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Nutritional status and associated factors in under-five children in Lembar Village West Lombok, Indonesia

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ABSTRACT

Background and purpose: Studies on determinants of nutritional status in under-five children in Indonesia have been widely explored. However, most studies utilised only one out of three nutritional status indicators-weight/age, height/age, or weight/height. These studies also show inconsistent results. This present study aims to examine nutritional status in under-five children by using all three indicators and associated factors which include mother's characteristics, nutrition intake, and child's history of infectious diseases.

Methods: A cross-sectional study was conducted with a total sample of 100 under-five children who were randomly selected. Data on the mother's characteristics, nutrition intake, and child's history of infectious diseases were collected through structured interview with the mother, while data on nutritional status were obtained through measurements. Data were analysed using logistic regression to identify association between the nutritional status of under-five children with the mother's characteristics, nutrition intake, and child's history of infectious diseases.

Results: There was no association between the nutritional status of under-five children based on weight/age, height/age, and weight/height with the mother's characteristics and nutrition intake. However, there was an association between the nutritional status of under-five children and child's history of infectious diseases with an adjusted odd ratio (AOR)=41.0 (95% CI: 12.10-139.14) for weight/age, AOR=3.52 (95%CI: 1.53-8.05) for height/age, and AOR=10.69 (95%CI: 1.31-87.11) for weight/height.

Conclusions: Child's history of infectious diseases is the only determinant associated with nutritional status in under-five children based on weight/age, height/age, and weight/height. Prevention measures are required to prevent infection among children by improving environmental hygiene as well as providing prompt treatment for infectious diseases especially diarrhoea and upper-respiratory tract infection.

Keywords: Nutritional status, infectious diseases, nutrition intake, mother's characteristics

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INTRODUCTION

The Indonesia Basic Health Research (*Riskesdas*) 2013 showed that the prevalence of under-weight and stunting in under-five children were 19.6% and 37.2% respectively.[1] The prevalence of under-weight in under-five children in West Nusa Tenggara Province was 25.7%-ranked 9th out of 18 provinces that have higher malnutrition prevalence than the national average. Furthermore, the prevalence of stunting in under-five children was 45.3%-ranked 3rd out of 20 provinces.[1]

The prevalence of under-weight in under-five children using weight/age indicator in West Lombok is 15.98%. This figure is the second highest in West Nusa Tenggara Province.[2] Jempatan Lembar Public Health Centre reported that the highest proportion of malnutrition was found in South Lembar Village with total cases of 48 out of 217 under-five children (22.2%).[3]

Studies on nutritional status in under-five children and its determinants have been widely explored in Indonesia. However, these studies utilise only one out of three available indicators–weight/age, height/age, or weight/ height. These studies also show inconsistent results. A study in Tamamaung District, Makasar City, found a positive association between nutritional status in under-five children based on height/age and weight/ height with energy intake, but there was no association with protein intake.[4] In contrast, a study in Semarang City using the same indicators found a positive correlation between nutritional status in under-five children and protein intake, but there was no association with energy intake.[5] Another study in Kendari, South Sulawesi, found an association between nutritional status in under-five children based on weight/age indicator with a history of contracting infectious diseases.[6] Other study exploring the Indonesia Basic Health Research (*Riskesdas*) 2007 data found an association between nutritional status in under-five children using weight/age, height/age, and weight/height indicators with diarrhoea. It also found an association between nutritional status in

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under-five children using weight/age and height/age indicators with upper-respiratory infection.[7]

This present study aims to examine nutritional status in under-five children using weight/age, height/age, and weight/height indicators and its association with the mother's characteristics, nutrition intake, and child's history of infectious diseases.

METHODS

A cross-sectional study was conducted in South Lembar Village, Lembar Sub-District, West Lombok District, West Nusa Tenggara Province. One hundred samples were recruited from all under-five children in South Lembar Village using systematic random sampling. Data on the mother's characteristics, nutrition intake, and child's history of infectious diseases were collected through a structured interview. Data on the nutritional status were obtained through direct measurements of weight and height. Interview and measurements were conducted in the respondent's house by the researcher and trained enumerators. Written informed consent was obtained before the interview and measurement. Anthropometry method was used to determine the nutritional status of under-five children based on indicators of weight/age, height/age, and weight/height. A digital weigher (*Camry*) was utilised to measure the weight of under-five children and a microtoise to measure the height. Age of the children was verified by comparing data obtained from interview and the growth chart card (KMS/*Kartu Menuju Sehat*). The under-five children were categorised as a stunted, under-weight, and thin child if indicators of height/age, weight/age, and weight/height with a Z-score <-2SD. Data were analysed using STATA SE 12.1. Logistic regression was applied to examine the association between the nutritional status of under-five children with the mother's characteristics, nutrient intake, and child's history of infectious diseases. The study has obtained the ethical clearance from the Human Research Ethics Committee, Faculty of Medicine Mataram University.

RESULTS

Table 1 shows the distribution frequency of nutritional status, age, and gender of children, mother's characteristics (age, education, employment, income, parity, birth spacing, number of under-five children in the family, marital status, knowledge level, exclusive breastfeeding status), child's history of infectious diseases, access to healthcare facilities, environmental sanitation, and nutrient intake (energy, protein, fat, and carbohydrate). The average age of the children is 32.42 months (SD=12.9) with more males than females. The proportion of stunting (48%) is higher than underweight (46%) and thin child (11%). The average age of the mother is 28.85 years (SD=6.1). The majority of the mother are married, junior high school graduates, housewives, with income of IDR 600,000/month and above, parity of less than 3, a birth spacing period with the previous child of≥24 months, and the number of under-five children in the family ≤2. The majority of mothers have a good knowledge regarding nutritional intake, utilise healthcare facilities and have adequate environmental sanitation. As many as 94% of respondents reported to exclusively breastfed their children. The proportion of children reported by their mother to have diarrhoea and upper respiratory tract infection within the last three months is 53%. Using a 24 hours food recall, it was found that as many as 66% and 58% of our children consume less energy and carbohydrate than the recommended amount. The level of environmental sanitation was determined by measuring the distance between animal farm and the house and water source. The majority of respondents use a pipe water source and have an animal farm about 30 metres away from their house.

Multivariate analysis was employed using logistic regression to examine the association between the nutritional status in under-five children with several independent variables. All independent variables with p value <0.25 in the bivariate analysis were included in the multivariate analysis. Table 2 shows an association between under-weight children (weight/age) and a history of contracting diarrhoea or upper respiratory tract infections with AOR=41.0 (95%CI: 12.10-139.14). Similarly, Table 3 and 4 show an association between nutritional status based on height/age and weight/height with a history of contracting diarrhoea or upper respiratory tract infections with AOR=3.52 (95%CI: 1.53-8.05) and 10.69 (95%CI: 1.31-87.11).

DISCUSSION

Our study shows as many as 46% and 48% of under-five children are underweight and stunted. Our study also shows as many as 11% of under-five children is thin (weight/height). This finding is higher than the provincial average of 25.7% for underweight children.[1] Relatively the same prevalence for stunting was found when compared to the provincial average (45.3%).[1] Stunting was defined based on height/age without taking into account the weight variable. Our study found a higher proportion of thin children (11%) when compared to the provincial average (6.7%).[1] It was suspected that the different proportions of underweight and

Table 1 Characteristics of respondents and their children, nutrient intake, child's history of infectious diseases and nutritional status of under-five children

Variables	n	%
Age (month), mean ±SD	32.42 ± 12.9	
Gender		
Male	55	55.0
Female	45	45.0
Weight/age		
Normoweight	54	54.0
Underweight	46	46.0
Height/age		
Normal	52	52.0
Stunted	48	48.0
Weight/height		
Normal	89	89.0
Thin child	11	11.0
Age (mother, year), mean±SD	28.85±6.1	
Marital status		
Married	93	93.0
Divorced	7	7.0
Education		
Above junior high school	26	26.0
Junior high school and below	74	74.0
Employment		
Employed	14	14.0
Housewives	86	86.0
Income		
≥IDR. 600,000,-	76	76.0
<IDR 600,000,-	24	24.0
Parity		
<3	76	76.0
≥3	24	24.0
Birth spacing		
≥24 months	97	97.0
<24 months	3	3.0
Number of under-five children in the family		
≤2	98	98.0
>2	2	2.0
Knowledge		
Good	89	89.0
Poor	11	11.0

thin children between our study and the provincial average from The Indonesia Basic Health Research are due to the different tools used to measure body weight. Digital weight scale of *Camry* without calibration was used in this study while the Indonesia Basic Health Research used digital weight scale of *Fesco* with daily calibration.

An association was only found between nutritional status in under-five children using indicators of weight/age, height/age, and weight/height with a history of contracting diarrhoea and upper respiratory infections. Our finding is consistent with other study exploring the 2007 Indonesia Basic Health Research data which also found an association between nutritional status in under-five children (weight/age and height/age) with upper respiratory infections.[7] A study in Padang found a significant correlation (p=0.001) between nutritional status in under-five children and pneumonia.[8] However, a study in Lolayan Subdistrict, Bolaang Mongondow District, Manado found no significant association between nutritional status in under-five children based on indicators of weight/age, height/age, and weight/height with infectious diseases (upper respiratory infection, diarrhoea, or pneumonia).[9]

Our study shows no significant association between nutritional status in under-five children with nutrient intake. This finding is consistent with another study in Tamamaung Village, Makasar City which found no correlation between nutritional status in under-five children (height/age) with protein intake. It also found no association between nutritional status (weight/height) among under-five children with energy and protein intakes.[4] A study in Menduran Grobogan Village, Semarang City also found no association between nutritional status in under-five children (height/age and weight/height) with energy intake. However, they found an association between nutritional status among under-five children (weight/height) with protein intake.[5]

A study in Nyogan, Muaro District, Jambi Province found an association between nutritional status in under-five children (weight/age, height/age, and weight/height) with energy and protein intakes ($p<0.05$).[10] This study used a food recall 24 hours for consecuted three days to measure nutrient intake.[10] In our study, though we also used a food recall 24 hours to measure nutrient intake, we only recorded it for one day.

Our study found no association between nutritional status among under-five children with the mother's characteristics (age, education

Table 1 Characteristics of respondents and their children, nutrient intake, child's history of infectious diseases and nutritional status of under-five children

Variables	n	%
Access to healthcare		
Yes	86	86.0
No	14	14.0
Environmental sanitation		
Good	65	65.0
Poor	35	35.0
Exclusive breastfeeding		
Yes	94	94.0
No	6	6.0
History of infectious diseases		
No	47	47.0
Yes	53	53.0
Nutrient intake		
Good	34	34.0
Poor	66	66.0
Protein intake		
Good	76	76.0
Poor	24	24.0
Fat intake		
Good	94	94.0
Poor	6	6.0
Carbohydrate intake		
Good	42	42.0
Poor	58	58.0
Total	100	100.00

Table 2 Association between the nutritional status of under-five children (weight/age) with mother's characteristics, nutrient intake, and child's history of infectious diseases

	Bivariate			Multivariate	
Variables	Normoweight n (%)	Underweight n (%)	p value	AOR	95%CI
Age (mother)					
>35 years	5(38.5)	8(61.5)	0.228	0.71	0.13-3.90
≤35 years	49(56.3)	38(43.7)			
Education					
Above junior high school	16(61.5)	10(38.5)	0.370		
Junior high school and below	38(51.3)	36(48.7)			
Employment					
Employed	6(42.9)	8 (57.1)	0.367		
Housewives	48(55.8)	38(44.2)			
Income					
≥IDR 600,000,-	42(55.3)	34(44.7)	0.652		
<IDR 600,000,-	12(50.0)	12(50.0)			

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Table 2 Association between the nutritional status of under-five children (weight/age) with mother's characteristics, nutrient intake, and child's history of infectious diseases

	Bivariate			Multivariate	
Variables	Normoweight n (%)	Underweight n (%)	p value	AOR	95%CI
Parity					
<3	39(51.3)	37(48.7)	0.338		
≥3	15(62.5)	9 (37.5)			
Birth spacing					
≥24 months	52(53.6)	45(46.4)	0.655		
<24 months	2(66.7)	1(33.3)			
Number of under-five children					
≤2	53(54.1)	45(45.9)	0.909		
>2	1(50.0)	1(50.0)			
Marital status					
Married	49(52.7)	44(47.3)	0.337		
Divorced	5(71.4)	2(28.6)			
Knowledge					
Good	50(56.2)	39(43.8)	0.213	2.57	0.38 - 17.06
Poor	4(36.4)	7(63.6)			
Exclusive breastfeeding					
Yes	52(55.3)	42(44.7)	0.295	41.0	12.10-139.14
No	2(33.3)	4(66.7)			
History of infectious diseases					
No	43(91.5)	4(8.5)	0.000		
Yes	11(20.8)	42(79.2)			
Access to healthcare					
Yes	46(53.5)	40(46.5)	0.799		
No	8 (57.1)	6 (42.9)			
Environmental sanitation					
Good	35(53.9)	30(46.1)	0.966		
Poor	19(54.3)	16(45.7)			
Energy intake					
Good	20(58.8)	14(41.2)	0.487		
Poor	34(51.5)	32(48.5)			
Protein intake					
Good	42(55.3)	34(44.7)	0.652		
Poor	12(50.0)	12(50.0)			
Fat intake					
Good	51(54.3)	43(42.7)	0.839		
Poor	3(50.0)	3(50.0)			
Carbohydrate intake					
Good	20(47.6)	22(53.4)	0.276		
Poor	34(58.6)	24(41.4)			

Table 3 Association between the nutritional status of under-five children (height/age) with mother's characteristics, nutrient intake, and child's history of infectious diseases

	Bivariate			Multivariate	
Variables	Normal n (%)	Stunted n (%)	p value	AOR	95%CI
Age (mother)					
>35 years	5 (38.5)	8 (61.5)	0.295		
≤35 years	47(54.0)	40(46.0)			
Education					
Above junior high school	15(57.7)	11(42.3)	0.499	0.48	0.13-1.67
Junior high school and below	37(50.0)	37(50.0)			
Employment					
Employed	5(35.7)	9 (64.3)	0.188		
Housewives	47(54.6)	39(45.4)			
Income					
≥IDR 600,000,-	40(52.6)	36(47.4)	0.822		
<IDR 600,000,-	12(50.0)	12 (50.0)			
Parity					
<3	41(54.0)	35(46.0)	0.488		
≥3	11(45.9)	13(54.1)			
Birth spacing					
≥24 months	51(52.6)	46(47.4)	0.511		
<24 months	1(33.3)	2(66.7)			
Number of under-five children					
≤2	51(52.0)	47(48.0)	0.954		
>2	1(50.0)	1(50.0)			
Marital status					
Married	46(49.5)	47(50.5)	0.064	0.21	0.02-1.99
Divorced	6(85.7)	1 (14.3)			
Knowledge					
Good	45(50.6)	44(49.4)	0.413		
Poor	7 (63.6)	4 (36.4)			
Exclusive breastfeeding					
Yes	51(54.3)	43(45.7)	0.074	5.66	0.59-53.76
No	1 (16.7)	5 (83.3)			
History of infectious diseases					
No	32(68.1)	15(31.9)	0.002	3.52	1.53-8.05
Yes	20(37.7)	33(62.3)			
Access to healthcare					
Yes	43(50.0)	43(50.0)	0.321		
No	9 (64.3)	5 (35.7)			
Environmental sanitation					
Good	34(52.3)	31(47.7)	0.933		
Poor	18(51.4)	17(48.6)			

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Table 3 Association between the nutritional status of under-five children (height/age) with mother's characteristics, nutrient intake, and child's history of infectious diseases

	Bivariate			Multivariate	
Variables	Normal n (%)	Stunted n (%)	p value	AOR	95%CI
Energy intake					
Good	15(44.1)	19(55.9)	0.257		
Poor	37(56.1)	29(43.9)			
Protein intake					
Good	39(51.3)	37(48.7)	0.807		
Poor	13(54.2)	11(45.8)			
Fat intake					
Good	48(51.1)	46(48.9)	0.458		
Poor	4(66.7)	2(33.3)			
Carbohydrate intake					
Good	19(45.2)	23(54.8)	0.249	0.70	0.28-1.70
Poor	33(56.9)	25(43.1)			

Table 4 Association between the nutritional status of under-five children (weight/height) with mother's characteristics, nutrient intake, and child's history of infectious diseases

	Bivariate			Multivariate	
Variables	Normal n (%)	Thin n (%)	p value	AOR	95%CI
Age (mother)					
>35 years	10(76.9)	3(23.1)	0.136	0.82	0.13-5.17
≤35 years	79(90.8)	8(9.2)			
Education					
Above junior high school	26(100.0)	0(0.0)	0.037		
Junior high school and below	63(85.1)	11(14.9)			
Employment					
Employed	13(92.9)	1(7.1)	0.619		
Housewives	76(88.4)	10(11.6)			
Income					
≥IDR 600,000,-	67(88.2)	9 (11.8)	0.632		
<IDR 600,000,-	22(91.7)	2 (8.3)			
Parity					
<3	69(90.8)	7(9.2)	0.309		
≥3	20(83.3)	4(16.7)			
Birth spacing					
≥24 months	87(89.7)	10(10.3)	0.209	0.23	0.04-1.17
<24 months	2(66.7)	1(33.3)			
Number of under-five children					
≤2	87(88.8)	11 (11.2)	0.616		
>2	2(100.0)	0(00.0)			

Table 4 Association between the nutritional status of under-five children (weight/height) with mother's characteristics, nutrient intake, and child's history of infectious diseases

	Bivariate			Multivariate	
Variables	Normal n (%)	Thin n (%)	p value	AOR	95%CI
Marital status					
Married	83(89.2)	10(10.8)	0.773		
Divorced	6(85.7)	1(14.3)			
Knowledge					
Good	81(91.0)	8(9.0)	0.067	5.13	0.86-30.49
Poor	8(72.7)	3(27.3)			
Exclusive breastfeeding					
Yes	83(88.3)	11(11.7)	0.374		
No	6(100.0)	0(00.0)			
History of infectious diseases					
No	46(97.9)	1(2.1)	0.008	10.69	1.31-87.11
Yes	43(81.1)	10(18.9)			
Access to healthcare					
Yes	76(88.4)	10(11.6)	0.619		
No	13(92.9)	1(7.1)			
Environmental sanitation					
Good	56(86.1)	9(13.9)	0.215	0.35	0.06-1.93
poor	33(94.3)	2(5.7)			
Energy intake					
Good	32(94.1)	2(5.9)	0.240	1.40	0.24-8.02
Poor	57(86.4)	9(13.6)			
Protein intake					
Good	69(92.0)	6(8.0)	0.097		
Poor	20(80.0)	5(20.0)			
Fat intake					
Good	84(89.4)	10(10.6)	0.674		
Poor	5(83.3)	1(16.7)			
Carbohydrate intake					
Good	38(90.5)	4(9.5)	0.688		
Poor	51(87.9)	7(12.1)			

level, employment, income, parity, birth spacing, and number of under-five children in the family). Our finding is consistent with other studies in Ajung Sub-district, Jember District[11] and Kao Sub-district North Halmahera District.[12] These studies found no significant correlation between nutritional status in under-five children and the number of under-five children in the family. Furthermore, secondary analysis of the 2007 and 2013 Indonesia Basic Health Research for Lebak District and Tangerang City revealed that there is no significant association between nutritional status in under-five children (weight/age, height/age, and weight/height) with the employment of their parent.[13] Another study in Manado also found no correlation between nutritional status among under-five children with the mother's characteristics (age and employment). However it showed an association between education level and parity.[14] In North Halmahera, the nutritional

status of under-five children is associated with birth spacing.[12]

To reduce the prevalence of underweight, stunting, and thin child among under-five children, prevention measures especially improving environment sanitation and prompt treatment for any infectious diseases should be enhanced. The main limitations of our study include the uncalibrated weight scale and using the food recall 24 hours only for one day. In addition, we only cover the limited area in West Nusa Tenggara Province leading to the limited generalizability of our findings to the wider population.

CONCLUSION

The nutritional status of under-five children based on weight/age, height/age, and weight/height indicators is associated with diarrhoea and upper respiratory infections, but there is no significant association with nutrient intake and the mother's characteristics.

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