 year have two simultaneous deprivations. The percentage for other dimensions is just less than 30 percent. Even there is only one of 100 people who is deprived in all dimensions.





Source: BPS, SUSENAS 2015

In 5-17 years, the peak is in four dimensions. This means that the frequent deprivation happens more on children aged 5-17 years than on 0-4 years. The older the children are, the more complex the deprivation becomes. Next, the second dimension with the highest percentage of deprived children is three dimension. Approximately 28 of 100 people aged

5-17 years are deprived in three dimensions. Lastly, the percentage of children deprived in all dimensions is just 1.23 percent.



Figure 6. Percentage of Deprived Children According to The Number of Dimensions, 5-17 years, 2015

It is important to analyze the deprivation based on the residence type as the problems in urban and rural are definitely different. It also can help the government to make evidencebased policy which is appropriate for each residence type. As shown in Figure 7 and 8, rural children tend to dominate the deprivation on many dimensions. In 0-4 years, the percentage of deprived rural children in three and more dimensions are higher than the percentage of deprived urban children. Urban children only dominate in one dimension in which the percentage of deprived children is almost twice as the percentage of deprived children in rural areas.

Source: BPS, SUSENAS 2015



Figure 7. Percentage of Deprived Children According to the Number of Dimensions and Residence Area, 0-4 years, 2015

Source: BPS, SUSENAS 2015

In 5-17 years, the phenomenon is similar to the phenomena in 0-4 years. Rural children tend to dominate the deprivation on many dimensions. The percentage of deprived rural children in three and more dimensions are higher than the percentage of deprived urban children. Urban children mostly dominate in two and less dimensions. The percentage of urban children deprived in two dimensions is almost the same as the percentage of rural children deprived in three dimensions.

Figure 8. Percentage of Deprived Children According to the Number of Dimensions and Residence Area, 5-17 years, 2015



Source: BPS, SUSENAS 2015

Cut	Pe	Percentage of			The Average Intensity of			ed Percer	ntage of
Off	Depri	ived Chi	ved Children Deprivation Deprived Childr			Deprivation			ldren
	0-4	5-17	0-17	0-4	5-17	0-17	0-4	5-17	0-17
	years	years	years	years	years	years	years	years	years
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
k≥1	94.78	96.62	96.13	0.44	0.46	0.44	42.09	44.34	41.86
k≥2	69.90	81.62	78.48	0.53	0.51	0.50	37.12	41.84	38.92
k≥3	34.09	54.17	48.80	0.67	0.72	0.59	22.79	39.23	29.03
k≥4	10.47	25.13	21.20	0.82	0.72	0.72	8.62	18.17	15.23
k≥5	1.23	7.37	5.73	1.00	0.86	0.23	1.23	6.33	1.33
k=6	-	1.13	0.83	-	1.00	1.00	-	1.13	0.83

 Table 9. Percentage of Deprived Children, the Average Intensity of Deprivation, and

 Adjusted Percentage of Deprived Children

Source: BPS Statistics Indonesia, 2015

Last step of MODA is to calculate some MODA indicators. In Table 9, it shows that 94,78 percent of 0-4 year-old children are deprived in at least one dimension with average intensity of deprivation is 0.44. Thus, the adjusted percentage of deprived children is 42.09. While, in 5-17 years, 96.62 percent of 5-17 year-old children are deprived in at least one dimension with average intensity of deprivation is 0.46. The adjusted percentage of deprived children is 42.09.

By combining the two age groups, the deprivation phenomena on all children in Indonesia could be obtained. As it seems, the percentage of children in Indonesia deprived in at least one dimension is 96.13 percent with average intensity 0.44. Therefore, the adjusted percentage of deprived children is 41.86. In other words, 42 of 100 children in Indonesia are deprived in at least one aspect of their basic rights.

4.4 Overlap between Multiple Deprivation and Monetary Poverty

Children deprived in various dimensions do not necessarily live in income poor families (Chzhen, et al, 2014). Using the national poverty line, figure 8 shows that in Indonesia, poor children are significantly more likely to be deprived in at least one dimension. Either in the group of 0-4 year-old or 5-17 year-old children, deprivation incidence at the cut-off of one deprivation or more is higher than the monetary poverty incidence, with also a large degree of overlap. In Indonesia, 18.2 percent of 0-4 year-old children are income poor and 94.78 percent are deprived in one or more dimensions. Nearly all income poor children are deprived in one or more dimensions, while almost no one is

poor only. This suggests a high degree of overlap between monetary poverty and material deprivation.

Meanwhile, in the group of 5-17 year-old children, 17.6 percent are income poor (while also being deprived) and 79.1 percent are deprived while not being poor. This implies that there is an absolute incidence of overlap between monetary poverty and material deprivation. In the combined e group of 0-17 year-old children where 17.73 percent are income poor and 96.13 are deprived in one or more dimensions, 17.66 percent are both poor and deprived and 78.46 percent are deprived while not being poor. All in all, the number of poor only children are less than the number of children who are deprived only.

Figure 9. Overlap between Multiple Deprivation and Monetary Poverty (Deprivation in at Least One Dimension; Equivalent Household's Expenditure below National Poverty Line)



5. Conclusion

The monetary poverty analysis should be followed by multidimensional deprivation analysis. Even though, a child is not defined poor, they still have a probability to be deprived. In aggregate, 78 out of 100 children aged 0-17 years in Indonesia are multidimensionally deprived. Most frequent deprivation among children aged 0-4 years old happens in health dimension. Having no health insurance and never getting complete immunization cause children to be deprived. According to the analysis of deprived children based on the number of deprived dimensions, children under five years old are mostly deprived in two dimensions.

In general cases of children aged 5-17 year-old in Indonesia, the most frequent deprivation happens in facility dimension. Lack access to decent drinking water, sanitation, and cooking fuel cause children to be deprived. According to the analysis of deprived children based on the number of deprived dimensions, children are mostly deprived in four dimensions. This means that children aged 5-17 tend to be deprived in more dimensions than children aged 0-4. This implies that it all could be triggered by the lack of attention to children compared to toddler.

Ensuring an inclusive growth on children and children's development in Indonesia should consider the characteristic of children's type of residence. In both age group, the percentage of deprived children in rural are more than the percentage of deprived children living in urban, specifically deprivation in at least two dimensions.

Income poor children tend to be significantly more likely to be deprived in each dimension than non-poor children. Nearly all income poor children in both ages groups and in all are deprived in at least one dimension, while almost no one is poor only. The absolute incidence of overlap between monetary poverty and material deprivation suggests that it could be best helped by cross-sectoral policy effort.

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