

## ORIGINAL ARTICLE

## COMPARISON STUDY ABOUT DETERMINANTS OF CHILDREN UNDER FIVE YEARS MALNUTRITION BETWEEN INDIGENOUS AND NON-INDIGENOUS COMMUNITIES IN INDONESIA

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## ABSTRACT

Many studies reveal the determinant factor of children under five years of malnutrition problem in Indonesia. However, there is only a few analysis conducted on indigenous communities and its comparison to non-indigenous communities. This study analyzes the determinant factors of malnutrition in children under five years in indigenous communities (Suku Baduy) and non-indigenous communities. This study is a comparative study using cross-sectional data, where the samples are households that have children under five years in indigenous communities (n=60) and in non-indigenous communities (n=60), with sample techniques using purposive random sampling. To calculate nutrition status, this study uses the anthropometric index based on weight-for-age according to WHO standards presented in the Z-score and Standard Deviations (SD). The result of this study indicates that the prevalence of children under five years suffering from malnutrition in indigenous communities is lower than in non-indigenous communities, which is 21,7% to 43,3%. Two factors influence the high prevalence of malnutrition in children under five years, namely, the education of the head of a family with OR=0.120 (95%CI: 0.021-0.675) and prenatal care in the fourth trimester with OR 9.890 (95%CI: 1.349-72.531). It is necessary to increase public knowledge on balanced nutrition in children under five years and improved maternal health access to resolve children under five years of malnutrition in those communities.

**Keywords:** malnutrition, anthropometric index, Suku Baduy, Indonesia

## INTRODUCTION

Indonesian children still suffer from malnutrition<sup>1,2</sup>. Data from the Ministry of Health Republic of Indonesia in 2018 shows that there were 30,8% of Indonesian children under five years suffering from stunting and 10,2% from wasting<sup>3</sup>. Although the figure has decreased compared to 2013, the prevalence is still high when compared to several Southeast Asian countries such as Singapore (4,4%; 3,6%)<sup>4</sup>, Thailand (10,8%; 5,4%)<sup>5</sup>, Brunei Darussalam (19,7%; 2,9%)<sup>6</sup>, Malaysia (20,7; 11,5%)<sup>7</sup>, and Vietnam (24,6%; 6,4%)<sup>8</sup>.

Three main problems cause the high prevalence of malnutrition in Indonesia. First, unequal public access to health services. The inequality occurs between cities and villages, western and eastern parts of Indonesia, as well as in intercommunity, such as the indigenous community and non-indigenous community. This condition causes interventions to improve nutrition for children under five in curative, preventive, and promotive measures difficult particularly in areas and communities where health facilities are limited. In fact, in many studies, limited access to health services increases the risk of malnutrition on childrens<sup>9,10</sup>.

Secondly, the low level of public knowledge regarding balanced nutrition. Although food

availability is relatively good in Indonesia, people have yet acquired adequate knowledge of balanced nutrition. Thus, intakes and food patterns do not meet the criteria of quality nutrition. This happens from pregnancy until infants aged two years old, whereas the first 1000 days of life is pivotal in children's growth and development as well as life quality in the future<sup>11</sup>. In this case, parents hold an important role in meeting the nutrition intakes of their children under five years<sup>12</sup>. Parents who lack knowledge of quality nutrition are prone to raising children under five years with malnutrition risk<sup>13-15</sup>.

Thirdly, poor and uneven environment quality. Digestion and respiratory tract infections on infants from bacterial and viral contamination is a direct result of malnutrition<sup>16,17</sup>. This is the outcome of a bad environment where children grow, such as poor sanitation, low access to clean water, air pollution, and trash pollution<sup>18,19</sup>. Unfortunately, many Indonesian children are still living under such environmental conditions, not only in rural but also in urban areas.

However, indigenous communities need more attention as they are vulnerable and are often marginalized in health development. There are 538 indigenous communities in Indonesia<sup>20</sup> whose conditions are very vulnerable to health development. They mostly live in forest areas far

from access to health services, one of which is *Suku Baduy*.

*Suku Baduy* lives in the forest and is still upholding their ancestral tradition and culture, which is to preserve nature<sup>21</sup>. They strongly believe in nature-related magical power and refuse modernization. The community is prohibited from using electricity, television, vehicles, and other technologies, for instances<sup>22,23</sup>. *Suku Baduy* is known as traditional farmers who never experience food shortage, let alone hunger<sup>21</sup>.

In Indonesia, there are not many studies that have analyzed the problem of malnutrition in children under five years in indigenous peoples, despite its importance as monitoring measures to improve the quality of children under five years of health in indigenous peoples. This study was prepared in response to the lack of research related to the nutritional status of children under five years in Indonesia's indigenous communities, with *Suku Baduy* as object research.

This study aimed at analyzing determinant factors of children under five years of malnutrition in indigenous communities and non-indigenous communities. The determinant factors analyzed in this study are household's social-demographic conditions, children under five years nutritional intakes, household access to health service and household environment condition.

## METHODS

### Study Design

This study is a comparative study using cross-sectional data. This study compares the determinants of malnutrition among children under five years in indigenous communities and urban communities in Indonesia. The indigenous communities that is the sample of this study is *Suku Baduy*. Meanwhile, the non-indigenous communities which is the comparison is the urban communities, by selecting one more community that has different characteristics with *Suku Baduy*. This research looks at an urban communities located in the same district as *Suku Baduy*.

### Study Location

Two locations are subject of this study. First, Kanekes Villages located in Leuwidamar Subdistrict, Lebak, Banten Province, Indonesia. The village is home to *Suku Baduy*. The second location took place in Rangkasbitung Barat and Rangkasbitung Timur of Rangkasbitung Subdistrict, Lebak District, Banten Province, Indonesia. Both villages are representatives of non-indigenous communities.

### Sample of Study

The sample in this study is households with children under five years. The sampling technique conducted with purposive random sampling. There is a total of 120 households with sample distribution as follows, 60 households from indigenous communities (*Suku Baduy*) and 60 households from non-indigenous communities or urban communities.

### Instruments and Indicators

There are five instruments used in the data collection. First, the instrument for measuring children under five years of nutritional status using the anthropometric index, which is measured by weight-for-age. Second, questionnaire on household's social-demographic conditions, with variables consisting of children under five years sex, number of family members, work of the head of the family, education of the head of the family, and age of the head of the family, as well age of mother and education of the mother. Third, questionnaire on children under five years nutritional intakes, with variables consisting of getting exclusive breastfeeding and complementary feeding; vitamin A intakes; vegetable consumption in the last one week; fruits consumption in the last one week; protein consumption in the last one week; and carbohydrate consumption in the last one week. Fourth, questionnaire on household access to health service, with variables consisting of complete immunization; routine prenatal care in first, second, third, and fourth trimesters; maternal iron intake; and childbirth assistant. Fifth, questionnaire on household environment condition, with variables consisting of drinking water source and sanitation type.

### Method of Measurement and Analysis

We assessed nutritional status in children under five years by utilizing the anthropometric index based on the ratio between body mass and age. This index was derived from the WHO standard with Z-score and standard deviation (SD). A child would be considered having malnutrition if the anthropometric index was Z-score  $< -3.0$  SD, under-nutrition if it was Z-score of  $-3.0$  to  $< -2.0$  SD, normal if it was Z-score of  $-2.0$ – $2.0$  SD, and over nutrition, if it was  $> 2.0$  SD<sup>24</sup>. The analysis in this study used univariate, bivariate, and multivariate analysis.

### Ethical considerations

This research was granted permission by the Lebak District Government and Universitas Pembangunan Nasional (UPN) Veteran Jakarta-Indonesia. All respondents have explained the objectives of the study and secured written informed consent from participants before data collection. Ethics clearance was obtained from

Ethics Committee Universitas Pembangunan Nasional (UPN) Veteran Jakarta-Indonesia with the study protocol code of No: B/2082/VII/2019/KEPK.

**RESULTS**

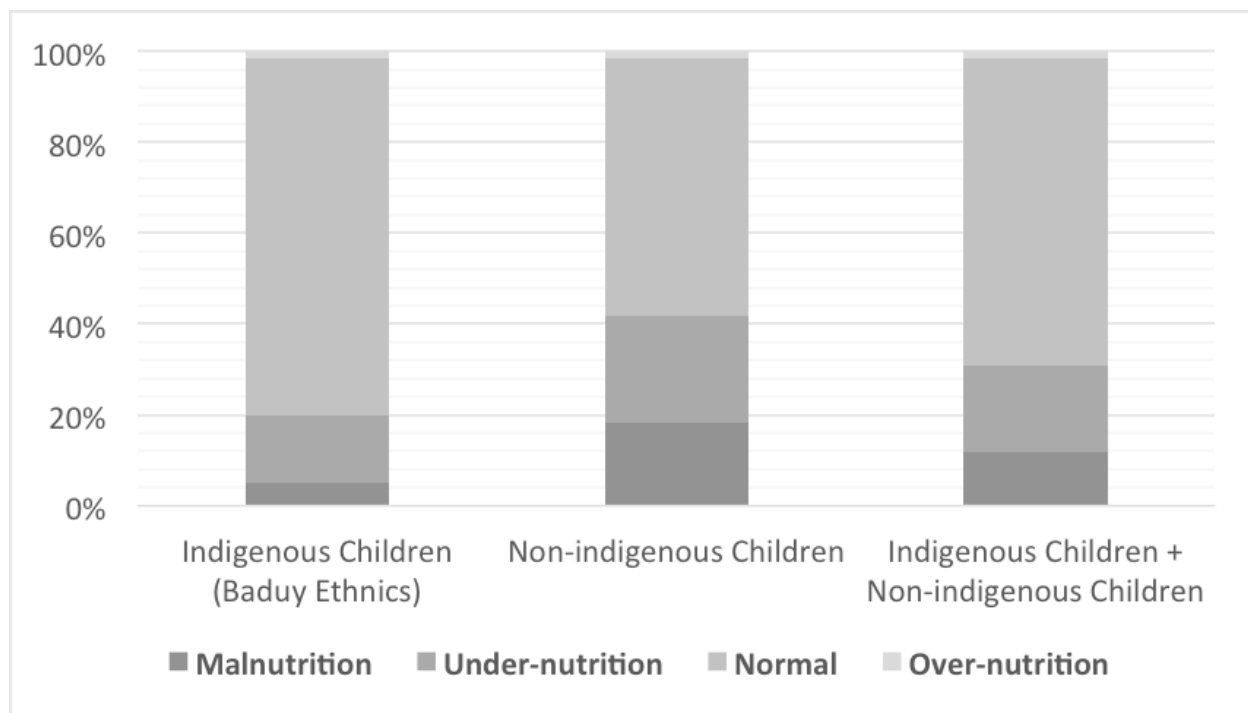
Table 1 is the characteristics of the respondents' socio-demographic condition. Univariate analysis results show the proportion of male children under five years by 40,9% and female children under five years by 59,1%. The proportion of the number of respondents with household members ≤ 4 individuals is 58,4%; 5-7 individuals is 39,1%; and > 7 individuals is 2,5%. Proportion of the number of respondents with household head occupation as farmers is 50,0%; merchants is 13,3%; civil servants is 3,3%; factory labors is 17,5%; drivers is 2,5%; unemployed is 1,7%; others is 11,7%.

Furthermore, characteristics based on household head education are household head who are uneducated or did not graduate elementary school is 50,0%; elementary school graduates is 9,2%; junior high school graduates is 15,8%; high school graduates are 21,7%, and university graduates are 3,3%. The proportion of households head age under 19 is 0,0%; 19-35 years old is 60,8%; and > 35 years old is 39,2%. Meanwhile the proportion of mother aged < 19 years old is 0,8%; 19-35 years old is 82,5%; and >35 years old is 16,6%. Last, the proportion of mother who is uneducated or did not graduate elementary school is 50,0%; elementary school graduates is 10,0%; junior high school graduates is 18,3%; senior high school graduates are 20,8%, and university graduates are 0,8%.

**Table 1: Socio-demographic characteristics of the respondents (n=120)**

Characteristics	Indigenous Children (Suku Baduy)		Non-indigenous Children		Total	
	n	%	N	%	N	%
<b>Children under five years sex:</b>						
Male	23	19.2	26	21.7	49	40.9
Female	37	30.8	34	28.3	71	59.1
<b>Number of family members:</b>						
≤ 4	41	34.2	29	24.2	70	58.4
5-7	19	15.8	28	23.3	47	39.1
> 7	0	0	3	2.5	3	2.5
<b>Work of the head of family:</b>						
Farmer	60	50	0	0	60	50.0
Merchants	0	0	16	13.3	16	13.3
Civil servants	0	0	4	3.3	4	3.3
Factory labours	0	0	21	17.5	21	17.5
Drivers	0	0	3	2.5	3	2.5
Unemployed	0	0	2	1.7	2	1.7
Others	0	0	14	11.7	14	11.7
<b>Education of the head of family:</b>						
Uneducated or did not graduated elementary school	60	50	0	0	60	50.0
Elementary school	0	0	11	9.2	11	9.2
Junior high school	0	0	19	15.8	19	15.8
Senior high school	0	0	26	21.7	26	21.7
University	0	0	4	3.3	4	3.3
<b>Age of the head of family (years):</b>						
< 19	0	0	0	0	0	0.0
19-35	48	40	25	20.8	73	60.8
> 35	12	10	35	29.2	47	39.2
<b>Age of mother (years):</b>						
< 19	0	0	1	0.8	1	0.8
19-35	56	46.7	43	35.8	99	82.5
> 35	4	3.3	16	13.3	20	16.6
<b>Education of mother:</b>						
Uneducated or did not graduated elementary school	60	50	0	0	60	50.0
Elementary school	0	0	12	10	12	10.0
Junior high school	0	0	22	18.3	22	18.3
Senior high school	0	0	25	20.8	25	20.8
University	0	0	1	0.8	1	0.8

**Figure 1: Nutritional status of children under five years among indigenous communities (n=60) and non-indigenous communities (n=60)**



The results of children under five years of nutritional status measurement shows that children under five years from indigenous communities have better nutritional status compared to children under five years from non-indigenous communities. The outcomes for indigenous communities are as follows: malnutrition by 5,0%; under-nutrition by 15,0%; normal by 78,3%; and over-nutrition by 1,7%. Meanwhile, the prevalence in non-indigenous communities for malnutrition is 18,3%; under-nutrition is 23,3%; normal is 56,7%; and over-nutrition is 1,7%. Total prevalence in both communities for malnutrition is 11,7%; under-nutrition is 19,2%; normal is 67,5%; and over-nutrition is 1,7%.

Table 2 shows the results of bivariate testing that indicates the relation between children under five years of nutritional status and determinant factors. The results show that there are five variables with significant correlation, namely, household head education level ( $P>0.001$ ), ethnicity ( $P=0.019$ ), household head occupation ( $P=0.019$ ), household head age ( $P=0.037$ ), and source of drinking water ( $P=0.019$ ).

Multivariate test results show two variables have a significant influence in children under five years of malnutrition, namely, household head education with OR=0.120 (95%CI: 0.021-0.675) and prenatal care in the fourth trimester with OR 9.890 (95%CI: 1.349-72.531) (Table 3).

**Table 2: Bivariate analysis of the nutritional status of children under five years in indigenous communities (n=60) and non-indigenous communities (n=60)**

Variable			Malnutrition*		Normal		P^
			n	%	n	%	
Socio-demographics	Community	Indigenous children	13	21.7	47	78.3	0.019
		Non-indigenous children	26	43.3	34	56.7	
	Children under five years sex	Male	15	30.6	34	69.4	0.866
		Female	24	33.8	47	66.2	
	Number of family members	≥ 5	18	36.0	32	64.0	0.621
		≤ 4	21	30.0	49	70.0	
	Work of the head of the family	Farmer	13	21.7	47	78.3	0.019
		Non-farmer	26	43.3	34	56.7	

	Education of the head of the family	Low education and uneducated	21	23.3	69	76.7	<0.001
		Middle and high education	18	60.0	12	40.0	
	Age of the head of family	< 19 & > 35	21	44.7	26	55.3	0.037
		19-35	18	24.7	55	75.3	
	Age of mother	< 19 & > 35	8	38.1	13	61.9	0.729
		19-35	31	31.3	68	68.7	
	Education of mother	Low education and uneducated	27	28.7	67	71.3	0.149
		Middle and high education	12	46.2	14	53.8	
Children under five years nutritional intakes	Exclusive breastfeeding	No	18	41.9	25	58.1	0.152
		Yes	21	27.3	56	72.7	
	Complementary feeding	No	35	31.5	76	68.5	0.470
		Yes	4	44.4	5	55.6	
	Vitamin A intakes	No	38	34.5	72	65.5	0.164
		Yes	1	10.0	9	90.0	
	Vegetables consumption	No	36	32.7	74	67.3	1.000
		Yes	3	30.0	7	70.0	
	Fruits consumption	No	32	31.1	71	68.9	0.586
		Yes	7	41.2	10	58.8	
Protein consumption	No	38	33.0	77	67.0	1.000	
	Yes	1	20.0	4	80.0		
Carbohydrate consumption	No	39	33.6	77	66.4	0.303	
	Yes	0	0.0	4	100.0		
Household access to health services	Complete immunization	No	4	40.0	6	60.0	0.726
		Yes	35	31.8	75	68.2	
	Prenatal care in first trimesters	No	6	46.2	7	53.8	0.348
		Yes	33	30.8	74	69.2	
	Prenatal care in second trimesters	No	8	47.1	9	52.9	0.270
		Yes	31	30.1	72	69.9	
	Prenatal care in third trimesters	No	6	50.0	6	50.0	0.201
		Yes	33	30.6	75	69.4	
Prenatal care in fourth trimesters	No	9	50.0	9	50.0	0.148	
	Yes	30	29.4	72	70.6		
Maternal iron intake	No	8	47.1	9	52.9	0.175	
	Yes	31	30.1	72	69.9		
Household environment condition	Childbirth assistant by doctor and midwife	No	11	24.4	34	75.6	0.208
		Yes	28	37.3	47	62.7	
	Drinking water quality	Bad	13	21.7	47	78.3	0.019
		Good	26	43.3	34	56.7	
	Sanitation quality	Bad	11	24.4	34	75.6	0.208
		Good	28	37.3	47	62.7	

\*Malnutrition is a combination of malnutrition, under-nutrition, and over-nutrition

^Significant at level  $P < 0.05$

**Table 3: Multivariate analysis of the nutritional status of children under five years in indigenous communities and non-indigenous communities (n=120)**

Variable	B	Wald	Sig.	OR	CI 95%	
					Lower	Upper
Community	-2.324	3.254	0.071	0.098	0.008	1.223
Education of the head of family	-2.123	5.783	0.016	0.120	0.021	0.675
Work of the head of family	-2.324	3.254	0.071	0.098	0.008	1.223
Age of the head of family	0.837	2.522	0.112	2.310	0.822	6.491
Education of mother	1.022	1.331	0.249	2.778	0.490	15.761
Exclusive breastfeeding	0.422	0.716	0.398	1.524	0.574	4.048
Vitamin A intakes	2.252	3.524	0.060	9.510	0.905	99.900
Prenatal care in third trimesters	0.862	0.660	0.416	2.368	0.296	18.952
Prenatal care in fourth trimesters	2.292	5.081	0.024	9.890	1.349	72.531
Maternal iron intake	-0.176	0.052	0.819	0.839	0.186	3.781
Childbirth assistant	0.108	0.020	0.888	1.114	0.247	5.031
Drinking water quality	-2.324	3.254	0.071	0.098	0.008	1.223
Sanitation quality	1.451	1.811	0.178	4.265	0.516	35.283

## DISCUSSION

The Government of Indonesia has included the program to resolve children under five years of malnutrition in The National Medium-term Development Program (RPJMN) 2020-2024, targeting the reduction of stunting numbers in children under five years from 30,8% to 19,0% and wasting from 10,2% to 7,0%. There are two prioritized agendas, that are (1) developing a nutrition and growth security system by providing nutritional intake guarantees since pregnancy, improving family parenting as well as clean water and environmental sanitation facilities; and (2) accelerating stunting reduction by increasing the effectiveness of specific interventions, expanding and sharpening integrated nutrition-sensitive intervention<sup>25</sup>.

It is understood that tackling the problem of malnutrition must be integrated and comprehensive in all communities, particularly those with a higher risk of experiencing malnutrition. This will be a challenge for the government for accurate data and information regarding determinant factors of children under five years of malnutrition in each community are needed, while studies in those issues are still limited. This especially applies to the indigenous community that tends to be marginalized in the national health service system in many countries<sup>26,27</sup>.

This research has resulted in several findings that are important to be discussed to find a solution for malnutrition in two communities, which are indigenous community and the non-indigenous community. First, we obtained different results from several studies in other countries regarding infant malnutrition problems in indigenous communities that conclude children from indigenous communities have a high risk of suffering from malnutrition. For instance, in Brazil, the First National Survey of Indigenous People's Health and Nutrition found 6% of the indigenous children are underweight and 26% are

stunted<sup>28,29</sup>. In Australia, about 10-14% of indigenous children suffer from under-nutrition<sup>30</sup>. In Peninsular Malaysia, 49% indigenous children are underweight and 64% are stunted<sup>31</sup>. In Peru, 49% indigenous children are found stunted, 20.4% underweight, and 4.0% wasting<sup>32</sup>. However, in this study, children under five years from *Suku Baduy* have better nutritional status compared to the ones from indigenous communities.

This finding becomes interesting because we witnessed the way of life and the source of good nutrition in the *Suku Baduy* tribe contribute greatly the community quality nutrition. The tribe's ability in preserving biodiversity makes local food rich in nutrients and abundant. The tribe is never short of food, which is different from non-indigenous communities that are vulnerable to food shortages. Therefore, maintaining the culture of preserving nature and developing local food production in *Suku Baduy* is one of the strategies to improve the community's nutritional status.

Second, there are two determinant factors causing children under five years of malnutrition in both communities in this study, namely, household head education level and antenatal care in the fourth trimester. The first factor always becomes the primary cause of malnutrition in several studies<sup>14,33</sup>. Education is key to parent's knowledge of balanced nutrition needed for children's growth and development<sup>34</sup>. The lack of knowledge in balanced nutrition will make parents serve their children with poor nutrition and bad diet<sup>35</sup>. The implication is infants will lack a good source of nutrition for their growth and development process.

The second factor is related to maternal health access. The key to children's growth and development depends on the first 1000 days of life and this starts from pregnancy<sup>36,37</sup>. Good nutritional intakes and routine check-ups during pregnancy are necessary. Prenatal care is important to examine fetal health condition and

to measure its growth and development<sup>38</sup>. In communities with minimal health access, pregnant women rarely see health workers for prenatal care<sup>39</sup>. As a result, there is a risk of low birth weight that results in malnutrition<sup>9,10</sup>. Thus, increasing maternal health access is key to resolve the problems of malnutrition.

## CONCLUSION

The results of this study can be a reference for the Government of Indonesia to design malnutrition improvement programs, especially in indigenous communities and urban communities. Where the program has become a priority agenda in the health sector in the next five years in Indonesia. Specifically, in the two communities that were the object of this study, it is necessary to increase community knowledge of balanced nutrition in infants and increase maternal health access to curb malnutrition problems in children under five years.

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